United States Department of Agriculture

# Tahoe National Forest Over-Snow Vehicle Use Designation

## Draft Environmental Impact Statement

## Volume I. Chapters 1 through 4 and References

Forest Service | Tahoe National Forest | R5-MB-314 | April 2018

# Over-snow Vehicle Use Designation

## Draft Environmental Impact Statement

## Tahoe National Forest

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**Abstract**: The Forest Service proposes to designate snow trails and areas for public over-snow vehicle (OSV) use on the Tahoe National Forest. These designations would occur on National Forest System snow trails and areas on National Forest System lands within the Tahoe National Forest. The Forest Service would also identify snow trails where grooming for public OSV use would occur within the Tahoe National Forest. An amendment to the *Tahoe National Forest Land and Resource Management Plan* (LRMP 1990) is needed contemporaneously with the approval of a decision regarding public OSV use to: (1) appropriately place planning, analysis, and decision-making for OSV use at the project level and (2) ensure this Project is consistent with the LRMP as amended (36 CFR 219.15(c)(4)).

Consistent with the Forest Service's Travel Management Regulations at 36 CFR Part 212 Subpart C, trails and areas designated for public over-snow vehicle use would be displayed on a publicly available over-snow vehicle use map (OSVUM). Public OSV use that is inconsistent with the OSVUM would be prohibited under Federal regulations at 36 CFR §261.14.

This draft environmental impact statement (DEIS) compares environmental effects of implementing five alternatives, including (1) no action-continuation of current management; (2) the Proposed Action, as modified; and three other action alternatives developed in response to issues, and discloses their environmental impacts.

A Notice of Intent to prepare an environmental impact statement (EIS) was published in the Federal Register on February 23, 2015. We prepared this draft EIS using public comments received during the scoping period, multiple interdisciplinary team discussions, and coordination with project stakeholders, literature review, and resource analyses.

We encourage your review of this document. It is important that reviewers provide their comments at such times and in such a way that they are useful to the Forest Service's preparation of the final EIS. Therefore, comments should be provided prior to the close of the comment period and should clearly articulate the reviewer's concerns and contentions. Comments must be received by the Forest Service or postmarked by the Postal Service within 45 days from the date of the Notice of Availability in the Federal Register. Failing to submit timely and specific comments can affect a reviewer's ability to participate in subsequent administrative review or judicial review. Comments received in response to this solicitation, including names and addresses of those who comment, will be part of the public record for this proposed action. Comments submitted anonymously will be accepted and considered; however, anonymous comments will not provide the respondent with standing to participate in subsequent administrative review or judicial review.

Once the final EIS is prepared, it and the associated draft decision document (Record of Decision) are subject to the pre-decisional administrative review process (objection process) pursuant to 36 CFR 218, subparts A and B. Objections will only be accepted from those who have previously submitted specific written comments regarding this proposed project during scoping or other designated opportunity for public comment in accordance with 36 CFR 218.5(a) and 219.53. Issues raised in objections must be based on previously submitted, timely, specific written comments regarding this proposed project unless based on new information arising after the designated comment opportunities.

Send comments to: Joe Chavez, on behalf of Eli Ilano, Forest Supervisor, Tahoe National Forest, 631 Coyote Street, Nevada City, CA 95959; (530) 478-6158. Comments may also be sent via facsimile to 530-478-6109, submitted on the project website at http://www.fs.fed.us/nepa/nepa_project_exp.php?project=45914, or sent via email to tahoe_nf_comments@fs.fed.us, with the email's subject line, "Comments on Tahoe OSV Designation." The publication date of the Notice of Availability in the Federal Register is the exclusive means for calculating the time to submit written comments on a proposed project or activity that is analyzed and documented in a draft EIS (36 CFR 218.24(c)(2)).

# Summary of the Draft Environmental Impact Statement

## Purpose and Need

One purpose of this Project is to establish designated areas and trails for OSV use on the Tahoe National Forest to: provide access, ensure that public OSV use occurs when there is adequate snow, promote the safety of all users, enhance public enjoyment, minimize impacts to natural and cultural resources, and minimize conflicts among the various uses of National Forest System lands.

There is a need to provide a manageable, designated OSV system of trails and areas within the Tahoe National Forest that is consistent with, and achieves the purposes of, the Forest Service Travel Management Rule at 36 CFR Part 212. This action responds to this need.

The *Tahoe National Forest Land and Resource Management Plan* (LRMP 1990) contains management area-specific standards and guidelines pertaining to public OSV use. The existing system of OSV trails and areas on the Tahoe National Forest is based on the LRMP's standards and guidelines. Proposed changes to the existing system of OSV trails and areas have been identified, based on internal and public input and the Travel Management Rule's criteria for designating roads, trails, and areas at 36 CFR 212.55. These changes would address needs for protecting natural resources, improving access for OSV users, improving quiet winter recreation opportunities, and ensuring consistency with LRMP management direction. Travel management decisions (including designating OSV areas and trails) under the 2012 Forest Service Planning Rule (36 CFR 219) are not forest plan decisions, but rather project-level decisions that require site-specific planning, public involvement, environmental analysis, and decision making (36 CFR 219.2(b)(1) and (2); Forest Service Handbook (FSH) 1909.12, Section 23.23a). An amendment to the *Tahoe National Forest Land and Resource Management Plan* (LRMP 1990) is needed contemporaneously with the approval of a decision regarding public OSV use to: (1) appropriately place planning, analysis, and decision-making for OSV use at the project level and (2) ensure this Project is consistent with the LRMP as amended (36 CFR 219.15(c)(4)).

A second purpose of this project is to comply with the Settlement Agreement between the Forest Service and Snowlands Network et al., by identifying those designated National Forest System snow trails where grooming for public OSV use would occur and analyzing the effects of the grooming program. Under the terms of the Settlement Agreement, the Forest Service is required to complete the appropriate NEPA analysis to identify snow trails available for grooming on the Tahoe National Forest.

This action identifies snow trails available for grooming and addresses the need to provide a high quality OSV trail system on the Tahoe National Forest that is smooth and stable for the rider and designed so the novice rider can use these trails without difficulty.

## Modified Proposed Action

The proposed action has been modified based on public comments received during the scoping period, and multiple interdisciplinary team discussions. These modifications are described in chapter 2 of this analysis. Figure 3, located in the map package, displays a map of the proposed action.

The Forest Service proposes to designate areas and trails on National Forest System (NFS) land for public over-snow vehicle (OSV) use. These designations would be consistent with the requirements of Subpart C of the Forest Service's Travel Management Regulation at 36 Code of Federal

Regulations (CFR) Part 212. The Forest Service would also designate trails to be groomed for public OSV use under the Tahoe National Forest OSV trail grooming program.

The Forest Service proposes the following actions on the Tahoe National Forest:

- Approximately 406,895 acres of National Forest System lands are designated for public cross-country OSV use, generally above 5,000 feet elevation. OSV use designations for the affected management areas in the existing Forest Plan (Appendix B) would be amended to accommodate the proposed OSV use designation changes under alternative 2.
- Public OSV use would not be designated in a 1-acre area near Robinson Flat to protect historic structures.
- Individual parcels of National Forest System lands currently under long-term special use permits for Royal Gorge Cross Country Ski Area, Tahoe Donner Cross Country Ski Area, Boreal Ski Area, Donner Ski Ranch Ski Area, Sugar Bowl Ski Area, Alpine Meadows Ski Area and Squaw Valley Ski Area would not be designated for public OSV use.
- Implement forestwide snow depth requirements for public OSV use by:
    - ♦ Allowing public, cross-country OSV use in designated OSV areas only when there is adequate snow depth to avoid damage to natural and cultural resources. To avoid damaging resources, a minimum of 12 inches of un-compacted snow is typically needed. On designated OSV trails with underlying roads, a minimum of 6 inches is typically needed to avoid damage to the underlying road surface; and
    - ♦ Follow California State Parks' Off-Highway Motor Vehicle Recreation Division snow depth standards for grooming, currently 12 to 18 inches of snow.
- Class 1 OSVs are allowed on all designated OSV trails and areas. Class 2 OSVs are only allowed on designated OSV trails available for grooming. Class of vehicle definitions can be found on page 2.
- Approximately 237 miles of designated OSV trails are available for grooming. Approximately 18 miles of marked, ungroomed trails are located within areas designated for cross-country OSV use. Approximately 70 miles of designated OSV trails are not available for grooming.
- There would be 22 designated OSV crossings of the Pacific Crest National Scenic Trail (PCT). In all cases, OSVs crossing the PCT would do so at 90 degrees to minimize the time and distance needed to cross the Trail. The 22 designated OSV crossings of the PCT would be as follows:
    - Thirteen designated crossings would utilize roads identified on the Tahoe National Forest's Motor Vehicle Use Map and would be the width of the road (approximately 14 feet). In one instance, the current alignment of the PCT overlays the Pass Creek Loop OSV Trail on Forest Service Road 70 for approximately 700 feet.
    - Nine proposed OSV crossings of the PCT would range in width up to 0.25 miles. These crossings are located in areas where OSV use is designated on either side of the PCT. OSV users would need a way to get across the Trail as OSV use along the PCT is prohibited by the National System Trails System Act, P.L 90-543, Section 7(c). Some of these proposed OSV crossings are wider than the width of a road because they are located in areas where snow conditions are highly variable during the course of a winter, for example areas prone to wind loading of snow and

formation of cornices. These wider crossings give OSV users options to select a safe crossing of the Trail under constantly changing, variable snow loading conditions.

## Significant Issues

Internal and external scoping identified the following significant issues and these issues were used to develop the action alternatives. The significant issues include the following:

**Table S-1. Significant issues**

| Issue Topic | Cause and Effect |
|---|---|
| Quality Recreational Experience | Public OSV use and grooming for public OSV use could impact the overall quality of the experience of recreationists seeking a quieter, non-motorized experience.<br>Designating areas and trails for OSV use has the potential to change recreation settings and opportunities by enhancing opportunities for motorized winter users in some areas and limiting those opportunities in other areas. |
| Noise | OSV use and grooming OSV trails could generate anthropogenic noise and increase noise levels in the short term above ambient levels. This may adversely impact wildlife species that are sensitive to this sort of disturbance, as well as the experience of the recreational user who values solitude and quiet recreational opportunities. |
| Air Quality | OSV use and grooming OSV trails may add exhaust and pollutants to the air. This could degrade the quality of the air and possibly impact recreational users, wildlife, and sensitive areas. |
| Water and Soil Resources | OSV use may result in ground disturbance and snow compaction, and this could directly, indirectly and/or cumulatively adversely impact soil and water resources through soil compaction, erosion, and displacement. |
| Terrestrial Wildlife | OSV use and grooming trails for public OSV usemay directly, indirectly, and cumulatively impact terrestrial wildlife through injury, mortality, or disturbance to individuals (e.g., increased noise and human presence resulting in a loss of breeding and/or feeding) and indirect and/or cumulative impacts to wildlife habitats (e.g., snow compaction in or near denning sites).<br>OSVs, when operating cross-country instead of on designated trails, could affect wildlife species by compacting snow in areas of inadequate snow cover and disturbing subnivean (i.e., the zone in and under the snow) habitat for small mammals. |
| Aquatic Wildlife | Public OSV use and grooming for public OSV use could impact fish and amphibian populations and habitat in the project area through: (1) direct disturbance to species when OSV use occurs in wet meadows, streams, lakes, and/or other sensitive habitats; (2) indirectly through generation of exhaust and associated pollutants in or near sensitive habitat, which can degrade water quality; (3) indirectly through release of fuel or other pollutants during refueling and proximity to sensitive habitats, which can degrade water quality; and (4) indirectly through increased soil erosion in marginal snow depth areas. |

## Alternatives Considered in Detail

The Tahoe National Forest developed five alternatives: No Action, the Modified Proposed Action, and three additional action alternatives generated in response to the significant issues listed above. The five alternatives considered in detail for this analysis are listed in table S-2. Complete details of the alternatives are found in chapter 2 of this document. Mitigations and monitoring procedures are in Appendix E (Mitigations for Designated Areas), F (Mitigations for Designated Trails), and G (General Monitoring Procedures), respectively.

**Table S-2. Summary of alternatives considered in detail**

| Alternative | Description of Alternative |
|---|---|
| 1 | Continue Current Management<br>• 636,002 acres of NFS lands are designated for cross-country OSV use<br>• 265 miles of trails for OSV use<br>  o 217 miles of designated trails are available for grooming for OSV use<br>  o 41 miles of trails marked, ungroomed for OSV use within OSV Use Areas<br>  o 7 miles of designated OSV trails are not available for grooming<br>• 1,218 acres of NFS land designated for OSV use from January 1 through September 14<br>• No designated crossings on the PCT<br>• No established minimum snow depth for public OSV cross-country or trail use |
| 2 | Modified Proposed Action<br>• 406,895 acres of NFS lands are designated for OSV use, generally above 5,000 feet elevation<br>• 325 miles of trails for OSV use<br>  o 237 miles of designated trails are available for grooming for OSV use<br>  o 14 miles of trails marked, ungroomed for OSV use within OSV Use Areas<br>  o 70 miles of designated trails not available for grooming<br>• 22 designated crossings on the PCT<br>• Adequate snow depth to prevent impacts to surface and subsurface resources (generally 12 inches for public OSV cross-country use and 6 inches for trail use)<br>• Follow OHMVR snow depth for grooming, currently 12 to 18 inches of snow |
| 3 | Addresses non-motorized quality recreational experience<br>• 275,972 acres of NFS lands are designated for cross-country OSV use<br>• 280 miles of trails for OSV use<br>  o 217 miles of designated trails are available for grooming for OSV use<br>  o 38 miles of trails marked, ungroomed for OSV use within OSV Use Areas<br>  o 25 miles of designated trails not available for grooming<br>• 1,408 acres of NFS land designated for OSV use from January 1 through September 14<br>• 3 designated crossings on the PCT<br>• Minimum snow depth of 18 inches for public OSV cross-country use and 18 inches for trail use<br>• Groom designated OSV trails when there are 18 inches or more of snow. |
| 4 | Addresses motorized quality recreational experience<br>• 641,105 acres of NFS lands are designated for cross-country OSV use<br>• 287 miles of trails for OSV use<br>  o 260 miles of designated trails are available for grooming for OSV use<br>  o 22 miles of trails marked, ungroomed for OSV use within OSV Use Areas<br>  o 5 miles of designated trails not available for grooming<br>• 1,218 acres of NFS land designated for OSV use from January 1 through September 14<br>• 21 designated crossings on the PCT<br>• Minimum snow depth of 12 inches for public OSV cross-country use and 6 inches for trail use<br>• Groom designated OSV trails when there are 12 inches or more of snow. |

| Alternative | Description of Alternative |
|---|---|
| 5 | Emphasizes protections for wildlife/natural resources and non-motorized opportunities<br>• 300,146 acres of NFS land open to cross-country OSV use<br>• 257 miles of trails for OSV use<br>  o 215 miles of designated trails are available for grooming for OSV use<br>  o 25 miles of trails marked, ungroomed for OSV use within OSV Use Areas<br>  o 17 miles of designated trails not available for grooming<br>• OSV use would be limited to designated OSV trails within 1 mile of existing OSV trailheads.<br>• OSV use would not be designated in areas within the USFS Scenery Management System definition of Foreground for the Pacific Crest Trail.<br>• 10 designated crossings on the PCT<br>• Minimum snow depth of 24 inches for public OSV cross-country use and 24 inches for trail use<br>• Follow OHMVR snow depth for grooming, currently 12 to 18 inches of snow |

# Summary of Environmental Impacts

**Table S-3 Summary of environmental effects**

| Indicators by Resource | Measures | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| **Recreation Motorized Opportunities – cross-country** | | | | | | |
| **Indicator**: Opportunities for motorized winter uses | Size of areas (acres) designated for OSV use; percent change from current management | 638,002 acres designated for OSV use | 406,895 acres designated for OSV use, a 36 percent decrease from current management | 275,972 acres designated for OSV use, a 57 percent decrease from current management | 641,105 acres designated for OSV use, a 0.5 percent increase from current management | 300,146 acres designated for OSV use, a 53 percent decrease from current management |
| **Indicator:** Quality of OSV opportunities | Percent of acres designated for OSV use in high to moderate assumption category | 33 percent of acres designated for OSV use provide high quality OSV opportunities, approximately 212,857 acres | 47 percent of acres designated for OSV use provide high quality OSV opportunities, approximately 191,311 acres | 58 percent of acres designated for OSV use provide high quality OSV opportunities, approximately 161,919 acres | 33 percent of acres designated for OSV use provide high quality OSV opportunities, approximately 212,873 acres | 48 percent of acres designated for OSV use provide high quality OSV opportunities, approximately 145,420 acres |
| **Recreation Motorized Opportunities – designated snow trails available for grooming and ungroomed** | | | | | | |
| **Indicator**: OSV trail designations | Length (miles) of designated OSV trails available for grooming/Length (miles) of marked snow trails (ungroomed) | 217 miles available for grooming<br>41 miles marked, ungroomed | 237 miles available for grooming<br>14 miles marked, ungroomed | 217 miles available for grooming<br>38 miles marked, ungroomed | 259 miles available for grooming<br>22 miles marked, ungroomed | 215 miles available for grooming<br>25 miles marked, ungroomed |

| Indicators by Resource | Measures | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| **Recreation Non- motorized Opportunities – displacements** | | | | | | |
| **Indicator**: Access to desired non-motorized recreation settings and opportunities | Designated area (acres) and trails (miles) within 5 miles of plowed trailheads | 89,667 acres **/**28 miles of designated trails within 5 miles of trailheads.<br>20.5 miles of the PCT available for non-motorized recreation within 5 miles of plowed trailheads | 62,635 acres /28 miles of designated trails within 5 miles of trailheads<br>20.5 miles of the PCT available for non-motorized recreation enthusiasts within 5 miles of plowed trailheads | 78,258 acres/28 miles of designated trails within 5 miles of trailheads<br>20.5 miles of the PCT available for non-motorized recreation enthusiasts within 5 miles of plowed trailheads | 22,310 acres/28 miles of designated trails within 5 miles of trailheads<br>20.5 miles of the PCT available for non-motorized recreation enthusiasts within 5 miles of plowed trailheads | 89,667 acres/28 miles of designated trails within 5 miles of trailheads |
| **Indicator:** Quality of non-motorized opportunities | Percent of acres available for quiet, non-motorized use that are within within 5 miles of plowed trailheads | 45 percent of the acres available for quiet, non-motorized use provide high quality non-motorized opportunities | 14.6 percent of the acres available for quiet, non-motorized use provide high quality non-motorized opportunities | 13.9 percent of the acres available for quiet, non-motorized use provide high quality non-motorized opportunities | 11.4 percent of the acres available for quiet, non-motorized use provide high quality non-motorized opportunities | 16.7 percent of the acres available for quiet, non-motorized use provide high quality non-motorized opportunities |
| **Recreation Non- motorized conflicts** | | | | | | |
| **Public Safety Indicator:** Areas available to non-motorized recreation enthusiasts for quality non-motorized recreation experiences | Size of areas (acres) not designated for OSV use/percent change from current management | 198,271 acres not designated for OSV use | 429,378 acres not designated for OSV use/116 percent increase from current management | 560,301 acres not designated for OSV use/182 percent increase from current management. | 195,168 acres not designated for OSV use/a slight decrease from current management. | 536,127 acres not designated for OSV use/53 percent decrease from current management. |

| Indicators by Resource | Measures | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| **Solitude, Air quality, Scenery Indicator**: Proximity and frequency of OSV designations in relation to designated non-motorized areas | **Solitude**: Distance of groomed public OSV snow trails from designated areas. Number of crossings of linear designated areas | The closest OSV trail to the Granite Chief Wilderness boundary is the Mosquito Ridge marked, not groomed OSV trail, more than two miles to the west.<br>PCT crossings not designated. High potential for motorized OSVs to impact non-motorized PCT experience | Same as alternative 1.<br>22 designated OSV crossings of the PCT. High potential for motorized OSVs to impact non-motorized PCT experience | Same as alternative 1.<br>3 designated OSV crossings of the PCT**.** Low potential for motorized OSVs to impact non-motorized PCT experience | Same as alternative 1.<br>21 designated OSV crossings of the PCT. High potential for motorized OSVs to impact non-motorized PCT experience | Same as alternative 1. 10 designated OSV crossings of the PCT. OSV use would not be designated within the Foreground of the PCT. Very Low potential for motorized OSVs to impact non-motorized PCT experience |
| | **Air Quality**: Qualitative/narrative description of potential impacts | Potential short-term impacts to the experience of recreational visitors in the vicinity of OSVs and grooming equipment due to the smell of exhaust emissions | Potential short-term impacts to the experience of recreational visitors in the vicinity of OSVs and grooming equipment due to the smell of exhaust emissions. Fewer acres designated for OSV use than in existing conditions. | Possible short-term impacts to the experience of recreational visitors in the vicinity of OSV and grooming equipment due to the smell of exhaust emissions. Fewer acres designated for OSV use than in all other alternatives. | Possible short-term impacts to the experience of recreational visitors in the vicinity of OSV and grooming equipment due to the smell of exhaust emissions. Slightly more acres designated for OSV use than in existing conditions. | Possible short-term impacts to the experience of recreational visitors in the vicinity of OSV and grooming equipment due to the smell of exhaust emissions. Fewer acres designated for OSV use than in alternatives 1, 2 and 4. |
| | **Scenery**: Qualitative/narrative description of potential visual impacts | Cross-country OSV use creates temporary tracks that crisscross the landscape. The visual evidence of snowmobile use decreases as fresh snow covers tracks or when the snow melts. | Description same as alternative 1.<br>Fewer acres designated for cross-country OSV use compared to alternative 1, and associated visual impacts than in existing conditions. | Description same as alternative 1.<br>Fewer acres designated for cross-country OSV use compared to alternative 1, and less associated visual impacts than in all other alternatives. | Description same as alternative 1.<br>Slightly more acres designated for cross-country OSV use compared to alternative 1, and slightly greater associated visual impacts than in existing conditions. | Description same as alternative 1.<br>Fewer acres designated for cross-country OSV use compared to alternative 1, and less associated visual impacts than in alternatives 1, 2 and 4. |

| Indicators by Resource | Measures | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| | **Potential conflict with other resource values**: Proximity of OSV use related to other resource values | No closure to historic structures at Robinson Flat. | One acre is designated for OSV use to protect historic buildings | Same as alternative 2 | Same as alternative 2 | Same as alternative 2 |

| Indicators by Resource | Measures | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| **Recreation Designated Areas** | | | | | | |
| **Indicator:** Wilderness Attributes | Size of areas (acres) affected and duration of impact. Qualitative description for wilderness attributes. | 4,404 acres designated for OSV use within 1/2 mile of wilderness boundaries. Potential impacts would be short-term when snow depth is adequate for OSVs to access the area. | 2,305 acres designated for OSV use within 1/2 mile of designated wilderness boundaries. Potential impacts would be short-term, when snow depth is adequate for OSVs to access the area. | No areas are designated for OSV use within 1/2 mile of designated wilderness boundaries. Potential impacts would be very unlikely. | 5,235 acres designated for OSV use within 1/2 mile of designated wilderness boundaries. Potential impacts would be short-term, during the winter while snow depth is adequate for OSVs to access the area. | 2,125 acres designated for OSV use within 1/2 mile of designated wilderness boundaries. Potential impacts would be short-term, during the winter while snow depth is adequate for OSVs to access the area. Potential impacts are less than in alternatives 1, and 4 and slightly less than Alternative 2. |
| **Indicator**: Roadless Characteristics: 1) undisturbed soil, water, and air (short-term impacts to air quality due to the presence of OSV exhaust), and (2) solitude (due to the sights and sounds of OSVs) | Size of area (acres) affected and duration of impact. Qualitative description for roadless characteristics | Approximately 109,234 inventoried roadless area (IRA) acres are designated for OSV use. Short term impacts to the roadless characteristics during the winter while snow depth is adequate for OSVs to access the area. | Approximately 74,875 IRA acres are designated for OSV use. Not designating OSV use in the High Loch Leven vicinity within the North Fork American River IRA reduces potential impacts on roadless characteristics. | Approximately 45,272 IRA acres are designated for OSV use. Not designating OSV use in same areas as alternative 2, plus PCT/Grubb, Devil's Canyon, Coon Canyon, and Summit Lake areas within the Castle Peak IRA reduces potential impacts on roadless characteristics more than alternatives 1, 2 and 3. | Approximately 112,388 IRA acres are designated for OSV use**,** slightly more than in alternative 1. Potential impacts are the same as alternative 1. | Approximately 5,161 IRA acres are designated for OSV use. Alternative 5 provides the most protection for roadless area characteristics when compared to all other alternatives. |

| Indicators by Resource | Measures | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| **Noise** | | | | | | |
| **Indicator:** Opportunities for motorized winter uses | Size of areas (acres) open to public, cross-country OSV use | 636,002 acres designated for OSV use | 406,895 acres designated for OSV use, a 36 percent decrease from existing conditions. | 275,972 acres designated for OSV use, a 57 percent decrease from existing conditions. | 641,105 acres designated for OSV use, a.5 percent increase from existing conditions. | 300,146 acres designated for OSV use; a 53 percent decrease from existing conditions. |
| | Acres and percent of designated acres that are anticipated to have high to moderate OSV use levels and the associated potential for noise impacts. | 212,857 acres, 33 percent of acres designated for use are anticipated to have high to moderate OSV use | 191,311 acres, 47 percent of acres designated for use are anticipated to have high to moderate OSV use. | 161,919 acres, 58 percent of acres designated for use are anticipated to have high to moderate OSV use. | 212,873 acres, 33 percent of acres designated for use are anticipated to have high to moderate OSV use. | 145,420 acres, 48 percent of acres designated for use are anticipated to have high to moderate OSV use |
| **Air Quality** | | | | | | |
| **Indicator**: Estimate of change (increase/decrease) in emissions and the potential to create adverse impacts to air quality | Miles of trail open to OSV visitor use | 265 miles currently available for OSV use. No known violations of the Clean Air Act (CAA) as a result of OSV use | Approximately 321 miles would be available for OSV use. A 21 percent increase in miles. No violations of the CAA are anticipated. | Approximately 280 miles would be available for OSV use. A 6 percent increase. No violations of the CAA are anticipated. | Approximately 287 miles would be available for OSV use. An 8 percent increase.No violations of the CAA are anticipated. | Approximately 257 miles would be available for OSV use. A 3 percent reduction. No violations of the CAA are anticipated |
| | Acres designated for public cross-country OSV use | 636,002 acres designated for cross-country OSV use.<br>There are no known violations of the CAA as a result of OSV use under the existing condition | 406,895 acres designated for cross-country OSV use. A 36 percent reduction from existing conditions.<br>No violations of the CAA are anticipated. | 275,972 acres designated for OSV use. A 57 percent reduction from existing conditions.<br>No violations of the CAA are anticipated. | 641,105 acres designated for V use. Less than 1 percent increase from existing condition.<br>No violations of the CAA are anticipated. | 300,146 acres designated for OSV use, a 53 percent reduction from existing conditions.<br>No violations of the CAA are anticipated. |

| Indicators by Resource | Measures | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| **Indicator**: Potential effects of OSV emissions to create adverse impacts to air quality | Shifts in OSV use in relation to Class I and Class II areas (Desolation and Granite Chief Wildernesses). | OSV areas designated for OSV use are within 1 mile of a Class I area.<br>There are no known violations of the CAA or impacts to the Class I or II area as a result of OSV use under the existing condition. | OSV areas designated for OSV use are within 1 mile of a Class I area and 2 miles to a Class II area. OSV designated crossings on the PCT would occur within 2 miles of Class I area. No known violations of the CAA under this alternative | OSV areas designated for use are within 1 mile of a Class I area and 2 miles to a Class II area. OSV designated crossings on the PCT would occur within 2 miles of Class I area. No known violations of the CAA under this alternative | OSV areas designated for use are within 1 mile of a Class I area and 2 miles to a Class II area. OSV designated crossings established on the PCT would occur within 2 miles of Class I area. N o known violations of the CAA under this alternative | OSV areas designated for OSV use are within 1 mile of a Class I area and 2 miles to a Class II area. OSV designated crossings established on the PCT would occur within 2 miles of Class I area. No known violations of the CAA under this alternative |
| **Hydrology – Water Quality** | | | | | | |
| **Indicator**: Number of snowmobiles per year using trails across the Forest | Total amount of use can be compared to use amounts in Yellowstone and other studies to gauge potential water quality effects | Higher Yellowstone OSV use levels than use levels on the TNF resulted in no impaired water quality Not likely to adversely affect water quality of snowmelt from OSV exhaust emissions. Provides the lowest level of protection. | Description same as alternative 1.<br>Less acres designated for OSV use than alternative 1 and established snow depths results in OSV exhaust emissions negligible and not be expected to exceed water quality standards. | Description same as alternative 1.<br>Approximately 131,000 less acres designated for OSV use than alternative 2 and higher minimum snow depths results in OSV exhaust emissions negligible and not be expected to exceed water quality standards. Provides more protection than alternatives 1, 2, and 4. | Description same as alternative 1.<br>Slightly higher number of acres designated for OSV use than alternative 1, snow depths and effects same as alternative 2. Provides more protection than alternative 1, less than alternative 3. | Description same as alternative 1.<br>Provides the most protection of all alternatives due highest snow depths. |

| Indicators by Resource | Measures | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| **Soil Productivity and Stability** | | | | | | |
| **Indicator:** Designated OSV use on sensitive soils | Size of areas (acres) designated for OSV use on sensitive soils | 190,169 acres on sensitive soil types | 141,205 acres acres on sensitive soil types.<br>This has less sensitive soils than alternatives 1 and 4, but greater than alternative 3 and 5. | 89,037 acres acres on sensitive soil types.<br>This has the least amount of sensitive soils designated for OSV use. | 193,213 acres acres on sensitive soil types.<br>This has the most acreage of sensitive soils designated for OSV use. | 92,429 acres acres acres on sensitive soil types.<br>This is less than alternatives 1, 2, and 4. |
| **Indicator**: Minimum snow depths on trails designated for OSV use | Depth of snow (inches) | No minimum snow depth. Soil resource damage could occur where snow levels are not sufficient to prevent contact directly with trail. May lead to increases in erosion where bare soil is exposed. | 6-inch minimum snow depth. May potentially create conditions in which the road surface is exposed to OSVs. May lead to some soil erosion or rutting of the trail surface. | 18-inch minimum snow depth. May be sufficient to prevent contact of OSVs with bare soil. | 6-inch minimum snow depth. May potentially create conditions in which the trail surface is exposed to OSVs. Potential for some soil erosion or rutting of trail surface. | 24-inch minimum snow depth. Sufficient to prevent contact of OSVs with bare soil. |
| **Indicator**: Minimum snow depths in areas designated for OSV use | Depth of snow (inches) | No minimum snow depth. Soil resource damage could occur where snow levels are not sufficient to prevent contact with the trail. This could lead to long term decreases in soil productivity | Potential effects to the soil is unlikely to be affected with at least 12 inches of snow covering the soil surface. | Potential effects to the soil is unlikely to be affected with at least 18 inches of snow covering the soil surface. | Potential effects to the soil is unlikely to be affected with at least 12 inches of snow covering the soil surface. | Potential effects to the soil is unlikely to to be affected with at least 24 inches of snow covering the soil surface. |

| Indicators by Resource | Measures | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| **Terrestrial Wildlife - Federally Listed, Proposed Species** – North American wolverine | | | | | | |
| Indicator: Potential for disturbance to individuals from OSV use and increased human presence, or injury or mortality of individuals | Acres designated for OSV use and conducive to OSV use with potential to affect habitat | 142,139 | 142,139 | 145,484 | 155,302 | 132,499 |
| **Terrestrial Wildlife R5 Sensitive species –** Pacific Marten | | | | | | |
| **Indicator**: Potential for injury or mortality of individuals from OSV use or related activities | Acres designated for OSV use and conducive to OSV use in winter habitat | 19,612 | 19,612 | 19,588 | 25,607 | 17,846 |
| **Indicato**r: Potential for loss of habitat connectivity | Acres designated for OSV use and conducive to OSV within habitat connectivity corridors | 18,297 | 18,297 | 18,107 | 18,411 | 17,511 |
| **Terrestrial Wildlife R5 Sensitive species** – California spotted owl | | | | | | |
| **Indicator**: Potential for disturbance to or displacement of individuals from noise and increased human presence, injury or mortality of individuals | Acres designated for OSV use and conducive to OSV use of important habitat with potential to be impacted by OSV use | 6,262 | 2,388 | 6,262 | 8,453 | 5,411 |
| | Acres designated for OSV use and conducive to OSV use of buffered CSO activity centers with potential to be impacted by OSV use | 1,605 | 2,388 | 1,605 | 2,093 | 1,344 |

| Indicators by Resource | Measures | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| **Terrestrial Wildlife R5 Sensitive species** – Northern Goshawk | | | | | | |
| **Indicator:** Potential for disturbance to individuals from noise and increased human presence, or injury or mortality of individuals | Acres designated for OSV use and conducive to OSV use of important habitat with potential to be impacted by OSV use | 31,160 | 18,540 | 29,898 | 31,160 | 25,543 |
| | Acres of buffered NGO PACs with potential to be impacted by OSV use | 700 | 420 | 700 | 778 | 632 |
| **Terrestrial Wildlife R5 Sensitive species** – Bald Eagle | | | | | | |
| **Indicator:** Potential for disturbance to individuals from noise and increased human presence, injury or mortality of individuals | Acres designated for OSV use and conducive to OSV use of high value reproductive habitat potentially impacted by OSV use | 4,124 | 1,375 | 4,748 | 4,259 | 4,124 |
| | Acres designated for OSV use and conducive to OSV use of buffered bald eagle nests potentially impacted by OSV use | 18 | 18 | 18 | 18 | 18 |
| **Terrestrial Wildlife R5 Sensitive species** – Great Gray Owl | | | | | | |
| Indicator: Potential for disturbance to individuals from noise and increased human presence, injury or mortality of individuals, or habitat modification | Acres designated for OSV use and conducive to OSV use of high-reproductive habitat potentially impacted by OSV use | 914 | 914 | 640 | 924 | 841 |

| Indicators by Resource | Measures | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| **Aquatic Resources** Threatened and Endangered Species: California red-legged frog | | | | | | |
| **Indicator**: Aquatic habitat | Acres designated for cross-country OSV in critical and suitable habitat | Critical habitat: 930<br>Suitable habitat: 48,212 | Critical habitat: 0<br>Suitable habitat: 2,065 | Critical habitat: 0<br>Suitable habitat: 4,908 | Critical habitat: 930<br>Suitable habitat: 48,212 | Critical habitat: 0<br>Suitable habitat: 2,082 |
| | Critical and suitable habitat (acres) within 100 feet of OSV trails | Critical habitat: 0<br>Suitable habitat: 40 | Critical habitat: 0<br>Suitable habitat: 330 | Critical habitat: 0<br>Suitable habitat: 40 | Critical habitat: 0<br>Suitable habitat: 91 | Critical habitat: 0<br>Suitable habitat: 40 |
| **Aquatic Resources** Threatened and Endangered Species: Sierra Nevada yellow-legged frog | | | | | | |
| **Indicator**: Aquatic habitat | Acres designated for cross-country OSV in critical and suitable habitat | Critical habitat: 84,795<br>Suitable habitat: 30,750 | Critical habitat: 76,241<br>Suitable habitat: 23,212 | Critical habitat: 47,520<br>Suitable habitat: 17,320 | Critical habitat: 84,846<br>Suitable habitat: 30,949 | Critical habitat: 33,125<br>Suitable habitat: 15,600 |
| | Critical and suitable habitat (acres) within 100 feet of OSV trails | Critical habitat: 657<br>Suitable habitat: 301 | Critical habitat: 665<br>Suitable habitat: 342 | Critical habitat: 573<br>Suitable habitat: 299 | Critical habitat: 707<br>Suitable habitat: 327 | Critical habitat: 626<br>Suitable habitat: 292 |
| **Botany Resources** Threatened and Endangered Species | | | | | | |
| **Indicator:** Species presence | Acres in designated high OSV use areas | 0 | 0 | 0 | 0 | 0 |
| | Acres in areas designated for OSV use | 57 | 0 | 0 | 57 | 0 |
| **Botany Resources** Sensitive Species | | | | | | |
| **Indicator:** Species presence | Acres in designated high OSV use areas | 308 | 253 | 102 | 354 | 237 |
| | Acres in areas designated for OSV use | 2,051 | 1,294 | 902 | 2,062 | 986 |

| Indicators by Resource | Measures | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| **Socioeconomics** | | | | | | |
| **Indicator:** Employment | Number of jobs and amount of labor income | No change due to management; increased visitor use over time would increase number of jobs, labor income, and tax revenue | Increased OSV visitation would support additional employment, labor income, and tax revenue in the local area; potential for reduction in non-motorized winter recreation visitation could offset increased economic activity | Potential for minor changes in motorized and non-motorized winter recreation use are not expected to meaningfully affect recreation-related employment, labor income, or tax revenue in local area | Increased OSV visitation would support additional employment, labor income, and tax revenue in the local area; potential for reduction in non-motorized winter recreation visitation could offset increased economic activity | OSV visitation would not measurably change relative to current conditions, therefore, recreation-related employment, labor income, and tax revenue in the local area would not change |
| **Indicator**: Recreation visitation | Number of recreation visits | No change; visitor use expected to increase over time | OSV visitation expected to increase due to more miles of trail available for grooming; increased OSV visitation may crowd out some non-motorized winter recreation users | No change. Visitor use expected to increase over time | OSV visitation expected to increase due to more miles of trail available for grooming; increased OSV visitation may crowd out some non-motorized winter recreation users | OSV visitation is not expected to change due to small change in miles of OSV trails available for grooming; non-motorized winter recreation may increase due to fewer acres designated for cross-country OSV use |
| **Indicator**: Values, beliefs, and attitudes | Qualitative evaluation of public values, beliefs, and attitudes | User conflict may increase due to population growth and increased visitor use | Increased OSV visitation may affect non-motorized winter recreation users' quality of life | No expected effects to motorized or non-motorized winter recreation users' quality of life | Increased OSV visitation may affect non-motorized winter recreation users' quality of life | OSV users' quality of life may decline if they travel farther or face site competition; non-motorized recreation users would benefit from decreased likelihood of user conflict |

| Indicators by Resource | Measures | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| **Indicator**: Low-income and minority populations | Qualitative evaluation of disproportionate effects to low-income and minority populations | No change; climate change may increase distances winter recreation users must travel for adequate snow depth | No change in cost; climate change may increase distances winter recreation users must travel for adequate snow depth | No change in cost due; climate change may increase distances winter recreation users must travel for adequate snow depth | No change in cost; climate change may increase distances winter recreation users must travel for adequate snow depth | OSV users would have to travel farther to access open areas or groomed trails; increased travel costs would disproportionately affect lower income individuals and families |

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# Acronyms

| | |
|---|---|
| BAT | Best available technology |
| BMP | Best management practice |
| CAA | Clean Air Act |
| CAAQS | California Ambient Air Quality Standards |
| CARB | California Air Resources Board |
| CVC | California Vehicle Code |
| CWA | Clean Water Act |
| DEIS | Draft Environmental Impact Statement |
| DEM | Digital Elevation Model |
| GIS | Geographic Information System |
| IRA | Inventoried roadless area |
| LRMP | Land and resource management plan (forest plan) |
| MVUM | Motor vehicle use map |
| NAAQS | National Ambient Air Quality Standards |
| NEPA | National Environmental Policy Act |
| NFMA | National Forest Management Act |
| NFS | National Forest System |
| NVUM | National Visitor Use Monitoring |
| OHMVR | Off-Highway Motor Vehicle Recreation Division |
| OHV | Off-highway Vehicle |
| OSV | Over-snow Vehicle |
| PCT | Pacific Crest National Scenic Trail |
| RCA | Riparian conservation area |
| RNA | Research natural area |
| RCO | Riparian conservation objectives |
| RFA | Recreation Facility Analysis |
| ROD | Record of Decision |
| ROS | Recreation Opportunity Spectrum |
| SDWA | Safe Drinking Water Act |

# Chapter 1. Purpose and Need for Action

## Document Structure

The Forest Service has prepared this environmental impact statement (EIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This EIS discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four chapters:

- **Chapter 1. Purpose and Need for Action**: This chapter briefly describes the modified proposed action, the need for that action, and other purposes to be achieved by the proposal. This section also details how the Forest Service informed the public of the proposed action and how the public responded.
- **Chapter 2. Alternatives, including the Modified Proposed Action**: This chapter provides a detailed description of the agency's modified proposed action as well as alternative actions that were developed in response to comments raised by the public during scoping. The end of the chapter includes a summary table comparing the Modified Proposed Action and alternatives with respect to their environmental impacts. Detailed maps for each alternatives can be found in figures 2 through 6 in the map package.
- **Chapter 3. Affected Environment and Environmental Consequences**: This chapter describes the environmental impacts of the modified proposed action and alternatives.
- **Chapter 4. Consultation and Coordination**: This chapter provides a list of preparers and agencies consulted during the development of the environmental impact statement.
- **Appendices**: The appendices provide more detailed information to support the analyses presented in the environmental impact statement.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Tahoe National Forest Supervisor's Office in Nevada City, California.

This document is tiered to the 1990 Tahoe National Forest Land and Resource Management Plan, as amended, 2010 Over Snow Vehicle Program Final Environmental Impact Report, Program Years 2010 – 2020, by the State of California Department of Parks and Recreation, Off-Highway Motor Vehicle Recreation (OHMVR) Division (California Department of Parks and Recreation, Off Highway Motor Vehicle Recreation Division 2010).

## Definitions

Route categories and travel planning definitions applicable to this project (table 1) are based on the definitions in 36 CFR 212 – Travel Management. For a complete list of terms, please refer to the glossary found at the end of this document.

**Table 1. Road and trail terminology - definitions**

| Term | Definition |
|---|---|
| Administrative Use | Motorized vehicle use associated with management activities or projects on National Forest System land administered by the Forest Service or under authorization of the Forest Service. Management activities include but are not limited to: law enforcement, timber harvest, reforestation, cultural treatments, prescribed fire, watershed restoration, wildlife and fish habitat improvement, private land access, allotment management activities, and mineral exploration and development that occur on National Forest System land administered by the Forest Service or under authorization of the Forest Service. |
| Area | A discrete, specifically delineated space that is smaller, and, except for over-snow vehicle use, in most cases much smaller, than a Ranger District. |
| Cross-country Over-snow Vehicle Use | Public over-snow vehicle use that occurs off of snow trails designated for over-snow vehicle use, but within areas designated for public over-snow vehicle use. |
| Designated Road or Trail or Area | A National Forest System road, National Forest System trail, or an area on National Forest System lands that is designated for over-snow vehicle use pursuant to 36 CFR 212.51 on an over-snow vehicle use map (36 CFR 212.1).[1] |
| Designation of over-snow vehicle use | Designation of a National Forest System road, a National Forest System trail, or an area on National Forest System lands where over-snow vehicle use is allowed pursuant to CFR 212.81. |
| Foreground | Seen areas and distance zones are determine the relative sensitivity of scenes based on their distance from an observer. These zones are identified as Foreground (up to 1/2 mile from the viewer), Middleground (up to 4 miles from the foreground), and Background (4 miles from the viewer to the horizon). |
| Forest road or trail | A road or trail wholly or partially within or adjacent to and serving the [National Forest System (NFS)] that is determined to be necessary for the protection, administration, and utilization of the NFS and the use and development of its resources (36 CFR 212.1) |
| Non-motorized use | A term used in this document to refer to travel other than that defined as motorized. For example, hiking, riding horses, or mountain biking. |
| Over-snow vehicle (OSV) | A motor vehicle that is designed for use over snow and that runs on a track or tracks and/or a ski or skis, while in use over snow (36 CFR 212.1). Class 1 OSVs are over-snow vehicles 50 inches or less in width at the widest point on the vehicle; Class 2 OSVs are over-snow vehicles more than 50 inches in width at the widest point on the vehicle. |
| Over-snow vehicle use map | A map reflecting roads, trails, and areas designated for over-snow vehicle use on an administrative unit or a Ranger District of the National Forest System. |
| Trail | A route 50 inches wide or less or a route over 50 inches wide that is identified and managed as a trail (36 CFR 212.1). |

# Background

This analysis responds to requirements in the Federal regulations for the management of OSV use on national forests (36 CFR Part 212, Subpart C), as well as a settlement agreement in the case of *Snowlands Network et al.* v. *U.S. Forest Service* (Case No. 2:11-cv-02921-MCE-DAD, E.D. Cal.)

[1] The decision resulting from this analysis would not designate National Forest System roads for public OSV use. Public OSV trails that would overlay existing National Forest System roads would be designated as National Forest System trails where public OSV use is allowed.

regarding the environmental impacts of the grooming of snow trails for OSV use on five national forests, including the Tahoe National Forest. The Forest Service will comply with the terms of the settlement agreement for the Tahoe National Forest by completing this analysis.

Furthermore, additional terms of the Settlement Agreement require the Forest Service to:

- Analyze ancillary activities such as the plowing of related parking lots and trailheads as part of the effects analysis;
- Consider a range of alternative actions that would result in varying levels of OSV use; and
- Consider an alternative submitted by Plaintiffs and/or Interveners in the NEPA analysis, so long as the alternative meets the purpose and need, and is feasible and within the scope of the NEPA analysis, and Plaintiffs and/or Interveners provide the Forest Service with a detailed description of that alternative during the scoping period for the NEPA analysis.

## Travel Management Regulations – Subpart C: "Use by Over-snow Vehicles"

The Forest Service published its final rule for Subpart C of the Forest Service's Travel Management Regulations (36 CFR Part 212) in the Federal Register on January 27, 2015 (80 FR 4500). The rule became effective on February 27, 2015 and states, in part:

> "Over-snow vehicle use on National Forest System roads, on National Forest System trails, and in areas on National Forest System lands shall be designated by the Responsible Official on administrative units or Ranger Districts, or parts of administrative units or Ranger Districts, of the National Forest System where snowfall is adequate for that use to occur, and, if appropriate, shall be designated by class of vehicle and time of year…" (36 CFR §212.81(a)).

Designations of trails and areas for over-snow vehicle use made as a result of the analysis in this EIS would conform to Subpart C of the Travel Management Regulations.

Consistent with the Travel Management Regulations at 36 CFR Part 212 Subpart C, designated public OSV areas and trails would be displayed on a publicly available over-snow vehicle use map (OSVUM). Once issued, these designations would be made enforceable with the provisions of 36 CFR §261.14, which prohibits the possession or operation of an OSV on National Forest System lands other than in accordance with the Subpart C designations.

### Designation Criteria

#### *Background*

The Travel Management Regulations set forth designation criteria that are to guide the responsible official's designation of areas and trails for OSV use (see 36 CFR §212.55(a)-(e)).[2] These criteria delineate certain elements and resources, the effects on which the responsible official must consider. The Travel Management Regulations at 36 CFR §212.55(a) and (b) require consideration of

[2] Subpart C of the Travel Management Regulations incorporates the designation criteria found at 36 CFR §212.55 along with certain other requirements found in Subpart B. Specifically, 36 CFR §212.81(d) provides that: "the requirements governing designation of National Forest System roads, National Forest System trails, and areas on National Forest System lands in §§212.52 (public involvement), 212.53 (coordination), 212.54 (revision), 212.55 (designation criteria (including minimization)), and 212.57 (monitoring), shall apply to decisions made under [Subpart C]."

enumerated “general” and “specific” designation criteria,[3] whereas 36 CFR §212.55(d) and (e) require the responsible official to consider rights of access and wilderness areas and primitive areas in designating areas and trails for OSV use.

The Travel Management Regulations describe the general designation criteria (36 CFR §212.55(a)) as follows:

> In designating National Forest System roads, National Forest System areas and trails on National Forest System lands for motor vehicle use, the responsible official shall consider effects on National Forest System natural and cultural resources, public safety, provision of recreational opportunities, access needs, conflicts among uses of National Forest System lands, the need for maintenance and administration of roads, trails, and areas that would arise if the uses under consideration are designated; and the availability of resources for that maintenance and administration.

The Travel Management Regulations describe the specific designation criteria (36 CFR §212.55(b)) as follows:

> In addition to the criteria in paragraph (a) of this section, in designating National Forest System areas and trails on National Forest System lands, the responsible official shall consider effects on the following, with the objective of minimizing:
>
> 1) Damage to soil, watershed, vegetation, and other forest resources;
>
> 2) Harassment of wildlife and significant disruption of wildlife habitats;
>
> 3) Conflicts between motor vehicle use and existing or proposed recreational uses of National Forest System lands or neighboring Federal lands; and
>
> 4) Conflicts among different classes of motor vehicle uses of National Forest System lands or neighboring Federal lands.

In addition, the responsible official shall consider:

> 5) Compatibility of motor vehicle use with existing conditions in populated areas, taking into account sound, emissions, and other factors.

Additionally, 36 CFR §212.55(d) requires the responsible official to recognize valid existing rights of access in designating areas and trails for OSV use and 36 CFR §212.55(e) provides that OSV areas and trails shall not be designated in wilderness areas or primitive areas, “unless, in the case of wilderness areas, motor vehicle use is authorized by the applicable enabling legislation for those areas.”

### *Minimization Criteria*

The term “minimization criteria,” refers to the subset of the specific criteria which the responsible official is to consider “with the objective of minimizing” the four categories of impacts set forth in 36 CFR §212.55(b)(1)-(4) when designating areas and trails for motorized use.

[3] 36 CFR §212.55(c) sets forth specific criteria for designation of roads, but because roads are not being designated as part of the OSV planning process, the §212.55(c) factors will not be addressed in detail in the EIS.

The term "granular"[4] refers to the degree of specificity with which the minimization criteria are applied. The Travel Management Regulations implement Executive Order 11644 (E.O. 11644), as amended by Executive Order 11989, from which the minimization criteria originate. E.O. 11644 states that "each respective agency head shall develop and issue regulations and administrative instructions… to provide for administrative designation of the *specific areas and trails* on public lands on which the use of off-road vehicles may be permitted…." (emphasis added). This supports the application of the minimization criteria to each specific area and trail. The Ninth Circuit Court of Appeals has further clarified this point:

> [T]he TMR requires the Forest Service to apply the minimization criteria to *each area* it designated for snowmobile use…. The TMR is concerned with the effects of each particularized area and trail designation. The minimization criteria must be applied accordingly." *WildEarth Guardians v. USFS*, No. 12-35434, D.C. No. 9:10-cv-00104-DWM, 9th Circuit Court of Appeals, 6/22/15, pp. 23 and 27 (emphasis in original).

However, it is important to note that applying the minimization criteria should not be interpreted as strictly requiring the prevention of all impacts. Instead, in applying the minimization criteria, the Forest Service maintains the flexibility to manage for a reasonable reduction of impacts while still addressing the need to provide areas and trails for public OSV experiences. This point is clarified in the preamble to the Travel Management Regulations Final Rule published on November 9, 2005:

> An extreme interpretation of "minimize" would preclude any use at all, since impacts always can be reduced further by preventing them altogether. Such an interpretation would not reflect the full context of E.O. 11644 or other laws and policies related to multiple use of NFS lands. Neither E.O. 11644, nor these other laws and policies, establish the primacy of any particular use of areas and trails over any other. The Department believes ''shall consider * * * with the objective of minimizing * * *'' will assure that environmental impacts are properly taken into account, without categorically precluding motor vehicle use" (70 FR 68281).

### *Applying the General Designation Criteria*

The general designation criteria were applied in the development of the proposed action are discussed within the effects analysis. The analysis contained in Chapter 3 analyzes the effects on natural and cultural resources, public safety, provision of recreation opportunities, access needs, conflicts among uses of National Forest System lands, the need for maintenance and administration of areas and trails that would arise if the uses under consideration are designated, and the availability of resources for maintenance and administration of OSV designations.

### *Applying the Minimization Criteria and Other Specific Designation Criteria*

Although the Ninth Circuit Court of Appeals has referred only to the minimization criteria when specifying the granular application requirement, the Travel Management Regulations introduce the four minimization criteria together with the fifth specific criteria, which requires the responsible official to consider the "[c]ompatibility of motor vehicle use with existing conditions in populated areas, taking into account sound emissions, and other factors" 36 CFR §212.55(b)(5). Accordingly, this analysis treats all five specific criteria the same, considering each specific area and trail proposed for designation against each of the five specific criteria.

[4] Granular is used by plaintiffs to define use of minimization criteria. See United States Court of Appeals, Ninth Circuit Court, *Wild Earth Guardians v. U.S. Forest Service*, 2015, page 3 of 30.

To apply the specific criteria in developing the proposed action and alternative actions, the forest used a filter system. The filter system consists of a table that crosswalks each proposed area and trail against each of the five specific criteria in granular fashion (see Volume II of this DEIS, Appendices E and F). For all specific criteria, forest resource specialists developed potential effect indicators, which are triggers for determining when effects to the given resources and uses set forth in 36 CFR §212.55(b)(1)-(5) may warrant mitigation.

In developing the proposed action, the Forest Service applied the minimization criteria (indeed, all the specific criteria) with full granularity. The forest developed nineteen discrete, specifically delineated areas on the forest for which the minimization criteria were be applied by screening the areas against the specific criteria (Table 2) developed with the objective of minimizing the impacts to resources. That is, each specific area and trail proposed for designation was considered in light of each specific criteria.

The Forest was subdivided into areas to address the relationship between OSV use, resource protection and socio-economic factors at a smaller scale. Generally, most of these areas encompass major components of the groomed trail system and affected communities that rely on the activity for economic benefit. Other areas occur in regions of the forest that, while located adjacent to communities, historically exhibit adequate snowfall and opportunities for OSV recreation. Minimization criteria were applied individually to each area to determine the need for designating or not designating OSV recreation trails and areas. These criteria allowed the Responsible Official to weigh socio-economic concerns against resource protection issues for each area and trail independently, and develop areas and trails for designations.

If the resource specialists found that the potential effect indicators were not triggered for a particular area or trail designation, then the designation could proceed without additional mitigation. However, if the specialists found that a designation would trigger one or more potential effect indicators, then the specialists worked with the Responsible Official to identify specific mitigations that would address the concern. Designations of these areas and trails could proceed provided the mitigations could be implemented. Based on application of the specific criteria, portions of the nineteen OSV use areas were removed from further consideration if it triggered one or more potential effect indicators and mitigation that would not effectively address the minimization criteria.

Table 2 captures the potential effects indicators developed to assess the areas and trails relative to minimization criteria. Appendices E and F document how the minimization criteria were applied on the Tahoe National Forest.

**Table 2. Specific (and minimization) criteria (areas and trails proposed for designation for OSV use)**

| 1<br>**Minimize Damage to Soil, Watershed, Vegetation and Other Forest Resources** | 2<br>**Minimize Harassment of Wildlife and Significant Disruption of Wildlife Habitats** | 3<br>**Minimize conflicts between motor vehicle use and existing or proposed recreational uses of NFS lands or neighboring Federal lands** | 4<br>**Minimize conflicts among different classes of motor vehicle uses on NFS lands or neighboring Federal lands** | 5<br>**Consider compatibility of motor vehicle use with existing conditions in populated areas*** |
|---|---|---|---|---|
| • Are there potential impacts to soil and water from OSV use? Could soil be exposed during the times OSV use could occur? Is there potential for soil disturbance associated with OSV use?<br>• Would the area (or trail) contain sensitive riparian areas, for example wet meadows, bogs, fens, etc.?<br>• Would the area (or trail) drain into a 303(d)-listed waterbody?<br>• Does the area have a hydraulic mine site or sites?<br>• Could OSV use affect a municipal water system comprised of a small reservoir that goes directly into a local community water supply?<br>• Are TES plants known to occur in or around the trail or area under consideration that could be affected by OSV use?<br>• Would the area (or trail) include designated botanical areas (SIA, RNA)? | • Would the area (or trail) encompass California spotted owl, and/or goshawk nest sites?<br>• Would the area (or trail) encompass sandhill crane nest sites?<br>• Would the area (or trail) encompass known bald eagle nest sites?<br>• Does the trail or area contain key deer winter range?<br>• Does the trail or area contain TES aquatic habitat and/or designated critical habitat?<br>• Would the area contain habitat for marten, wolverine, or other sensitive forest carnivores? | • Would OSV use in this area cause conflicts with non-motorized visitors' desire for solitude and quiet recreation (for example, PCT, Wilderness, wild & scenic rivers, ski areas (cross-country, downhill)?<br>• Would the area abut a wilderness area or National Park managed by other agencies?<br>• Does the area abut a non-motorized area on adjacent national forest or other Federal lands?<br>• Does the area abut a developed recreation site on neighboring Federal lands? | • Does this area allow wheeled motor vehicle use over snow? If so, does this affect safety and winter management of this area?<br>• Does this area cross or contain plowed roads allowing vehicle use? Are road crossings allowed by OSVs?<br>• Does this area receive use by both tracked over-snow vehicles under 50 inches wide and over 50 inches wide? Is this creating conflicts? | • Is the area adjacent to neighborhoods and communities?<br>• Is the area adjacent to recreation residences used during the winter?<br>If so, is OSV use of this area compatible with distinct characteristics of the community? |

Note: Column 5 is not a minimization criteria but is required to be specifically considered by the Travel Management Regulations.

## Scope of this Action

The Tahoe National Forest Over-snow Vehicle Use Designation is not intended to be a comprehensive, holistic winter recreation planning effort. The decision resulting from this analysis would not designate National Forest System roads for public OSV use. Public OSV trails that would exist on snow overlaying existing National Forest System roads would be designated as National Forest System trails where public OSV use is allowed.

Regulating the use of wheeled, motorized vehicles or bicycles is not within the scope of this action. Other types of motor vehicles that may operate over snow, but do not meet the definition of an OSV, are regulated under Subpart B of the Travel Management Regulations. Routes and areas for these types of vehicles were previously designated and published on a motor vehicle use map as the result of a separate environmental analysis and decision.

The following uses of OSVs would be exempt from these designations and the prohibition in 36 CFR §261.14:

a. Limited administrative use by the Forest Service;
b. Use of any fire, military, emergency, or law enforcement vehicle for emergency purposes;
c. Authorized use of any combat or combat support vehicle for national defense purposes;
d. Law enforcement response to violations of law, including pursuit;
e. Over-snow vehicle use that is specifically authorized under a written authorization issued under Federal law or regulations [such as for managing permitted livestock or for access under a special use permit (36 CFR §212.81(a)]; and
f. Use of a road or trail that is authorized by a legally documented right-of-way held by a State, county, or other local public road authority (36 CFR §261.14).

Not all existing National Forest System OSV areas and trails on National Forest System lands would be designated for public OSV use. The agency recognizes no need to designate OSV trails, only identify them, in areas that would be designated as open to cross-country OSV use. It would not be necessary to designate an OSV trail where OSV use would not be confined to the trail. However, to address requirements in the Settlement Agreement with Snowlands Network et al., groomed OSV trails located in areas designated for OSV use will be identified.

Further, with respect to the grooming action, there are financial limitations on the miles and frequency of trail grooming within the forest's snow trail grooming program. The forest's current grooming program is primarily funded by the State of California Department of Parks and Recreation, Off-Highway Motor Vehicle Recreation (OHMVR) Division. These funds are not likely to substantially increase in future years.

Subpart C of the Travel Management Regulations also specifies that certain requirements of Subpart B of the Travel Management Regulations will continue to apply to the decision designating National Forest System OSV areas and trails (36 CFR 212.81(d)), including:

1. Public involvement as required by the National Environmental Policy Act (36 CFR 212.52);
2. Coordination with Federal, State, county, and other local governmental entities and tribal governments (36 CFR 212.53);
3. Consideration of the criteria for designation of roads, trails, and areas (36 CFR 212.55);

4. Identification of designated uses on a publicly available use map of roads, trails, and areas (36 CFR 212.56); and
5. Monitoring of effects (36 CFR 212.57).

The trail and area designations made as a result of this analysis would be effective immediately upon the issuance of the record of decision, which is expected in July, 2018. To enforce these designations, the Forest Service would produce an OSV use map (OSVUM) that would look similar to the existing motor vehicle use map (MVUM) for the Tahoe National Forest. Such a map would allow OSV enthusiasts to identify the routes and areas where OSV use would be allowed on the Tahoe National Forest.

## Project Location

This proposal would be implemented on all of the National Forest System lands within the Tahoe National Forest in northeastern California (figure 1). However, not all National Forest System trails and areas on these National Forest System lands would be designated for public OSV use.

Land status is correct as of April 25, 2016. Subsequently, land may be acquired or exchanged. Any acquired lands will be managed in accordance with Forest Plan management direction for the area within which they occur. Designations do not apply to private lands.

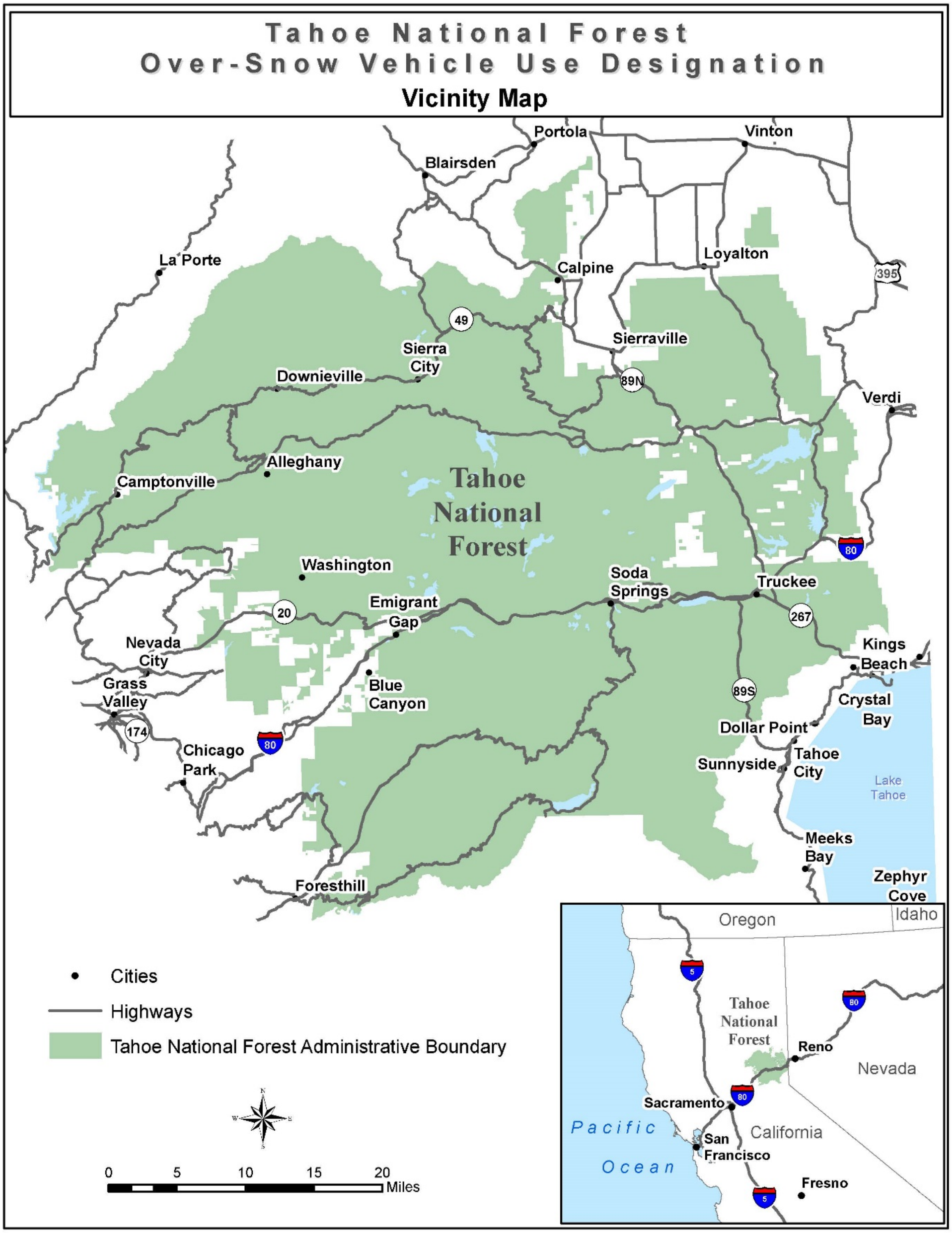


**Figure 1. Vicinity map**

## Purpose and Need

One purpose of this Project is to establish designated areas and trails for OSV use on the Tahoe National Forest to: provide access, ensure that public OSV use occurs when there is adequate snow, promote the safety of all users, enhance public enjoyment, minimize impacts to natural and cultural resources, and minimize conflicts among the various uses of National Forest System lands.

There is a need to provide a manageable, designated OSV system of trails and areas within the Tahoe National Forest that is consistent with, and achieves the purposes of, the Forest Service Travel Management Rule at 36 CFR Part 212. This action responds to this need.

The *Tahoe National Forest Land and Resource Management Plan* (LRMP 1990) contains management area-specific standards and guidelines pertaining to public OSV use. The existing system of OSV trails and areas on the Tahoe National Forest is based on the LRMP’s standards and guidelines. Proposed changes to the existing system of OSV trails and areas have been identified, based on internal and public input and the Travel Management Rule’s criteria for designating roads, trails, and areas at 36 CFR 212.55. These changes would address needs for protecting natural resources, improving access for OSV users, improving quiet winter recreation opportunities, and ensuring consistency with LRMP management direction. Travel management decisions (including designating OSV areas and trails) under the 2012 Forest Service Planning Rule (36 CFR 219) are not forest plan decisions, but rather project-level decisions that require site-specific planning, public involvement, environmental analysis, and decision making (36 CFR 219.2(b)(1) and (2); Forest Service Handbook (FSH) 1909.12, Section 23.23a). An amendment to the *Tahoe National Forest Land and Resource Management Plan* (LRMP 1990) is needed contemporaneously with the approval of a decision regarding public OSV use to: (1) appropriately place planning, analysis, and decision-making for OSV use at the project level and (2) ensure this Project is consistent with the LRMP as amended (36 CFR 219.15(c)(4)).

A second purpose of this project is to comply with the Settlement Agreement between the Forest Service and Snowlands Network et al., by identifying those designated National Forest System snow trails where grooming for public OSV use would occur and analyzing the effects of the grooming program. Under the terms of the Settlement Agreement, the Forest Service is required to complete the appropriate NEPA analysis to identify snow trails available for grooming on the Tahoe National Forest.

This action identifies snow trails available for grooming and addresses the need to provide a high quality OSV trail system on the Tahoe National Forest that is smooth and stable for the rider and designed so the novice rider can use these trails without difficulty.

## Modified Proposed Action

Based on internal review and public comments received during the scoping period, the Forest Service modified its original proposed action. Mitigations to address minimization criteria for designated OSV areas and trails were used to modify the proposed action (appendix E and F, respectively). Specific actions of the modified proposed action, minimization criteria, mitigations and recommended monitoring are discusses in detail in chapter 2 and the appendices of this DEIS.

## Decision Framework

This decision will designate snow trails and areas on National Forest System lands for OSV use on the Tahoe National Forest where snowfall is adequate for that use to occur. It will also identify the National Forest System and non-system trails where grooming for public OSV use would occur. The decision would only apply to public use of OSVs as defined in the Forest Service’s Travel Management Regulations (36 CFR 212.1).

### Responsible Official

The Tahoe National Forest Supervisor is the deciding official who would issue the decision. The Forest Supervisor will consider all reasonable alternatives and decide whether to continue current management of public OSV uses on the Tahoe National Forest, implement the modified proposed action, or select an alternative for the management of public OSV uses.

## Public Involvement

The interdisciplinary team relied on public involvement to ensure that a reasonable range of alternatives, representing a broad array of perspectives, would be analyzed in this draft environmental impact statement.

Scoping is a valuable step in the analysis process and is designed to share the proposed action, gather new information, define the overall scope of the analysis, and ultimately identify issues used to develop alternatives and otherwise refine the analysis.

A scoping letter describing the proposed action and seeking public comments was sent via regular mail or email to approximately 812 interested groups, individuals, tribes, and agencies on February 20, 2015, with comments requested to be returned by March 25, 2015. A press release was also sent to local news media outlets on February 20, 2015. A notice of intent to prepare an environmental impact statement was published in the Federal Register on February 23, 2015. All notices included a web address for the project’s website where comments could be submitted, plus information on additional ways to provide comments. The project’s website could also be accessed from the homepage of the Tahoe National Forest’s public website, where information on the project is available.

Scoping letters were sent to the plaintiffs on February 20, 2015. The Forest Service discovered that it had inadvertently omitted some of the intervenors from its address list for the February 20, 2015, mailing, so scoping letters were sent to those intervenors on March 19, 2015, and they were given 30 days to respond.

The public was invited to comment on the proposed action, identify potential conflicts or benefits, and provide any relevant information that would be useful in the subsequent environmental analysis. The Forest Service received and considered responses from 230 interested groups, individuals, and agencies in the form of letters, emails, and website submissions. All comments were thoughtful narratives reacting to the proposed action with support, opposition, concerns, or requests for revision and new alternatives. The Forest Service appreciates the time and perspectives shared by each commenter, and the willingness of all to engage in the environmental analysis process.

Public scoping meetings were held on March 2, 3, 4, 5, and 9, 2015, and were attended by interested and affected stakeholders and members of the public. The meetings’ objectives were to share information about the project’s proposed action and the NEPA process, as well as collect public input on the purpose and need for action. Approximately 215 people attended the five meetings. The project first appeared on the Tahoe National Forest’s Schedule of Proposed Actions on January 1, 2015.

### Future Administrative Review Opportunities

The Tahoe National Forest Over-snow Vehicle Use Designation is an activity implementing a land management plan. In addition, the action alternatives propose changes to the *Tahoe National Forest Land and Resource Management Plan* (USDA Forest Service 1990), as amended. It is not an activity authorized under the Healthy Forests Restoration Act of 2003 (Pub. L. 108-148). Therefore, this activity is subject to pre-decisional administrative review consistent with the Consolidated Appropriations Act of 2012 (Pub. L. 112-74) as implemented by subparts A and B of 36 CFR part 218. The forest plan amendment portion of this project is subject to the objection regulations at 36 CFR 219 Subpart B.

## Issues

Comments that express concerns about cause-effect relationships between the proposed action and its effects are called "issues." Issues serve to highlight effects or unintended consequences that may result from the proposed action, giving opportunities to reduce adverse effects through design features, mitigations, or alternatives. They are the cause-effect relationships that we identified to consider and analyze in depth to determine the likely impacts of each alternative. They are not the results of the analysis. Not all comments are issues.

Significant issues generally concern resources that may be significantly impacted by implementation of the proposed action and cannot be resolved through routine or standard project design features or mitigation measures. A significant issue is most often addressed by development and analysis of an alternative to the proposed action.

An issue may be deemed a non-significant issue for any of the following reasons: (1) the issue is already decided by law, regulation, Forest Plan, or other higher level decision; (2) the issue is outside the scope of the proposed action (the issue is not part of the proposal or is not affected by it); (3) the issue is irrelevant to the decision to be made; and (4) the issue is conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality NEPA regulations explain this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…."

### Significant Issues

Based on the content analysis process described above, six significant issues were identified for the Tahoe National Forest Over-snow Vehicle Use Designation analysis.

#### Quality Recreational Experiences

##### *Non-motorized recreation.*

OSV use and grooming for OSV use have the potential to impact the overall quality of the experience of recreationists seeking a more quiet, non-motorized experience through (1) displacing visitors who prefer non-motorized recreation opportunities; (2) posing safety concerns for non-motorized users due to the high speed of vehicles on shared trails; (3) creation of noise and air quality impacts that lead to the displacement of non-motorized users; (4) quickly consuming untracked powder snow, which reduces a desired backcountry skiing experience; (5) disrupting ski tracks, making the snow surface unsuitable for cross-country skiing; and (6) grooming trails, which the State of California's Over Snow Vehicle Program Draft EIR estimates triples the OSV use on trails to the detriment of non-motorized users.

#### *Motorized recreation experience.*

Designating areas and trails for OSV use could change recreation settings and opportunities by enhancing opportunities for motorized winter users in some areas and limiting those opportunities in other areas. In the same way, OSV designations could enhance opportunities for non-motorized winter users in some areas, while limiting or displacing those users in other areas.

#### *Conflicts*

Conflicts between motorized and non-motorized winter users may arise due to differing desired recreation experiences, public safety concerns, noise, air quality, and access issues. OSV use has the potential to impact designated areas that are managed for non-motorized recreation opportunities (for example, the Granite Chief Wilderness, North Fork American Wild and Scenic River, and Pacific Crest National Scenic Trail) through noise, and increased human presence. Of particular concern for conflicts between motorized and non-motorized winter recreationists are areas that can be accessed in the winter from the Forest's six winter trailheads: Yuba Gap, Donner Summit, Yuba Pass, Little Truckee Summit, Bassett's, and China Wall. Most winter recreationists (both motorized and non-motorized) launch their winter recreation activities from these six designated winter trailheads.

For this analysis, quality recreation experiences are defined as the forest's most popular winter recreation activities, according to the National Visitor Use Monitoring Report (USDA Forest Service 2005, 2010, 2015) along with the importance of motorized and non-motorized winter recreation opportunities as described in the Recreation Facility Analysis Niche Statements (USDA Forest Service 2007).

Measurement indicators for determining effects to motorized and non-motorized recreation settings, recreation opportunities, quality experiences, and conflicts between motorized and non-motorized winter users are described in Chapter 3, Recreation Resource section in table 19.

### Noise

OSVs traveling in designated areas and on designated trails and machines e grooming OSV trails could generate anthropogenic (human-caused) noise and increase noise levels in the short term above ambient levels. This has the potential to adversely impact wildlife species that are sensitive to this sort of disturbance as well as the experience of the recreational user who values solitude and quiet recreational opportunities.

The noise model inputs will consider the proximity of predicted noise increases above ambient levels in sensitive areas to include:

- Points on the Pacific Crest Trail;
- Trails near wilderness areas;
- Trails near communities;
- Trails brought forward by the public as concern areas during scoping;
- Wildlife concern areas.

Measurement indicators for determining effects of noise are described in Chapter 3, Noise Resource section in table 34.

## Air Quality

OSVs traveling on designated trails and in designated areas and machines grooming OSV trails could generate exhaust and emit pollutants into the air, and possibly degrade the quality of the air. This potential degradation of air quality could impact recreational users, wildlife, and sensitive areas.

There are no measurement indicators for determining effects to air quality. Only a qualitative discussion of the potential contribution of OSV emissions from the estimated number of visitors to the Tahoe National Forest each year will be described.

## Water and Soil Resources

OSV use may result in ground disturbance and snow compaction, and this could directly, indirectly and/or cumulatively adversely impact soil and water resources through soil compaction, erosion, and displacement. These possible impacts to soils could then indirectly result in adverse impacts to plants due to changes in soil temperature and productivity. In addition, changes in snowmelt patterns could affect hydrologic regimes in localized areas. It is also possible that public OSV use could directly damage riparian and wetland vegetation. Public OSV use could also release burned and unburned fuel and lubricants into the environment. These potential impacts can then indirectly result in adverse impacts to water quality and alter snowmelt patterns.

OSVs, when operating cross country instead of on trails, can disturb the ground, if snow depth and density are insufficient, and create widespread impacts. These possible effects are highly dependent on location, particularly in areas of thin snow cover, and the amount and timing of use.

OSVs, when operating on trails without adequate snow depth have the potential to also result in soil compaction, erosion, and displacement, and decreased water quality, as described above.

Measurement indicators for determining effects to soil and water resources are described in Chapter 3, Hydrology and Soils Resource sections in table 51 and table 60.

## Terrestrial Wildlife

OSV use and grooming of OSV trails could impact terrestrial wildlife through direct injury, mortality, or disturbance to individuals (e.g., increased noise and human presence resulting in a loss of breeding and/or feeding) and modifications of wildlife habitats (e.g., alteration of competitor/predator communities).

OSVs, when operating cross country instead of on trails, can impact wildlife species as snow is compacted in areas of inadequate snow cover, in addition to subnivean (i.e., the zone in and under the snow) habitat for small mammals. These potential effects are highly dependent on location, particularly areas of inadequate snow cover, and the amount and timing of use.

Resource indicators and measures for this issue are shown in Chapter 3, Terrestrial Wildlife in table 63.

## Aquatic Wildlife

OSV use and grooming for OSV use have the potential to impact aquatic wildlife species (fish and amphibians) and their habitats in the project area through: (1) direct disturbance to species when OSV use occurs in wet meadows, streams, and/or other sensitive habitats; (2) indirectly through generation of exhaust and associated pollutants in or near aquatic species habitat, which can degrade water quality; (3) indirectly through release of fuel or other pollutants during refueling and proximity to aquatic species habitats, which can degrade water quality; and (4) indirectly through increased soil erosion in marginal snow depth areas.

Over-snow vehicles, when operated cross country instead of on designated trails, may create more widespread impacts due to the potential for soil compaction and soil erosion. These possible effects are highly dependent on location, amount of snow cover, and amount and timing of use.

Over-snow vehicles, when operated on designated National Forest System roads and designated National Forest System trails without adequate snow cover, could also result in soil compaction, erosion, and displacement, and decreased water quality, as described above. These potential impacts to soil and water resources can indirectly affect riparian habitats and aquatic habitats, if in close proximity to these trails.

Resource indicators and measures for this issue are shown in Chapter 3, Aquatic Resource section in table 87.

## Other Relevant Resources Topics (Non-significant Issues)

Other relevant resources are not significant issues, and therefore, not necessarily critical to the analysis, but are helpful in understanding the full extent of the alternatives. Other relevant resources provide additional information for the analysis, but do not necessarily drive the formulation of alternatives. They are of interest in terms of minimizing impacts. It is anticipated that when project design features and mitigating measures are implemented, the resulting effects to each of the following resources would be imperceptible, or if perceptible (meaning, "if it occurs in some perceptible intensity"), meaningless when considered in the appropriate context. Analysis was conducted to identify and disclose how the minimization criteria were considered and evaluated for effectiveness (36 CFR 212.55(b)).The responsible official and interdisciplinary team reviewed public and internal scoping to date and law, regulation, and policy to determine other relevant resources. We identified the following relevant resources for the Tahoe National Forest OSV use designation analysis.

### Botany

Designating areas and trails for public OSV use and grooming trails for public OSV use has the potential to (1) impact woody species that extend above the snow cover; (2) impact plant composition and habitat suitability; (3) impact plants under the snow when there is less than adequate snow cover; and (4) transport non-native invasive plant seeds into new areas.

The potential for impacts to botanical resources are influenced by snow depth, season of use, and proximity to groomed and ungroomed trails where public OSV use would occur.

Resource indicators and measures for this issue are shown in Chapter 3, Botany Resource section in table 94.

### Socioeconomics

Designating areas and trails for public OSV use and changes in areas available for public OSV use and non-motorized use may impact the local economy (economic contributions of winter recreation on National Forest System lands) and could result in social consequences (including quality of life and local lifestyles). In addition to economic impacts, management actions affecting over-snow vehicle use on National Forest System lands may also have social consequences. Social impacts will be considered qualitatively, including how management actions may affect traditional and cultural ties to Federal lands within the area of influence.

Minority and low-income populations within the area of influence that qualify as Environmental Justice populations will also be identified to determine if disproportionately high adverse human health or environmental effects would result from proposed actions.

Resource indicators and measures for this issue are shown in Chapter 3, Socioeconomic Resource section in table 110.

### Cultural Resources

In all of the alternatives, the types of management activities proposed could directly, indirectly, or cumulatively affect cultural resources and are subject to the regulations outlined in Section 106 of the National Historic Preservation Act , as amended and as promulgated by 36 CFR Part 800, to address those effects to cultural resources. A qualitative discussion of the effects to cultural resources in areas designated for OSV use will be described.

### Transportation and Engineering

This analysis evaluates possible effects to engineering and roads, including safety, traffic, affordability, jurisdiction, and the underlying forest transportation system.

Effects on public safety and traffic will be evaluated by considering the interface between motor vehicle operators and other users of the trail systems. Cost and affordability will be evaluated in terms of changes to the total cost of maintaining the Tahoe National Forest transportation system that would be open to motor vehicle use. This analysis would not involve standard (wheeled motor vehicle) road maintenance costs. The effects to the underlying National Forest System roads and trails, including wear and tear that may affect wheeled motor vehicle use would also be evaluated. Mitigations and monitoring procedures have been identified for all of the action alternatives to minimize these possible impacts.

### Climate Change

OSV use and grooming of OSV trails could contribute to greenhouse gas emissions via OSV exhaust and release of these pollutants into the air. The air quality analysis will consider these emissions and provide information for the EIS related to the differences between the alternatives regarding overall air quality.

However, preliminary analysis indicates that while localized air quality may be degraded in some site-specific locations based on concentrated OSV use in specific popular motorized recreation areas, it is unlikely to contribute in any measureable way to regional levels. For this reason, the impact of the project on climate change will not be considered further in the analysis.

# Chapter 2. Alternatives

## Introduction

This chapter describes and compares the no-action alternative and four action alternatives for the Tahoe National Forest Over-snow Vehicle Use Designation. It includes a detailed description and maps (located in the map package) of each alternative and alternatives considered, but eliminated from detailed study; and presents the alternatives in comparative form, sharply defining the differences between alternatives and providing a clear basis for choice among options by the decision maker and the public. Numbers such as acres and miles are approximate due to the use of GIS data and rounding.

### Areas Considered for OSV Use Designation

The Tahoe National Forest Land and Resource Management Plan, as amended, uses standards and guidelines to establish OSV use designations on 109 management areas across the forest. However, for this planning effort, the Tahoe National Forest has delineated 21 discrete specific areas considered for OSV use designation, within the administrative boundaries of the Tahoe National Forest. Each area considered for OSV use is smaller than a ranger district, consistent with 36 CFR 212.1. Two of these areas will not be considered for OSV designation under any of the alternatives. Granite Chief Wilderness which was designated by Congress as non-motorized, and North Fork American Wild and Scenic River which is not for motorized use as stated in the Forest Plan (LRMP, pg. V-429 and 452).

The remaining 19 areas considered for OSV use designation (see table 3 for a list of all areas, and figure 2 in the map package) have been reviewed for consistency with the Travel Management Rule's designation criteria (36 CFR 212.55). Each alternative proposes designating varying portions of these 19 areas for public cross-country OSV use. These areas are primarily bounded by ridge tops, roads, or other geographic features that allow each area to be readily distinguished. They are also defined by their proximity to access points and communities that are socially and economically tied to OSV use and other types of winter recreation.

### Designated Trails

Each alternative proposes specific National Forest System roads and trails to be designated as OSV trails (see table 4 for a full list of trails) for public OSV use. Designated OSV trails have been reviewed for consistency with the Travel Management Rule's designation criteria (36 CFR 212.55). OSV trail segments and mileages vary by alternative.

Three types of OSV trails are discussed in this document.

#### Designated OSV Trails Available for Grooming

> The grooming season generally begins in mid-December and continues through March. Start and stop times vary per trail location and are dependent upon the presence and depth of snow. Trails are prioritized for grooming based on visitor use. Grooming has historically occurred several times per week on priority trails and after major storms.
>
> Trails would be groomed for public OSV use to a minimum width of 10 feet and typically 14 feet wide. Groomed trail width is determined by a variety of factors such as width of the underlying road bed, width of grooming tractor, level of use, and to minimize use conflicts. Snow trails would not be groomed beyond the width of the underlying roadbed, where one

exists. Where the terrain allows, main ingress and egress snow trails that connect to the trailhead would be groomed to 18 feet wide or greater to facilitate the added traffic.

Snow trail grooming for public OSV use would be conducted in accordance with the 1997 Snowmobile Trail Grooming Standards set by the California Off-Highway Motor Vehicle Recreation (OHMVR) Division. The California OHMVR Division's snowcat fleet is subject to emission regulation by the California Air Resources Board (CARB) as off-road equipment. The CARB sets an emission limit for the vehicle fleet as a whole rather than for individual pieces of equipment.

- **Marked, Ungroomed OSV Trails**

  These trails are identified, not designated, in areas designated for OSV cross-country use, where OSV use is not confined to the trail.

- **Designated OSV Trails Not Available for Grooming**

  These trails are designated for OSV use and not available for grooming. Often, they are linkages between parking areas and trailheads to designated OSV cross-country use areas.

## Vehicle Class

An OSV is defined as a motor vehicle that is designed for use over snow and that runs on a track or tracks and/or a ski or skis, while in use over snow (36 CFR 212.1). This broad definition includes a wide range of vehicles, from snow bikes to highway-legal vehicles equipped with tracks. Subpart C of the Forest Service's Travel Management Regulation at 36 CFR Part 212 allows for designation by class of vehicle. To provide a safe and enjoyable recreation experience, as well as to protect resources, two different OSV classes are discussed in the action alternatives:

- Class 1: over-snow vehicles 50 inches or less in width at the widest point on the vehicle; and
- Class 2: over-snow vehicles more than 50 inches in width at the widest point on the vehicle.

## Forest Plan Amendment

A forest plan amendment would be needed under all of the action alternatives (Alternatives 2, 3, 4, and 5). The proposed amendment to the forest plan, common to all of the action alternatives, would remove *Tahoe National Forest Land and Resource Management Plan* (LRMP 1990) OSV use standards and guidelines for each management area, and replace them with the following forest-wide standard: "Manage over the snow vehicle (OSV) use through designation of routes and trails consistent with travel management regulations."

Designating OSV areas and trails under the Travel Management Rule is not a land management plan decision, but rather a project-level decision that requires site-specific planning and analysis (36 CFR 219.2(b)(1) and (2); FSH 1909.12, Section 23.23a). Under this amendment, specific trail and area designations for public OSV use would be appropriately proposed and analyzed, with decisions made, at the project level. Any and all OSV use designations would require project-level environmental analysis and decision-making with public involvement as required by the National Environmental Policy Act (NEPA). The proposed change to the LRMP would be consistent with the 2012 Planning Rule's stated levels of planning at 36 CFR 219.2 in which forest plans do not authorize activities or projects, nor do they make commitments for taking site-specific actions. Rather, forest plans provide the sideboards for future site-specific actions (36 CFR 219.2(b)(1) and (2)).

In accordance with 36 CFR Part 219.13(b)(5), the responsible official must determine: (1) which specific substantive requirement(s) within 36 CFR 219.8 through 219.11 are directly related to the plan direction being added, modified, or removed by the amendment and (2) apply such requirement(s) within the scope and scale of the amendment. The substantive requirements address sustainability (36 CFR 219.8), diversity of plant and animal communities (36 CFR 219.9), multiple use (36 CFR 219.10), and timber requirements based on the NFMA (36 CFR 219.11). The responsible official is not required to apply any substantive requirements that are not directly related to the amendment. The Responsible Official has determined the proposed plan amendment is directly related to 36 CFR 219.10 Multiple Use, (a)(1) recreation settings and opportunities.

### Monitoring

Recreation staff and law enforcement and investigations officers regularly monitor winter trailheads, trails and other areas during the OSV season. Recreation staff and law enforcement officers use trail patrols (via snowmobiles, skis or snowshoes) and communication with visitors and other staff (such as the groomers) to gain an understanding of the changing conditions on the Forest throughout the winter.

Wilderness boundaries and other areas not designated for OSV use near designated OSV trails and areas would be visited by Forest Service staff throughout the OSV season to determine if OSV incursions have occurred. Trailheads and groomed trail areas would be visited and assessed for user conflicts and public safety concerns. Designated OSV trails would be visited to ensure public OSV use is not encroaching outside the trail corridor in areas where such use was not designated. If concerns related to these issues arose, site-specific controls (such as speed limits, segregated access points for motorized and non-motorized use, increased visitor information, or increased on-site management presence) would be coordinated and implemented as necessary.

Compacted snow on road surfaces resulting from OSV use and grooming may increase road drainage needs. Impacts to watershed resources would be minimized by periodically visually monitoring native surface roads used as OSV trails during spring runoff to determine if additional road drainage is needed. Visual Monitoring of wet meadow areas, trail stream crossings, hill climb areas and other areas with sensitive resources and/or concentrated use would occur when snow depth is less than 24 inches periodically to determine if resource damage was occurring, which could prompt corrective actions.

## How Alternatives were Developed

Five alternatives were developed to address the significant isssues raised during scoping and detailed in Chapter 1 of this DEIS.

The no-action alternative (alternative 1) represents the current management of the OSV program on the Tahoe National Forest as described in the Tahoe National Forest Land and Resource Management Plan (LRMP, 1990), as amended.

The proposed action (alternative 2), as originally described in the February 23, 2015 Notice of Intent, responds primarily to the quality recreational experience by balancing motorized and non-motorized opportunities. The Forest Service modified the original proposed action based on scoping input received from the public, taking into account where most visitors need to drive and park to access winter recreation opportunities on the Forest, as well as elevations where snowfall is adequate for OSV use to occur (36 CFR 212.81(a)). Further, scoping input was combined with the Travel Management Rule’s designation criteria (36 CFR 212.55) to propose and evaluate the proposed action’s OSV trail and area designations. The Forest Service applied the Travel Management Rule’s specific criteria at 36 CFR 212.55(b) using a route-by-route and area-by-area approach, which is documented in Volume 2 of this DEIS, Appendices E and F.

After reviewing scoping comments the original proposed action was modified with the following changes:

- The original proposed action described National Forest System areas and trails as open, closed, or prohibited. The Final Rule for Subpart C of the Forest Service's Travel Management Regulations (36 CFR Part 212) became effective on February 27, 2015. Due to the timing of the release of the Final Rule and the NOI, the NOI proposed action used the Proposed Rule, dated June 18, 2014, which stated: "Designation of a National Forest System road, National Forest System trail, or area on National Forest System lands where over-snow vehicle use is allowed, restricted, or prohibited pursuant to § 212.81 on an over-snow vehicle use map." The final rule, states: "Designation of a National Forest System road, a National Forest System trail, or an area on National Forest System lands where over-snow vehicle use is allowed pursuant to § 212.81." The modified proposed action in this DEIS (Alternative 2) uses the Final Rule's approach of designating areas and trails for OSV use.

- The Forest Service has authority from Placer County to control and maintain the seasonally closed portion of Foresthill Road (G0088) and its right-of-way for snow recreation purposes starting at China Wall. This was not reflected in the Proposed Action/Notice of Intent, but is incorporated in this process going forward.

- Generally, areas below 5,000 feet elevation would not be designated for public OSV use. No key deer winter range would be designated for OSV use, except for the lower section of the Mosquito Ridge Trail.

- OSVs would be classified into two classes of vehicle, with restrictions on Class 2 vehicles.

- Snow depth requirements were clarified to reflect resource damage concerns.

- A rerouted section of the PCT in the Packer Lake area was completed after the original proposed action was released. The modified proposed action reflects the new PCT alignment.

Alternative 3 was submitted by Snowlands Network and others during scoping to respond to issues surrounding (1) the quality and quantity of non-motorized winter recreational opportunities available on the Forest; (2) the potential for OSV trail grooming and OSV noise to adversely impact quiet recreation experiences and disturb wildlife; and (3) air quality impacts, particularly localized impacts to those desiring a non-motorized winter recreation experience. This alternative would designate less acreage for OSV use across the Forest, with an emphasis on providing greater non-motorized winter recreation opportunities compared to current management. This alternative would designate existing popular OSV cross-country areas and trails on the Forest for public OSV use.

Alternative 4 was developed with input from the Blue Ribbon Coalition and other OSV enthusiasts. This alternative emphasizes providing opportunities for winter motorized recreationand provides slightly more opportunities for public OSV user compared to current management (Alternative 1).

Alternative 5 responds to public comments concerning potential impacts on wildlife and natural resources from OSV use. It would provide less designated acreage for OSV use, and therefore, fewer opportunities for motorized winter recreation experiences on the Forest to emphasize protection of wildlife and other forest resources. In addition, Alternative 5 would provide greater opportunities for non-motorized winter recreation activities compared to Alternatives 1, 2, and 4.

## Alternatives Considered in Detail

The Forest Service explored and evaluated five alternatives (all are summarized and compared in the "Comparison of Alternatives" section at the end of this chapter).

## Alternative 1: No Action (Continue Current Management)

The no-action alternative is required under NEPA regulations [40 CFR §1502.14(d)]. This alternative represents the existing baseline condition or trends by which the action alternatives are compared. Under this alternative, the Forest Service would follow the OSV use designations for each management area in the *Tahoe National Forest Land and Resource Management Plan* (LRMP 1990), as amended (Volume II of this DEIS, Appendix B). No changes would be made to the Forest Plan's OSV use designations within the Tahoe National Forest except as prohibited by Forest Order.

Under alternative 1, public OSV use designations on the approximately 836,273-acre Tahoe National Forest would be managed in accordance with existing Forest Plan direction as follows:

- Approximately 636,002 acres of National Forest System lands are designated for public cross-country OSV use (table 3).
- Approximately 1,218 acres of National Forest System lands are designated for public cross-country OSV use in deer holding areas from January 1 through September 14 (LRMP, pg. V-30).
- The Forest Plan does not establish a minimum snow depth for trail or cross-country public OSV use.
- The Tahoe National Forest has a total of approximately 265 miles of designated OSV trails. Approximately 217 miles of designated OSV trails are available for grooming and 41 miles of marked, ungroomed trails for OSV use are located within areas designated for OSV use. Approximately 7 miles of designated OSV trails are not available for grooming (table 4, figure 2 located in the map package).
- The Forest Plan does not provide specific management direction for OSV trail grooming activities; however, the forest follows the California State Parks' Off-Highway Motor Vehicle Recreation Division snow depth standards for grooming, currently 12 to 18 inches of snow.
- Approximately 99 miles of the PCT traverse the Tahoe National Forest. Of that, 76 miles of the PCT is on National Forest System lands. OSV use on the PCT is prohibited by the National Scenic Trails Act, P.L 90-543, Section 7(c).
- There are no designated OSV crossings of the PCT.

Alternative 1 is summarized in table 3 and table 4 and displayed in figure 2 located in the map package.

**Table 3. OSV use designations - alternative 1**

| Areas Considered for OSV Use Designation | Area Size (Total Acres) | OSV Designated Use (Acres) |
|---|---|---|
| Barker | 9,847 | 9,783 |
| Black Buttes | 41,252 | 39,592 |
| Bowman | 19,604 | 18,033 |
| Donner Summit | 11,634 | 9,052 |
| Foresthill East | 90,992 | 90,391* |
| Foresthill North | 36,151 | 34,026 |
| Foresthill West | 32,957 | 26,482 |

| Areas Considered for OSV Use Designation | Area Size (Total Acres) | OSV Designated Use (Acres) |
|---|---|---|
| Lafayette | 46,807 | 41,210 |
| Reservoirs | 40,883 | 40,883 |
| Sierraville East | 75,557 | 55,375 |
| Sierraville North | 17,564 | 17,564 |
| Sierraville West | 96,311 | 95,214 |
| South of 20 | 17,346 | 10,078 |
| Summit West | 15,560 | 4,466 |
| Truckee | 34,446 | 21,356 |
| Yuba NE | 83,273 | 72,566 |
| Yuba NW | 43,255 | 37,717 |
| Yuba South | 20,657 | 14,140 |
| Yuba West | 40,708 | 76 |

* Public OSV use is allowed between January 1 and September 14 for 1,218 acres.

**Table 4. OSV Trails – alternative 1**

| Designated OSV Trails Available for Grooming | Trail Length (Miles) | Areas |
|---|---|---|
| American Hill Trail | 9.51 | Foresthill East |
| Bald Ridge Loop Trail | 14.40 | Sierraville West |
| Bowman Trail | 13.60 | Bowman |
| Duncan “Y” Trail | 5.14 | Foresthill East |
| Fifty-Four Road Trail | 12.54 | Sierraville West<br>Yuba NE |
| Ford Point Trail | 1.68 | Foresthill East |
| Foresthill Divide Trail | 14.21 | Foresthill East |
| Haskell Peak Trail | 15.55 | Yuba NE |
| Howard Trail | 5.40 | Yuba NE |
| Humbug Tie Trail | 0.82 | Foresthill East |
| Humbug Trail | 4.66 | Foresthill East |
| Independence Lake Loop Trail | 1.98 | Sierraville West<br>Truckee |
| Jackson Meadow Little Truckee Trail | 14.61 | Sierraville West |
| Lower Ford Point Trail | 1.30 | Foresthill East |
| Meadow Lake Loop Trail | 6.18 | Sierraville West |
| Mosquito Ridge Trail | 6.78 | Foresthill East |
| Pass Creek Loop Trail | 7.58 | Sierraville West |
| Prosser Creek CNNTR Trail | 13.35 | Sierraville West |
| Prosser Hill Winter Trail | 1.05 | Sierraville West |
| Rattlesnake Trail | 10.10 | Black Buttes |
| Ridge Loop Trail | 6.05 | Sierraville West |
| Rim Loop Trail | 2.84 | Sierraville West |
| Robinson Flat Trail | 1.27 | Foresthill East |
| Sawtooth Trail | 1.21 | Truckee |

| Designated OSV Trails Available for Grooming | Trail Length (Miles) | Areas |
|---|---|---|
| Soda Springs Trail | 6.36 | Foresthill East |
| Sterling Trail | 2.30 | Black Buttes |
| Tadpole Trail | 3.01 | Foresthill East |
| Treasure Mtn Loop Trail | 16.17 | Sierraville West |
| Yuba Webber Trail | 17.00 | Sierraville West<br>Yuba NE |
| **Total** | **216.65** | |
| **Marked, Ungroomed Trails for OSV Use** | | |
| Andesite West OSV Trail | 2.47 | Donner Summit<br>Summit West |
| Gold Valley Trail | 11.46 | Yuba NE |
| Mosquito Ridge Trail | 21.11 | Foresthill East |
| Sawtooth Trail | 6.22 | Truckee |
| **Total** | **41.25** | |
| **Designated OSV trails not Available for Grooming** | | |
| Andesite West OSV Trail | 1.00 | Donner Summit |
| Gold Valley Trail | 1.18 | Yuba NE |
| Martis Peak Trail | 1.81 | Truckee |
| Mosquito Ridge Trail | 0.27 | Foresthill East |
| Sawtooth Trail | 2.81 | Truckee |
| **Total** | **7.06** | |

## Alternative 2: Modified Proposed Action (Preferred Alternative)

The following, along with mitigations in Appendices E, and F, respectively describes how the Forest Service would manage public OSV use on the Tahoe National Forest under the modified proposed action:

- Approximately 406,895 acres of National Forest System lands would be designated for public cross-country OSV use, generally above 5,000 feet elevation (table 5, figure 3 in the map package).
- Public OSV use would not be designated in a 1-acre area near Robinson Flat to protect historic structures.
- Individual parcels of National Forest System lands currently under long-term special use permits for Royal Gorge Cross Country Ski Area, Tahoe Donner Cross Country Ski Area, Boreal Ski Area, Donner Ski Ranch Ski Area, Sugar Bowl Ski Area, Alpine Meadows Ski Area and Squaw Valley Ski Area would not be designated for public OSV use.
- Implement forestwide snow depth requirements for public OSV use by:
    - Allowing public, cross-country OSV use in designated OSV areas only when there is adequate snow depth to avoid damage to natural and cultural resources. To avoid damaging resources, a minimum of 12 inches of uncompacted snow is typically needed. On designated OSV trails with underlying roads, a minimum of 6 inches is typically needed to avoid damage to the underlying road surface; and
    - Following California State Parks' Off-Highway Motor Vehicle Recreation Division snow depth standards for grooming, currently 12 to 18 inches of snow.
- Class 1 OSVs are allowed on all designated OSV trails and areas. Class 2 OSVs are only allowed on designated OSV trails available for grooming. Class of vehicle definitions can be found on page 2.
- Approximately 237 miles of designated OSV trails are available for grooming. Approximately 14 miles of marked, ungroomed trails are located within areas designated for cross-country OSV use. Approximately 70 miles of designated OSV trails are not available for grooming (table 6, figure 3 in the map package).
- There would be 22 designated OSV crossings of the PCT (table 7, figure 3 in the map package).
    - Thirteen designated crossings would utilize roads identified on the Tahoe National Forest's Motor Vehicle Use Map and would be the width of the road (approximately 14 feet).
    - Nine proposed OSV crossings of the PCT would not utilize roads and would range in width up to 0.25 miles. These crossings are located in areas where OSV use is designated on either side of the PCT. OSV users would need a way to get across the Trail as OSV use along the PCT is prohibited by the National System Trails System Act, P.L 90-543, Section 7(c). Some of these proposed OSV crossings are wider than the width of a road because they are located in areas where snow conditions are highly variable during the course of a winter, for example areas prone to wind loading of snow and formation of cornices. These wider crossings give OSV users options to select a safe crossing of the Trail under constantly changing, variable snow loading conditions. In all cases, OSVs crossing the PCT would do so at 90 degrees to minimize the time and distance needed to cross the Trail. There is one exception, where the current alignment of the PCT overlays the Pass

Creek Loop OSV Trail on Forest Service Road 70 for approximately 700 feet. In this place, OSVs are not required to cross the PCT at 90 degrees because the PCT and the Road alignment currently share the same footprint.

Alternative 2 is summarized in table 5, table 6, and table 7 and displayed in figure 3 located in the map package.

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**Table 5. OSV use designations under alternative 2**

| Areas Considered for OSV Use Designation | Area size (Total Acres) | OSV Designated Use (Acres) |
|---|---|---|
| Barker | 9,847 | 9,783 |
| Black Buttes | 41,252 | 37,816 |
| Bowman | 19,604 | 10,966 |
| Donner Summit | 11,634 | 8,034 |
| Foresthill East | 90,992 | 54,585 |
| Foresthill North | 36,151 | 22,987 |
| Foresthill West | 32,957 | 0 |
| Lafayette | 46,807 | 14,183 |
| Reservoirs | 40,883 | 36,998 |
| Sierraville East | 75,557 | 29,004 |
| Sierraville North | 17,564 | 4,111 |
| Sierraville West | 96,311 | 93,050 |
| South of 20 | 17,346 | 4,246 |
| Summit West | 15,560 | 0 |
| Truckee | 34,446 | 9,259 |
| Yuba NE | 83,273 | 54,588 |
| Yuba NW | 43,255 | 15,268 |
| Yuba South | 20,657 | 1,750 |
| Yuba West | 40,708 | 267 |

**Table 6. OSV Trails– alternative 2**

| Designated OSV Trails Available for Grooming | Trail Length (Miles) | Areas |
|---|---|---|
| American Hill Trail | 9.51 | Foresthill East |
| Bald Ridge Loop Trail | 14.40 | Sierraville West |
| Bowman Trail | 13.60 | Bowman |
| Duncan “Y” Trail | 5.14 | Foresthill East |
| Fifty-Four Road Trail | 12.54 | Sierraville West<br>Yuba NE |
| Ford Point Trail | 1.68 | Foresthill East |
| Foresthill Divide Trail | 14.21 | Foresthill East |
| Haskell Peak Trail | 15.55 | Yuba NE |
| Howard Trail | 5.40 | Yuba NE |

| Designated OSV Trails Available for Grooming | Trail Length (Miles) | Areas |
|---|---|---|
| Humbug Tie Trail | 0.82 | Foresthill East |
| Humbug Trail | 4.66 | Foresthill East |
| Independence Lake Loop Trail | 1.98 | Sierraville West<br>Truckee |
| Jackson Meadow Little Truckee Trail | 14.61 | Sierraville West |
| Lower Ford Point Trail | 1.30 | Foresthill East |
| Meadow Lake Loop Trail | 6.18 | Sierraville West |
| Mosquito Ridge Trail | 28.16 | Foresthill East |
| Pass Creek Loop Trail | 7.58 | Sierraville West |
| Prosser Creek Trail | 13.35 | Sierraville West |
| Prosser Hill Winter Trail | 1.05 | Sierraville West |
| Rattlesnake Trail | 10.10 | Black Buttes |
| Ridge Loop Trail | 6.05 | Sierraville West |
| Rim Loop Trail | 2.84 | Sierraville West |
| Robinson Flat Trail | 1.27 | Foresthill East |
| Soda Springs Trail | 6.36 | Foresthill East |
| Sterling Trail | 2.30 | Black Buttes |
| Tadpole Trail | 3.01 | Foresthill East |
| Treasure Mtn Loop Trail | 16.17 | Sierraville West |
| Yuba Webber Trail | 17.00 | Sierraville West<br>Yuba NE |
| **Total** | **237.04** | |
| **Marked, Ungroomed Trails for OSV Use** | | |
| Andesite West OSV Trail | 1.68 | Donner Summit<br>Summit West |
| Gold Valley Trail | 12.64 | Yuba NE |
| **Total** | **14.32** | |
| **Designated OSV trails not Available for Grooming** | | |
| Andesite West OSV Trail | 1.79 | Donner Summit<br>Summit West |
| Bear Valley | 6.52 | Sierraville East |
| CAL IDA Scales | 14.86 | Yuba NW |
| Carmen Valley | 8.06 | Sierraville North |
| Carmen Valley Spurs | 1.7 | Sierraville North |
| Eureka | 6.49 | Yuba NW |
| Frosty East | 5.01 | Sierraville North |
| Martis Peak Trail | 1.81 | Truckee |
| Mosquito Ridge | 18.72 | Foresthill East<br>Foresthill West |
| North Tie | 0.05 | Sierraville North |
| Sawtooth OSV Trail | 1.40 | Truckee |
| Texas Hill/Mears | 3.83 | Foresthill North |
| Un-named (Boy Scout Camp to Yuba River) | 0.56 | Yuba NE |

| Designated OSV Trails Available for Grooming | Trail Length (Miles) | Areas |
|---|---|---|
| **Total** | **70.24** | |

**Table 7. Designated Pacific Crest Trail OSV crossings (displayed from south to north) – alternative 2**

| Designated Pacific Crest Trail OSV Crossing | Area |
|---|---|
| • 16E75 (Rubicon Jeep) | Barker |
| • 0003-004 (Niehaus) | Barker |
| • 0003 (Barker Pass) | Barker |
| • T.18N., R.14E.,22 | Sierraville West |
| • 0086 (Meadow Lake) | Sierraville West |
| • 0070-040-20 (Moscove Spur) | Sierraville West |
| • 0070-040 (Moscove) | Sierraville West |
| • 0070-065 (Jackson Overlook) | Sierraville West |
| • 0070 (Pass Creek Loop) | Sierraville West |
| • 0007 (Fibreboard) | Sierraville West |
| • 0093-002-03 (Monarch Spur) | Yuba NE |
| • T.20N., R.12E.,08 | Yuba NE |
| • T.20N., R.12E.,05 | Yuba NE |
| • T.21N., R.12E.,29, 30 | Yuba NE |
| • T.21N., R.12E.,19 | Yuba NE |
| • T.21N., R.12E.,19 | Yuba NE |
| • T.21N., R.12E.,18 | Yuba NE |
| • T.21N., R.11E.,13 | Yuba NE |
| • T.21N., R.11E.,11 | Yuba NE |
| • T.21N., R.11E.,02 | Yuba NE |
| • 11E68 (Lavezzola Creek OHV Trail) | Yuba NE |
| • 2308-001 (Cowell Mine Rd.) | Yuba NE |

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## Alternative 3

This alternative addresses issues related to quality and quantity of non-motorized winter recreational opportunities, noise impacts from OSV use, and air quality impacts from OSV use by emphasizing providing opportunities for non-motorized winter recreation across the Forest. The following summarizes how the Forest Service would manage public OSV use on the Tahoe National Forest under this alternative:

- Approximately 275,972 acres of National Forest System lands would be designated for public cross-country OSV use (table 8 and figure 4 in the map package).
- Approximately 1,408 acres of National Forest System lands are designated for public cross-country OSV use in deer holding areas from January 1 through September 14 (LRMP, page V-30).

- Public OSV use would not be designated in a 1-acre area near Robinson Flat to protect historic structures.
- Individual parcels of National Forest System lands currently under long-term special use permits for Royal Gorge Cross Country Ski Area, Tahoe Donner Cross Country Ski Area, Boreal Ski Area, Donner Ski Ranch Ski Area, Sugar Bowl Ski Area, Alpine Meadows Ski Area and Squaw Valley Ski Area would not be designated for public OSV use.
- Cross-country OSV use would be designated during specific dates in aquatic and terrestrial wildlife species' habitats as follows:
  - ♦ Within all Sierra Nevada and mountain yellow-legged frog habitat April 15 or later (dependent on sufficient snow to buffer vegetative habitat).
  - ♦ Bald Eagle nesting habitat – September 1 to December 31
  - ♦ California spotted owl/great gray owl nesting habitat – August 16 to April 30
  - ♦ Northern goshawk nesting – September 16 to February 14
  - ♦ Pacific marten denning habitat– August 1 to April 30
- Public OSV use would not be designated within 150 feet of waterways that support Lahontan cutthroat trout.
- Public OSV use would not be designated within 300 feet of lakes and 150 feet of rivers and streams.
- Both Class 1 and 2 OSVs are allowed on all designated OSV trails and areas. Class of vehicle definitions can be found on page 2.
- Approximately 217 miles of designated OSV trails are available for grooming. Approximately 38 miles of marked, ungroomed trails are located within areas designated for cross-country OSV use. Approximately 25 miles of designated OSV trails are not available for grooming (table 9, figure 4 in the map package).
- Implement forestwide snow depth requirements for public OSV use by:
  a. Allowing public, cross-country OSV use in designated OSV use areas when there are 18 or more inches of snow or ice covering the landscape, to prevent impacts to surface and subsurface resources including, but not limited to, archaeological deposits, historic features, and historic properties. Public OSV use on designated trails would be allowed when there are 18 or more inches of snow covering the trail.
  b. Groom designated OSV snow trails when there are 18 inches or more of snow.
- There would be 3 designated OSV crossings of the PCT (table 10, figure 4 in the map package). In all cases, OSVs crossing the PCT would do so at 90 degrees to minimize the time and distance needed to cross the Trail. The 20 designated OSV crossings of the PCT would be as follows:
  - ➢ Two designated crossings would utilize roads identified on the Tahoe National Forest's Motor Vehicle Use Map and would be the width of the road (approximately 14 feet).
  - ➢ One proposed OSV crossing of the PCT would range in width up to 0.13 miles. This crossing is located in areas where OSV use is designated on either side of the PCT. OSV users would need a way to get across the Trail as OSV use along the PCT is prohibited by the National System Trails System Act, P.L 90-543, Section 7(c). This

proposed OSV crossing is wider than the width of a road because they are located in areas where snow conditions are highly variable during the course of a winter, for example areas prone to wind loading of snow and formation of cornices. This wider crossing give OSV users options to select a safe crossing of the Trail under constantly changing, variable snow loading conditions.

Alternative 3 is summarized in table 8, table 9, and table 10 and displayed in figure 4 located in the map package.

**Table 8. OSV use designations - alternative 3**

| Areas Considered for OSV Use Designation | Area size (Total Acres) | OSV Designated Use (Acres) |
|---|---|---|
| Barker | 9,847 | 0 |
| Black Buttes | 41,252 | 29,589 |
| Bowman | 19,604 | 11,697 |
| Donner Summit | 11,634 | 1,765 |
| Foresthill East | 90,992 | 49,523* |
| Foresthill North | 36,151 | 14,123 |
| Foresthill West | 32,957 | 0 |
| Lafayette | 46,807 | 301 |
| Reservoirs | 40,883 | 15,707 |
| Sierraville East | 75,557 | 32,460 |
| Sierraville North | 17,564 | 95 |
| Sierraville West | 96,311 | 77,290 |
| South of 20 | 17,346 | 0 |
| Summit West | 15,560 | 0 |
| Truckee | 34,446 | 15,200 |
| Yuba NE | 83,273 | 27,679 |
| Yuba NW | 43,255 | 0 |
| Yuba South | 20,657 | 543 |
| Yuba West | 40,708 | 0 |

***** Public OSV use is allowed between January 1 and September 14 for 1,408 acres.

**Table 9. OSV Trails – alternative 3**

| Designated OSV Trails Available for Grooming | Trail Length (Miles) | OSV use Area |
|---|---|---|
| American Hill Trail | 9.51 | Foresthill East |
| Bald Ridge Loop Trail | 14.40 | Sierraville West |
| Bowman Trail | 13.60 | Bowman |
| Duncan “Y” Trail | 5.14 | Foresthill East |
| Fifty-Four Road Trail | 12.54 | Sierraville West<br>Yuba NE |
| Ford Point Trail | 1.68 | Foresthill East |
| Foresthill Divide Trail | 14.21 | Foresthill East |
| Haskell Peak Trail | 15.55 | Yuba NE |
| Howard Trail | 5.40 | Yuba NE |
| Humbug Tie Trail | 0.82 | Foresthill East |
| Humbug Trail | 4.66 | Foresthill East |
| Independence Lake Loop Trail | 1.98 | Sierraville West<br>Truckee |
| Jackson Meadow Little Truckee Trail | 14.61 | Sierraville West |
| Lower Ford Point Trail | 1.30 | Foresthill East |
| Meadow Lake Loop Trail | 6.18 | Sierraville West |
| Mosquito Ridge Trail | 6.78 | Foresthill East |
| Pass Creek Loop Trail | 7.58 | Sierraville West |
| Prosser Creek CNNTR Trail | 13.35 | Sierraville West |
| Prosser Hill Winter Trail | 1.05 | Sierraville West |
| Rattlesnake Trail | 10.10 | Black Buttes |
| Ridge Loop Trail | 6.05 | Sierraville West |
| Rim Loop Trail | 2.84 | Sierraville West |
| Robinson Flat Trail | 1.27 | Foresthill East |
| Sawtooth Trail | 1.21 | Truckee |
| Soda Springs Trail | 6.36 | Foresthill East |
| Sterling Trail | 2.30 | Black Buttes |
| Tadpole Trail | 3.01 | Foresthill East |
| Treasure Mtn Loop Trail | 16.17 | Sierraville West |
| Yuba Webber Trail | 17.00 | Sierraville West<br>Yuba NE |
| **Total** | **216.65** | |
| **Marked, Ungroomed Trails for OSV Use** | | |
| Gold Valley Trail | 10.98 | Yuba NE |
| Mosquito Ridge Trail | 18.31 | Foresthill East |
| Sawtooth Trail | 9.02 | Truckee |
| **Total** | **38.31** | |

| Designated OSV trails Not available for grooming | Trail Length (Miles) | OSV use Area |
|---|---|---|
| 0787-004-05 (In the Boca Hill/Prosser Ranch Area) | 0.51 | Reservoirs |
| 0787-004-10 (In the Boca Hill/Prosser Ranch Area) | 0.12 | Reservoirs |
| 0787-004-15 (In the Boca Hill/Prosser Ranch Area) | 0.21 | Reservoirs |
| 0787-010 (In the Boca Hill/Prosser Ranch Area) | 2.00 | Reservoirs |
| 0787-010-20 (In the Boca Hill/Prosser Ranch Area) | 0.69 | Reservoirs |
| 0890-010-10 (In the Boca Hill/Prosser Ranch Area) | 1.11 | Reservoirs |
| 0890-014 (In the Boca Hill/Prosser Ranch Area) | 0.58 | Reservoirs |
| Boca | 2.59 | Reservoirs |
| Boca Boat Ramp | 0.50 | Reservoirs |
| Boca CCC | 0.21 | Reservoirs |
| Gold Valley Marked Snowmobile Trail | 1.66 | Yuba NE |
| Humps | 2.68 | Reservoirs |
| Humps Spur | 0.74 | Reservoirs |
| Martis Peak Trail | 1.59 | Truckee |
| Mosquito Ridge | 4.47 | Foresthill East |
| Old Reno Spur | 3.68 | Reservoirs |
| South Powerline Road | 0.76 | Reservoirs |
| U18171905 (In the Boca Hill/Prosser Ranch Area) | 0.13 | Reservoirs |
| U18171906 (In the Boca Hill/Prosser Ranch Area) | 0.07 | Reservoirs |
| U18172802 (In the Boca Hill/Prosser Ranch Area) | 0.10 | Reservoirs |
| **Total** | **24.83** | |

**Table 10. Designated Pacific Crest Trail OSV crossings (displayed from south to north) – alternative 3**

| OSV/Pacific Crest National Scenic Trail Crossing | Area |
|---|---|
| • 0086 (Meadow lake) | Sierraville West |
| • 0070 (Pass Creek Loop) | Sierraville West |
| • 0007 (Fibreboard) | Sierraville West |

## Alternative 4

This alternative addresses the quality recreational experience significant issue by emphasizing motorized use. The following summarizes how the Forest Service would manage public OSV use on the Tahoe National Forest under this alternative.

- Approximately 641,105 acres of National Forest System lands are designated for public OSV use (table 11, figure 5 located in the map package).
- Approximately 1,218 acres of National Forest System lands are designated for public cross-country OSV use in deer holding areas from January 1 through September 14 (LRMP, page V-30).
- Public OSV use would not be designated in a 1-acre area near Robinson Flat to protect historic structures.
- Implement forestwide snow depth requirements for public OSV use by:
    a. Allowing public, cross-country OSV use in designated areas only when there are 12 or more inches of snow or ice covering the landscape, to prevent impacts to surface and subsurface resources including, but not limited to, archaeological deposits, historic features, and historic properties. On designated snow trails with underlying roads, a minimum of 6 or more inches of snow covering is typically needed to avoid damage to the underlying road surface.
    b. Groom designated OSV snow trails when there are 12 inches or more of snow.
- Both Class 1 and 2 OSVs are allowed on all designated trails and areas. Class of vehicle definitions can be found on page 2.
- Approximately 260 miles of designated OSV trails are available for grooming. Approximately 22 miles of marked, ungroomed trails are located within areas designated for cross-country OSV use. Approximately 5 miles of designated OSV trails are not available for grooming (table 12, figure 5 located in the map package).
- There would be 21 designated OSV crossings of the PCT (table 13, figure 5 located in the map package). In all cases, OSVs crossing the PCT would do so at 90 degrees to minimize the time and distance needed to cross the Trail.
    - Thirteen crossings would utilize roads identified on the Tahoe National Forest's Motor Vehicle Use Map and would be the width of the road (approximately 14 feet).
    - Eight proposed OSV crossings of the PCT would not utilize roads and would range in length from 0.13 miles to 1.31 miles.

Alternative 4 is summarized in table 11, table 12, and table 13, and figure 5 located in the map package.

**Table 11. OSV use designations under alternative 4**

| Areas Considered for OSV Use Designation | Area Size (Total Acres) | OSV Designated Use (Acres) |
|---|---|---|
| Barker | 9,847 | 9,783 |
| Black Buttes | 41,252 | 39,592 |
| Bowman | 19,604 | 18,033 |
| Donner Summit | 11,634 | 9,069 |

| Areas Considered for OSV Use Designation | Area Size (Total Acres) | OSV Designated Use (Acres) |
|---|---|---|
| Foresthill East | 90,992 | 89,198* |
| Foresthill North | 36,151 | 34,026 |
| Foresthill West | 32,957 | 26,482 |
| Lafayette | 46,807 | 41,210 |
| Reservoirs | 40,883 | 40,883 |
| Sierraville East | 75,557 | 55,375 |
| Sierraville North | 17,564 | 17,564 |
| Sierraville West | 96,311 | 95,214 |
| South of 20 | 17,346 | 10,078 |
| Summit West | 15,560 | 8,707 |
| Truckee | 34,446 | 21,393 |
| Yuba NE | 83,273 | 72,566 |
| Yuba NW | 43,255 | 37,717 |
| Yuba South | 20,657 | 14,140 |
| Yuba West | 40,708 | 76 |

***** Public OSV use is allowed between January 1 and September 14 for 1,218 acres.

**Table 12. OSV Trails – alternative 4**

| Designated OSV Trails Available for Grooming | Trail Length (Miles) | Areas |
|---|---|---|
| American Hill Trail | 9.51 | Foresthill East |
| Bald Ridge Loop Trail | 14.40 | Sierraville West |
| Bowman Trail | 13.60 | Bowman<br>Black Buttes |
| Duncan “Y” Trail | 5.14 | Foresthill East |
| Fifty-Four Road Trail | 12.54 | Sierraville West<br>Yuba NE |
| Ford Point Trail | 1.68 | Foresthill East |
| Foresthill Divide Trail | 14.21 | Foresthill East |
| Haskell Peak Trail | 15.55 | Yuba NE |
| Howard Trail | 5.40 | Yuba NE |
| Humbug Tie Trail | 0.82 | Foresthill East |
| Humbug Trail | 4.66 | Foresthill East |
| Independence Lake Loop Trail | 1.98 | Sierraville West<br>Truckee |
| Jackson Meadow Little Truckee Trail | 14.61 | Sierraville West |
| Lower Ford Point Trail | 1.30 | Foresthill East |
| Meadow Lake Loop Trail | 6.18 | Sierraville West |
| Mosquito Ridge Trail | 28.16 | Foresthill East |
| Pass Creek Loop Trail | 7.58 | Sierraville West |
| Prosser Creek CNNTR Trail | 13.35 | Sierraville West |
| Prosser Hill Winter Trail | 1.05 | Sierraville West |

| Designated OSV Trails Available for Grooming | Trail Length (Miles) | Areas |
|---|---|---|
| Rattlesnake Trail | 10.10 | Black Buttes |
| Ridge Loop Trail | 6.05 | Sierraville West |
| Rim Loop Trail | 2.84 | Sierraville West |
| Robinson Flat Trail | 1.27 | Foresthill East |
| Sawtooth Trail | 1.21 | Truckee |
| Soda Springs Trail | 6.36 | Foresthill East |
| Sterling Trail | 2.30 | Black Buttes |
| Tadpole Trail | 3.01 | Foresthill East |
| Texas Hill/Mears | 21.38 | Foresthill North |
| Treasure Mtn Loop Trail | 16.17 | Sierraville West |
| Yuba Webber Trail | 16.95 | Sierraville West<br>Yuba NE |
| **Total** | **259.36** | |
| **Marked, Ungroomed Trails for OSV Use** | | |
| Andesite West OSV Trail | 2.88 | Donner Summit<br>Summit West |
| Gold Valley Trail | 11.46 | Yube NE |
| Sawtooth Trail | 7.69 | Truckee |
| **Total** | **22.03** | |
| **Designated OSV trails Not Available for Grooming** | | |
| Andesite West OSV Trail | 0.59 | Donner Summit |
| Gold Valley Trail | 1.18 | Yuba NE |
| Martis Peak Trail | 1.81 | Truckee |
| Sawtooth OSV Trail | 1.33 | Truckee |
| **Total** | **4.91** | |

**Table 13. Designated Pacific Crest Trail OSV crossings (displayed from south to north) – alternative 4**

| OSV/Pacific Crest National Scenic Trail Crossing | Area |
|---|---|
| 16E75 (Rubicon Jeep) | Barker |
| 0003-004 (Niehaus) | Barker |
| 0003 (Barker Pass) | Barker |
| T.18N., R.14E.,22 | Sierraville West |
| 0086 (Meadow Lake) | Sierraville West |
| 0070-040-20 (Moscove Spur) | Sierraville West |
| 0070-040 (Moscove) | Sierraville West |
| 0070-065 (Jackson Overlook) | Sierraville West |
| 0070 (Pass Creek Loop) | Sierraville West |
| 0007 (Fibreboard) | Sierraville West |
| 0093-002-03 (Monarch Spur) | Yuba NE |
| T.20N., R.12E.,08 | Yuba NE |
| T.20N., R.12E.,05 T.21N., R.12E.,32 | Yuba NE |
| T.21N., R.12E.,29, 30 | Yuba NE |
| T.21N., R.12E.,19, 30 | Yuba NE |
| 12E66 (Lots A Lakes OHV) | Yuba NE |
| T.21N., R.11E.,13 T.21N., R.12E.,18, 19 | Yuba NE |
| 11E67 (Gold Valley OHV Trail) | Yuba NE |
| T.21N., R.11E.,02 | Yuba NE |
| 11E68 (Lavezzola Creek OHV Trail) | Yuba NE |
| 2308-001 (Cowell Mine Rd.) | Yuba NE |

## Alternative 5

Alternative 5 emphasizes protections for wildlife and natural resources as well as quality recreational experiences for non-motorized recreation. The following summarizes how the Forest Service would manage public OSV use on the Tahoe National Forest under this alternative.

The following summarizes how the Forest Service would manage public OSV use on the Tahoe National Forest under this alternative:

- Approximately 300,146 acres of National Forest System lands are designated for public cross-country OSV use (table 14, figure 6 in the map package).
- OSV use would be limited to designated OSV trails within 1 mile of existing OSV trailheads.
- Public cross-country OSV use would not be designated within a 1-acre area near Robinson Flat to protect historic structures.
- Individual parcels of National Forest System lands currently under long-term special use permits for Royal Gorge Cross Country Ski Area, Tahoe Donner Cross Country Ski Area, Boreal Ski Area, Donner Ski Ranch Ski Area, Sugar Bowl Ski Area, Alpine Meadows Ski Area and Squaw Valley Ski Area would not be designated for public OSV use.
- Implement forestwide snow depth requirements for public OSV use by:
    a. Allowing public, cross-country OSV use in designated OSV use areas when there are 24 or more inches of snow or ice covering the landscape, to prevent impacts to surface and subsurface resources including, but not limited to, subnivean habitat, archaeological deposits, historic features, and historic properties. Public OSV use on designated trails would be allowed when there are 24 or more inches of snow covering the trail. All designated trails for public OSV use (including those identified for OSV grooming) would overlay an existing paved, gravel, or native surface travel route.
    b. Groom designated OSV snow trails when there are 12 inches or more of snow.
- Class 1 OSVs are allowed on all designated OSV trails and areas. Class 2 OSVs are only allowed on designated OSV trails available for grooming. Class of vehicle definitions can be found on page 2.
- Approximately 215 miles of designated OSV trails are available for grooming. Groomed OSV trails would be the same as alternative 1, plus changing Howard's Loop to an out and back ride by removing the section of trail that is not on an underlying roadbed from the trail system. Approximately 25 miles of marked, ungroomed trails are located within areas designated for cross-country OSV use. Approximately 17 miles of designated OSV trails are not available for grooming (table 15, figure 6 in the map package)
    - OSV use would not be designated in areas within the Forest Service Scenery Management System definition of Foreground for the Pacific Crest Trail. This area would be up to one-half mile in the visible lands on each side of the Pacific Crest National Scenic Trail or smaller as the visible landscape along the Trail will be less than one-half mile on each side of the trail due to topography. Users could cross this non-motorized corridor on designated OSV trails.
    - Ten designated crossings would utilize roads identified on the Tahoe National Forest's Motor Vehicle Use Map and would be the width of the road (approximately 14 feet). In one instance, the current alignment of the PCT overlays the Pass Creek Loop OSV Trail on Forest Service Road 70 for approximately 700 feet.

Alternative 5 is summarized in table 14, table 15, and table 16, and displayed in figure 6 located in the map package.

**Table 14. OSV use designations for alternative 5**

| Areas Considered for OSV Use Designation | Area size (Total Acres) | OSV Designated Use (Acres) |
|---|---|---|
| Barker | 9,847 | 7,111 |
| Black Buttes | 41,252 | 15,709 |
| Bowman | 19,604 | 10,147 |
| Donner Summit | 11,634 | 724 |
| Foresthill East | 90,992 | 39,783 |
| Foresthill North | 36,151 | 16,148 |
| Foresthill West | 32,957 | 0 |
| Lafayette | 46,807 | 13,593 |
| North Fork Wild/Scenic River | 31,146 | 0 |
| Reservoirs | 40,883 | 34,968 |
| Sierraville East | 75,557 | 28,788 |
| Sierraville North | 17,564 | 4,111 |
| Sierraville West | 96,311 | 74,596 |
| South of 20 | 17,346 | 4,246 |
| Summit West | 15,560 | 0 |
| Truckee | 34,446 | 8,023 |
| Yuba NE | 83,273 | 24,480 |
| Yuba NW | 43,255 | 15,969 |
| Yuba South | 20,657 | 1,750 |
| Yuba West | 40,708 | 0 |

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**Table 15. OSV Trails – alternative 5**

| Designated OSV Trails Available for Grooming | Trail Length (Miles) | Areas |
|---|---|---|
| American Hill Trail | 9.51 | Foresthill East |
| Bald Ridge Loop Trail | 14.40 | Sierraville West |
| Bowman Trail | 13.60 | Bowman<br>Black Buttes |
| Duncan “Y” Trail | 5.14 | Foresthill East |
| Fifty-Four Road Trail | 12.54 | Sierraville West<br>Yuba NE |
| Ford Point Trail | 1.68 | Foresthill East |
| Foresthill Divide Trail | 14.21 | Foresthill East |
| Haskell Peak Trail | 15.55 | Yuba NE |
| Howard Trail | 4.90 | Yuba NE |
| Humbug Tie Trail | 0.82 | Foresthill East |
| Humbug Trail | 4.66 | Foresthill East |
| Independence Lake Loop Trail | 1.98 | Sierraville West<br>Truckee |
| Jackson Meadow Little Truckee Trail | 14.61 | Sierraville West |
| Lower Ford Point Trail | 1.30 | Foresthill East |
| Meadow Lake Loop Trail | 6.18 | Sierraville West |
| Mosquito Ridge Trail | 6.78 | Foresthill East |
| Pass Creek Loop Trail | 7.58 | Sierraville West |
| Prosser Creek CNNTR Trail | 13.35 | Sierraville West |
| Prosser Hill Winter Trail | 1.05 | Sierraville West |
| Rattlesnake Trail | 10.10 | Black Buttes |
| Ridge Loop Trail | 6.05 | Sierraville West |
| Rim Loop Trail | 2.84 | Sierraville West |
| Robinson Flat Trail | 1.27 | Foresthill East |
| Soda Springs Trail | 6.36 | Foresthill East |
| Sterling Trail | 2.30 | Black Buttes |
| Tadpole Trail | 3.01 | Foresthill East |
| Treasure Mtn Loop Trail | 16.17 | Sierraville West |
| Yuba Webber Trail | 17.00 | Sierraville West<br>Yuba NE |
| **Total** | **215.16** | |
| **Marked, Ungroomed Trails for OSV Use** | | |
| Gold Valley Trail | 5.28 | Yuba NE |
| Martis Peak Trail | 0 .06 | Truckee |
| Mosquito Ridge Trail | 19.50 | Foresthill East |
| White Rock Lake | 0.21 | Sierraville West |
| **Total** | **25.05** | |

| Designated OSV trails not Available for Grooming | Trail Length (Miles) | OSV use Area |
|---|---|---|
| Barker Pass | 1.51 | Barker |
| Cowell Mine Rd | 1.93 | Yuba NE |
| Gold Valley Marked Snowmobile Trail | 2.12 | Yuba NE |
| Martis Peak Trail | 1.53 | Truckee |
| Moscove | 2.46 | Sierraville West |
| Mosquito Ridge Trail | 1.87 | Foresthill East |
| Niehaus | 0.86 | Barker |
| Niehaus SP | 0.45 | Barker |
| North Miller OHV | 0.20 | Barker |
| Rubicon Jeep | 1.66 | Barker |
| Sawtooth OSV Trail | 1.41 | Truckee |
| Sierra Buttes OSV | 0.95 | Yuba NE |
| White Rock Lake | 0.53 | Sierraville West |
| **Total** | **17.48** | |

**Table 16. Designated Pacific Crest Trail OSV crossings (displayed from south to north) – alternative 5**

| OSV/Pacific Crest National Scenic Trail Crossing | Area |
|---|---|
| • 16E75 (Rubicon Jeep) | Barker |
| • 0003-004 (Niehaus) | Barker |
| • 0003 (Barker Pass) | Barker |
| • 0086-070 (White Rock Lake) | Sierraville West |
| • 0086 (Meadow Lake) | Sierraville West |
| • 0070-040 (Moscove) | Sierraville West |
| • 0070 (Pass Creek Loop) | Sierraville West |
| • 0007 (Fibreboard) | Sierraville West |
| • 12E07 (Sierra Buttes OHV) | Yuba NE |
| • 2308-001 (Cowell Mine Rd.) | Yuba NE |

# Comparison of Alternatives

**Table 17. Comparison of areas to be designated for OSV use, by alternative (acres)**

| Areas Considered for Designated OSV Use | Area size (Total Acres) | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| Barker | 9,847 | 9,783 | 9,783 | 0 | 9,783 | 7,111 |
| Black Buttes | 41,252 | 39,592 | 37,816 | 29,589 | 39,592 | 15,709 |
| Bowman | 19,604 | 18,033 | 10,966 | 11,697 | 18,033 | 10,147 |
| Donner Summit | 11,634 | 9,052 | 8,034 | 1,765 | 9,069 | 724 |
| Foresthill East | 90,992* | 90,391* | 54,585 | 49,523* | 89,198* | 39,783 |
| Foresthill North | 36,151 | 34,026 | 22,987 | 14,123 | 34,026 | 16,148 |
| Foresthill West | 32,957 | 26,482 | 0 | 0 | 26,482 | 0 |
| Lafayette | 46,807 | 41,209 | 14,183 | 301 | 41,210 | 13,593 |
| Reservoirs | 40,883 | 40,883 | 36,998 | 15,707 | 40,883 | 34,968 |
| Sierraville East | 75,557 | 55,375 | 29,004 | 32,460 | 55,375 | 28,788 |
| Sierraville North | 17,564 | 17,564 | 4,111 | 95 | 17,564 | 4,111 |
| Sierraville West | 96,311 | 95,214 | 93,050 | 77,290 | 95,214 | 74,596 |
| South of 20 | 17,346 | 10,078 | 4,246 | 0 | 10,078 | 4,246 |
| Summit West | 15,560 | 4,466 | 0 | 0 | 8,707 | 0 |
| Truckee | 34,446 | 21,356 | 9,259 | 15,200 | 21,393 | 8,023 |
| Yuba NE | 83,273 | 72,566 | 54,588 | 27,679 | 72,566 | 24,480 |
| Yuba NW | 43,255 | 37,717 | 15,268 | 0 | 37,717 | 15,969 |
| Yuba South | 20,657 | 14,139 | 1,750 | 543 | 14,139 | 1,750 |
| Yuba West | 40,708 | 76 | 267 | 0 | 76 | 0 |
| **Total**** | 774,804 | 638,002 | 406,895 | 275,972 | 641,105 | 300,146 |

*Public OSV use is allowed between January 1 and September 14 for 1,218 acres in alternatives 1, and 4, alternative 3 is 1,408 acres.

**Totals do not include the OSV Areas of Granite Chief Wilderness and North Fork American Wild and Scenic River

All area size estimates are approximate and are rounded to the nearest whole number.

**Table 18. Comparison of trails for OSV use, by alternative (miles)**

| Trail | Areas | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| | **Designated OSV Trails Available for Grooming** | | | | | |
| American Hill Trail | Foresthill East | 9.51 | 9.51 | 9.51 | 9.51 | 9.51 |
| Bald Ridge Loop Trail | Sierraville West | 14.40 | 14.40 | 14.40 | 14.40 | 14.40 |
| Bowman Trail | Bowman | 13.60 | 13.60 | 13.60 | 13.60 | 13.60 |
| Duncan “Y” Trail | Foresthill East | 5.14 | 5.14 | 5.14 | 5.14 | 5.14 |
| Fifty-Four Road Trail | Sierraville West<br>Yuba NE | 12.54 | 12.54 | 12.54 | 12.54 | 12.54 |
| Ford Point Trail | Foresthill East | 1.68 | 1.68 | 1.68 | 1.68 | 1.68 |
| Foresthill Divide Trail | Foresthill East | 14.21 | 14.21 | 14.21 | 14.21 | 14.21 |
| Haskell Peak Trail | Yuba NE | 15.55 | 15.55 | 15.55 | 15.55 | 15.55 |
| Howard Trail | Yuba NE | 5.40 | 5.40 | 5.40 | 5.40 | 4.90 |
| Humbug Tie Trail | Foresthill East | 0.82 | 0.82 | 0.82 | 0.82 | 0.82 |
| Humbug Trail | Foresthill East | 4.66 | 4.66 | 4.66 | 4.66 | 4.66 |
| Independence Lake Loop Trail | Sierraville West<br>Truckee | 1.98 | 1.98 | 1.98 | 1.98 | 1.98 |
| Jackson Meadow Little Truckee Trail | Sierraville West | 14.61 | 14.61 | 14.61 | 14.61 | 14.61 |
| Lower Ford Point Trail | Foresthill East | 1.30 | 1.30 | 1.30 | 1.30 | 1.30 |
| Meadow Lake Loop Trail | Sierraville West | 6.18 | 6.18 | 6.18 | 6.18 | 6.18 |
| Mosquito Ridge Trail | Foresthill East | 6.78 | 28.16 | 6.78 | 28.16 | 6.78 |
| Pass Creek Loop Trail | Sierraville West | 7.58 | 7.58 | 7.58 | 7.58 | 7.58 |
| Prosser Creek CNNTR Trail | Sierraville West | 13.35 | 13.35 | 13.35 | 13.35 | 13.35 |
| Prosser Hill Winter Trail | Sierraville West | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 |
| Rattlesnake Trail | Black Buttes | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 |
| Ridge Loop Trail | Sierraville West | 6.05 | 6.05 | 6.05 | 6.05 | 6.05 |
| Rim Loop Trail | Sierraville West | 2.84 | 2.84 | 2.84 | 2.84 | 2.84 |
| Robinson Flat Trail | Foresthill East | 1.27 | 1.27 | 1.27 | 1.27 | 1.27 |
| Sawtooth Trail | Truckee | 1.21 | 0 | 1.21 | 1.21 | 0 |
| Soda Springs Trail | Foresthill East | 6.36 | 6.36 | 6.36 | 6.36 | 6.36 |

| Trail | Areas | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| Sterling Trail | Black Buttes | 2.30 | 2.30 | 2.30 | 2.30 | 2.30 |
| Tadpole Trail | Foresthill East | 3.01 | 3.01 | 3.01 | 3.01 | 3.01 |
| Texas Hill/Mears | Foresthill North | 0 | 0 | 0 | 21.38 | 0 |
| Treasure Mtn Loop Trail | Sierraville West | 16.17 | 16.17 | 16.17 | 16.17 | 16.17 |
| Yuba Webber Trail | Sierraville West<br>Yuba NE | 17.00 | 17.00 | 17.00 | 16.95 | 17.00 |
| **Total** | | **216.65** | **237.04** | **216.65** | **259.36** | **214.94** |
| | **Marked, Ungroomed Trails for OSV Use** | | | | | |
| Andesite West OSV Trail | Donner Summit<br>Summit West | 2.47 | 1.68 | 0 | 2.88 | 0 |
| Gold Valley Trail | Yuba NE | 11.46 | 12.64 | 10.98 | 11.46 | 5.28 |
| Martis Peak Trail | Truckee | 0 | 0 | 0 | 0 | 0.06 |
| Mosquito Ridge Trail | Foresthill East | 21.11 | 0 | 18.31 | 0 | 19.50 |
| Sawtooth Trail | Truckee | 6.22 | 0 | 9.02 | 7.69 | 0 |
| White Rock Lake | | 0 | 0 | 0 | 0 | 0.21 |
| **Total** | | **41.25** | **14.32** | **38.31** | **22.03** | **25.05** |
| | **Designated OSV Trails Not Available for Grooming** | | | | | |
| Andesite West OSV Trail | Donner Summit<br>Summit West | 1.00 | 1.79 | 0 | 0.59 | 0 |
| Barker Pass | Barker | 0 | 0 | 0 | 0 | 1.51 |
| Bear Valley | Sierraville East | 0 | 6.52 | 0 | 0 | 0 |
| Boca | Reservoirs | 0 | 0 | 2.59 | 0 | 0 |
| Boca Boat Ramp | Reservoirs | 0 | 0 | 0.50 | 0 | 0 |
| Boca CCC | Reservoirs | 0 | 0 | 0.21 | 0 | 0 |
| CAL IDA Scales | Yuba NW | 0 | 14.86 | 0 | 0 | 0 |
| Carmen Valley | Sierraville North | 0 | 8.06 | 0 | 0 | 0 |
| Carmen Valley Spur | Sierraville North | 0 | 1.7 | 0 | 0 | 0 |
| Cowell Mine Rd | Yuba NE | 0 | 0 | 0 | 0 | 1.93 |
| Eureka | Yuba NW | 0 | 6.49 | 0 | 0 | 0 |
| Frosty East | Sierraville North | 0 | 5.01 | 0 | 0 | 0 |

| Trail | Areas | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| Gold Valley Trail | Sierraville North | 1.18 | 0 | 1.66 | 1.18 | 2.12 |
| Humps | Reservoirs | 0 | 0 | 2.68 | 0 | 0 |
| Humps Spur | Reservoirs | 0 | 0 | 0.74 | 0 | 0 |
| Martis Peak Trail | Truckee | 1.81 | 1.81 | 1.59 | 1.81 | 1.53 |
| Moscove | Sierraville West | 0 | 0 | 0 | 0 | 2.46 |
| Mosquito Ridge | Foresthill East<br>Foresthill West | 0.27 | 18.72 | 4.47 | 0 | 1.87 |
| Niehaus | Barker | 0 | 0 | 0 | 0 | 0.86 |
| Niehaus SP | Barker | 0 | 0 | 0 | 0 | 0.45 |
| North Miller OHV | Barker | 0 | 0 | 0 | 0 | 0.20 |
| North Tie | Sierraville North | 0 | 0.05 | 0 | 0 | 0 |
| Rubicon Jeep | Barker | 0 | 0 | 0 | 0 | 1.66 |
| Sawtooth OSV Trail | Truckee | 2.81 | 1.40 | 0 | 1.33 | 1.41 |
| Sierra Buttes OSV | Yuba NE | 0 | 0 | 0 | 0 | 0.95 |
| Texas Hill/Mears | Foresthill North | 0 | 3.83 | 0 | 0 | 0 |
| Un-named (Boy Scout Camp to Yuba River) | Yuba NE | 0 | 0.56 | 0 | 0 | 0 |
| Old Reno Spur | Reservoirs | 0 | 0 | 3.68 | 0 | 0 |
| South Powerline Road | Reservoirs | 0 | 0 | 0.76 | 0 | 0 |
| White Rock Lake | Sierraville West | 0 | 0 | 0 | 0 | 0.53 |
| 0787-004-05 (In the Boca Hill/Prosser Ranch Area) | Reservoirs | 0 | 0 | 0.51 | 0 | 0 |
| 0787-004-10 (In the Boca Hill/Prosser Ranch Area) | Reservoirs | 0 | 0 | 0.12 | 0 | 0 |
| 0787-004-15 (In the Boca Hill/Prosser Ranch Area) | Reservoirs | 0 | 0 | 0.21 | 0 | 0 |
| 0787-010 (In the Boca Hill/Prosser Ranch Area) | Reservoirs | 0 | 0 | 2.00 | 0 | 0 |
| 0787-010-20 (In the Boca Hill/Prosser Ranch Area) | Reservoirs | 0 | 0 | 0.69 | 0 | 0 |
| 0890-010-10 (In the Boca Hill/Prosser Ranch Area) | Reservoirs | 0 | 0 | 1.11 | 0 | 0 |
| 0890-014 (In the Boca Hill/Prosser Ranch Area) | Reservoirs | 0 | 0 | 0.58 | 0 | 0 |
| U18171905 (In the Boca Hill/Prosser Ranch Area) | Reservoirs | 0 | 0 | 0.13 | 0 | 0 |
| U18171906 (In the Boca Hill/Prosser Ranch Area) | Reservoirs | 0 | 0 | 0.07 | 0 | 0 |
| U18172802 (In the Boca Hill/Prosser Ranch Area) | Reservoirs | 0 | 0 | 0.10 | 0 | 0 |

| Trail | Areas | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| **Total** | | **7.06** | **70.24** | **24.83** | **4.91** | **17.48** |

# Suggested Alternatives or Alternative Components Considered

The Responsible Official carefully considered each of the public suggestions below to determine whether the suggestion should be carried forward into detailed analysis in the EIS or dismissed from further consideration. Suggestions carried forward into detailed analysis could become a new alternative or part of a revision to the proposed action.

For an alternative to be analyzed in detail in the EIS, it must meet the purpose and need for action, must address one or more significant issues, and address unresolved conflicts related to the proposed action. Alternatives should be considered, even if outside the jurisdiction of the agency (40 CFR 1502.14(c)). Reasonable alternatives include those that are practical or feasible from a technical and economic standpoint and use common sense. Alternatives not considered in detail in the EIS may include, but are not limited to, those that fail to meet the purpose and need, are technologically infeasible or illegal, or would result in unreasonable environmental harm.

The suggested alternatives are summarized below.

### Ensure OSV use designations avoid municipal watersheds.

There are no Forest Service designated municipal watersheds in the project area; however, the majority of water that flows off of National Forest System lands contribute to drinking water supplies for the States of California and Nevada.

### Modify the minimum snow depth for cross-country OSV use to more or less than 12 inches. Also, lower the 6-inch snow depth to 2 inches or a range of 2-6 inches to accommodate access to areas with greater snow depths.

We heard a range of snow depth suggestions from commenters during the scoping process. Snow depth varies by the alternatives analyzed in detail in the EIS.

### Ensure monitoring and enforcement are part of the proposal.

Monitoring and enforcement are critical to the success of implementation. A monitoring discussion can be found on page 20 of this DEIS.

### Include, in any action, a prohibition of recreational OSV travel on or across open or flowing water.

This planning effort addresses OSV use on National Forest System lands. Therefore, OSV use on open water, such as lakes and ponds is not addressed.

### Consider a suggestion for an alternative to the proposed action with an emphasis on providing additional opportunities for non-motorized users.

Alternatives 3 and 5 have been developed to address this suggestion and are included for detailed analysis in the EIS. However, not all aspects of the suggested alternative 3 are within the scope of the analysis, as described below, and these specific components have been dismissed from further detailed analysis:

- Designation of non-motorized trailheads to access non-motorized areas.
    - ♦ The designation of non-motorized trailheads is outside the scope of the purpose and need for action which is to provide a manageable, designated OSV system of areas and trails for

public use within the Tahoe National Forest, that is consistent with and achieves the purposes of the Forest Service Travel Management Rule at 36 CFR Part 212, subpart C. Therefore this feature would not be included in Alternative 3 to be analyzed in detail.

- Monitoring of ambient air quality and noise near trails, in trailheads, and in OSV areas with heavy over-snow vehicle traffic.
    - ♦ The monitoring of ambient air quality and noise is outside the scope of the purpose and need for action, which is to provide a manageable, designated OSV system of areas and trails for public use within the Tahoe National Forest that is consistent with and achieves the purposes of the Forest Service Travel Management Rule at 36 CFR Part 212, subpart C. The Forest Service has no regulatory jurisdiction over air quality or noise. There are no standards which would allow the Forest Service to identify or enforce prohibitions against unacceptable noise or air quality levels. These levels are set by state law. The OSV Program Monitoring Checklist for the California Department of Parks and Recreation, OHMVR Division, and U.S. Forest Service does not include ambient air quality monitoring (California OSV Program EIR, Program Years 2010-2020, appendix C). Therefore this feature will not be included in Alternative 3 to be analyzed in detail. The EIS, however, will examine effects on air quality and noise from the proposed action and alternatives to the proposed action, including the indirect effects of changes in air quality and noise levels on forest resources.
- Transition to cleaner and quieter OSVs through encouragement of best available technology (BAT) forestwide to reduce air and noise pollution. Exception is in the “Managed Shared Use” area where air quality and noise monitoring every five years will determine whether mandatory BAT would be needed.
    - ♦ The imposition of best available technology requirements is outside the scope of the purpose and need for action, which is to provide a manageable, designated OSV system of areas and trails for public use within the Tahoe National Forest that is consistent with and achieves the purposes of the Forest Service Travel Management Rule at 36 CFR Part 212, subpart C. The regulation of best available technology, whether only encouraged or mandated, is outside the scope of this analysis. The Forest Service has no regulatory jurisdiction over air quality or noise and there are no Forest Service directives requiring the establishment of standards. Therefore this feature will not be included in alternative 3 to be analyzed in detail.
- Nordic trail grooming.
    - ♦ Grooming of trails for non-motorized use would not address the purpose and need for action which is to provide a manageable, designated OSV system of areas and trails for public use within the Tahoe National Forest, that is consistent with and achieves the purposes of the Forest Service Travel Management Rule at 36 CFR Part 212, subpart C. The purpose and need for action calls for identifying those designated National Forest System OSV trails where grooming for OSV use could occur. Therefore, this feature would not be included in alternative 3 to be analyzed in detail.
- Granting of access rights to private lands.
    - ♦ Over-snow vehicle use that is specifically authorized under a written authorization issued under Federal law or regulations is exempt from subpart C designations (36 CFR Part 261.14(e)). The granting or maintenance of such access is outside the scope of the purpose and need for action, which is to provide a designated system of areas and trails for motorized over-snow vehicle use within the Tahoe National Forest that is consistent with

and achieves the purposes of the Forest Service Travel Management Rule at 36 CFR Part 212, subpart C. Therefore this feature will not be included in alternative 3 to be analyzed in detail. Under the scope of this project, the Forest Service would only designate routes under subpart C of the Travel Management Rule that are available for public use. Therefore, designating routes specifically for access to private lands, and not for public use, would not fall within the scope of this analysis or subpart C of the Travel Management Rule.

- Tahoe National Forest should designate appropriate areas for snow play. Designation of snow play areas allows for concentration of use in areas that are appropriate for snow play and that have adequate parking. Such areas and their primary access routes should be closed to OSV traffic for safety and other reasons.
    - ♦ The designation of snow play areas is outside the scope of the purpose and need for action, which is to provide a designated system of areas and trails for motorized over-snow vehicle use within the Tahoe National Forest that is consistent with and achieves the purposes of the Forest Service Travel Management Rule at 36 CFR Part 212, subpart C. Therefore, this feature will not be included in alternative 3 to be analyzed in detail.

#### Designate OSV crossings of the Pacific Crest Trail, using the same crossings as designated by wheeled motorized vehicles shown on the subpart B Motor Vehicle Use Map.

The Responsible Official has included this concept in all alternatives except alternative 1 (no action).

#### Segregate motorized and non-motorized user groups by designating separate trailheads, separate trails and/or separate areas. Designate specific areas as snowplay areas.

Motorized and non-motorized recreational experiences are important concerns to be considered for this analysis (see Significant Issues). However, the development of new facilities such as new trailheads, new trails, or new snowplay areas are outside the scope of this project. This analysis is focused on the designation of OSV use and grooming of OSV trails. For this reason, this suggestion has been dismissed from further detailed analysis. However, we agree that facility improvements or changes may be valuable and/or necessary in the future.

#### Ensure OSV use is restricted in riparian areas, in streams and on frozen lakes

We considered this suggestion and have developed alternatives that does not designate OSV use when there is not adequate snow to prevent resource damage. This planning project only addresses OSV use on National Forest System lands. Water bodies (lakes), frozen or not, are not within the scope of this analysis.

#### Consider an alternative with an emphasis on providing additional opportunities for motorized users

Alternative 4, which emphasizes providing additional opportunities for winter motorized recreational use, is included for detailed analysis in the EIS. However, not all aspects of this suggested alternative are within the scope of the analysis, and these elements have been dismissed from further detailed analysis, as described below:

This suggested alternative recommends designating several OSV trails that are ungroomed but located within areas where cross-country OSV use would be designated under the proposed action.

Since these trails would be unmarked, ungroomed, and located in areas where cross-country OSV use would be designated, the Agency sees no need to designate them in the proposed action.

- This suggested alternative recommends designating several OSV trails that are ungroomed but located within areas where cross-country OSV use would be allowed by the proposed action. Where trails would be unmarked, ungroomed, and located in areas where cross-country OSV use would be allowed, the agency sees no need to designate them in the applicable lternatives.
    - ♦ Many of these ungroomed trails pass through lands not under Forest Service jurisdiction. Establishment of Forest Service jurisdiction would be required for these trails to be designated for OSV use under subpart C.
- This suggested alternative recommends a sound standard for OSVs. The Forest Service has no regulatory jurisdiction over noise. These levels are set by state law. The OSV Program Monitoring Checklist for the California Department of Parks and Recreation, OHMVR Division, and Forest Service does not include ambient noise monitoring. Therefore this feature will not be included. The DEIS, however, will examine effects on noise from the proposed action and alternatives to the proposed action, including the indirect effects of changes in noise levels on forest resources.
- This suggested alternative recommends adding narrow groomed trails (using equipment with 8 feet or narrower width) to allow for utilizing more OHV trails where a larger groomer cannot fit. As part of the OSV trail grooming program, the Forest Service follows California State Parks Off-Highway Motor Vehicle (OHMVR) Division grooming standards, including state trail-width standards and existing equipment abilities. Standards state, “Trails should be groomed at a minimum of 10 feet wide, with wider trails when necessary due to traffic and other conditions. Where the terrain allows, main ingress and egress trails that connect to the trailhead should be groomed to 14 feet wide or greater to facilitate the added traffic.” Deviation of groomed trail width down to 8 feet wide is not feasible at this time, given the type and size of grooming equipment currently in use and will not be analyzed in this document.
- This suggested alternative recommends a review and update of parking and staging facilities. The purpose and need for action is to provide a manageable, designated OSV system of areas and trails that is consistent with and achieves the purposes of the Forest Service Travel Management Rule at 36 CFR part 212. The creation or addition of new parking areas at trailheads does not fall within the scope of these designations, and therefore, this recommendation will not be included.
- This suggested alternative recommends that designating non-motorized companion trails along motorized routes or designating/grooming non-motorized only trails to Wilderness or non-motorized land classification to reduce conflict of uses. The creation of non-motorized companion trails that do not currently exist along designated motorized routes and the designation/grooming of non-motorized only trails to Wilderness or non-motorized land classification would not address the purpose and need and are beyond the scope of this project.
- This suggested alternative recommends that the Forest Service consider a special user-fee pass/permit system “Fee- Demo” that is specific to an area, Forest, or Ranger District, specifically on-site self-service stations where a pass can be purchased to support on-the-ground services at said unit. Fees would be collected from both motorized and non-motorized users benefitted by any necessary management activities. Imposing user fees at additional winter recreation areas would not address the purpose and need for action and this action is outside the scope of this analysis.

# Chapter 3. Affected Environment and Environmental Consequences

## Introduction

This chapter presents the relevant resource components of the existing environment-the baseline environment. It describes the resources of the area that would be affected by the alternatives. This chapter also discloses the environmental effects of implementing the alternatives. These form the scientific and analytical basis for comparing the alternatives described in chapter 2.

The effects of the modified proposed action were aggregated rather than describing the site-specific effect at each road or trail, unless necessary for a particular sensitive resource or concern area. For instance, specialists' reports describe the overall effects of designating places people could ride OSVs instead of listing every route and predicting the effects at a particular site.

### OSV Use Assumptions

Assumptions regarding areas of high, moderate, low and potential public OSV use were identified on an assumptions map (Appendix H). This OSV use assumptions map was utilized by all resource specialists when conducting their analyses. In addition to observed use, the following criteria were used to spatially delineate areas of the forest with different levels of potential public OSV use:

> **High use**: Areas within 0.5 mile of staging areas and of groomed trails; meadows within 0.5 mile of a groomed trail.
>
> **Moderate use**: Areas within 0.5 mile of marked (not groomed) trails; areas between 0.5 mile and 1.5 miles of groomed routes; meadows 10 acres or greater in size or 0.5 to 1.5 miles from OSV trails.
>
> **Low or no use**: Areas where OSV use is prohibited or restricted under current management; areas below 5,000 feet elevation; California wildlife habitat relationships (CWHR) Vegetation 2D, 3D, 4D, 4M; vegetation types 5 and 6 with a slope greater than 20 percent; meadows 30 acres or greater, 1.5 miles or greater from OSV trail; areas more than 1.5 miles from groomed OSV trail; areas more than 0.5 mile from marked (not groomed) OSV trail.
>
> **Potential use**: CWHR Vegetation Open Areas (annual grass, barren, lacustrine, mixed chaparral, montane chaparral, perennial grass, sagebrush, wet meadow, and urban)

Additional resource specific assumptions utilized during effects analysis are disclosed in the applicable sections of this chapter.

### Past, Present, and Reasonably Foreseeable Actions

The interdisciplinary team considered the effects of past actions as part of the existing condition. The current conditions are the sum total of past actions. The Council on Environmental Quality recognizes "agencies can conduct an adequate cumulative effects analysis by focusing on current aggregate effects of past actions without delving into the historical details of individual past actions" (Council on Environmental Quality 2005). Innumerable actions over the last century and beyond have shaped the Tahoe National Forest's current designated road system within the planning area. Attempting to isolate and catalog these individual actions and their effects would be nearly impossible. By looking at current conditions, the effects of past human actions and natural events, regardless of which event contributed to those effects are captured.

Courts have interpreted a “reasonably foreseeable future action” as one that has been proposed and is in the planning stages. To analyze the cumulative effects of present and reasonably foreseeable future actions, each resource specialist looked at the list of projects in Volume II of this DEIS, Appendix C. They identified the ones expected to cause effects to their resource, at the same time and in the same place as effects from the proposed action or alternatives.

# Recreation Resources

## Relevant Laws, Regulations, and Policy

### Regulatory Framework

#### *National Forest Management Act*

Specifically for off-highway vehicle management, the National Forest Management Act (NFMA) requires that this use be planned and implemented to protect land and other resources, promote public safety, and minimize conflicts with other uses of the National Forest System lands. NFMA also requires that a broad spectrum of forest and rangeland-related outdoor recreation opportunities be provided that respond to current and anticipated user demands.

#### *Sierra Nevada Forest Plan Amendment*

The Sierra Nevada Forest Plan Amendment established standards and guidelines specific to wheeled motor vehicle travel off of designated routes, trails, and limited off-highway vehicle (OHV) use areas. Unless otherwise restricted by current forest plans or other specific area standards and guidelines or forest orders, cross-country travel by OSVs would continue (forestwide standard and guideline number 69 (USDA Forest Service 2009)).

#### *Land and Resource Management Plan*

The 1990 Tahoe National Forest Land and Resource Management Plan provides forestwide and management area-specific goals and strategies, desired future conditions, land allocation, and standards and guidelines relevant to winter recreation as follows:

#### *Management Goals and Strategies:*

**Recreation:**

Provide a broad spectrum of dispersed and developed recreation opportunities in accordance with identified needs and demands.

Recreation management will be in concert and cooperation with appropriate City, County, State, and other Federal agencies.

Manage the North Fork American Wild River in accordance with Public Law 95-625, which documents the Congressional designation of the River. Implement the management and development plan, the Wild Trout Plan, and the habitat management plans for the North Fork.

Develop several National Recreation Trail proposals for consideration during the trail implementation planning process. Emphasize developing a variety of trails that would provide for a wide range of recreation uses including hiking, equestrian, snowmobile, cross-country skiing, motorcycle, jeep/OHV, handicapped, and historical activities. Develop proposals for National Recreation Trail designation that would include needed facilities such as new or augmented trailheads and additional trails to create loops for improved recreational experiences. Identify and evaluate opportunities for trailheads and trails with easy access from urban areas along main routes to the forest.

Recognize the value of semi-primitive motorized (SPM) and non-motorized (SPNM) areas in the forest because of their scarcity and the demand for the few acres remaining. Closely monitor the loss of inventoried SPNM and SPM land that is not allocated in the Tahoe National Forest Land and Resource Management Plan for these ROS classes. Where possible, avoid losing SPM and SPNM areas during the planning period by considering options that would not road the areas significantly.

### Visual Management:

Maintain visual quality at the visual quality objective (VQO) level specified in each management area, as a minimum, but maintain higher visual quality wherever practical and compatible with other goals.

### Wilderness

Manage the Granite Chief Wilderness area to preserve the wilderness character of its living and nonliving components and to provide for compatible human use and enjoyment.

Provide quality wilderness experiences for the public.

### Pacific Crest National Scenic Trail

The Pacific Crest National Scenic Trail (PCNST) crosses the Tahoe National Forest. As required by public law 95-625, the Secretary of Agriculture was to prepare a comprehensive plan for the development, use, and protection of the PCNST. The Secretary assigned planning responsibilities to the Forest Service, which has overall responsibility for administration and coordination for the Trail. On April 15, 1982, Associate Chief Douglas Leisz signed the 'Notice of Decision and Finding of No Significant Impact--Comprehensive Management Plan for the Pacific Crest National Scenic Trail.' This plan states the following direction:

> Viewing and understanding resource management are considered to be part of the normal character of the trail. The management of the various resources will give due consideration to the existence of the trail and trail users within the multiple-use concept. Prescription for management of the visual resources associated with the trail will be part of agency planning process.'

### Recommended Wild and Scenic Rivers:

- **Sagehen Creek**

To the extent the Forest Service is authorized under law to control stream impoundments and diversions, the free-flowing characteristics of Sagehen Creek will not be modified.

Outstandingly remarkable values for Sagehen Creek shall be protected, and or enhanced, to the extent practicable.

Control management and development of public lands on Sagehen Creek within a ½ mile corridor. Protect this corridor from modification to the degree that eligibility and classification would be affected based on the inventory classification.

- **North Yuba River, Canyon Creek, and lower South Yuba River**

To the extent the Forest Service and Bureau are authorized under law to control stream impoundments and diversions, the free-flowing characteristics of the North Yuba River, Canyon Creek, and lower South Yuba River cannot be modified

Outstandingly remarkable values for the North Yuba River, Canyon Creek, and lower South Yuba River shall be protected, and/or enhanced, to the extent practicable.

Control management and development of Public lands on the North Yuba River, Canyon Creek, and lower South Yuba River and its ½ mile corridor. Protect these corridors from modification to the degree that eligibility and classification would be affected based on the inventory classification.

#### *Forestwide Desired Future Conditions*

#### *Management Standards and Guidelines*

**OSV Use**

The Tahoe National Forest LRMP uses management area-specific standards and guidelines to establish OSV use designations across the Tahoe National Forest. Each of the Forest’s 109 management areas has a standard and guideline that specifies if: (1) the management area is open to OSV travel (for example, the Lavezzola Management Area, LRMP, pg. V-95) or (2) closed to OSV travel (for example, the Coolbrith Management Area, LRMP, pg. V-85) or (3) OSVs are restricted to designated routes (for example, the Queens Management Area, LRMP, pg. V-339). Some of the Forest’s management areas have a standard and guideline that closes a portion of the management area to OSVs, sometimes during a particular season (for example, the Pendola Management Area, LRMP, pg. V-174). Appendix B displays the Tahoe National Forest LRMP OSV use standards and guidelines for each of the Forest Plan’s 109 management area.

**Recreation Opportunity Spectrum**

The Tahoe National Forest LRMP uses forestwide standards and guidelines to define the following Recreation Opportunity Spectrum classes: Primitive (P), Semi Primitive Non-Motorized (SPNM), Semi Primitive Motorized (SPM), Roaded Natural (RN), Rural (R), and Modern Urban (MU) (LRMP, Forestwide Standards and Guidelines #8 through #13, pp. V-20 through V-22). Descriptions of each ROS class from the Forest Plan are in the Existing Conditions section, below. Each of the Forest Plan’s 109 management areas is assigned an ROS class (TNF LRMP, pp. V-69 through V-544).

**Visual Quality Ojectives**

The Tahoe National Forest LRMP uses standards and guidelines to establish visual quality objectives across the Forest. Each of the Forest Plan’s 109 management areas has a standard and guideline specifying visual quality objectives for the management area (TNF LRMP, pp. V-69 through V-544). Visual quality objective standards and guidelines define the following visual quality objectives (VQOs): Preservation (P), Retention (R), Partial Retention (PR), Modification (M), and Maximum Modification (MM) (LRMP, Forestwide Standards and Guidelines #16 through #20, pp. V-24 through V-25).

### Pacific Crest National Scenic Trail Management

The Tahoe National Forest LRMP provides the following direction for managing the Pacific Crest National Scenic Trail (PCT): The standards and guidelines for location, design, signing, user facilities, and management of the PCT will be in accordance with the criteria established in the PCT Comprehensive Plan, 1/18/82.

The 1982 Comprehensive Plan provides the following direction for winter use along the PCT:

> Winter use (cross-country skiing and snowshoeing) should be accommodated where practical and feasible. Each agency should follow its own procedures for marking and signing the trail for winter use purposes. As a guideline, all trail markers should be at eye level (approximately 40" above average maximum snow depth). Sanitation facilities and snow removal for parking may be necessary. Any improvements, or alterations of the vegetation, should not detract from the quality of the recreation opportunities for other trail activities such as hiking and horseback riding.
>
> Snowmobiling along the Trail is prohibited by the National Trails System Act, P.L. 90-543, Section 7(c). Winter sports plans for areas through which the trail passes should consider this prohibition in determining areas appropriate for snowmobile use. Winter sports brochures should indicate designated snowmobile crossings on the Pacific Crest Trail where it is signed and marked for winter use. If cross-country skiing and/or snowshoeing is planned for the trail, any motorized use of adjacent land should be zoned to mitigate the noise of conflict.

### *Special Area Designations*

- North Fork American Wild River – congressional designation, Public Law 95-625
- Granite Chief Wilderness – congressional designation
- Onion Creek Experimental Forest, designated by the Chief of the Forest Service on December 29, 1958, will continue to be managed for watershed research under an agreement with the Pacific Southwest Forest and Range Experiment Station
- Sagehen Experimtental Forest, designated by the Chief of the Forest Service on November 28, 2005
- Pacific Crest National Scenic Trail (PCNST) – congressional designation

## Federal Law

Laws, regulations and policies applicable to OSV use designations include the following:

- Wilderness Act of 1964, California Wilderness Act of 1984, and applicable Wilderness Implementation Plans
- Wild and Scenic Rivers Act of 1968 and applicable Wild and Scenic River Plans
- National Trails System Act of 1968 (P.L. 90-543) and the Pacific Crest National Scenic Trail Comprehensive Plan
- 2005 Travel Management Rule – Subpart C (36 CFR Parts 212 and 261) as amended in 2015 - Use by Over-snow Vehicles (Travel Management Rule)

### Executive Orders

Executive Order 11644 of February 8, 1972, as amended by Executive Order 11989 of May 24, 1977, and by Executive Order 12608 of September 9, 1987, requires certain Federal agencies, including the Forest Service, to "ensure that the use of off-road vehicles on public lands [is] controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands."

### Other Guidance or Recommendations

National Best Management Practices for Water Quality Management on National Forest System Lands - Rec - 7 Over Snow Vehicle Use.

The California Off-Highway Motor Vehicle Recreation Division of the California Department of Parks and Recreation provides funding for operating, maintaining, and grooming of winter recreation trails and trailheads in mountainous regions throughout California. OSV trail grooming and ancillary activities, such as trailhead plowing and maintenance are described in detail in the OSV Program Draft and Final Environmental Impact Report (EIR), Program Years 2010–2020. The EIR includes annual monitoring and reporting requirements for Forest Service participation in the grooming program (California Department of Parks and Recreation 2010).

## Methodology

This analysis used ArcMap and relevant GIS data layers from the Tahoe National Forest, wilderness areas, inventoried roadless areas, national trails, wild and scenic rivers, research natural areas, etc. The GIS layer of proposed OSV designations and groomed trails was used as an overlay with the recreation settings and opportunities, scenery, access and designated area layers listed above to determine any potential conflicts.

Forest Plan direction was considered to ensure compliance with management direction. A review of existing law, regulation, and policy relevant to recreation settings and opportunities, access, scenery, and designated area resources within the project area was completed and referenced where appropriate.

The requirements of the Travel Management Rule, Subpart C, including the general criteria for designation of roads, trails and areas (36 CFR 212.55(a)):

- Natural and cultural resources
- Public safety
- Provision of recreational opportunities
- Access needs
- Conflicts among uses of National Forest System lands
- Need for maintenance and administration of roads, trails and areas that would arise if uses under consideration are designated and availability of resources for that maintenance and administration.

And the specific criteria to consider effects on the following with the objective of minimizing (36 CFR 212.55 (b)):

1. Damage to soil, watershed, vegetation, and other forest resources;

2. Harassment of wildlife and significant disruption of wildlife habitats;
3. Conflicts between motor vehicle use and existing or proposed recreational uses of National Forest System lands or neighboring Federal lands; and
4. Conflicts among different classes of motor vehicle uses of National Forest System lands or neighboring Federal lands.

In addition:

5. Compatibility of motor vehicle use with existing conditions in populated areas, taking into account sound, emissions, and other factors.

The Forest Service evaluated 21 discrete areas for OSV use designation, within the administrative boundaries of the Tahoe National Forest. Two of the areas will not be considered for potential OSV designation under any of the alternatives, including the Granite Chief Wilderness (designated by Congress as non-motorized) and the North Fork American Wild and Scenic River (not designated for motorized use in the Tahoe Forest Plan).

The remaining 19 areas considered for OSV use designation have been reviewed for consistency with the Travel Management Rule's designation criteria (36 CFR 212.55), see Appendix D. The OSV trails proposed for designation were also reviewed for consistency with the same criteria, see Appendix E.

The National Visitor Use Monitoring (NVUM) results, California State Parks, California Outdoor Recreation Plan, National Recreation Survey and the Environment information and online visitor information sources provided by the Tahoe National Forest and other local organizations and industry was used as an overview of the recreation opportunities, visitor use, and trends within the analysis area. The Recreation Facility Assessment niche statement was used to depict the importance of winter use (motorized or non-motorized) on the national forest; and secondly, consideration was given to how important the National Forest System lands are for this use (motorized or non-motorized) compared to other non-National Forest System lands.

The NVUM visitor use information from 2005, 2010, and 2015 was considered. The best available site-specific visitor use information for Tahoe National Forest OSV use was from the 2009 OSV Winter Trailhead Survey conducted in support of the 2010 State OSV Program EIR for Program Years 2010–2020. OSV registration information for the State of California and for counties within the Tahoe National Forest was also used to depict OSV use trends.

A case study and literature review of current information regarding motorized and non-motorized winter recreation trends and preferences; and coordination with local Forest Service resource specialists regarding on-the-ground conditions and use patterns were used to summarize existing conditions and potential impacts.

To evaluate potential impacts to recreation settings and opportunities, access, scenery, and designated area resources, each alternative will be compared using issues, indicators and measures defined below.

## Resource Indicators and Measures

Resource indicators and measures shown in table 19 will be used to measure and disclose effects to recreation resources related to OSV use designations and grooming trails for OSV use.

**Table 19. Resource indicators and measures for assessing effects to recreation resources**

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Source (LRMP S&G,[5] law or policy, BMPs,[6] etc.)? |
|---|---|---|---|
| **Motorized Recreation Opportunities – cross-country** | Opportunities for motorized winter uses<br><br>Quality of OSV opportunities[7] | Acreage of designated public OSV cross-country use; percent change as compared to current management<br><br>Percent of designated acres that are considered high quality OSV opportunities based on the high to moderate OSV use assumption categories | The Tahoe LRMP has a standard and guideline pertaining to OSV use for each of its 109 management areas (MAs), specifying whether all or portions of the MA are open to OSV use, closed to OSV use, or OSVs are restricted to designated rotues only. (TNF LRMP, pp. V-69 through V-544)<br><br>Travel Management Rule (36 CFR 212), subpart C.<br><br>OSV use assumptions for analysis |
| **Motorized Recreation Opportunities – designated snow trails** | OSV trail designations | Length of designated OSV trails (miles), percent change from current management | Travel Management Rule (36 CFR 212), subpart C. |
| **Motorized Recreation Opportunities – groomed snow trails** | OSV trail grooming | Length of groomed OSV trails (miles), percent change from current management | Travel Management Rule (36 CFR 212), subpart C. |

[5] Standard and guideline
[6] Best management practices
[7] The areas mapped in the high to moderate OSV use assumption categories, shown on Map X, were also assumed to be areas that would provide high quality OSV opportunities. The mapped OSV use assumptions were used to compare high-quality OSV opportunities across each alternative.

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Source (LRMP S&G,[5] law or policy, BMPs,[6] etc.)? |
|---|---|---|---|
| **Non-motorized Recreation Opportunities - displacement** | Access to desired non-motorized recreation settings and opportunities<br><br>Quality of non-motorized opportunities | Acreage and length of trails (miles) designated for non-motorized recreation enthusiasts within 5 miles of plowed trailheads<br>Percent of acres available for quiet, non-motorized use that are considered high quality non-motorized opportunities based on proximity to plowed trailheads (areas within 5 miles of plowed trailheads) and absence of motorized use | Public comment |
| **Non-motorized Recreation Conflicts – Public Safety** | Areas and trails available to non-motorized recreation enthusiasts for quality non-motorized recreation experiences | Acreage not designated for public cross-country OSV use; percent change compared to current management | Minimization Criteria: 36 CFR 212.55(b)(3): Consider effects on the following with the objective of minimizing: Conflicts between motor vehicle use and existing or proposed recreational uses of National Forest System lands or neighboring Federal lands; and (4) Conflicts among different classes of motor vehicle uses of National Forest System lands or neighboring Federal lands. In addition, the responsible official shall consider: (5) Compatibility of motor vehicle use with existing conditions in populated areas, taking into account sound, emissions, and other factors |
| **Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Designated non-motorized areas** | Solitude | Distance of groomed public OSV trails from non-motorized areas, number of crossings of linear non-motorized features. | Wilderness Act of 1964<br>Wild and Scenic Rivers Act of 1968<br>National Trails System Act of 1968<br>Pacific Crest National Scenic Trail Comprehensive Plan<br>Values or features that often characterize Inventoried Roadless Areas (66 FR 3245, January 12, 2001) |
| | Air Quality | Qualitative/narrative description of potential impacts | Minimization Criteria: 36 CFR 212.55(b)(3) |

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Source (LRMP S&G,[5] law or policy, BMPs,[6] etc.)? |
|---|---|---|---|
| **Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Designated non-motorized areas** (continued) | Scenery | Qualitative/narrative description of potential visual impacts | LRMP Management Area Standards and Guidelines<br>Specific Visual Quality Objectives standards and guidelines pertain to each management area.Visual quality objectives (VQO) include: Preservation (P), Retention (R), Partial Retention (PR), Modification (M), and Maximum Modification (MM). |
| | Potential conflict with other resource values | Proximity of OSV use related to other resource values (such as tribal/ spiritual sites, sensitive wildlife areas, popular non-motorized winter recreation areas, populated areas, neighboring Federal lands, etc.). | Minimization Criteria: 36 CFR 212.55(b)(3) |
| **Designated Areas** | Wilderness Attributes | Size of areas (acres) affected and duration of impact. Qualitative description for wilderness attributes | FSH 1909.12 (72.1) |
| | Roadless Characteristics | Size of area (acres) affected and duration of impact. Qualitative description for roadless characteristics | 36 CFR 294.11 |

## OSV Use Assumptions for Analysis

The following OSV use assumptions were developed based on information in the *California Over-Snow Vehicle Program Final State Environmental Impact Report (EIR) for Program Years 2010-2020* and 2009 Trailhead Survey (conducted in support of the 2010 State OSV Program EIR for Program Years 2010–2020),, and based on local knowledge and observations of resource specialists from the Tahoe National Forest. The assumptions were mapped and used in this analysis to consider potential impacts from OSV designations and OSV trail grooming activities on recreation and designated areas, and to identify areas with high quality, desirable OSV opportunites where OSV use is expected to be in the high to moderate range.

The OSV use assumptions include:

- Limited OSV use on steep slopes with heavy forest cover/high tree density (assume no use on slopes 35 percent or greater). In open terrain, with no trees, there is no slope-limiting factor for high-marking.
- OSV's avoid open areas with many shrubsuntil snow depth is adequate to cover the schrubs.
- OSV use patterns:
    - ♦ Primarily day use (generally 10:00 am to 3:00 pm; grooming occurs at night).
    - ♦ OSV use is at the highest on weekends and holidays.
    - ♦ Highest concentrations of OSV use occur along groomed trails (this is supported by research documented in State EIR).
    - ♦ Concentrated use occurs at trailheads.
    - ♦ Higher OSV use in open meadows (concentrated on meadows with groomed trail access) and flatter areas.
    - ♦ OSV "high marking" occurs primarily on slopes with open vegetation, near groomed trails.
    - ♦ Lower elevations generally have less OSV use – snow occurs at lower elevations less frequently and does not persist for long periods of time (2 to 5 days), 5,000 feet and below for the Tahoe.
- Ungroomed routes receive 50 percent less OSV use than groomed routes (only 25,000 registered OSVs in California per State EIR, most use on groomed trails; if OSV trail grooming were discontinued, assume that use would decline by 50 percent).
- Groomed trails are suitable for OSVs other than snowmobiles (side-by-sides and quads on tracks, snowcats, etc.)
- Groomed trails provide a higher degree of potential receipt of educational messages including messages encouraging trail sharing to reduce potential use conflicts.

## Spatial and Temporal Context for Effects Analysis

### Spatial Context:

The spatial boundaries for analyzing the direct, indirect, and cumulative effects to recreation are within the Tahoe National Forest boundary, because the proposed OSV designation decision would apply to OSV trails and areas within the forest boundary and have the potential to cumulatively impact OSV recreation experiences and opportunities across the forest.

### Effects Timeframe:

The temporal boundaries for analyzing the direct and indirect effects to recreation are, in the short term, one year, and in the long term up to 20 years. Short-term effects such as changes in the acres available to motorized or non-motorized winter uses would occur upon implementation of the OSV designation decision. Long-term effects such as decreases in use conflicts and protection of resources due to effective management of OSV use through a designated OSV system of trails and areas would occur over the life of the decision

The temporal boundaries for analyzing cumulative effects to recreation are up to 20 years, because the OSV designations would remain in effect over the long term, and would therefore overlap in time with other forest management activities that could cumulatively impact OSV recreation experiences and opportunities.

## Affected Environment

### Existing Condition

#### *Recreation Settings and Opportunities*

The Tahoe National Forest is one of the most popular recreation forests in the United States with year-round recreation opportunities. In winter, there are outstanding winter sports opportunities including world-renowned downhill ski areas and extensive snowmobile and cross-country ski trails to experience. (USDA Forest Service 2016).

The main travel corridors are: Interstate 80, Highway 49, Highway 20, Highway 89 (North and South), Foresthill Divide Road, Mosquito Ridge Road, Bowman Road, Marysville Road, and Gold Lake Highway. The Tahoe National Forest is bordered on the north by the Plumas National Forest, on the south by the Eldorado National Forest, on the east by the Humboldt-Toiyabe National Forests and Lake Tahoe Basin Management Unit. On the western border are the foothills above the Sacramento Valley.

**Recreation Niche**

The recreation niche is a characterization of the distinct role the national forest has in providing outdoor recreation opportunities to the public. The niche allows the Forest Service to focus management efforts on providing recreation opportunities related to what is unique and valuable about the Tahoe. The recreation niche statement of Tahoe National Forest is:

> *Within a one-hour drive of Reno and Sacramento, the Tahoe National Forest provides visitors the opportunity for individual challenge and renewal in a rugged Sierra Nevada setting. Winter and summer activities abound; emerging outdoor recreation sports are tested here. World-class downhill ski areas can be found nestled in the Tahoe high country; cross-country ski areas provide visitors with backcountry winter excursions in fir and pine-canopied landscapes. Other popular winter activities include snowplay, snowmobiling and backcountry skiing. With over 1000 miles of trails, the Tahoe provides California's most extensive motorized touring and non-motorized-trekking opportunities in mountainous landscapes. The Tahoe also provides a variety of rivers and lakes offering opportunities for waterbased recreation such as fishing, rafting, boating and swimming. Campgrounds and other facilities provide visitors lodging and simply a*

> *place to rest after a long day of arduous outdoor-recreation adventure. All of these activities are packaged in a scenic setting, surrounded by historic towns and locations that add to the visitor's overall quality experience. It's Tuesday, take the day off – and come up and enjoy a day on the Tahoe! (USDA Forest Service 2007).*

### Recreation Opportunity Spectrum

The Forest Service uses the recreation opportunity spectrum (ROS) to inventory and describe the range of recreation opportunities available based on the following characteristics of an area: physical (characteristics of the land and facilities), social (interactions and contact with others), and managerial (services and controls provided). The recreational settings are described on a continuum ranging from Primitive to Urban. The ROS classes within the Tahoe National Forest include Primitive (P), Semi-Primitive Non-Motorized (SPNM), Semi-Primitive Motorized (SPM), Roaded Natural (RN), and Rural (R). OSV designations consistent with the ROS classes provide for a diversity of opportunities for both motorized and non-motorized winter activities and the associated desired experiences. The descriptions below are from the Tahoe Forest Plan Standards and Guidelines for ROS.

**Primitive:** Area is characterized by an essentially unmodified natural environment of fairly large size. Interaction among users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use within the area is not permitted.

Users should have an extremely high probability of experiencing the area as it is described above.

**Semi-Primitive Non–Motorized:** Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Interaction among users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but are subtle. Public motorized use is not permitted.

Users should have a high, but not extremely high probability of experiencing the area as it is described above.

Temporary vehicle use may be authorized based on special needs, but only for the duration of the project, roads would then be obliterated. Examples of special needs are insect or fire salvage, vehicle and equipment access (supported by an escaped fire situation analysis), and placement or removal of facilities under special-use permit.

**Semi-Primitive Motorized:** Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but are subtle. Public motorized use is permitted. Roads constructed and projects planned for resource utilization will strive to maintain the character of the ROS class. Following resource utilization, roads will be closed to public use or put-to-bed unless the road meets a specific recreation use in keeping with the ROS class.

Users should have a moderate probability of experiencing the area as it is described above, except that there is a high degree of interaction with the natural environment. Opportunity is available to use motorized equipment while in the area.

**Roaded Natural:** Area is characterized by a predominantly natural-appearing environment with moderate evidences of the sights and sounds of humans. Such evidences usually harmonize with the natural environment. Interaction among users may be low to moderate, but evidence of other users is prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities.

Users should have about equal probability to either experience affiliation with other user groups or be isolated from sights and sounds of people.

Opportunity exist to have a high degree of interaction with the natural environment. Challenge and risk opportunities associated with more primitive type of recreation are not very important. Practice and testing of outdoor skills might be important. Opportunities for both motorized and non-motorized forms of recreation are possible.

**Rural:** Areas characterized by substantially modified natural environment. Resource modification and utilization practices are primarily to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by large numbers of people. Facilities are often provided for special activities. Moderate densities are provided far away from developed sites. Facilities for intensive motorized use and parking are available.

Users should be able to experience affiliation with individuals and groups, sites and opportunities are convenient. Human Interaction and convenience are generally more important than the setting of the physical environment. Opportunities for wildland challenges, risk taking, and testing of outdoor skills are generally unimportant except for specific activities like downhill skiing, for which challenge and risk taking are important elements.

**Modern Urban[8]:** Areas characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Renewable resource modification and utilization practices are designed to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans, on site, are predominant. Large numbers of users can be expected, both on site and in nearby areas. Facilities for highly intensive motor use and parking are available with forms of mass transit often available to carry people throughout the site.

Users should be able to experience affiliation with individuals and groups. Sites and opportunities are convenient. Experiencing natural environments, having challenges and risks afforded by the natural environment, and the use of outdoor skills is relatively unimportant. Opportunities for competitive and spectator sports and for passive uses of highly human-influenced parks and open spaces are common.

A majority of Tahoe National Forest acres are in the Roaded Natural and Rural classes.

**Table 20. Tahoe National Forest recreation opportunity spectrum classes**

| Recreation Opportunity Spectrum | ROS Class Acres | Acreage Percent of total Forest Acres |
|---|---|---|
| Primitive | 33,000 | 4% |
| Semi-Primitive Non-Motorized | 48,975 | 6% |
| Semi-Primitive Motorized | 89,994 | 11% |
| Roaded Natural/Rural | 664,122 | 79% |
| Total | 836,041 | 100% |

Travel Management Plan FEIS Table 3.07-2. ROS acres in each class for all alternatives
Acres and percentage for both Roaded Natural and Rural ROS were combined into a single category.
No Urban ROS designations have been made on the Tahoe National Forest.

[8] Although there is no Modern-Urban ROS Class identified on the Tahoe NF, this Class is presented for comparative purposes.

The Granite Chief Wilderness and the North Fork American Wild River, the only Primitive ROS areas, are closed to public OSV use. The ROS classes are incorporated into the Tahoe Forest Plan management areas.

### *Motorized Winter Recreation*

The Tahoe National Forest receives adequate snowfall for OSV trail grooming in all four Ranger Districts, however the east side of the forest (Truckee and Sierraville districts) receives the most snow and has a longer grooming season. Snowmobile use is managed under the Tahoe Off-Highway Vehicle Travel Plan and the Transportation Management Program.

OSV use is prohibited in the Granite Chief Wilderness, Research Natural Areas, North Fork American River Wild and Scenic River and the Onion Creek Experimental Forest. Forest Plan standards and guidelines for each of the Forest’s 109 management areas specify OSV use designations (open to OSV use, closed to OSV use, or restricted to designated routes) for each management area. (Refer to Appendix B. Forest Plan Direction.)

There are four Snowmobile Outfitter/Guides currently permitted to operate on the Tahoe National Forest, including Eagle Ridge Snowmobile Outfitters (Little Truckee Summit), Coldstream Adventures (Cabin Creek and Coldstream), Lake Tahoe Snowmobiling (Brockway Summit and Hwy 267), and Full Throttle (Martis Peak Road and Highway 267) (USDA Forest Service 2010).

For over 30 years, the Forest Service, Pacific Southwest Region, in cooperation with the California Department of Parks and Recreation (California State Parks) Off-highway Motor Vehicle Division has enhanced winter recreation, and more specifically, snowmobiling recreation by maintaining National Forest System trails by grooming snow for snowmobile use. Plowing of local access roads and trailhead parking lots, grooming trails for snowmobile use, and light maintenance of facilities (e.g., restroom cleaning, garbage collection) are the essential elements of the OSV program that keep the national forests open for winter recreation use.

There are approximately 265 miles of National Forest System OSV trails on the Tahoe National Forest, with approximately 217 miles of these available for grooming. There are six designated winter trailheads that include three SnoParks (Yuba Gap, Donner Summit, and Yuba Pass), restroom facilities, three Snow Tractor/Groomer storage sheds (Little Truckee Summit on the Sierraville Ranger District, Bassett’s on the Yuba River Ranger District, and China Wall on the American River Ranger District). All grooming is done on top of the designated road system. The groomed OSV trail system that is included in the California Department of Parks and Recreation, OSV Program funded activities on the American River, Yuba River, Truckee, and Sierraville Ranger Districts is described below.

**Bassetts Trail System**. The Bassetts trail system and trailhead parking are located off State Route 49 roughly 15 miles west of Sierraville in the Yuba River Ranger District. Trailhead parking is provided off Gold Lake Road. Some of the Bassett area trails extend north to the Gold Lake area in the Plumas National Forest. Bassetts provides 82 miles of groomed trail (including county roads). Trails connect to the Little Truckee Summit trailhead. Trail elevations range from 5,700 feet to 7,800 feet. The Bassetts trail system is located within the Yuba Northeast and Sierraville West OSV areas on the Tahoe National Forest. Detailed OSV route mileage on Tahoe National Forest lands is shown in table 22.

**China Wall Trail System.** The China Wall trail system and trailhead parking are located 12 miles northeast of Foresthill on Foresthill Road off of Interstate 80 near Auburn. Trailhead parking is provided via a parking lot accessed from Foresthill Road. The China Wall trail system provides 50 miles of groomed trail (including County roads), a plowed trailhead, and a restroom maintained by the Forest Service (American River Ranger District). Trail elevations range from 5,000 feet to 7,200 feet. Unmarked routes follow Foresthill Road from which riders can take side trips to Humbug, Deadwood, and American

Hill ridges. The groomed trails include the China Wall Staging Area to Road 66, Humbug Loop, Foresthill Divide Road, American Hill Loop (Road 13), Ford Point Trail and Tadpole Loop, Soda Springs Trail, and Duncan Y trail (Road 43). The China Wall trail system is located within the Foresthill East OSV area on the Tahoe National Forest. Detailed OSV route mileage on Tahoe National Forest lands is shown in table 22.

Placer County plows 3 miles of Foresthill Road and the trailhead parking.

**Little Truckee Summit Trail System**. The Little Truckee Summit trail system is accessed from three different trailhead parking areas: Yuba Pass Sno-Park on State Route 49 eight miles west of Sierraville; Little Truckee Summit on State Route 89 at Jackson Meadow Road roughly 16 miles north of Truckee; and Prosser Hill five miles north of Truckee.

Little Truckee Summit offers 138 miles of groomed trail (including County roads) with elevations ranging from 5,700 feet to 7,800 feet. Snowmobile trail grooming is done by a private contractor through the Sierra County Public Works and Transportation Department. Some snowmobile trail grooming is done under Forest Service volunteer agreements by private landowners living year-round off the groomed trail system. Plowed trailhead access is provided by Caltrans at all three trailheads; however only the Little Truckee Summit trailhead is plowed by State of California OSV Program funds under contract to Sierra County.

In the spring, temporary trailheads are set-up along the main groomed snowmobile route by plowing Jackson Meadow Road (Forest Route 07) out of Little Truckee Summit, to help provide better access for OSV riders and decrease damage to the Jackson Meadow Road. Plowing of Jackson Meadow Road has historically been done by private contractor through Sierra County, however, in 2010, plowing was done by Sierra County. Winter restroom cleaning and maintenance at all three locations is done with a combination of Forest Service (Tahoe National Forest) OHV Ground Operations funds (Prosser Hill), sno-park funds (Yuba Pass Sno-Park), and State of California OSV Program funds through Sierra County (Little Truckee Summit). The Little Truckee Summit trail system is located within the Sierraville West OSV areas on the Tahoe National Forest. Detailed OSV route mileage on Tahoe National Forest lands is shown in table 22.

**Table 21. Overview of State of California OSV Grooming Program Activity on the Tahoe National Forest**

| Project Location<br>National Forest (NF), Ranger District, and County | Recreation Facility | State of California OSV Program Funded Activity |
|---|---|---|
| Tahoe NF, Yuba River Ranger District, Sierra County, near Bassetts | Bassetts and Little Truckee Summit Trail Systems | Groom 82 miles of trail, plow 13 miles of road and 2 trailheads, and service restrooms. |
| Tahoe NF, American River Ranger District, Placer County, near Auburn | China Wall Trail System | Groom 50 miles of trail, plow 3 miles of road and 1 trailhead, service 1 restroom, and refuse collection. |
| Tahoe NF, Sierraville and Truckee Ranger Districts (East Zone), Sierra and Nevada counties | Little Truckee Summit, Prosser, and Yuba Pass groomed trail systems | Groom 138 miles of trail (connects to Bassetts/Gold Lakes), plow 8 miles of road and 1 trailhead (2 plowed by Caltrans), service 3 restrooms |

**Table 22. Overview of OSV Trails on Tahoe National Forest Lands**

| Tahoe National Forest OSV Area | Groomed OSV Trail Systems | Designated OSV Trails Available for Grooming (miles) | Marked, Ungroomed Trails for OSV Use (miles) | Designated OSV trails not Available for Grooming (miles) | Total OSV Trail miles on Tahoe National Forest Lands |
|---|---|---|---|---|---|
| Black Buttes | | 12 | | | 12 |
| Bowman | | 14 | | | 14 |
| Donner Summit | | | 2 | 1 | 3 |
| Foresthill East | China Wall | 55 | 21 | 0.5 | 76.5 |
| Sierraville West | Little Truckee Summit and Bassets | 114 | | | 114 |
| Truckee | | 1 | 6 | 5 | 12 |
| Yuba Northeast | Bassets | 21 | 11 | 1 | 33 |
| Tahoe National Forest OSV Area | Groomed OSV Trail Systems | Designated OSV Trails Available for Grooming (miles) | Marked, Ungroomed Trails for OSV Use (miles) | Designated OSV trails not Available for Grooming (miles) | Total OSV Trail miles on Tahoe National Forest Lands |

## Non-motorized Winter Recreation

The Tahoe National Forest contains one designated wilderness (28,475 acres), 11 inventoried roadless areas (171,328 acres), one designated and four recommended Wild and Scenic Rivers, three research natural areas, and two experimental forests.

The non-motorized Pacific Crest National Scenic Trail follows the Sierra Crest through the middle of the Tahoe National Forest, and the non-motorized South Yuba National Recreation Trail follows the South Fork of the Yuba River.

There are five cross-country ski areas including Lunch Creek, Castle Peak, Kyburz, Cabin Creek and Pole Creek.

## Designated Areas

### Wilderness

The California Wilderness Act of 1984 designated the Granite Chief Wilderness on the Tahoe National Forest. The Wilderness is adjacent to the western watershed boundary of Lake Tahoe and includes Five Lakes Creek and the headwaters of the North Fork and Middle Fork of the American River. The major attractions of this area are its high, rugged granite cliffs and broad glaciated valleys. (USDA Forest Service 2007, p 36).

The Wilderness Act of 1964 prohibits OSV use in designated wilderness areas. The nearest marked OSV route to the Granite Chief Wilderness is the Mosquito Ridge trail, located more than two air miles to the west of the Wilderness boundary.

### Inventoried Roadless Areas:

Inventoried roadless areas (IRA) provide clean drinking water and function as biological strongholds for populations of threatened and endangered species. They provide large, relatively undisturbed landscapes that are important to biological diversity and the long-term survival of many at-risk species. Inventoried roadless areas provide opportunities for dispersed outdoor recreation, opportunities that diminish as open space and natural settings are developed elsewhere. They also serve as bulwarks against the spread of non-native invasive plant species and provide reference areas for study and research (USDA Forest Service 2009).

Tahoe National Forest has 11 inventoried roadless areas totaling 171,328 acres (Tahoe National Forest, GIS data), excluding private lands located within the IRA boundaries. The names and acres of each IRA are listed in table 23. Detailed descriptions of the roadless area characteristics can be found in the 1990 Forest Plan FEIS appendix G, and in the 2010 Tahoe Motorized Travel Management FEIS.

**Table 23. Tahoe National Forest inventoried roadless areas**

| Inventoried Roadless Area | Acres | OSV Status |
|---|---|---|
| Bald Mountain (extends onto the Humboldt-Toiyabe NF) | 5,834 | Approximately 1,061 acres of this IRA has been established as a Research Natural Area. OSV use prohibited within the SPNM and RNA portion, OSV use allowed or restricted in remaining acreage. No OSV trails in this area. |
| Castle Peak | 15,738 | The Andesite West OSV trail passes through the western side of the Castle Peak IRA. OSV use is prohibited in the Independence Zoological SIA in the northeast portion of the IRA.. OSV use is allowed or restricted on the remaining acreage. This area receives heavy cross-country skiing and snowmobile use in the winter. There are areas of high to moderate OSV use in this IRA. |
| Duncan Canyon | 9,253 | The Mosquito Ridge, Robson Flat, Duncan Y and Soda Springs OSV trails form a loop around the Duncan Canyon IRA, but are not within the IRA acreage. OSV use is allowed within this IRA. There are areas of high to moderate OSV use in this IRA. |
| East Yuba | 10,805 | The Gold Valley Marked snowmobile trail is located in the SW portion of the East Yuba IRA. OSV use is allowed within this IRA. There are areas of high to moderate OSV use in this IRA. |
| Granite Chief (Granite Chief Wilderness acreage included) | 31,297 | The California Wilderness Act of 1984 designated 25,680 acres of this IRA as the Granite Chief Wilderness. OSV use is prohibited in the designated Wilderness, and in the SPNM areas of the IRA adjacent to the Wilderness. No OSV trails in this area. |
| Grouse Lakes (Grouse Lake vehicular closure included) | 19,271 | OSV use is allowed within this IRA. No OSV trails in this area. There are areas of high to moderate OSV use in this IRA. |
| Lakes (Basin) (extends onto the Plumas NF) | 557 | The Gold Valley Marked snowmobile trail is located just outside of this IRA, within the East Yuba IRA. OSV use is allowed in this area. |
| Middle Yuba | 7,884 | Over 40 percent of this IRA is in private ownership. OSV use is allowed in a majority of this IRA. No OSV trails in this area. |
| North Fork American River (NFAR Wild River included) | 43,374 | The Soda Springs, Foresthill Divide, American Hill, Tadpole, Ford Point, Humbug, and Humbug Tie OSV trails run near the southern boundary of the North Fork American River IRA, but are not within the IRA or WSR acreage. OSV use is prohibited in a majority of this IRA. OSV use is low in this IRA. |
| North Fork of the Middle Fork American River | 11,257 | OSV use is allowed in a majority of this IRA. No OSV trails in this area. |
| West Yuba (extends onto the Plumas NF) | 1,605 | OSV use is allowed in a majority of this IRA. No OSV trails in this area. |

## Wild and Scenic Rivers:

The North Fork American Wild River is classified by Congress and administered according to the North Fork American Wild River Management and Development Plan. Visual quality is managed according to standards and guidelines in the *Tahoe National Forest Land and Resource Management Plan* (LRMP 1990)

Four river corridors on the Tahoe National Forest have been recommended for designation as Wild and Scenic Rivers. The proposed corridors include sections of Sagehen Creek, Canyon Creek, North Yuba River, and the Lower South Yuba River. The proposed segments are managed to protect their wild and scenic characteristics through the study period and until designated or released from consideration.

The Bowman OSV trail passes through a recommeneded scenic segment of the South Yuba River. The Fifty Four Road trail crosses a recommended recreational segment of the North Yuba River. The Prosser Creek Connector trail crosses a recommended scenic segment of Sagehen Creek.

### Research Natural Areas

There are three research natural areas (RNAs) on the Tahoe National Forest that are managed to maintain select vegetative, aquatic, and/or geologic elements in natural conditions. Babbit Peak RNA (within the Bald Mountain IRA), Sugar Pine RNA (a portion of the RNA is in the North Fork American River IRA), and Lyon Peak Needle Lake RNA (within the Granite Chief IRA) are not designated for OSV use under existing Forest Plan standards and guidelines.

### Experimental Forests

There are two experimental forests within the Tahoe National Forest. Experimental forests provide lands for conducting research and development that serves as a basis for the management of forests and grasslands.

### Special Interest Areas

There are eight special interest areas on the Tahoe National Forest. Special interest areas are established to protect, and where appropriate, foster public use, study, and enjoyment of areas with scientific, scenic, historical, geological, botanical, zoological, paleontological, or other special characteristics. OSV use is not designated in a majority of the special interest areas, with the exception of Sagehen Headwaters and Meadow Lake Special Interest Areas.

### Pacific Crest National Scenic Trail

Approximately 99 miles of the PCT traverse the Tahoe National Forest. Of that, 76 miles of the PCT is on National Forest System lands. OSV use along the PCT is prohibited by the National Trails System Act, P.L 90-543, Section 7(c). The PCT is managed for non-motorized trail uses.

The PCT was designated in 1968 as one of the first national scenic trails. The PCT (extending from Mexico to Canada) was established to provide for maximum outdoor recreation potential and for the conservation and enjoyment of the nationally significant scenic, historic, natural, or cultural qualities of the areas which such trails may pass (USDA Forest Service 192).

The Pacific Crest National Scenic Trail Comprehensive Management Plan (1982) contains the following direction:

> *Viewing and understanding resource management are considered to be part of the normal character of the trail. The management of the various resources will give due consideration to the existence of the trail and trail users within the multiple use concept. Prescription for management of the visual resources associated with the trail will be part of agency planning processes.*

The Comprehensive Management Plan reinforces that snowmobiling along the trail is prohibited and has the following direction for implementation of the Plan:

> *Winter Use: Winter use (cross country skiing and snowshoeing) should be accommodated where practical and feasible. Each agency should follow its own procedures for marking and signing the trial for winter use purposes. As a guideline, all trail markers should be at eye level (approximately 40" above average maximum snow depth). Sanitation facilities and snow removal for parking may be necessary. Any improvement or alterations of the vegetation should not detract from the quality of the recreation opportunities for other trail activities such as hiking and horseback riding.*
>
> *Snowmobiling along the trail is prohibited by the national Trail System Act, P.L. 90-543, Sec 7(c). Winter sports plans for areas through which the trail passes should consider this prohibition in determining areas appropriate for snowmobile use. Winter sports brochures should indicate designated snowmobile crossing of the Pacific Crest Trail where it is signed and marked for winter use. If cross-country skiing and/or snowshoeing are planned for the trail, any motorized use of adjacent land should be zoned to mitigate the noise of conflict.*

Management areas that are crossed by the PCT have this specific direction referenced as part of their prescription in the Forest Plan.

The Tahoe Forest Plan includes the following under Management Goals and Strategies for Facilities (transportation system):

> *3. Manage Tahoe National Forest lands next to the Pacific Crest National Scenic Trail under the multiple use concept, giving due consideration to the existence of the trail and users of the trail* (LRMP, pg. V-11).

Approximately one-quarter of the PCT mileage on the Tahoe passes through wilderness and other areas where OSV use is not designated for OSV use. The remaining mileage passes through areas that are designated for OSV use, however OSV use is not allowed on the Trail itself. Existing groomed and marked OSV trails cross the PCT in four locations, however no designated crossings have been identified.

### Visitor use

To determine possible effects of management alternatives, it is important to understand the characteristics of people who visit and recreate on the Tahoe National Forest. Responding to the need for improved information about visitors to National Forest System lands, the Forest Service developed a nationwide, systematic monitoring process for estimating annual recreation use: the National Visitor Use Monitoring (NVUM) program.

The NVUM program was designed to provide statistically reliable estimations of recreation visitation to national forests and grasslands. Through collection and dissemination of information about recreational visitors and their preferred activities, resource managers can make informed, strategic decisions about the types and amount of recreation opportunities provided on the national forest.

NVUM surveys were conducted on the Tahoe National Forest during fiscal years 2005, 2010, and 2015. Surveys collected information about participation in recreation activities, visitor demographics, and spending patterns. Summaries from these surveys are useful to describe recreation use patterns on the national forest. As displayed, these data are only valid at the forest level and cannot be disaggregated to specific sites or locations.

Local visitors are common to the Tahoe National Forest. Over 40 percent of visits came from people living within 25 miles of the national forest; and less than 10 percent have traveled over 200 miles. About half of all visits to the Tahoe National Forest last less than 4 hours. Frequent visitors are relatively common with over 35 percent of all visits made by people who visit more than 50 times per year.

In 2015, the three most reported main activities were downhill skiing (23 percent), hiking/walking (20 percent), and viewing natural features (8 percent). In 2010, the three most reported main activities were downhill skiing (18 percent), hiking (13 percent), and cross-country skiing (13 percent). In 2005, the three most reported main activities were downhill skiing (31 percent), hiking (15 percent), and fishing (11 percent). In 2015, snowmobiling was reported as a main activity for 0.2 percent, in 2010, snowmobiling was reported as a main activity for 1.7 percent, and in 2005 snowmobiling was reported as a main activity for 7 percent.

Table 24 shows the estimated visitor use based on the percentage of visitors reporting snowmobiling and cross-country skiing as their main activity.

**Table 24. National Visitor Use Management winter activities**

| Year | Activity | Total Annual National Forest Visits | % Main Activity | Estimated Annual National Forests Visits based on the % main activity | Average hours participating in main activity |
|---|---|---|---|---|---|
| 2015 | Snowmobiling | 1,660,000 | 0.2% | 3,320 | 3.5 |
| 2015 | Cross-country Skiing | 1,660,000 | 5.7% | 94,620 | 3.0 |
| 2010 | Snowmobiling | 1,847,000 | 1.7% | 31,399 | 3.1 |
| 2010 | Cross-country Skiing | 1,847,000 | 12.6% | 232,722 | 3.5 |
| 2005 | Snowmobiling | 1,696,000 | 7.0% | 118,720 | 3.9 |
| 2005 | Cross-country Skiing | 1,696,000 | 12.6% | 213,696 | 3.5 |

*A National forest visit is defined as the entry of one person upon a national forest to participate in recreation activities for an unspecified period of time. A national forest visit can be composed of multiple site visits. The visit ends when the person leaves the national forest to spend the night somewhere else.

The California Department of Motor Vehicles records OSV registration by county each year. The Tahoe National Forest falls within the five counties shown in table 25.

**Table 25. California OSV registration for counties in Tahoe National Forest, 2009 through 2014**

| County | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|
| Nevada | 1,037 | 1,066 | 1,023 | 1,020 | 1,041 | 1,030 |
| Placer | 1,407 | 1,291 | 1,252 | 1,199 | 1,165 | 1,127 |
| Plumas | 1,236 | 1,180 | 1,111 | 1,025 | 1,022 | 920 |
| Sierra | 223 | 220 | 205 | 208 | 207 | 192 |
| Yuba | 340 | 351 | 325 | 300 | 310 | 303 |
| **TOTAL** | **4,243** | **4,108** | **3,916** | **3,752** | **3,745** | **3,572** |

*Data from CA State Parks, not official DMV records

Table 26 shows total statewide OSV registrations and out-of-state registrations.

**Table 26. California statewide OSV registration, 2009 through 2014**

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|
| Subtotal | 18,542 | 17,982 | 17,776 | 16,956 | 16,929 | 16,189 |
| Out of State | 260 | 242 | 235 | 244 | 215 | 197 |
| **Total** | **18,802** | **18,224** | **18,011** | **17,200** | **17,144** | **16,386** |

*Data from CA State Parks, not official DMV records

Snowmobile registrations in the Tahoe National Forest counties and statewide have declined slightly over the past six years. The State EIR estimated that OSV use would continue to increase at a rate of approximately 4 percent per year, as it had between 1997 and 2009 (California Department of Park and Recreation 2010); however, that has not been the case in recent years.

Because the Tahoe National Forest is near several large metropolitan areas in northern California and Nevada, and high-use areas around Lake Tahoe, demand for a variety of year-long recreation opportunities is high. It is projected that recreation on the forest would, at a minimum, increase at the same rate as the projected population in the surrounding counties (USDA Forest Service 2007). OSV visitor use varies based on the amount of snowfall and the length of the season.

Table 27 is derived from the OSV trailhead survey conducted for the State EIR, and based on data summarized in the State EIR (California Department of Park and Recreation 2010). The table shows the average number of vehicles at winter trailheads, and the average number of OSVs that would be expected on weekends and holidays versus weekdays. Based on this information, estimated use per winter season would be 22,410 OSV users forestwide.

**Table 27. Tahoe National Forest OSV visitor use**

| Location | Day description | Number of vehicles | Number of OSVs* |
|---|---|---|---|
| Forestwide | Weekend or holiday (approx. 33 per season)** | 202 | 404 |
| Forestwide | Weekday (approx. 65 per season)** | 40 | 80 |
| Forestwide (other non-program parking) | Weekend or holiday | 43 | 86 |
| Forestwide (other non-program parking)*** | Weekday | 8 | 16 |
| **Visitor Use information split out by trailhead:** | | | |
| Bassetts Trailhead | Weekend or holiday | 30 | 30 |
| Bassetts Trailhead | Weekday | 8 | 7 |
| Little Truckee Summit Trailhead | Weekend or holiday | 140 | 280 |
| Little Truckee Summit Trailhead | Weekday | 17 | 34 |
| China Wall Trailhead | Weekend or holiday | 32 | 64 |
| China Wall Trailhead | Weekday | 16 | 32 |

Based on 2009 data from California State Draft EIR

*assumes an average of 2 OSVs per vehicle parked at a trailhead

**seasonal total assumes 33 weekends/holidays of observed maximum total and 65 weekdays at 20 percent capacity.

*** Non-program parking is parking used by winter OSV visitors that is not one of the California State OSV Program-funded trailheads

## Conflicts between Motorized and Non-motorized Winter Experiences

The 2015 NVUM report indicates that 80.6 percent of visitors to the Tahoe National Forest are very satisfied, and 14.5 percent are somewhat satisfied. The satisfaction survey questions did not directly address winter use, however, the NVUM Importance-Performance ratings for Undeveloped General Forest Areas that could be relevant to winter recreation include conditions of developed facilities, access, service, and feeling of safety, all were rated “keep up the good work” (USDA Forest Service 2015).

Both motorized and non-motorized winter recreation activities can be described in three general categories including trail touring, backcountry exploring, and alpine adventure (Snowlands 2015). Trail touring is typically focused on the use of groomed trail systems, where the quality of the groomed trail with moderate climbs and descents is often the most important factor for the recreation experience. Backcountry exploring is focused on cross-country travel away from the groomed trail system with emphasis on travelling and exploring. Alpine adventure is characterized by the challenge of riding or skiing through powder snow on steeper slopes. In alpine adventure, backcountry skiers seek the downhill experience, while snowmobilers enjoy the challenge of climbing up (Snowlands 2015). Of particular concern for conflicts between motorized and non-motorized winter uses are areas that can be accessed in the winter from the Forest's six winter trailheads: Yuba Gap, Donner Summit, Yuba Pass, Little Truckee Summit, Bassett's, and China Wall. Most winter recreationists (both motorized and non-motorized) launch their winter recreation activities from these six designated winter trailheads.

Opportunities for quality recreation experiences depend on both the settings (physical, social, and managerial aspects), and on the desired experience of the recreationist. Conflicts occur when one recreationist effects or degrades the experience of another. Many non-motorized recreationists experience conflict with motorized recreationists (Adams and McCool 2010). Conflict can result in displacement or the abandonment of the use of a particular trail or area, or a change in time of use (Adams and McCool 2010).

Conflict between motorized and non-motorized winter uses arise due to differing desired recreation experiences, public safety concerns, noise, air quality, and access issues. Public comments received during the scoping period for this project describe conflicts related to (1) displacing visitors who prefer non-motorized recreation opportunities; (2) posing safety concerns for non-motorized users due to the high speed of vehicles on shared trails; (3) creating noise and air quality impacts that lead to the displacement of non-motorized users; (4) quickly consuming untracked powder snow, which reduces a desired backcountry skiing experience; (5) disrupting ski tracks, making the snow surface unsuitable for cross-country skiing; and (6) grooming trails which the State of California's Over Snow Vehicle Program Draft EIR estimates triples public OSV use on trails to the detriment of non-motorized users.

In public comments received during the scoping period for this project, motorized winter enthusiasts expressed concerns regarding additional limitations on use; however, they generally did not describe conflicts with non-motorized uses. Snowmobile trails are typically available for multiple uses, and in some areas provide opportunities for non-motorized uses such as cross country skiing, snowshoeing, and winter mountain biking. There are also those who use snowmobiles as a means to access backcountry areas to participate in non-motorized activities (American Council of Snowmobile Associations 2014).

There are approximately 25,000 annual OSV registrations in the state of California, and according to the 2009 State DEIR trailhead survey, approximately 22,410 OSV visits forestwide per winter season, typically mid-December through March. OSV use would be spread across the available areas and trails designated for OSV use. Based on 22,410 visits, if use were spread evenly across each day of the season, there would be approximately 213 OSVs on the forest per day. Daily use may be higher during weekends and holidays and lower during the week. For the existing conditions, this equates to 2,995 acres and 1 mile of trail per OSV. The level of OSV use is relatively low in comparison to other winter activities and there is adequate acreage available for the OSV use to disperse and avoid conflict.

Quality non-motorized winter recreation experiences are typically characterized by quiet activities such as cross-country skiing or snow-shoeing in a natural environment that is not influenced by the sound, smell of exhaust, or sight of snowmobiles. Areas must be accessible from plowed trailheads, as non-motorized recreationists typically do not travel long distances. Most non-motorized over snow recreation takes place within three to five miles of trailheads (American Council of Snowmobile Associations 2014). Non-motorized visitors spend an average of 2.3 hours on the snow per visit (Rolloff et al. 2009).

Quality motorized winter recreation opportunities are typically characterized by groomed trail systems and open hills for high marking. For this analysis, OSV opportunites across the Tahoe NF were mapped based on the OSV use assumptions criteria (listed in the Methodology section above). The areas that fall within the high to moderate OSV use areas are considered to provide high quality OSV opportunities based on the proximity to groomed trails and plowed trailheads, open meadows with trail access, and slopes with open vegetation near groomed trails. Snowmobilers typically have a maximum 80-mile round-trip travel range (California Department of Parks and Recreation 2010). Approximately half of motorized visitors indicated that they would not snowmobile or would snowmobile less if the trails were not groomed (Rolloff et al. 2009). OSV visitors spend an average of 6 hours on the snow per visit. Motorized recreationists are also interested in travelling through and experiencing a natural environment.

## Environmental Consequences

### Alternative 1

#### *Direct and Indirect Effects*

**Recreation Settings and Opportunities**

OSV use would continue to be managed according to the Tahoe Forest Plan. No changes to the OSV designations would be made, the existing winter motorized and non-motorized recreation opportunities would continue to be available. Grooming would continue as described in the 2010 State EIR, based on availability of funding, and adequate snowfall. There would be no reduction of opportunities or change in location for winter motorized OSV use.

The 2005 Travel Management Rule, subpart C, would not be implemented, and no OSV use map would be produced.

Opportunities for winter non-motorized recreation would also remain the same as described in the existing conditions. OSV use would remain consistent with existing ROS classes, with motorized use prohibited in Primitive and Semi-Primitive Non-motorized ROS classes (with the exception of the Grouse Management Area (041) and a small portion of the Sunflower Management Area (091)where OSV use is allowed in the winter) and allowed in Semi-Primitive Motorized, Roaded Natural and Rural ROS classes. OSV use is not allowed on the PCT and there are no designated OSV.

**Conflicts between Motorized and Non-motorized Winter Experiences**

Existing areas of conflict between motorized and non-motorized winter uses would continue. Most cross-country skiing occurs in the Snow Belt above 5,300 feet in elevation, and most use would occur within five miles of an all-weather road that is cleared of snow during the winter (USDA Forest Service 2007). These areas are most likely to see conflict between motorized and non-motorized winter uses. There are approximately 25,000 annual OSV registrations in the state of California, and according to the 2009 State DEIR trailhead survey, approximately 22,410 OSV visits forestwide per winter season, typically mid-December through March. OSV use would be spread across the available areas and trails that are designated for OSV use.

Non-motorized winter recreation enthusiasts may continue to be displaced in some areas by motorized OSV use. Displacement or conflict may occur where non-motoirzed enthusiasts are unable to access areas for desired quiet, non-motorized experiences away from the sights, sounds, and smells of motorized use, without traveling long distances through motorized routes and areas, or traveling further than they are physically able to traverse in a typical day. There are approximately 89,667 acres available for high quality, quiet, non-motorized winter activities and approximately 28 miles of cross-country ski trails and 20.5 miles of the PCT within 5 miles of plowed trailheads. These areas are free from motorized use and are easily accessible by non-motorized visitors in a typical day trip. There are approximately 198,271 acres across the Forest available for quiet, non-motorized experiences, where OSV use is not designated. There are also 1,218 acres designated for public cross-country OSV use in deer holding areas from January 1 through September 14, allowing opportunities for quiet, non-motorized recreation in these areas when OSVs are not present.

Other potential conflicts would continue to occur in some areas, as motorized OSVs consume untracked powder snow that is desired by backcountry skiers, create tracks across the snow surface making skiing difficult, and creating safety concerns in areas where motorized and non-motorized use is occurring at shared trailheads and on shared trails.

### Designated Areas

OSV use within the Granite Chief Wilderness is prohibited by the Wilderness Act. The closest OSV trail to the wilderness boundary is the Mosquito Ridge OSV trail, located more than two miles to the west. OSV incursions have not been an issue in this area.

OSV use is allowed on approximately 109,234 acres within inventoried roadless areas. Portions of the East Yuba, Lakes Basin, Grouse Lakes, Castle Peak, and Duncan Canyon Inventoried Roadless Areas are open to OSV use and are in areas where moderate to high OSV use occurs near the groomed trail system. Portions of five other inventoried roadless areas also fall in areas open to OSV use; however, low to no OSV use is expected in these areas. OSV use is prohibited in the Granite Chief IRA, including the designated Wilderness acreage. The roadless characteristics of high quality or undisturbed soil, water, and air, and solitude may be temporarily impacted when OSVs are present.

The Pacific Crest National Scenic Trail (PCT) would continue to be managed as a non-motorized trail, however OSV use adjacent to the trail could impact the winter non-motorized trail experience due to noise and the presence of OSVs near the trail, or crossing the trail. OSV trails across the PCT would not be designated and OSVs would continue to cross the trail along existing OSV routes, and could cross the PCT at any location where the trail passes through an area where OSVuse is allowed. The portion of the PCT on the Tahoe National Forest that passes through the Granite Chief Wilderness and other areas where OSV use is currently prohibited would continue to provide opportunities for quite non-motorized trail experiences.

Ongoing motorized use in close proximity to areas managed as non-motorized and inventoried roadless areas temporarily degrades opportunities for solitude when OSVs are present. Similarly, there may be temporary impacts to air quality from exhaust in the vicinity of OSVs, and short-term impacts to scenery when OSV tracks through the snow crisscross the landscape, leaving visual evidence of motorized use. The tracks only remain on the landscape until they are covered by additional snowfall or until the snow melts, and do not cause long-term impacts to scenery or the underlying soils and vegetation.

**Table 28. Recreation resource indicators and measures for the existing condition, alternative 1**

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Existing Conditions |
|---|---|---|---|
| **Motorized Recreation Opportunities – cross-country** | Opportunities for motorized winter uses | Size of areas (acres) designated for to public OSV use | 638,002 acres open for OSV use |
| | Quality of OSV opportunities | Percent of designated acres that are considered high quality OSV opportunities based on the high to moderate OSV use assumption categories | 33 percent of the acres open for OSV use provide high quality OSV opportunities. This totals to approximately 212,857 acres.<br>No minimum snow depth for OSV use cross-country |
| **Motorized Recreation Opportunities – designated snow trails and snow trails available for grooming** | OSV trail designations | Length (miles) of designated OSV trails available for grooming/Length (miles) of marked snow trails (ungroomed) | 217 miles designated OSV trails available for grooming;<br>41 marked, ungroomed trails designated for OSV use<br>No minimum snow depth for OSV use on trails<br>Follow OHMVR snow depth standards (for snow trail grooming to occur using OHMVR division funds/equipment) |
| **Non-motorized Recreation Opportunities - displacement** | Access to desired non-motorized recreation settings and opportunities | Size of area (acres) and length of trails (miles) available to non-motorized recreation enthusiasts within 5 miles of plowed trailheads | 89,667 acres and 28 miles of cross-country ski trails and 20.5 miles of the PCT available for non-motorized recreation within 5 miles of plowed trailheads |
| | Quality of non-motorized opportunities | Percent of acres available for quiet, non-motorized use that are within desired areas (defined as areas within 5 miles of plowed trailheads) | 45 percent of the acres not designated for OSV use (available for quiet, non-motorized use) provide high quality non-motorized opportunities, within 5 miles of plowed trailheads. |
| | Recreation Opportunity Spectrum | Consistency of OSV designations and grooming with existing ROS classes | Motorized OSV use prohibited in Primitive and Semi-Primitive Non-Motorized ROS classes[9]. Motorized OSV use allowed in Semi-Primitive Motorized, Roaded Natural and Rural ROS classes |

[9] With the exception of the Grouse Management Area (041) and a small portion of the Sunflower Management Area (091).

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Existing Conditions |
|---|---|---|---|
| **Non-motorized Recreation Conflicts – Public Safety** | Areas and trails available to non-motorized recreation enthusiasts for quality non-motorized recreation experiences | Size of areas (acres) OSV use not designated | 198,271 acres not designated for OSV use<br>1,218 acres OSV use allowed between January 1 and September 14 |
| **Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Designated non-motorized areas** | Proximity and frequency of OSV designations in relation to designated non-motorized areas | Distance of groomed public OSV snow trails from designated areas, number of OSV trails across linear designated areas | The closest OSV trail to the Granite Chief Wilderness boundary is the Mosquito Ridge marked, not groomed OSV trail, more than two miles to the west.<br>OSV use is not allowed on the PCT. Groomed and marked OSV trails cross the PCT in four locations. OSV trails across the PCT in areas where OSV use is allowed are not designated. |
| | Noise | Size of areas (acres) potentially affected by noise;size of areas (acres) not designated for winter motorized use | 638,002 acres designated for OSV use and potentially affected by noise.<br>198,271 acres not designated for OSV use and available for quiet recreation.<br>1,218 acres OSV use designated between January 1 and September 14. This area is available for quiet recreation from September through January |
| | Air Quality | Qualitative/narrative description of potential impacts (with reference to air quality analysis | Potential short-term impacts to the experience of recreational visitors in the vicinity of OSVs and grooming equipment due to the smell of exhaust emissions (see air quality report). |
| | Scenery | Qualitative/narrative description of potential visual impacts | Cross-country OSV use creates temporary tracks in the snow that crisscross the landscape. The visual evidence of snowmobile use decreases as fresh snow covers the tracks and/or when the snow melts at the end of the season. |
| | Potential conflict with other resource values | Proximity of OSV use related to other resource values (such as tribal/ spiritual sites, sensitive wildlife areas, popular non-motorized winter recreation areas, populated areas, neighboring Federal lands, etc.). | Existing conflict with historic structures at Robinson Flat. |

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Existing Conditions |
|---|---|---|---|
| **Designated Areas** | Wilderness Attributes | Size of areas (acres) affected and duration of impact. Qualitative description for wilderness attributes | Opportunities for solitude may be temporarily affected due to the sights and sounds of OSVs near the wilderness boundaries. There are approximately 4,404 acres open to OSV use within 1/2 mile of designated wilderness boundaries. The duration of the potential impacts would be short-term, during the winter while snow depth is adequate for OSVs to access the area. |
| | Roadless Characteristics | Size of area (acres) affected and duration of impact. Qualitative description for roadless characteristics | Approximately 109,234 IRA acres open to OSV use. Short term impacts to the roadless characteristics of: (1) undisturbed soil, water, and air (short-term impacts to air quality due to the presence of OSV exhaust), and (2) solitude (due to the sights and sounds of OSVs) during the winter while snow depth is adequate for OSVs to access the area. |

### *Cumulative Effects*

In alternative 1 both motorized and non-motorized winter use would continue to occur on trails and in areas across the forest, existing conflicts between these uses and desired experiences would continue in some popular areas. Cumulative impacts to the recreation experience are unlikely, since no changes would be made to the allowed uses or areas, and other ongoing or reasonably foresseable projects are not expected to impact winter recreation uses or create additional conflict between these uses. Short-term and temporary impacts to air quality (from OSV exhaust) and opportunities for solitude (due to OSV noise, and the presence of people) may occur when OSVs are present adjacent to Wilderness areas, within Inventoried Roadless Areas, or adjacent to the PCT. Noise from OSVs in areas and on trails across the forest would add to other sound sources, such as OSV grooming equipment, vehicles on highways, vehicles on Forest roads, equipment being used for forest management projects, etc.

## Alternative 2 – Modified Proposed Action

### *Direct and Indirect Effects*

#### Recreation Settings and Opportunities

Alternative 2 would provide a range of winter motorized and non-motorized recreation opportunities across the Tahoe National Forest. Having a clearly designated system of trails and areas where OSV use is designated and the subsequent production of the OSV use map would improve information available to the public about opportunities for OSV use. This would assist both motorized and non-motorized recreationists in selecting areas that meet their setting and experience preferences, and therefore, would minimize the potential for conflict.

Alternative 2 increases the total miles of OSV trail available for grooming and includes additional miles of OSV trail available for grooming on the Mosquito Ridge Trail in the Foresthill East OSV area. Actual groomed mileage varies and is based on snowfall and funding availability.

The proposed crossing at the creek on the Howards Meadow loop would provide a connection to enhance loop-riding opportunities for OSVs in this area.

Alternative 2 designates fewer acres for OSV use compared to alternative 1 and 4, however, alternative 2 focuses on providing motorized winter recreation opportunities in areas that receive high to moderate OSV use due to their access from parking and staging areas and groomed trails, elevation, and terrain while mitigating potential conflicts (particulary due to OSV noise and exhaust) in areas on the Forest that are also popular for non-motorized winter recreation activities. Alternative 2 provides a higher proportion of high-quality OSV use areas (defined by the high to moderate OSV use categories) relative to the acres designated for OSV use than alternatives 1 and 4, and about the same proportion as in alternative 5. Some popular areas for both backcountry skiiers and snowmobilers (e.g., Coon Canyon and the north and east bowls of Castle Peak) would remain designated for OSV use and therefore provide opportunities for both non-motorized and motorized winter recreation. These areas provide opportunites for winter visitors who enjoy using OSVs to reach backcountry areas to participate in non-motorized winter activities.

Alternative 2 reduces the total acres proposed to be designated for OSV use from the existing condition, and the designated OSV areas would be located generally above 5,000 feet elevation. This increases the acreage not designated for OSV use (compared to existing management (alternative 1), which would enhance quiet, non-motorized winter recreation opportunities, particularly in the lower elevations of the Forest. The specific areas that would not be designated for OSV use are included in portions of 18 of the 19 OSV areas analyzed, and specifically a 1-acre area near Robinson Flat to protect historic structures, the High Loch Leven, Independence Lake, and Steephollow areas, and individual parcels of National Forest System lands currently under long-term special use permits for Royal Gorge Cross Country Ski Area, Tahoe Donner Cross Country Ski Area, Boreal Ski Area, Donner Ski Ranch Ski Area, Sugar Bowl Ski Area, Alpine Meadows Ski Area and Squaw Valley Ski Area.

The proposed OSV use designations would be in compliance with existing ROS classes, maintaining a variety of both motorized and non-motorized recreation opportunities available across the national forest. Primitive and Semi-Primitive Non-Motorized areas would not be designated for OSV use (with the exception of the Grouse Management Area (041) and a small portion of the Sunflower Management Area (091) where public OSV use is allowed in the winter), while motorized opportunities would be available in Semi-Primitive Motorized, Roaded Natural and Rural settings.

The forestwide requirement that cross-country travel is only allowed when there is adequate snow depth to avoid damage to resources, typically 12 inches, may impose additional limitations on OSV use, although it is likely that most OSV owners would not ride with less than adequate snow depths to prevent damage to their OSVs. Establishing the forestwide snow depth requirement for cross-country OSV use would minimize impacts to soil, water, vegetation, and wildlife resources, as described in the relevant sections of this analysis. The requirement that public OSV use on snow trails is only allowed when there is adequate snow depth to avoid damage to resources, typically 6 inches would allow access to higher elevations and deeper snow conditions on and off trails.

### Conflicts between Motorized and Non-motorized Winter Experiences

Based on 22,410 OSV visits per winter season, if use were spread evenly across each day of the season, there would be approximately 213 OSVs on the forest per day. Daily use may be higher during weekends and holidays and lower during the week. For the alternative 2, this equates to 1,910 acres and 1.1 miles of groomed trail per OSV. Based on the OSV use assumption that most OSV use would be concentrated along groomed trails, the trail opportunites in alternative 2 would be essentially the same as in existing conditions. The change from the existing 2,995 acres per OSV to 1,910 acres per OSV would not be likely to create use conflict, and there is still likely adequate acreage to disperse the use and avoid use conflict.

Motorized use has inherent conflicts with non-motorized recreationists who are typically seeking a quiet recreation setting that is not influenced by the sight, sound, or exhaust smell of motorized vehicles. There are also inherent conflicts in that motorized OSVs travel much faster and farther than non-motorized recreationists. Public OSV use may impact the setting for non-motorized experiences by making tracks through the snow that often crisscross across the landscape, leaving visual evidence of motorized use. The tracks only remain on the landscape until they are covered by additional snowfall or until the snow melts, and do not cause long-term impacts to scenery or the underlying soils and vegetation (see additional analysis in the applicable resource sections of this analysis). OSV tracks can interfere with cross-country skiing by causing ruts in the trails, and since OSVs travel faster and farther than non-motorized recreationists, they often “consume” the fresh powder slopes, limiting opportunities for backcountry skiers who are seeking similar opportunities on snow covered slopes (Snowlands 2015).

Non-motorized winter recreation enthusiasts may continue to be displaced in some areas by motorized OSV use. Displacement or conflict may occur where non-motoirzed recreationists are unable to access areas for desired quiet, non-motorized experiences away from the sights, sounds, and smells of motorized use withouttraveling long distances through motorized routes and areas, or traveling further than they are physically able to traverse in a typical day. There are approximately 62,635 acres available for high quality, quiet, non-motorized winter activities and 28 miles of cross-country ski trails and 20.5 miles of the PCT within 5 miles of plowed trailheads. These areas are free from motorized use and are easily accessible by non-motorized visitors in a typical day trip. This is a 27,032-acre decrease from alternative 1. There are a total of approximately 429,378 acres across the Tahoe National Forest available for quiet, non-motorized experiences, where OSV use is not designated. Alternative 2 provides more quiet non-motorized opportunities than alternatives 1 and 4, resulting in fewer conflicts between motorized and non-motorized uses, compared to the existing conditions, but fewer quiet non-motorized opportunities than in alternatives 3 and 5.

An approximate 10 percent increase in the miles of OSV trail available for grooming provides additional opportunities for motorized OSVs, and has the potential to increase OSV use and the associated possible conflicts as compared to the existing conditions.

Two classes of OSV have been identified, including Class 1: over-snow vehicles 50 inches or less in width at the widest point on the vehicle, and Class 2: over-snow vehicles more than 50 inches in width at the widest point on the vehicle. There are currently no known conflicts occurring between different classes of OSV use. Snowcats are used for grooming OSV trails. The grooming operations are conducted during the night or during low-use timeframes, if possible, to avoid conflicts with day use. Since snowcats groom the OSV trails, the trails would be wide enough to accommodate larger tracked OSVs in addition to snowmobiles; however, there is currently very little use by larger tracked OSVs on the Tahoe National Forest. Class 1 OSVs are allowed on all designated OSV trails and areas. Class 2 OSVs are only allowed on designated OSV trails available for grooming. Only allowing the larger, class 2 OSVs on designated OSV trails available for grooming reduces the potential for conflict between different classes of OSVs.

Monitoring of trailheads and groomed trail areas for user conflicts and public safety concerns would be implemented. If monitoring indicates that conflicts are occurring, the Tahoe National Forest would consider implementing site-specific controls as necessary (such as speed limits, segregated access points for motorized and non-motorized use, increased visitor information or increased on-site management presence).

### Designated Areas

In alternative 2, the Mosquito Ridge OSV trail (along a section of Road 96 in the Foresthill East OSV area) would be groomed, rather than just a marked OSV trail. This would provide a groomed loop-riding opportunity from the Robinson Flat area around French Meadows Reservoir. Grooming this section of trail could increase use as compared to existing conditions, however this use would not be expected to impact the Granite Chief Wilderness area, since the trail is located more than 2 miles to the west.

OSV use is designated on 74,875 acres within inventoried roadless areas, slightly fewer than in alternative 1. Not designating OSV use in the High Loch Leven vicinity within the North Fork American River IRA reduces potential impacts on roadless characteristics, which include: (1) undisturbed or high quality soil, water and air and (2) opportunities for solitude in this area.  Portions of the East Yuba, Lakes Basin, Grouse Lakes, Castle Peak, and Duncan Canyon Inventoried Roadless Areas would be designated for OSV use and are in areas where moderate to high OSV use occurs near the groomed trail system. Portions of five other inventoried roadless areas also fall in areas that would be designated for OSV use; however, low to no OSV use is expected in these areas. OSV use is prohibited in the Granite Chief IRA, including the designated Wilderness acreage.

Alternative 2 designates OSV use in areas adjacent to the PCT segments within the Northeast Yuba, Sierraville West, Truckee, and Barker OSV analysis areas. Alternative 2 does not designate any areas for OSV use adjacent to the PCT segments within the Donner Summit, Summit West, and Granite Chief Wilderness OSV analysis areas. Alternative 2 designates 20 OSV trails across the PCT located in the Barker, Sierraville West and Yuba Northeast OSV analysis areas. Designating OSV trails acrossthe PCT would minimize the potential for motorized use to impact the trail experience and is consistent with the PCT comprehensive management plan. Limiting the locations where OSVs cross the trail would enhance the quiet, non-motorized experience while accommodating motorized access to OSV areas and maintaining OSV loop riding opportunities. Since most OSV trails acrossthe PCT would utilize roads identified on the Tahoe National Forest’s Motor Vehicle Use Map, motorized disturbance to the trail would be at a similar level as could be experienced in the summer months. Identifying designated trails on the OSV use map would allow PCT visitors to know in advance where they may encounter OSVs crossing the trail, and alerts OSV riders to locations of potential non-motorized recreationists along the trail. This knowledge enhances both public safety and the experience expectations of visitors in these areas. Alternative 2 would minimize potential motorized OSV impacts to the non-motorized PCT experience to a greater extent than alternatives 1 and 4, but does not provide as much protection of the non-motorized PCT experience as in alternatives 3 and 5. The proposed areas to be designated, and not designated for OSV use along the PCT provide for multiple uses along the trail, while also giving consideration to the existence of the trail and users of the trail, consistent with the management direction for the PCT in the Tahoe Forest Plan.

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**Table 29. Recreation resource indicators and measures for alternative 2 direct and indirect effects**

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Alternative 2, Modified Proposed Action |
|---|---|---|---|
| **Motorized Recreation Opportunities – cross-country** | Opportunities for motorized winter uses<br><br>Quality of OSV opportunities | Size of areas (acres) designated for public OSV use, percent change from current management<br>Percent of designated acres that are considered high quality OSV opportunities based on the high to moderate OSV use assumption categories | 406,895 acres designated for OSV use, 49 percent of the Tahoe NF. This is a 36 percent decrease from current management.<br>47 percent of acres designated for OSV use provide high quality OSV opportunities. This totals to approximately 191,311 acres.<br>OSV use is allowed when there is adequate snow depth to avoid damage to resources, typically a minimum of 12 inches |
| **Motorized Recreation Opportunities – designated snow trails and snow trails available for grooming** | OSV trail designations | Length (miles) of designated OSV trails available for grooming/Length (miles) of marked snow trails (ungroomed) | 237 miles of designated National Forest System (NFS) OSV trails available for grooming<br>14 miles marked, ungroomed trails for OSV use<br>70 miles of designated OSV trails not available for grooming<br>OSV use on trails allowed when there is adequate snow depth to avoid damage to resources, typically a minimum of 6 inches |
| **Non-motorized Recreation Opportunities - displacement** | Access to desired non-motorized recreation settings and opportunities<br><br>Quality of non-motorized opportunities | Size of area (acres) and length of trails (miles) available to non-motorized recreation enthusiasts within 5 miles of plowed trailheads<br>Percent of acres available for quiet, non-motorized use that are within desired areas (defined as areas within 5 miles of plowed trailheads) | 62,635 acres and 28 miles of cross-country ski trails and 20.5 miles of the PCT available for non-motorized recreation enthusiasts within 5 miles of plowed trailheads<br><br>14.6 percent of the acres not designated for OSV use (available for quiet, non-motorized use) provide high quality non-motorized opportunities, within 5 miles of plowed trailheads. |
| **Non-motorized Recreation Conflicts – Public Safety** | Areas and trails available to non-motorized recreation enthusiasts for quality non-motorized recreation experiences | Size of areas (acres) not designated for OSV use, percent change from current management | 429,378 acres not designated for OSV use<br>This is a 116 percent increase from current management (alternative 1) |

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Alternative 2, Modified Proposed Action |
|---|---|---|---|
| **Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Designated non-motorized areas** | Proximity and frequency of OSV designations in relation to designated non-motorized areas | Distance of groomed public OSV snow trails from designated areas, number of OSV trails across linear designated areas | The closest OSV trail to the Granite Chief Wilderness boundary is the. Mosquito Ridge marked (not groomed) OSV trail, more than two miles to the west.<br>OSV use is not allowed on the PCT.<br>22 PCT crossings would be designated. 13 of which are on roads (approximately 14 feet in width) and the other 9 are crossings of various widths (up to 0.25 miles wide), not on NFTS roads |
| **Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Designated non-motorized areas** (continued) | Soltude | Size of areas (acres) that could be affected by noise/size of areas (acres) not designated for winter motorized use | 406,895 acres designated for OSV use and possibly affected by noise<br>429,378 acres not designated for OSV use and available for quiet recreation |
| | Air Quality | Qualitative/narrative description of possible impacts (with reference to air quality analysis) | Possible short-term impacts to the experience of recreational visitors in the vicinity of OSVs and grooming equipment due to the smell of exhaust emissions (see air quality report). |
| | Scenery | Qualitative/narrative description of possible visual impacts | Cross-country OSV use creates temporary tracks in the snow that crisscross the landscape. The visual evidence of snowmobile use decreases as fresh snow covers the tracks and/or when the snow melts at the end of the season.<br>OSV use areas are designated adjacent to the PCT in the Northeast Yuba, Sierraville West, Truckee, and Barker OSV areas, OSV use is not designated adjacent to the PCT in the Donner Summit, Summit West, and Granite Chief Wilderness areas. |
| | Potential conflict with other resource values | Proximity of OSV use related to other resource values (such as tribal/ spiritual sites, sensitive wildlife areas, popular non-motorized winter recreation areas, populated areas, neighboring Federal lands, etc.). | One acre is not designated for OSV use to protect historic structures. |

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Alternative 2, Modified Proposed Action |
|---|---|---|---|
| **Designated Areas** | Wilderness Attributes | Size of areas (acres) affected and duration of impact. Qualitative description for wilderness attributes | Opportunities for solitude may be temporarily affected due to the sights and sounds of OSVs near the wilderness boundaries. There are approximately 2,305 acres designated for OSV use within 1/2 mile of designated wilderness boundaries. The impacts would be short-term during the winter while snow depth is adequate for OSVs to access the area. |
| | Roadless Characteristics | Size of area (acres) affected and duration of impact. Qualitative description for roadless characteristics | Approximately 74,875 IRA acres designated for OSV use. Short-term impacts to the roadless characteristics of (1) undisturbed soil, water, and (2) solitude during the winter while snow depth is adequate for OSVs to access the area. Fewer IRA acres that could be impacted by OSV use than in alternative 1. |

### *Cumulative Effects*

#### Recreation Settings and Opportunities

The OSV route designations and restrictions increase the management presence across the Forest through additional signs, maps, and motorized route designations that visitors must understand and comply with, slightly impacting the managerial component of the forest setting. This could result in cumulative impacts when added to other ongoing and future national forest projects that place limitations or temporary restrictions on the recreating public, or that provide additional signs, maps, and motorized route designations that visitors must understand and comply with, such as the 2017 MVUM update.

The trailhead and parking lot plowing activities associated with the OSV trail grooming program would also increase the presence of management personnel in the area; however, this would not be a change from existing conditions.

The foreseeable project, the Little Truckee Summit Parking Improvement project could cumulatively enhance winter recreational activities in this area.

#### Conflicts between Motorized and Non-motorized Winter Experiences

Indirect impacts of noise from alternative 2 would be less than in alternative 1, based on the number of acres designated for OSV use, therefore the potential cumulative impacts to quiet recreation experiences when added to other forest management projects that could also generate noise, is less than in alternative 1. One present action that could lead to cumulative noise impacts is the Placer County Water Agency (PCWA) gate and associated authorization to plow 15 miles of the Mosquito Ridge road, since OSVs, snow plows could be operating in the same area at the same time.

A general assumption can be made that as an area's population increases over time, visitor use would also increase, along with the potential for use conflicts on the limited public recreation resources. However, OSV use is also dependent on weather conditions and snowpack. OSV use has not increased at the rate that was anticipated in the 2009 State EIR. Due to the fluctuations in OSV use levels and winter conditions, it is difficult to accurately predict whether use conflicts would continue to increase over time. As the climate changes and snow levels rise, the area on the Thaoe National Forest with sufficient snow for OSV use would be reduced. This would potentially lead to a loss of motorized recreation opportunities, or increased use conflicts as both motorized and non-motorized winter visitors are spread across an area with less snow and shorter winter seasons.

#### Designated Areas

OSV use is prohibited in designated areas on the Tahoe National Forest, such as Wilderness. There are no known potential cumulative impacts associated with the OSV prohibitions, which are in compliance with the relevant management direction for specific designated areas. Illegal encroachment by OSVs into non-designated areas could occur, but would be monitored and dealt with as a law enforcement issue. The proposed Squaw Valley to Alpine Meadows Base-to-Base Gondola Project along a portion of the eastern Wilderness boundary, in addition to the OSV use designations in the Barker OSV area south of the Wilderness may add to the presence of people and OSVs that could be seen and heard from within the Wilderness during the winter months, temporaryily having a cumulative impact to opportunites for solitude within the Granite Chief Wilderness area, primarily near the eastern and southern Wilderness boundaries.

## Alternative 3

### *Direct and Indirect Effects*

#### Recreation Settings and Opportunities

Alternative 3 would designate OSV use on fewer acres than any of the alternatives. With additional areas not designated for OSVs, the opportunities for winter non-motorized use (in areas not influenced by the sights, sounds and exhaust smells of OSV use) are enhanced, and opportunities for winter motorized use are reduced. Alternative 3 emphasizes providing greater non-motorized winter recreation opportunities compared to current management, however alternative 3 also designates existing popular OSV cross-country areas and trails on the Forest for public OSV use. Alternative 3 provides the highest proportion of high-quality OSV use areas (defined by the high to moderate OSV use categories) relative to the acres designated for OSV of all Alternatives.

Groomed trail opportunities would be the same as under existing conditions.

Proposed OSV designations would be consistent with existing ROS classes, maintaining a variety of both motorized and non-motorized recreation opportunities available across the forest. Primitive and Semi-Primitive Non-Motorized areas would not to be designated for OSV use. In addition, the Grouse Management Area (041) would largely not be designated for OSV use. Winter motorized opportunities would be available in Semi-Primitive Motorized, Roaded Natural, and Rural settings. The additional areas not designated for OSV use, which are located primarily within the Semi-Primitive Motorized ROS class, would not require a change the existing ROS class, but would reduce the influence of motorized OSV use within these areas and help minimize impacts from motorized use on non-motorized winter visitors.

The forestwide snow depth requirement of 18 inches for both trail and cross-country travel would impose additional limitations on OSV use. Although it is likely that most OSV owners would not ride with less than adequate snow depths to prevent damage to their OSVs, the required depth of 18 inches may preclude access to some areas with lower snowfall, and may shorten the riding season due to lower snow depths both early and late in the season.

#### Conflicts between Motorized and Non-motorized Winter Experiences

Alternative 3 would reduce acreage of areas designated for OSV use thereby enhancing opportunities for non-motorized experiences, and reducing the potential for conflict by providing greater separation of motorized and non-motorized uses compared to atlernatives 1, 2, and 4.

Based on 22,410 OSV visits per winter season, if use were spread evenly across each day of the season, there would be approximately 213 OSVs on the forest per day. Daily use may be higher during weekends and holidays and lower during the week. For alternative 3, this equates to 1,296 acres and 1.3 miles of groomed trail per OSV. Based on the OSV use assumption that most OSV use would be concentrated along groomed trails, the trail opportunites in alternative 3 would be essentially the same as in existing conditions. The change from the existing 2,995 acres per OSV to 1,296 acres per OSV, although potentially noticeable to OSV visitors, would not be likely to create use conflict, and there is still likely adequate acreage to disperse the use and avoid use conflict.

Non-motorized winter recreation enthusiasts may continue to be displaced in some areas by motorized OSV use. Displacement or conflict may occur where non-motorized enthusiasts are unable to access areas for desired quiet, non-motorized experiences away from the sights, sounds, and smells of motorized use without traveling long distances through motorized routes and areas, or traveling further than they are physically able to traverse in a typical day. There are approximately 78,258 acres available for high quality, quiet, non-motorized winter activities and 28 miles of cross-country ski trails and 20.5 miles of the PCT within 5 miles of plowed trailheads. These areas are free from motorized use and are easily accessible by non-motorized visitors in a typical day trip. This is an 11,409 acre decrease from alternative 1. There are a total of approximately 560,301 acres across the Tahoe National Forest available for quiet, non-motorized experiences, where OSV use is not designated. There are also 1,408 acres designated for public cross-country OSV use in deer holding areas from January 1 through September 14, that are available for quiet recreation when OSVs are not present. Alternative 3 provides more quiet non-motorized opportunities than any other alternative, resulting in fewer conflicts between motorized and non-motorized uses.

Class1 and class 2 OSVs would be allowed in all areas and on trails designated for OSV use, there are no known conflicts between classes of OSVs. Allowing the larger, class 2 OSVs on all designated OSV trails and areas poses a potential for conflict between different classes of OSVs, if the use of the larger Class 2 OSV increases in the future. Based on current use levels, conflicts are not anticipated. Alternative 3 effects on potential conflicts related to snow trails available for grooming and monitoring would be the same as described for alternative 2.

### Designated Areas

The closest designated OSV trail to the wilderness boundary is the Mosquito Ridge. This marked (not groomed) OSV trail follows a portion of FS road 96 and is located more than two miles from the western boundary of the Granite Chief Wilderness Wilderness. This is the same as in the existing conditions, and no known wilderness incursions associated with this trail are anticipated.

OSV use is designated on 45,272 acres within inventoried roadless areas, fewer than in alternatives 1, 2, or 4. The addition of areas not designated for OSV use, including the High Loch Leven area within the North Fork American River IRA and the PCT/Grubb, Devil’s Canyon, Coon Canyon, and Summit Lake areas within the Castle Peak IRA reduce potential impacts on roadless characteristics, which include undisturbed or high quality soil, water, and air, and opportunities for solitude in these areas.

Alternative 3 generally does not designate any OSV use in areas directly adjacent to the PCT. In the Northeast Yuba and Sierraville West OSV analysis areas, the closest designated OSV areas are approximately ¼ to ½ mile away from the PCT, the closest designated area to the PCT in the Donner Summit OSV area is approximately 1.5 miles away, and the closest designated area in the Truckee OSV area is approximately 3 miles away. No OSV use is designated in the Summit West, Granite Chief, or Barker OSV areas in alternative 3. Three OSV trails across the PCT would be designated over roads that are on the Tahoe National Forest Motor Vehicle Use Map, in the Sierraville West OSV analysis area. Fewer OSV trails across the PCT would be designated than in all other alternatives, further minimizing the potential for OSVs to impact the non-motorized trail experience and.wouldreduce OSV connectivity between designated areas on either side of the PCT. Alternative 3 minimizes impacts to the non-motorized PCT experience to a greater extent than alternatives 1, 2, and 4, and is similar to alternative 5.

**Table 30. Recreation resource indicators and measures for alternative 3 direct and indirect effects**

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Alternative 3 |
|---|---|---|---|
| **Motorized Recreation Opportunities – cross-country** | Opportunities for motorized winter uses<br><br>Quality of OSV opportunities | Size of areas (acres) designated for public OSV use, percent change from current management<br><br>Percent of designated acres that are considered high quality OSV opportunities based on the high to moderate OSV use assumption categories | 275,972 acres designated for OSV use, a 57 percent decrease from current management<br><br>58 percent of acres designated for OSV use provide high quality OSV opportunities. This totals to approximately 161,919 acres.<br>18-inch minimum snow depth for OSV use cross-country |
| **Motorized Recreation Opportunities – designated snow trails and snow trails available for grooming** | OSV trail designations | Length (miles) of designated OSV trails available for grooming/Length (miles) of marked snow trails (ungroomed) | 217 miles of designated OSV trails available for grooming<br>38miles of marked, ungroomed trails for OSV use<br>25 miles of designated OSV trails not available for grooming<br>18-inch minimum snow depth for OSV use on trails<br>18-inch minimum snow depth for grooming |
| **Non-motorized Recreation Opportunities - displacement** | Access to desired non-motorized recreation settings and opportunities<br><br>Quality of non-motorized opportunities | Size of area (acres) and length of trails (miles) available to non-motorized recreation enthusiasts within 5 miles of plowed trailheads<br><br>Percent of acres available for quiet, non-motorized use that are within desired areas (defined as areas within 5 miles of plowed trailheads) | 78,258 acres and 28 miles of cross-country ski trails and 20.5 miles of the PCT available for non-motorized recreation enthusiasts within 5 miles of plowed trailheads<br><br>13.9 percent of the acres not designated for OSV use (available for quiet, non-motorized use) provide high quality non-motorized opportunities, within 5 miles of plowed trailheads. |
| **Non-motorized Recreation Conflicts – Public Safety** | Areas and trails available to non-motorized recreation enthusiasts for quality non-motorized recreation experiences | Size of areas (acres) not designate for OSV use | 560,301 acres OSV use not designated, this is a 182 percent increase from current management<br>1,408 acres designated for public cross-country OSV use in deer holding areas from January 1 through September 14, available for quiet recreation when OSVs are not present) |
| **Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Designated non-motorized areas** | Proximity and frequency of OSV designations in relation to designated non-motorized areas | Distance of groomed public OSV snow trails from designated areas, number of OSV trails across linear designated areas. | The closest OSV trail to the Granite Chief Wilderness boundary is the Mosquito Ridge marked (not groomed) OSV trail, more than two miles to the west.<br>OSV use is not allowed on the PCT and the Andesite Trail (3 miles)<br>Three PCT crossings would be designated on NFTS roads. |

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Alternative 3 |
|---|---|---|---|
| **Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Designated non-motorized areas** (continued) | Solitude | Size of areas (acres) that could be affected by noise/size of areas (acres) closed to winter motorized use | 275,972 acres designated for OSV use and possibly affected by noise/560,301 acres not designated for OSV use and available for quiet recreation/1,408 acres designated for public cross-country OSV use in deer holding areas from January 1 through September 14, available for quiet recreation when OSVs are not present |
| | Air Quality | Qualitative/narrative description of possible impacts (with reference to air quality analysis) | Short-term impacts that could affect the experience of recreational visitors in the vicinity of OSVs and grooming equipment due to the smell of exhaust emissions (see air quality report). |
| | Scenery | Qualitative/narrative description of possible visual impacts | Cross-country OSV use creates temporary tracks in the snow that crisscross the landscape. The visual evidence of snowmobile use decreases as fresh snow covers the tracks and/or when the snow melts at the end of the season.<br>OSV use is generally not designated adjacent to the PCT in Alternatives 3. In the Northeast Yuba and Sierraville West OSV analysis areas, the closest designated OSV areas are approximately ¼ to ½ mile away from the PCT, the closest desingated area to the PCT in the Donner Summit OSV area is approximately 1.5 miles away, and the closest designated area in the Truckee OSV area is approximately 3 miles away. No OSV use is designated in the Summit West, Granite Chief, or Barker OSV areas |
| | Potential conflict with other resource values | Proximity of OSV use related to other resource values (such as tribal/ spiritual sites, sensitive wildlife areas, popular non-motorized winter recreation areas, populated areas, neighboring Federal lands, etc.). | One acre is not designated for OSV use to protect historic structures. |

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Alternative 3 |
|---|---|---|---|
| **Designated Areas** | Wilderness Attributes | Size of areas (acres) affected and duration of impact. Qualitative description for wilderness attributes | No areas are designated for OSV use within 1/2 mile of designated wilderness boundaries. |
| | Roadless Characteristics | Size of area (acres) affected and duration of impact. Qualitative description for roadless characteristics | Approximately 45,272 IRA acres are designated for OSV use. Short-term impacts to the roadelss characteristics of undisturbed soil, water, and air (short-term impacts to air quality due to the presence of OSV exhaust), and solitude (due to the sights and sounds of OSVs) during the winter while snow depth is adequate for OSVs to access the area. Fewer IRA acres would be impacted by OSV use than in alternatives 1, 2 and 4. |

#### *Cumulative Effects*

The cumulative effects to recreation settings and opportunities from alternative 3 are similar to those described in alternative 2, with the following exceptions.

The cumulative effects related to conflicts between motorized and non-motorized winter experiences would be less than described in alternative 2. The indirect impacts of noise from alternative 3 would be less than in all other alternatives, based on the number of acres designated for OSV use, therefore the potential cumulative impacts to quiet recreation experiences when added to other forest management projects or activities that could also generate noise, is less than in all other alternatives.

Cumulative effects related to winter use near the Granite Chief Wilderness boundaries would not occur in Alternative 3 since OSV use would not be designated in the Barker OSV area south of the Wilderness boundary.

### Alternative 4

#### *Direct and Indirect Effects*

**Recreation Settings and Opportunities**

Alternative 4 would designate OSV use on the slightly more acres (641,105 acres) than in the existing conditions, alternative 1 (638,002 acres). Alternative 4 emphasizes providing opportunities for winter motorized recreation and designates more acres for OSV use than all other alternatives, however the proportion of designated acres that are considered high quality OSV use areas (defined by the high to moderate OSV use categories) relative to the acres designated for OSV use is lower than alternatives 2, 3, and 5, and the same as alternative 1. The minimum snow depth of 12 inches for cross-country OSV use and 6 inches for trails would allow motorized recreational access to higher elevations and adequate snow levels to a greater extent than Alternative 3 or 5, but with slightly less flexibility than described in the alternative 2 proposed snow depth requirements.

Alternative 4 does not propose any additional areas that would not be designated for OSV use, other than those areas closed under existing conditions, and the miles of groomed snow trails would increase.

The proposed OSV designations would comply with existing ROS classes, maintaining a variety of both motorized and non-motorized recreation opportunities available across the national forest. Primitive and Semi-Primitive Non-Motorized areas would not be designated for OSV use (with the exception of the Grouse Management Area (041) and a small portion of the Sunflower Management Area (091) where OSV use is allowed in the winter), while motorized opportunities would be available in Semi-Primitive Motorized, Roaded Natural and Rural settings.

**Conflicts between Motorized and Non-motorized Winter Experiences**

Alternative 4 would slightly increase the acreage of areas designated for OSV as compared to alternative 1, thereby enhancing opportunities for motorized experiences.

Based on 22,410 OSV visits per winter season, if use were spread evenly across each day of the season, there would be approximately 213 OSVs on the forest per day. Daily use may be higher during weekends and holidays and lower during the week. For alternative 4, this equates to 3,010 acres and 1.3 miles of groomed trail per OSV. Based on the OSV use assumption that most OSV use would be concentrated along groomed trails, the trail opportunites in alternative 4 would be slightly more per OSV than in all other alternatives. The change from the existing 2,995 acres per OSV to 3,010 acres per OSV, would enhance opportunites for OSV use, but would not be likely to create use conflict, as there is adequate acreage to disperse the use and avoid use conflict.

Non-motorized winter recreation enthusiasts may continue to be displaced in some areas by motorized OSV use. Displacement or conflict may occur where non-motorized enthusiasts are unable to access areas for desired quiet, non-motorized experiences away from the sights, sounds, and smells of motorized use without traveling longdistances through motorized routes and areas, or traveling further than they are physically able to traverse in a typical day. There are approximately 22,310 acres available for high quality, quiet, non-motorized winter activities and 28 miles of cross-country ski trails and 20.5 miles of the PCT within 5 miles of plowed trailheads. These areas are free from motorized use and are easily accessible by non-motorized visitors in a typical day trip. This is a 67,357 acre reduction from the existing conditions, alternative 1, and is substantially lower than in all other alternatives. There are a total of 195,168 acres across the Tahoe National Forest available for quiet, non-motorized experiences, where OSV use is not designated. There are also 1,218 acres designated for public cross-country OSV use in deer holding areas from January 1 through September 14, available for quiet recreation when OSVs are not present. Alternative 4 provides slightly fewer non-motorized opportunities than alternative 1, and substantially fewer than in alternatives 2, 3, and 5, resulting in a higher potential for use conflicts in more areas of the forest.

A 20 percent increase in the miles of OSV trail available for grooming provides the most opportunities for motorized OSV trail use and has the potential to increase OSV use along the trail system, and the associated potential for conflicts as compared to the existing conditions.

Class1 and class 2 OSVs would be allowed in all areas and on trails designated for OSV use, there are no known conflicts between classes of OSVs. Allowing the larger, class 2 OSVs on all designated OSV trails and areas poses a potential for conflict between different classes of OSVs, if the use of the larger Class 2 OSV increases in the future. Based on current use levels, conflicts are not anticipated.

### Designated Areas

In alternative 4, the Mosquito Ridge OSV trail (along a section of FS road 96) would be available for grooming, rather than just a marked OSV trail. This would provide a groomed loop riding opportunity from the Robinson Flat area around French Meadows Reservoir. Grooming this section of trail could slightly increase use as compared to existing conditions, however this use would not be expected to impact the Granite Chief Wilderness area, since the trail is located more than two miles to the west.

OSV use is designated on 112,388 acres within inventoried roadless areas, slightly more than in alternative 1. Potential impacts to roadless characteristics are the same as described in alternative 1.

Alternative 4 designates OSV use in areas adjacent to PCT segments within the Northeast Yuba, Sierraville West, Donner Summit (restricted use), Summit West, Truckee, and Barker OSV analysis areas. Alternative 4 does not designate any areas for OSV use adjacent to the PCT segments within the Granite Chief Wilderness OSV analysis area. Alternative 4 designates 21 OSV trails across the PCT located in the Barker, Sierraville West and Yuba Northeast OSV analysis areas. Potential impacts to the non-motorized trail experience along the PCT would be slightly more than in Alternative 2, and substantaially more than in alternatives 3 and 5.

**Table 31. Recreation resource indicators and measures for alternative 4 direct and indirect effects**

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Alternative 4 |
|---|---|---|---|
| **Motorized Recreation Opportunities – cross-country** | Opportunities for motorized winter uses<br><br>Quality of OSV opportunities, | Size of areas (acres) designated for public OSV use, percent change from current management<br>Percent of designated acres that are considered high quality OSV opportunities based on the high to moderate OSV use assumption categories | 641,105 acres designated for OSV use, a 0.5 percent increase from current management<br><br>33 percent of the acres designated for OSV use provide high quality OSV opportunities. This totals to approximately 212,873 acres.<br><br>12-inch minimum snow depth for OSV use cross-country |
| **Motorized Recreation Opportunities – designated snow trails and snow trails available for grooming** | OSV trail designations | Length (miles) of designated OSV trails available for grooming/Length (miles) of marked snow trails (ungroomed) | 259 miles of designated NFS OSV trails available for grooming<br>22 miles marked, ungroomed trails for OSV use<br>5 miles designated OSV trails not available for grooming<br>6-inch minimum snow depth for OSV use on trails<br>12-inch minimum snow depth for grooming |
| **Non-motorized Recreation Opportunities - displacement** | Access to desired non-motorized recreation settings and opportunities<br><br>Quality of non-motorized opportunities | Size of area (acres) and length of trails (miles) available to non-motorized recreation enthusiasts within 5 miles of plowed trailheads<br><br>Percent of acres available for quiet, non-motorized use that are within desired areas (defined as areas within 5 miles of plowed trailheads) | 22,310 acres and 28 miles of cross-country ski trails and 20.5 miles of the PCT available for non-motorized recreation enthusiasts within 5 miles of plowed trailheads<br>11.4 percent of the acres not designated for OSV use (available for quiet, non-motorized use) provide high quality non-motorized opportunities, within 5 miles of plowed trailheads |
| **Non-motorized Recreation Conflicts – Public Safety** | Areas and trails available to non-motorized recreation enthusiasts for quality non-motorized recreation experiences | Size of areas (acres) not designated for OSV use | 195,168 acres not designated for OSV use. This is a slight decrease from current management<br>1,218 acres designated for public cross-country OSV use in deer holding areas from January 1 through September 14, available for non-motorized recreation when OSVs are not present |

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Alternative 4 |
|---|---|---|---|
| **Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Designated non-motorized areas** | Proximity and frequency of OSV designations in relation to designated non-motorized areas | Distance of groomed public OSV snow trails from designated areas, number of OSV trails across linear designated areas | The closest OSV trail to the Granite Chief Wilderness boundary is the. Mosquito Ridge OSV trail, which is available for grooming under Alternative 4. The Mosquito Ridge Trail is more than two miles to the west.<br>OSV use is not allowed on the.<br>14 PCT crossings on NFTS roads, 14 feet wide<br>7 PCT crossings not on roads would range in length from 0.15 miles to 1.31 miles |
| | Solitude | Size of areas (acres) that could be affected by noise/size of areas (acres) not designated to winter motorized use | 641,105 acres designated for OSV use and possibly affected by noise /195,168 acres not designated for OSV use and available for quiet recreation/1,218 acres designated for public cross-country OSV use in deer holding areas from January 1 through September 14, available for quiet recreation when OSVs are not present |
| | Air Quality | Qualitative/narrative description of possible impacts (with reference to air quality analysis) | Short-term impacts that could affect the experience of recreational visitors in the vicinity of OSVs and grooming equipment due to the smell of exhaust emissions (see air quality report). |
| | Scenery | Qualitative/narrative description of possible visual impacts | Cross-country OSV use creates temporary tracks in the snow that crisscross the landscape. The visual evidence of snowmobile use decreases as fresh snow covers the tracks and/or when the snow melts at the end of the season.<br>Alternative 4 designates OSV use in areas adjacent to PCT segments within the Northeast Yuba, Sierraville West, Donner Summit (restricted use), Summit West, Truckee, and Barker OSV analysis areas. Alternative 4 does not designate any areas for OSV use adjacent to the PCT segments within the Granite Chief Wilderness OSV analysis area |
| | Potential conflict with other resource values | Proximity of OSV use related to other resource values (such as tribal/ spiritual sites, sensitive wildlife areas, popular non-motorized winter recreation areas, populated areas, neighboring Federal lands, etc.). | Existing conflict with historic structures at Robinson Flat. One acre not designated for OSV use to protect historic structures. |

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Alternative 4 |
|---|---|---|---|
| **Designated Areas** | Wilderness Attributes | Size of areas (acres) affected and duration of impact. Qualitative description for wilderness attributes | Opportunities for solitude may be temporarily affected due to the sights and sounds of OSVs near the wilderness boundaries. There are approximately 5,235 acres designated for OSV use within 1/2 mile of designated wilderness boundaries, The duration of the possible impacts would be short-term, during the winter while snow depth is adequate for OSVs to access the area. |
| | Roadless Characteristics | Size of area (acres) affected and duration of impact. Qualitative description for roadless characteristics | Approximately 112,388 IRA acres designated for OSV use. Short-term impacts to the roadless characteristics of (1) undisturbed soil, water, and air (short-term impacts to air quality due to the presence of OSV exhaust), and (2) solitude (due to the sights and sounds of OSVs) during the winter while snow depth is adequate for OSVs to access the area. Slightly more IRA acres could be impacted by OSVs than in alternative 1 (current management). |

## Cumulative Effects

The cumulative effects to recreation settings and opportunities from Alternative 4 are similar to those described in alternative 2.

The cumulative effects related to conflicts between motorized and non-motorized winter experiences would be less than described in alternative 2. Indirect impacts of noise from alternative 4 would be slightly more than in alternative 1 and substantially more than alternatives 2, 3, and 5, based on the number of acres designated for OSV use, therefore the potential cumulative impacts to quiet recreation experiences when added to other forest management projects and activities that could also generate noise, is more than in all other Alternatives.

Cumulative effects related to winter use near the Granite Chief Wilderness boundaries would occur, as describe in alternative 2, since the Barker OSV area south of the Wilderness would be designated for OSV use.

## Alternative 5

### *Direct and Indirect Effects*

#### Recreation Settings and Opportunities

In alternative 5, acres designated for cross-country OSV use would be slightly more than in alternative 3, but less than all other alternatives. Alternative 5 provides fewer opportunities for motorized winter recreation experiences on the Forest to emphasize protection of wildlife and other forest resources. Alternative 5 provides a higher proportion of high-quality OSV use areas (defined by the high to moderate OSV use categories) relative to the acres designated for OSV use than alternatives 1 and 4, and about the same proportion as in alternative 2. In addition, alternative 5 would provide greater opportunities for non-motorized winter recreation activities compared to alternatives 1, 2, and 4. Groomed trails mileage would be slightly less than in the existing conditions, and in alternative 3. This would reduce opportunities for motorized winter recreation compared to alternatives 1, 2, and 4, and would enhance opportunities for quiet, non-motorized activities across the forest.

Changing Howard’s Loop to an out and back ride would eliminate a loop-riding opportunity, but also would protect the underlying resources soil and vegetation by closing the segment of trail that is not on an underlying road or trail.

Not designating the marked Andesite Ridge trail would enhance quiet, non-motorized opportunities in the Andesite Ridge/Castle peak area.

Additional areas not designated for OSV use under alternative 5 include isolated parcels on Schallenberger Ridge adjacent to the state park (these parcels are also not designated for OSV use under alternatives 2 and 3), White Rock Lake, North and west sides of Mt. Lola, South flank of Sand Ridge, Grouse Ridge Area (which is also not designated for OSV use under alternative 3), Inventoried Roadless areas, Primitive and semi-primitive non-motorized areas, and Prosser-Boca. Not designating these areas would further enhance opportunities for quiet, non-motorized use and reduce conflicts between motorized and non-motorized winter use across the Forest.

The proposed OSV designations would comply with existing ROS classes, maintaining a variety of both motorized and non-motorized recreation opportunities available across the national forest. Primitive and Semi-Primitive Non-Motorized areas would not be designated for OSV use (including the Grouse Management Area (041)), while motorized opportunities would be available in Semi-Primitive Motorized, Roaded Natural and Rural settings. Not designating OSV use areas within the Semi-Primitive Motorized ROS class would not formally change the ROS class, but would reduce the influence of motorized OSV use within these areas and help minimize impacts to non-motorized winter visitors desiring a quiet recreation experience.

Requiring a minimum of 24 inches for OSV cross-country use and trail use could lead to a notable reduction in OSV opportunities during seasons, or portions of seasons with lower snowfall and in lower elevation areas of the Forest. This reduction of OSV opportunities could increase over time as changing climatic conditions impacted snow conditions.

### Conflicts between Motorized and Non-motorized Winter Experiences

Alternative 5 would reduce acreage of areas designated for OSV, as compared to all alternatives, except alternative 3, thereby enhancing opportunities for non-motorized experiences, and reducing the potential for conflict by providing greater separation of motorized and non-motorized uses compared to the alternatives 1, 2, and 4.

Based on 22,410 OSV visits per winter season, if use were spread evenly across each day of the season, there would be approximately 213 OSVs on the forest per day. Daily use may be higher during weekends and holidays and lower during the week. For the alternative 5, this equates to 1,409 acres and 1.2 miles of groomed trail per OSV. Based on the OSV use assumption that most OSV use would be concentrated along groomed trails, the trail opportunites in alternative 5 would be essentially the same as in alternative 1 and 3. The change from the existing 2,995 acres per OSV to 1,409 acres per OSV, although potentially noticeable to OSV visitors, would not be likely to create use conflict, and there is still likely adequate acreage to disperse the use and avoid use conflict.

Non-motorized winter recreation enthusiasts may continue to be displaced in some areas by motorized OSV use. Displacement or conflict may occur where non-motorized enthusiasts are unable to access areas for desired quiet, non-motorized experiences away from the sights, sounds, and smells of motorized use without traveling long distances through motorized routes and areas, or traveling further than they are physically able to traverse in a typical day. There are approximately 89,667 acres available for high quality quiet, non-motorized winter activities and 28 miles of cross-country ski trails and 20.5 miles of the PCT within 5 miles of plowed trailheads. These areas are free from motorized use and are easily accessible by non-motorized visitors in a typical day trip. This is the same as in existing condition, alternative 1. There are a total of 536,127 acres across the Tahoe National Forest available for quiet, non-motorized experiences, where OSV use is not designated. Alternative 5 provides slightly fewer acres for quiet non-motorized opportunities as compared to alternative 3. Compared to alternatives 1, 2, and 4, alternative 5 substantially decreases the potential for conflicts between motorized and non-motorized use within the areas where OSV use is not designated.

Alternative 5 provides only slightly fewer miles of OSV trail available for grooming as in the existing conditions and alternative 3; and fewer than in alternatives 2 and 4. The potential for OSV trail related conflict would remain about the same as in existing conditions.

In alternative 5, OSV use would be limited to to designated OSV trails within 1 mile of existing OSV trailheads. This would enhance opportunities for non-motorized, quiet recreation in close proximity to plowed trailheads. This would help to minimize conflict between motorized and non-motorized uses and improve the sense of public safety at shared trailheads by providing areas near trailheads where non-motorized enthusiasts could recreate without the concern of encountering OSVs traveling cross-country at high speeds.

Two classes of OSV have been identified in alternative 5, including Class 1:  over-snow vehicles 50 inches or less in width at the widest point on the vehicle and Class 2: over-snow vehicles more than 50 inches in width at the widest point on the vehicle. There are currently no known conflicts occurring between different classes of OSV use. Snowcats are used for grooming OSV trails. The grooming operations are conducted during the night or during low use timeframes if possible to avoid conflicts with day use. Since snowcats groom the OSV trails, the trails would be wide enough to accommodate larger tracked OSVs in addition to snowmobiles; however, there is currently very little use by larger tracked OSVs on the Tahoe National Forest. Class 1 OSVs are allowed on all designated OSV trails and areas. Class 2 OSVs are only allowed on designated OSV trails available for grooming. Only allowing the larger, class 2 OSVs on designated OSV trails available for grooming reduces the potential for conflict between different classes of OSVs

### Designated Areas

The OSV trail closest to the Granite Chief Wilderness boundary is the Mosquito Ridge marked (not groomed) OSV trail, along a portion of NFS road 96, located more than 2 miles to the west. This is the same as in the existing conditions, and no known wilderness incursions associated with this trail are anticipated.

OSV use would be designated on only 5,161 acres within inventoried roadless areas, fewer than all other alternatives. This would enhance roadless characteristics related to naturalness, and outstanding opportunities for solitude or primitive and unconfined recreation in a majority of inventoried roadless areas acres across the forest. There would be minimal impacts to roadless characteristics of undisturbed or high quality soil, water, air, and solitude because OSVs and their associated sights, sounds, and exhaust would not be present within a majority of IRA acres. Alternative 5 provides the most protection to roadless area characteristics when compared to all other alternatives.

Ten OSV trails across the PCT would be designated on National Forest Transportation (NFTS) roads displayed on the Motor Vehicle Use Map (MVUM). Alternative 5 is more restrictive on where OSV trails are designated across the PCT when compared to alternatives 1, 2, and 4, but not as restrictive as alternative 3.

Alternative 5 would not designate OSV use adjacent to the PCT up to one-half mile in the visible lands on each side of the Pacific Crest National Scenic Trail or smaller as the visible landscape along the Trail would be smaller than one-half mile on each side of the trail due to topography (in the Northeast Yuba, Sierraville West, Donner Summit, Truckee and Barker OSV analysis areas). Alternative 5 does not designate any OSV use areas in the Summit West and Granite Chief Wilderness OSV Analysis areas. This would protect the trail experience for PCT visitors and would eliminate the potential for OSV use to impact the trail experience (other than on theat 10 designated OSV trails across the PCT) and reduce the potential for conflict between motorized and non-motorized uses. Alternative 5 would minimize potential impacts from OSVs on the non-motorized trail experience to a similar extent as in alternative 3, and substantially more than in alternatives 1, 2, and 4.

**Table 32. Recreation resource indicators and measures for alternative 5 direct and indirect effects**

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Alternative 5 |
|---|---|---|---|
| **Motorized Recreation Opportunities – cross-country** | Opportunities for motorized winter uses<br><br>Quality of OSV opportunities | Size of areas (acres) designated for public OSV use, percent change from current management<br><br>Percent of designated acres that are considered high quality OSV opportunities based on the high to moderate OSV use assumption categories | 300,146 acres designated for OSV use, a 53 percent decrease from current management<br><br>48 percent of the designated acres provide high quality OSV opportunities. This totals to approximately 145,420 acres.<br><br>24-inch minimum snow depth for OSV use cross-country |
| **Motorized Recreation Opportunities – designated snow trails and snow trails available for grooming** | OSV trail designations | Length (miles) of designated OSV trails available for grooming/Length (miles) of marked snow trails (ungroomed) | 215 miles of designated NFS OSV trails available for grooming/25 miles marked snow trails (ungroomed)<br>24-inch minimum snow depth for OSV use on trails<br>17 miles designated OSV trails not available for grooming<br>24 inch minimum snow depth for OSV use on trails<br>12 inch minimum snow depth for grooming |
| **Non-motorized Recreation Opportunities - displacement** | Access to desired non-motorized recreation settings and opportunities<br><br>Quality of non-motorized opportunities | Size of area (acres) and length of trails (miles) available to non-motorized recreation enthusiasts within 5 miles of plowed trailheads<br><br>Percent of acres available for quiet, non-motorized use that are within desired areas (defined as areas within 5 miles of plowed trailheads) | 89,667 acres and 28 miles of cross-country ski trails and 20.5 miles of the PCT available for non-motorized recreation enthusiasts within 5 miles of plowed trailhead<br>16.7 percent of the acres not designated for OSV use (available for quiet, non-motorized use) provide high quality non-motorized opportunities, within 5 miles of plowed trailheads. |
| **Non-motorized Recreation Conflicts – Public Safety** | Areas and trails available to non-motorized recreation enthusiasts for quality non-motorized recreation experiences | Size of areas (acres) not designated for OSV use | 536,127 acres not designated for OSV use |

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Alternative 5 |
|---|---|---|---|
| **Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Designated non-motorized areas** | Proximity and frequency of OSV designations in relation to designated non-motorized areas | Distance of groomed public OSV snow trails from designated areas, number of OSV trails across linear designated areas | The closest OSV trail to the Granite Chief Wilderness boundary is the. Mosquito Ridge marked (not groomed) OSV trail, more than 2 miles to the west.<br>OSV use is not allowed on the PCT.<br>10 PCT crossings would be designated.<br>A non-motorized corridor up to one-half mile in the visible lands on each side of the PCT will be established. |
| | Solitude | Size of areas (acres) that could be affected by noise/size of areas (acres) would not be designated to winter motorized use | 300,146 acres designated for OSV use and possibly affected by noise<br>536,127 acres not designated for OSV use and available for quiet recreation |
| | Air Quality | Qualitative/narrative description of possible impacts (with reference to air quality analysis) | Short-term impacts that could affect the experience of recreational visitors in the vicinity of OSVs and grooming equipment due to the smell of exhaust emissions (see air quality report). |
| | Scenery | Qualitative/narrative description of possible visual impacts | Cross-country OSV use creates temporary tracks in the snow that crisscross the landscape. The visual evidence of snowmobile use decreases as fresh snow covers the tracks and/or when the snow melts at the end of the season.<br>Alternative 5 would not designate OSV use adjacent to the PCT up to one-half mile in the visible lands on each side of the Pacific Crest National Scenic Trail or smaller as the visible landscape along the Trail would be smaller than one-half mile on each side of the trail due to topography (in the Northeast Yuba, Sierraville West, Donner Summit, Truckee and Barker OSV analysis areas). Alternative 5 does not designate any OSV use areas in the Summit West and Granite Chief Wilderness OSV Analysis areas. |
| | Potential conflict with other resource values | Proximity of OSV use related to other resource values (such as tribal/ spiritual sites, sensitive wildlife areas, popular non-motorized winter recreation areas, populated areas, neighboring Federal lands, etc.). | Existing conflict with historic structures at Robinson Flat. One acre is not designated for OSV use to protect historic structures. |

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Alternative 5 |
|---|---|---|---|
| **Designated Areas** | Wilderness Attributes | Size of areas (acres) affected and duration of impact. Qualitative description for wilderness attributes | Opportunities for solitude may be temporarily affected due to the sights and sounds of OSVs near the wilderness boundaries, although to a lesser degree than in alternatives 1 through 4. There are approximately 2,125 acres designated for OSV use within 1/2 mile of designated wilderness boundaries. The duration of the potential impacts would be short-term, during the winter while snow depth is adequate for OSVs to access the area. |
| | Roadless Characteristics | Size of area (acres) affected and duration of impact. Qualitative description for roadless characteristics | Approximately 5,161 IRA acres would be designated for OSV use. Short-term impacts to (1) undisturbed or high quality soil, water, and air (short-term impacts to air quality due to presence of OSV exhaust), and (2) solitude (due to the sights and sounds of OSVs) during the winter, while snow depth is adequate for OSVs to access the area. Alternative 5 provides the most protection for roadless area characteristics when compared to all other alternatives. |

### Cumulative Effects

The cumulative effects to recreation settings and opportunities from Alternative 5 are similar to those described in alternative 2.

The cumulative effects related to conflicts between motorized and non-motorized winter experiences would be less than described in Alternative 2. The Indirect impacts of noise from Alternative 5 would be substantially less than in Alternatives 1, 2, and 4, and slightly more than in Alternative 3, based on the number of acres designated for OSV use, therefore the potential cumulative impacts to quiet recreation experiences when added to other forest management projects or activities that could also generate noise, is less than in Alternatives 1, 2, and 4, and slightly more than in Alternative 3.

Cumulative effects related to winter use near the Granite Chief Wilderness boundaries would occur in Alternative 5, but to a lesser degree than in Alternaive 2 or 4, since fewer acres would be designated for OSV use in the Barker OSV area, south of the Wilderness boundary.

## Summary of Environmental Effects

### Recreation Settings and Opportunities

Alternatives 2 and 4 increase the miles of snow trail available for grooming. Alternatives 3 and 5 maintain approximately the same amount of snow trail available for grooming as in the existing conditions. Cross-country travel by OSV is limited by minimum snow depth requirements for all action alternatives; however, alternative 2 provides the most flexibility in application of the minimum snow depth by requiring only adequate snow depth to avoid damage to resources. Alternative 5 represents the most restrictive snow depth requirement of 24 inches for both cross-country travel and travel on OSV trails. Alternatives 2 and 4 provide the most access for motorized OSV use, alternative 3 enhances opportunities for quiet, non-motorized recreation with substantially more acreage where OSV use would not be designated. Overall, alternatives 3 and 5 provide the most non-motorized winter recreation opportunities.

For this analysis, OSV opportunites across the Tahoe National Forest were mapped based on the OSV use assumptions criteria (listed in the Methodology section above). The areas that fall within the high to moderate OSV use areas are considered to provide high quality OSV opportunities based on the proximity to groomed trails and plowed trailheads, open meadows with trail access, and slopes with open vegetation near groomed trails. Alternative 3 provides the highest proportion of high-quality OSV use areas relative to the acres designated for OSV use in this alternative, as defined by the high to moderate OSV use assumption categories. Alternatives 2 and 5 provide approximately the same percentage of high quality OSV use areas as a proportion of designated OSV use areas, and alternative 4 provides about the same percentage of high quality OSV use areas as alternative 1, existing conditions.

Of the acres not designated for OSV use, and available for quiet, non-motorized recreation, alternatives 5 provides the highest percentage of high-quality, desirable, non-motorized opportunities as defined as areas within 5 miles of plowed trailheads. Alternative 2 provides more acreage of desireable high-quality non-motorized opportunities near plowed trailheads than alternatives 3 and 4 but substantially greater acreage compared to alternatives 1 and 4. Alternative 4 provides fewer high quality, desireable, non-motorized opportunities than all other alternatives.

### Conflicts between Motorized and Non-motorized Uses

All action alternatives minimize conflicts between motorized and non-motorized uses to some degree by designating a clear system of OSV trails and Areas, and development of the subsequent OSV use maps that wouldl allow visitors to choose areas to recreate that would best meet their expectations and desired settings.

Alternative 3 minimizes conflicts between motorized and non-motorized uses to a greater extent than proposed in alternatives 2 and 4, by designating additional areas where OSV use is not designated. Alternative 5 further minimizes conflicts by not designating areas for OSV use within a one-mile buffer around plowed trailheads, and maintains the quiet, non-motorized experience along the PCT by not designating OSV use adjacent to the PCT up to one-half mile in the visible lands on each side of the Pacific Crest National Scenic Trail or smaller as the visible landscape along the Trail would be smaller than one-half mile on each side of the trail due to topography. These designations provide separate areas for non-motorized recreation that are not influenced by the noise, smell of exhaust and presence of OSVs.

Alternatives 1, 2, and 4 provide the most acres designated for public OSV use, and therefore have the potential for continued or increased conflict between motorized and non-motorized uses in the future. In all alternatives.

Alternative 2 substantially increases opportunities for quiet, non-motorized use while also moderately increasing OSV trail opportunities. Alternative 3 substantially increases opportunities for quiet non-motorized use while maintaining the same level of OSV trail opportunities as in existing conditions. Alternative 4 provides approximately the same amount of quiet, non-motorized opportunities as in existing conditions, alternative 1, but substantially increases OSV trail opportunities. Alternative 5 substantially increases opportunities for quiet, non-motorized use while maintaining approximately the same level of OSV trail opportunities as in existing conditions.

Alternatives 2 and 5 minimize potential conflicts between different classes of OSVs by allowing the larger, class 2 OSVs only on OSV trails available for grooming.

Alternatives 1, 2 and 4 provide greater opportunities for motorized winter recreation, and therefore, have the potential for continued or increased conflict between motorized and non-motorized uses in the future.

### Designated Areas

Potential impacts to designated wilderness from the OSV trail system are minimal, and the same in all alternatives, there are fewer acres designated for OSV use adjacent to wilderness in alternative 5 than in all other alternatives. Alternatives 3 and 5 provides additional protection of the roadless characteristics by designating OSV use in fewer Inventoried Roadless Area acres than the other alternatives. OSV use is also not designated along the Wild and Scenic North Fork of the American River. All of the action alternatives designate OSV trails across the PCT that would minimize the influence of motorized use on non-motorized opportunities and quiet settings along the trail. Alternative 5 further protects the PCT experience by not designating OSV use in areas within the USFS Scenery Management System definition of Foreground for the PCT.

## Impacts of the Forest Plan Amendment

As stated in Chapter 2, the Responsible Official has determined the proposed plan amendment is directly related to 36 CFR 219.10 Multiple Use, (a)(1) recreation settings and opportunities. The health and resiliency of the Tahoe National Forest's natural resources are critical to the sustained delivery of nature-based recreation settings and opportunities. As such, recreation settings and opportunities need to be compatible with the landscape's ability to support associated types of activities, use levels, access, and infrastructure. Motorized recreation opportunity spectrum (ROS) classes are located on landscapes where the topography, geology, and soils can support motorized use and the associated roads and motorized trails. ROS provides a framework where recreational opportunities, activities and expected experiences are integrated to ensure compatibility with the landscape's natural and cultural resource values. The ROS establishes recreational settings particularly informative for decisions on infrastructure and the built environment but is not intended to be the sole framework for managing recreational uses and activities.

The *Tahoe Land and Resource Management Plan* (LRMP 1990) established public OSV use through standards and guidelines for each management area that were associated with ROS classifications. Management areas were open to OSV use or closed to OSV use or OSVs were restricted to designated routes only (DEIS, Volume 2, Appendix B). To modernize the Tahoe National Forest's approach, the Responsible Official has proposed to adopt a forest-wide standard to "manage over the snow vehicle (OSV) use through designation of routes and trails consistent with travel management regulations," which would replace the LRMP's 1990 standards and guidelines. Such an approach would continue to require project-level OSV use designation decisions to be consistent with management direction in the LRMP, as amended, including ROS classifications. However, adhering to the Travel Management Rule's designation criteria at 36 CFR 212.55, which requires a granular, site-specific approach to designating areas and trails for public OSV, enables the Forest Service to consider factors in addition to ROS that contribute to sustained delivery of nature-based recreation. In applying the Travel Management Rule's criteria for designating OSV trails, and areas (36 CFR 212.55), the Forest Service would be proposing, analyzing, and making OSV use designations in a manner that was not contemplated or required when the LRMP was adopted in 1990.

The proposed plan amendment would not change the existing LRMP's ROS classifications. Rather, the forest plan amendment would appropriately place OSV use designations at the project-level, with each designation requiring site-specific planning, environmental analysis, and decision-making. Project-level planning and analysis would allow the Responsible Official to more rapidly and efficiently make changes to OSV use designations as needed to respond to changing conditions and/or new monitoring information. The proposed amendment would allow the Forest Service to more rapidly adapt site-specific OSV use designations to new information and/or changed circumstances as a forest plan amendment would not be required to make changes in use designations.

## Compliance with LRMP and Other Relevant Laws, Regulations, Policies and Plans

Alternative 1, no action, would not comply with Subpart C of the Travel Management rule that requires designation of roads, trails, and areas on National Forest System lands to provide for over-snow vehicle use.

Alternatives 2, 3, 4, and 5 would comply with Subpart C of the Travel Management rule. The *Tahoe National Forest Land and Resource Management Plan* would be amended under these alternatives to ensure the Subpart C Travel Management Rule designations would be consistent with the Forest Plan.

## Other Relevant Mandatory Disclosures

### Short-term Uses and Long-term Productivity

Short-term uses will not affect the long-term productivity of recreation resources.

### Unavoidable Adverse Effects

Allowing motorized OSV use, which is an acceptable use of National Forest System lands, unavoidably affects non-motorized or quiet opportunities in some areas, as discussed in the analysis related to conflicts between motorized and non-motorized winter experiences.

### Irreversible and Irretrievable Commitments of Resources

OSV trail and area designations are not irreversible and irretrievable commitments of resources.

# Noise

## Relevant Laws, Regulations, and Policy

### Regulatory Framework

#### *National Forest Management Act*

Specifically for off-highway vehicle management, the National Forest Management Act requires that this use be planned and implemented to protect land and other resources, promote public safety, and minimize conflicts with other uses of the National Forest System lands. The National Forest Management Act also requires that a broad spectrum of forest and rangeland-related outdoor recreation opportunities be provided that respond to current and anticipated user demands.

#### *Sierra Nevada Forest Plan Amendment*

The Sierra Nevada Forest Plan Amendment established standards and guidelines specific to wheeled motor vehicle travel off of designated routes, trails, and limited OHV use areas. Unless otherwise restricted by current forest plans or other specific area standards and guidelines or Forest Orders, cross-country travel by OSVs would continue, Forestwide Standard and Guideline number 69 (USDA Forest Service 2009b).

#### *Land and Resource Management Plan*

The *Tahoe National Forest Land and Resource Management Plan* (LRMP 1990) as amended provides forestwide and management area-specific goals and strategies, desired future conditions, land allocation, and standards and guidelines relevant to this noise analysis as follows:

**Management Goals and Strategies:**

**Recreation:**

Recognize the value of semi-primitive motorized (SPM) and non-motorized (SPNM) areas in the forest because of their scarcity and the demand for the few acres remaining. Closely monitor the loss of inventoried SPNM and SPM land that is not allocated in the Plan for these ROS classes. Where possible, avoid losing SPM and SPNM areas during the planning period by considering options that would not road the areas significantly.

**Wilderness**

Manage the Granite Chief Wilderness area to preserve the wilderness character of its living and nonliving components and to provide for compatible human use and enjoyment.

Provide quality wilderness experiences for the public.

### *Management Standards and Guidelines*

#### OSV Use

The Tahoe National Forest LRMP uses standards and guidelines to establish OSV use designations across the Tahoe National Forest. Each of the Forest's 109 management areas has a standards and guidelines that specifies whether: (1) the management area is open to OSV travel (for example, the Lavezzola Management Area, LRMP, pg. V-95) or (2) closed to OSV travel (for example, the Coolbrith Management Area, LRMP, pg. V-85) or (3) OSVs are restricted to designated routes (for example, the Queens Management Area, LRMP, pg. V-339). Some of the Forest's management areas have a standard and guideline that closes a portion of the management area to OSVs, sometimes during a particular season (for example, the Pendola Management Area, LRMP, pg. V-174). Appendix B displays the Tahoe National Forest LRMP OSV use standards and guidelines for each of the Forest Plan's 109 management area.

#### Recreation Opportunity Spectrum

The Tahoe National Forest LRMP uses forestwide standards and guidelines to define the following Recreation Opportunity Spectrum classes: Primitive (P), Semi Primitive Non-Motorized (SPNM), Semi Primitive Motorized (SPM), Roaded Natural (RN), Rural (R), and Modern Urban (MU) (LRMP, Forestwide Standards and Guidelines #8 through #13, pp. V-20 through V-22). Each of the Forest Plan's 109 management areas is assigned an ROS class (TNF LRMP, pp. V-69 through V-544).

#### Pacific Crest National Scenic Trail

The Tahoe National Forest LRMP applies the following management area-specific standard and guideline to the 13 management areas through which the Pacific Crest National Scenic Trail (PCT) traverses: "The standards and guidelines for location, design, signing, user facilities, and management of the PCNST will be in accordance with the criteria established in the PCNST Comprehensive Plan, 1/18/82" (LRMP, pg. V- 64).

The 1982 Comprehensive Plan provides the following direction for winter use along the Pacific Crest National Scenic Trail:

> Winter use (cross-country skiing and snowshoeing) should be accommodated where practical and feasible. Each agency should follow its own procedures for marking and signing the trail for winter use purposes. As a guideline, all trail markers should be at eye level (approximately 40" above average maximum snow depth). Sanitation facilities and snow removal for parking may be necessary. Any improvements, or alterations of the vegetation, should not detract from the quality of the recreation opportunities for other trail activities such as hiking and horseback riding.
>
> Snowmobiling along the trail is prohibited by the National Trails System Act, P.L. 90-543, Section 7(c). Winter sports plans for areas through which the trail passes should consider this prohibition in determining areas appropriate for snowmobile use. Winter sports brochures should indicate designated snowmobile crossings on the Pacific Crest Trail where it is signed and marked for winter use. If cross-country skiing and/or snowshoeing is planned for the trail, any motorized use of adjacent land should be zoned to mitigate the noise of conflict.

### Federal Law

The proposed OSV designations will be reviewed to determine their consistency with the following applicable laws, regulations and policies:

- Wilderness Act of 1964 and applicable Wilderness Implementation Plans

- National Trails System Act of 1968 (P.L. 90-543) and the Pacific Crest National Scenic Trail Comprehensive Plan
- 2005 Travel Management Rule – Subpart C (36 CFR Parts 212 and 261) as amended in 2015 - Use by Over-snow Vehicles (Travel Management Rule)

#### *Executive Orders*

Executive Order 11644 of February 8, 1972, as amended by Executive Order 11989 of May 24, 1977, and by Executive Order 12608 of September 9, 1987, requires certain Federal agencies, including the Forest Service, to “ensure that the use of off-road vehicles on public lands [is] controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands.”

#### *State and Local Law*

California Vehicle Code (CVC) Section 27200 – regulates noise emitted by vehicles.

CVC Section 27203 limits noise at 82 dBA for snowmobiles manufactured after 1972. Noise levels generated by OSVs are further limited through manufacturer restrictions. Snowmobiles produced since February 1, 1975, and certified by the Snowmobile Safety and Certification Committee’s independent testing company emit no more than 78 dBA from a distance of 50 feet while traveling at full throttle when tested under the Society of Automotive Engineers (SAE) J192 procedures. Additionally, those produced after June 30, 1976, and certified by the Snowmobile Safety and Certification Committee’s independent testing company emit no more than 73 dBA at 50 feet while traveling at 15 mph when tested under SAE J1161 procedures (California Department of Parks and Recreation 2010).

OSV use on county roads and National Forest System lands are subject to the State standards described above. The Tahoe LRMP does not identify Standards and Guidelines regulating noise emissions of forest activities (California Department of Parks and Recreation 2010).

### Methodology

This analysis uses SPreAD-GIS: an ArcGIS toolbox for modeling the propagation of engine noise in a wildland setting Version 2.0. SPreAD-GIS is based on the System for the Prediction of Acoustic Detection, a model developed by the Forest Service and Environmental Protection Agency to predict and plan for recreation opportunities in national forests. Input data includes commonly available datasets including:

- Digital elevation model (DEM)
- Land cover
- Local weather conditions (average air temp, relative humidity, wild speed and direction for given season)
- Sound source characteristics (from a table of built in source types)
- Ambient sound conditions (a tool is available to estimate this based on land cover and a table of background sound for various environmental conditions)

### Resource Indicators and Measures

Resource indicators and measures shown in table 19 will be used to measure and disclose effects to noise related to OSV use designations and grooming trails for OSV use.

**Table 33. Resource indicators and measures for alternative 2 direct and indirect effects**

| Resource Element | Resource Indicator | Measure (Quantify if possible) |
|---|---|---|
| **Noise** | Opportunities for motorized winter uses | Size of areas (acres) open to public, cross-country OSV use; percentage change compared to current management.<br><br>Acres and percent of designated acres that are anticipated to have high to moderate OSV use levels and the associated potential for noise impacts. |
| | OSV designations | Length of snow trails (miles), groomed and ungroomed, designated and identified for public OSV use |

## Spatial and Temporal Context for Effects Analysis

### Spatial Context:

The spatial boundaries for analyzing the direct and indirect effects to noise are within the Tahoe National Forest boundary, because the proposed OSV designation decision would apply to OSV trails and areas within the forest boundary.

The spatial boundaries for analyzing cumulative effects to noise are within the Tahoe National Forest boundary, because the OSV designations would apply to OSV trails and areas within the forest boundary and have the potential to cumulatively impact OSV recreation experiences and opportunities across the forest.

### Effects Timeframe:

The temporal boundaries for analyzing the direct and indirect effects to noise are, in the short term, one year and in the long term up to 20 years. Short-term effects such as changes in the acres that could be impacted by OSV noise would occur upon implementation of the OSV designation decision. Long-term effects such as decreases in user conflicts due to effective management of OSV use through a designated OSV system of trails and areas would occur over the life of the decision.

The temporal boundaries for analyzing cumulative effects to noise are up to 20 years, because the OSV designations would remain in effect over the long term, and would therefore, overlap in time with other forest management activities with potential to cumulatively impact OSV recreation experiences and opportunities.

## Affected Environment

### Noise

The sounds associated with OSV use and the ancillary activities of operating plowing and grooming equipment associated with the winter OSV activities may be interpreted as noise with possible impacts to other recreational uses, and wildlife resources. These effects are specifically addressed in the Recreation and Wildlife sections of this analysis.

Opportunities for quality recreation experiences depend on both the settings (physical, social, and managerial aspects), and on the desired experience of the visitor. Conflicts occur when one recreationist effects or degrades the experience of another. Many non-motorized recreationists experience conflict with motorized recreationists (Adams and McCool 2010). Conflict can result in displacement or the abandonment of the use of a particular trail or area, or a change in time of use (Adams and McCool 2010).

Conflict related to noise may result if non-motorized recreationists are not able to achieve their desired experience due to the presence of noise from motorized use in the area.

Sound is a physical phenomenon, a vibration in the air that can be measured. Noise is an interpretation of sound, or a sound that has characteristics that may irritate or annoy a listener, interfere with a listener's activity, or in some other way be distinguished as unwanted (Harrison et al. 1980).

The acoustic impact of sound can be determined by measuring the inherent characteristics of the sound and considering that in conjunction with the setting in which the sound is heard and the individual attributes of the listener. Whether sounds are determined to be acceptable, or are interpreted as noise depends on the values and desires of the person making the judgement (Harrison et al. 1980).

As noted in the Recreation section of this document, conflict between motorized and non-motorized winter uses arise due to differing desired recreation experiences, public safety concerns, noise, air quality, and access issues. Public comments received during the scoping period for this analysis describe conflicts related to the creation of noise impacts that lead to the displacement of non-motorized recreationists.

Areas of specific concern to non-motorized enthusiasts who are typically seeking a quiet recreation setting that is not influenced by the sound of motorized vehicles include cross-country ski trails, the PCT, Wilderness, and Semi-Primitive Non-motorized ROS classes.

Generally, human-related sounds are more appropriate toward the rural and roaded end of the ROS spectrum and less toward the Semi-Primitive Non-motorized and Primitive end of the spectrum (Harrison et al. 2008). ROS classes are described in the Recreation section of this analysis.

California Vehicle Code Section 27203 limits noise at 82 dBA for snowmobiles manufactured after 1972. Noise levels generated by OSVs are further limited through manufacturer restrictions. Snowmobiles produced since February 1, 1975, and certified by the Snowmobile Safety and Certification Committee's independent testing company emit no more than 78 dBA from a distance of 50 feet while traveling at full throttle when tested under the Society of Automotive Engineers (SAE) J192 procedures. Additionally, those produced after June 30, 1976, and certified by the Snowmobile Safety and Certification Committee's independent testing company emit no more than 73 dBA at 50 feet while traveling at 15 mph when tested under SAE J1161 procedures (California Department of Parks and Recreation 2010).

## Sound Propagation

Sound is measured by amplitude (decibels, dB) that determine loudness, frequency (Hertz, Hz) that determine pitch, and duration of the sound.

As sound waves travel away from the source, they lose energy (amplitude decreases). Several factors influence how far the sound will travel. Spherical spreading loss refers to the fact that a sounds loudness decreases as the distance between the source and the listener increases. Atmospheric absorption loss refers to sound waves being transferred to, or absorbed by the atmosphere. This varies with air temperature, elevation, relative humidity, vegetation and ground cover. Long distance loss refers to refraction of sound due to varying air temperatures or wind directions and diffraction or scattering of sound waves around a barrier (Harrison et al. 1980).

Background or ambient sound levels influence how noticeable a given sound will be, and the setting in which it is heard influences how appropriate that sound may be.

## Environmental Consequences

### Alternative 1

#### *Direct and Indirect Effects*

Under alternative 1, 636,002 acres would be designated for OSV use and the associated influence of OSV noise. Noise sources of multiple OSVs and vehicles would be concentrated at plowed OSV trailheads, and more dispersed along groomed trails. Approximately 212,857 acres, or 33 percent, of the 636,002 acres would be designated for OSV use, such as areas adjacent to groomed OSV trails and areas with highly desirable slope and vegetation conditions are anticipated to have high to moderate OSV use levels and the associated potential noise impacts.

Existing conflicts between motorized and non-motorized winter experiences on the Tahoe National Forest would continue and may increase as population and visitor use increase.

The Pacific Crest National Scenic Trail would continue to be managed as a non-motorized trail, however OSV use adjacent to the trail could impact the winter non-motorized trail experience due to noise and the presence of OSVs near the trail, or crossing the trail. No OSV trails across the PCT would be designated and OSVs would continue to cross the trail along existing OSV routes, and could cross the PCT at any location where the trail passes through and OSV open area. The portion of the PCTl on the Tahoe National Forest that passes through the Granite Chief Wilderness and other areas where OSV use is currently prohibited would continue to provide opportunities for quite non-motorized trail experiences.

Ongoing OSV use near designated non-motorized areas could result in short-term impacts to solitude. OSV use across, and adjacent to the PCT would continue, with the potential for ongoing noise-related impacts to non-motorized trail visitors, when OSVs are present near the trail.

**Table 34. Noise resource indicators and measures for alternative 1**

| Resource Element | Resource Indicator (Quantify if possible) | Measure (Quantify if possible) | Existing Condition |
|---|---|---|---|
| Noise | Opportunities for motorized winter uses | Size of areas (acres) open to public, cross-country OSV use<br><br>Acres and percent of designated acres that are anticipated to have high to moderate OSV use levels and the associated potential for noise impacts. | 636,002 acres designated for public, cross-country OSV use<br><br>212,857 acres, 33 percent of the designated acres are anticipated to have high to moderate OSV use |
| Noise | OSV designations | Length of snow trails (miles), groomed and ungroomed, designated and identified for public OSV use. | 217 miles of designated trails available for grooming for OSV use<br><br>41 miles of marked, ungroomed trails for OSV use are located within areas designated for OSV use.<br><br>Approximately 7 miles of designated OSV trails are not available for grooming. |

### *Cumulative Effects*

In alternative 1, both motorized and non-motorized winter use would continue to occur on trails and in areas across the forest, existing conflicts between these uses and desired experiences would continue in some popular areas. Short-term and temporary impacts to opportunities for solitude (due to OSV noise, and the presence of people) may occur when OSVs are present adjacent to Wilderness areas, within Inventoried Roadless Areas, or adjacent to the PCT. Noise from OSVs in areas and on trails across the forest would add to other sound sources, such as OSV grooming equipment, snow plows, vehicles on highways, vehicles on Forest roads, equipment being used for forest management projects, etc.

## Alternative 2 – Modified Proposed Action

### *Direct and Indirect Effects*

Under alternative 2, 406,895 acres would be designated for OSV use and the associated influence of OSV noise. Noise sources of multiple OSVs and vehicles would be concentrated at plowed OSV trailheads, and more dispersed along groomed trails and in designated areas. Approximately 194,311 acres, or 47 percent of the 406,895 acres designated for OSV use, such as areas adjacent to groomed OSV trails and areas with highly desirable slope and vegetation conditions are anticipated to have high to moderate OSV use levels and the associated possible noise impacts.

Using average environmental factors for the winter season on the Tahoe National Forest and the SPreAD-GIS model, figure 7, figure 8, and figure 9 show the anticipated sound propagation away from point source sound locations along OSV trails. The trail points represent a snapshot in time, and were selected based on important non-motorized trails and areas. OSV sound source points shown on figure 7, figure 8, and figure 9 include the Andesite Ridge OSV trail, locations where OSV trails cross the PCT, and areas near the Peter Grubb Hut in Round Valley could be impacted by OSV noise. The noise propagation contour lines on the maps show how the OSV sound is expected to spread out from the source location given unique environmental, vegetation, and terrain conditions. The maps also show noise levels where the introduced OSV noise would be in excess of ambient sound conditions.

Using average environmental factors for the winter season on the Tahoe National Forest and the SPreAD-GIS model, figure 7, figure 8, and figure 9 show the anticipated sound propagation away from point source sound locations along OSV trails. The trail points represent a snapshot in time, and were selected based on important non-motorized trails and areas. OSV sound source points shown on figure 7, figure 8, and figure 9 include Castle Pass and areas near the Peter Grubb Hut in Round Valley in the Donner Summit OSV area, locations where OSV trails cross the PCT in the Barker OSV area, and near French Meadows on the Mosquito Ridge trail in the Foresthill East OSV area that are potentially impacted by OSV noise. The noise propagation contour lines on the maps show how the OSV sound is expected to spread out from the source location given unique environmental, vegetation and terrain conditions. The contour lines are color coded to show the extent ofnoise levels where the introduced OSV noise would be above ambient sound conditions. Table 35 shows examples of common sounds and their decibel level.

**Table 35. Examples of Comparative Sound Levels***

| Sound Source | Sound Level dB(A) |
|---|---|
| 75-piece orchestra | 130 |
| Car horn, snow blower | 110 |
| Pre-1969 snowmobile | 102 |
| Blow dryer, diesel truck | 100 |
| Electric shaver, lawn mower | 85 |
| Garbage disposal, vacuum cleaner | 80 |
| Post-1975 snowmobile (full throttle and 50 feet; maximum allowed by law) | 78 |
| Alarm clock, city traffic | 70 |
| Dishwasher | 60 |
| Leaves rustling, refrigerator | 40 |

*Table from American Council of Snowmobiles Associations Facts and Myths about Snowmobiling and Winter Trails, 2014

Figure 7 shows the sound of OSVs on the Andesite Ridge trail spreading primarily to the west, away from the Peter Grubb Hutt area, although some noise disturbance is likely when OSVs are present on the groomed trail and adjacent areas that are designated for OSV use.

Although sounds of OSVs may be heard in the far western portion of the Granite Chief Wilderness (as shown in figure 8) when OSVs are present on designated trails, noise is not anticipated to negatively impact the wilderness area since the presence of OSV noise would be short-term and temporary when OSVs are present on these trails. Little OSV use is anticipated near the wilderness.

Alternative 2 designates OSV use in areas adjacent to PCT segments within the Northeast Yuba, Sierraville West, Truckee, and Barker OSV analysis areas. Alternative 2 does not designate any areas for OSV use adjacent to the PCT segments within the Donner Summit, Summit West, and Granite Chief Wilderness OSV analysis areas. Alternative 2 designates 20 OSV trails across the PCT located in the Barker, Sierraville West and Yuba Northeast OSV analysis areas. Figure 9 shows the location of one of the trails across the PCT in the Barker Area. Designating OSV trails across the PCT would minimize the potential for motorized use to impact the trail experience, and is consistent with the PCT comprehensive management plan. Limiting the locations where OSVs cross the trail would enhance the quiet, non-motorized experience while accommodating motorized access to OSV areas and maintaining OSV loop riding opportunities.

The winter trailhead at Donner Summit is the most popular way to access the PCT going either north or south in the wintertime, and OSV use would not be designated in areas adjacent to the PCT where non-motorized recreationists would generally travel on a day-trip. Also, OSV use would not be designated in areas along the PCT (both north and south) where it crosses Highway 49 east of Sierra City, again to mitigate potential noise conflicts along the PCT where winter visitors might access the Trail.

Alternative 2 would minimize potential motorized OSV impacts to the non-motorized PCT experience to a greater extent than alternatives 1 and 4, but does not provide as much protection of the non-motorized PCT experience as in Alternatives 3 and 5. The proposed areas to be designated, and not designated for OSV use along the PCT provide for multiple uses along the trail, while also giving consideration to the existence of the trail and uses of the trail, consistent with the management direction for the PCT in the Tahoe Forest Plan.  The potential for noise impacts would be highest near the designated OSV trails across the PCT because OSV use could be relatively more concentrated in those areas, at least temporarily while OSVs were crossing the trail.

Additionally, in alternative 2, OSV use would not be designated, and opportunities for solitude and quiet, non-motorized experiences would be enhanced in the following areas: High Loch Leven area and the individual parcels of National Forest System lands currently under long-term special use permits for Royal Gorge Cross Country Ski Area, Tahoe Donner Cross Country Ski Area, Boreal Ski Area, Donner Ski Ranch Ski Area, Sugar Bowl Ski Area, Alpine Meadows Ski Area and Squaw Valley Ski Area.

Ongoing monitoring for use conflicts would consider the influence of noise on recreational experiences. Site-specific sound modeling with the SPreAD-GIS program may be useful to analyze individual areas if future conflicts are identified through monitoring. The sound propagation model would help determine appropriate actions to help mitigate the conflicts related to noise.

**Table 36. Resource indicators and measures for alternative 2 direct and indirect effects**

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Alternative 2 Direct and Indirect Effects |
|---|---|---|---|
| Noise | Opportunities for motorized winter uses | Size of areas (acres) designated to public, cross-country OSV use; percentage change compared to current management<br>Acres and percent of designated acres that are anticipated to have high to moderate OSV use levels and the associated potential for noise impacts. | 406,895 acres designated for OSV use, 36 percent decrease from current management<br>191,311 acres, 47 percent of the designated acres are anticipated to have high to moderate OSV use |
| | OSV designations | Length of snow trails (miles), groomed and ungroomed, designated and identified for public OSV use | 237 miles of designated trails available for grooming for OSV use<br>14 miles of designated marked trails for OSV use<br>70 miles of designated OSV trails not available for grooming |

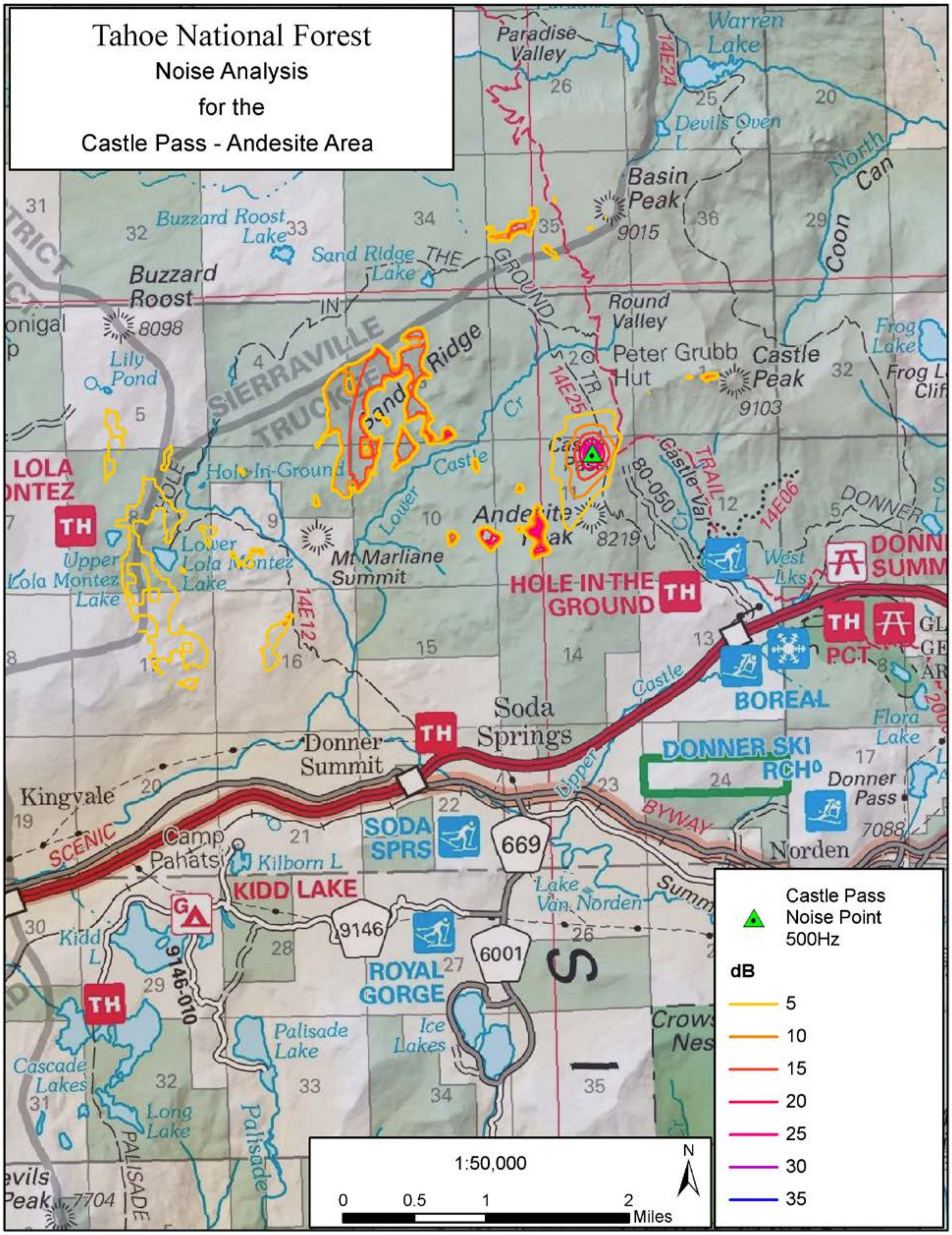


**Figure 7. Noise analysis on the Andesite Ridge trail**

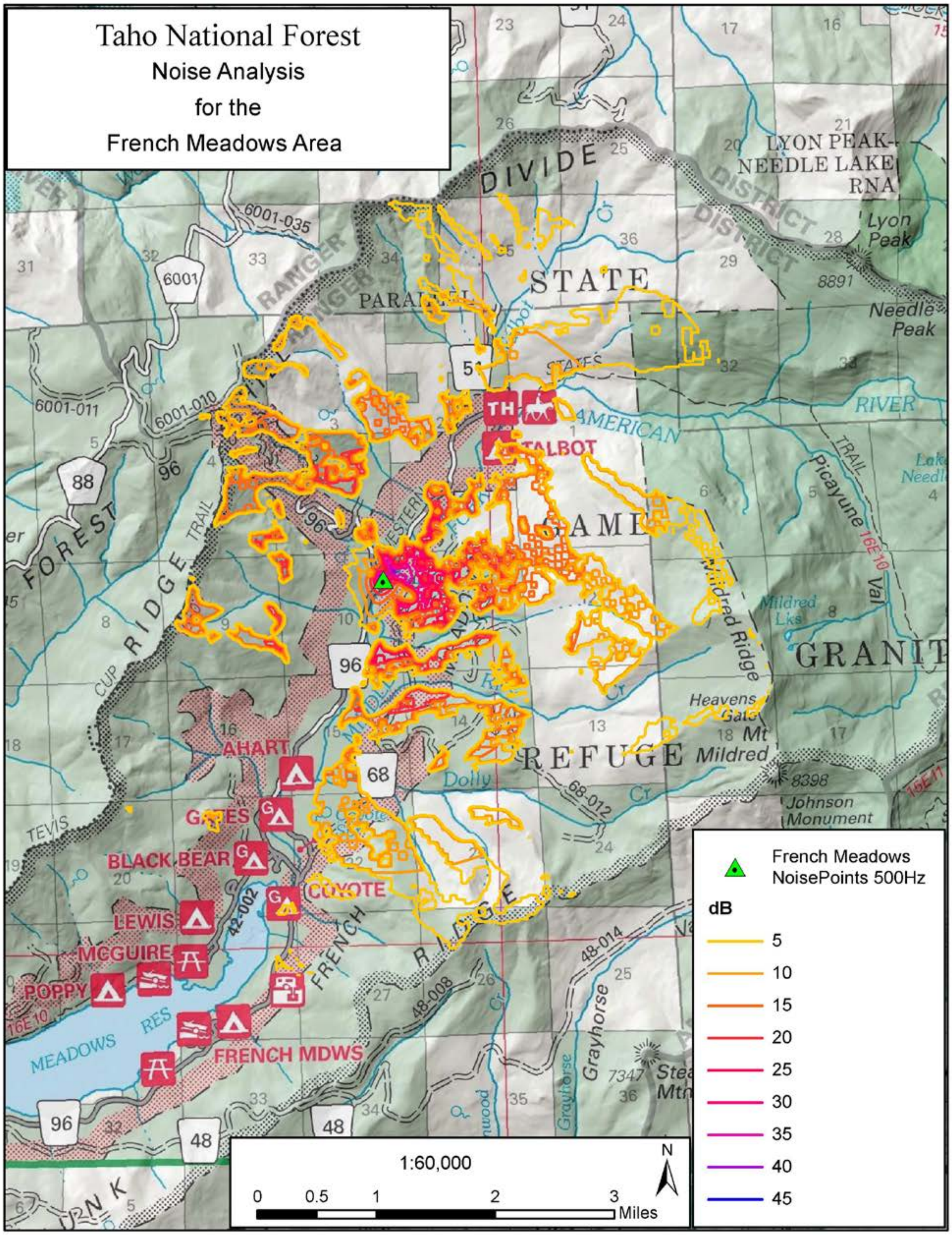


Figure 8. Noise analysis for the French Meadows Area

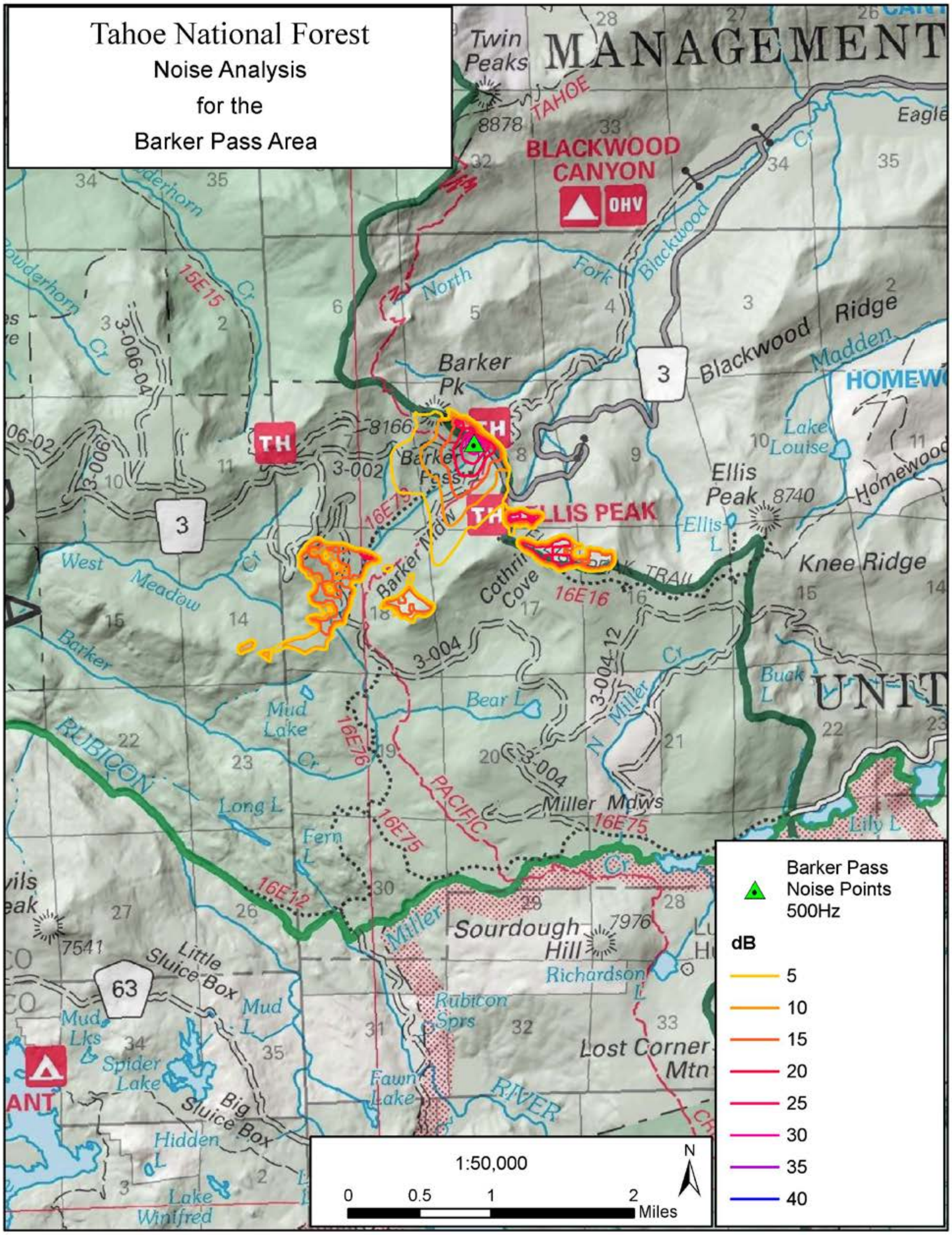


**Figure 9. Noise analysis for the Barker Pass Area**

## Cumulative Effects

The trailhead and parking lot plowing activities and OSV trail grooming activities would increase the noise associated with motorized vehicles in the forest setting, however this would not be a change from existing conditions. Parking lot plowing occurs during the day when OSV use also typically occurs, so the sounds generated by each activity could be cumulative. OSV trail grooming generally occurs at night when very few or no OSVs are operating, therefore, the noise impacts from trail grooming would be less likely to be cumulative with other motor vehicle sounds, but may be more noticeable because the ambient sound conditions are typically quieter during the night.

Non-motorized winter visitors to the Tahoe National Forest could experience noise from OSVs, in addition to other noise such as snow plows, vehicles on roads, and aircraft that may be in the same area at the same time, cumulatively impacting the quiet recreation experience in the short term.

## Alternative 3

### *Direct and Indirect Effects*

Under alternative 3, 275,972 acres would be designated for OSV use and the associated influence of OSV noise. Noise sources of multiple OSVs and vehicles would be concentrated at plowed OSV trailheads, and more dispersed along groomed trails and in areas designated for OSV use. Approximately 161,919 acres, or 58 percent of the 275,972 acres designated for OSV use, such as areas adjacent to groomed OSV trails and areas with highly desirable slope and vegetation conditions are anticipated to have high to moderate OSV use levels and the associated possible noise impacts.

Noise impacts associated with the groomed and ungroomed OSV trail system in alternative 3 would be slightly less than in alternative 2.

Alternative 3 would designate OSV use on fewer acres than alternative 2. With additional areas where OSV use would not be designated, the opportunities for non-motorized use (in areas not influenced by the sounds of OSV use) are enhanced under this alternative.

Alternative 3 would substantially reduce the acres designated for OSV use in the Donner Summit area, and would not designate the Andesite West OSV Trail, thus reducing noise disturbance in this area, as shown in figure 7.

Although sounds of OSVs may be heard in the far western portion of the Granite Chief Wilderness (as shown in figure 8) when OSVs are present on trails outside the Wilderness, noise is not anticipated to negatively impact the Granite Chief Wilderness area because OSV noise would be short-term and temporary. Alternative 3 substantially reduces the acres designated for OSV use in the Foresthill East OSV area, further reducing associated noise impacts in this area. OSV use would not be anticipated near the Wilderness due to its long distance away for designated OSV areas and trails.

Alternative 3 generally does not designate any OSV use in areas directly adjacent to the PCT. In the Northeast Yuba and Sierraville West OSV analysis areas, the closest designated OSV areas are approximately ¼ to ½ mile away from the PCT, the closest designated area to the PCT in the Donner Summit OSV area is approximately 1.5 miles away, and the closest designated area in the Truckee OSV area is approximately 3 miles away. No OSV use is designated in the Summit West, Granite Chief, or Barker OSV areas in alternative 3. Three OSV trails across the PCT would be designated over roads that are on the Tahoe National Forest Motor Vehicle Use Map, in the Sierraville West OSV analysis area. Fewer OSV trails across the PCT would be designated than in all other alternatives, further minimizing the potential for OSVs to impact the non-motorized trail experience and would reduce OSV connectivity between designated areas on either side of the PCT. Alternative 3 minimizes impacts to the non-motorized PCT experience to a greater extent than alternatives 1, 2, and 4, and is similar to alternative 5.

Alternative 3 would not designate OSV use or OSV trails across the PCT in the Barker OSV area, therefore, the experience of non-motorized visitors along the PCT south of the Granite Chief Wilderness would not be influenced by the noise from OSVs as shown in figure 9.

In addition to the areas described in alternative 2, OSV use would not be designated, and opportunities for solitude and quiet, non-motorized experiences would be enhanced in the following areas: expanded areas around Independence Lake, and High Loch Leven(Sierraville West OSV area). New areas not proposed for OSV use designation under alternative 3 include Andesite Ridge and Summit Lake, Coon Canyon, Donner South, Sardine Lakes, Lunch Creek East, PCT/Grubb, and Devil’s Oven (in the Donner Summit and Sierraville East OSV areas), further enhancing quiet, non-motorized opportunities in these areas.

Designating OSV use limited to designated trails through the Lunch Creek East, Southwest Andesite Ridge, and Prosser-Boca areas (Donner Summit and Reservoirs OSV areas) provides an opportunity to minimize impacts on non-motorized recreation experience, while also maintaining access and opportunities for motorized OSV use.

Potential impacts from OSV noise would be reduced along the entire length of the PCT, different than described in alternative 2 which avoids designating OSV use in areas most likely to have noise conflicts between motorized and non-motorized witner recreation uses. With only three designated OSV trails across the PCT, the potential noise disturbance near designated OSV trails across the PCT would be limited to a smaller portion of the PCT.

**Table 37. Resource indicators and measures for alternative 3 direct and indirect effects**

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Alternative 3 Direct and ndirect Effects |
|---|---|---|---|
| Noise | Opportunities for motorized winter uses | Size of areas (acres) designated for OSV use; percentage change compared to current management<br>Acres and percent of designated acres that are anticipated to have high to moderate OSV use levels and associated noise impacts. | 275,972 acres designated for OSV use, a 57 percent decrease from current management<br>161,919 acres, 58 percent of the designated acres are anticipated to have high to moderate OSV use |
| | OSV designations | Length of snow trails (miles), groomed and ungroomed, designated and identified for public OSV use | 217 miles of designated trails available for grooming for OSV use<br>38 miles of designated marked trails for OSV use<br>24 miles designated OSV trails not available for grooming |

### *Cumulative Effects*

Activities contributing to potential cumulative effects of alternative 3 would generally be the same as those described for alternative 2; however, with fewer acres designated for cross-country OSV use and fewer miles of trail available for grooming, the potential for cumulative noise impacts is reduced under alternative 3 compared to alternatives 1, 2, and 4.

### Alternative 4

#### *Direct and Indirect Effects*

Under alternative 4, 641,105 acres would be designated for to OSV use and the associated influence of OSV noise. Noise sources of multiple OSVs and vehicles would be concentrated at plowed OSV trailheads, and more dispersed along groomed trails and in designated OSV use aeas. Approximately 212,873 acres, or 33 percent of the 641,105 acres desginated for OSV use, such as areas adjacent to groomed OSV trails and areas with highly desirable slope and vegetation conditions are anticipated to have high to moderate OSV use levels and associated noise impacts.

Alternative 4 would designate OSV use on more acres and miles of trail than all other alternatives therefore, it has the highest potential for conflicts with OSV noise across the forest.

Potential noise-related impacts as shown in figure 7, figure 8, and figure 9 would be substantially the same as described for alternative 2. Additional acres would be designated for OSV use in the Foresthill East OSV area, therefore, possibly increasing the impacts associated with noise in this area.

Alternative 4 designates OSV use in areas adjacent to PCT segments within the Northeast Yuba, Sierraville West, Donner Summit, Summit West, Truckee, and Barker OSV analysis areas. Alternative 4 does not designate any areas for OSV use adjacent to the PCT segments within the Granite Chief Wilderness OSV analysis area. Alternative 4 designates 21 OSV trails across the PCT located in the Barker, Sierraville West and Yuba Northeast OSV analysis areas. Potential impacts from OSV noise would continue along the PCT, similar to alternative 1.Potential impacts to the non-motorized trail experience along the PCT would be slightly more than in alternative 2, and substantaially more than in alternatives 3 and 5.

**Table 38. Resource indicators and measures for alternative 4 direct and indirect effects**

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Alternative 4 Direct and Indirect Effects |
|---|---|---|---|
| Noise | Opportunities for motorized winter uses | Size of areas (acres) designated for OSV use; percentage change compared to current management<br>Acres and percent of designated acres that are anticipated to have high to moderate OSV use levels and associated noise impacts. | 641,105 acres designated for OSV use, a 0.5 percent increase from current management.<br>212,873 acres, 33 percent of the designated acres are anticipated to have high to moderate OSV use |
| | OSV designations | Length of snow trails (miles), groomed and ungroomed, designated and identified for public OSV use | 259 miles of designated trails available for grooming for OSV use<br>22 miles of designated marked trails for OSV use<br>5 miles of designated trails not available for grooming |

#### *Cumulative Effects*

Activities contributing to potential cumulative noise effects of alternative 4 would be generally the same as those described for alternative 2; however, similar acreages designated for cross-country OSV use and miles of trail available for grooming as Alternative 1, the potential for cumulative noise impacts is similar to alternative 1 and relatively higher compared to alternatives 2, 3, and 5.

## Alternative 5

### *Direct and Indirect Effects*

Under alternative 5, 300,146 acres would be designated for to OSV use and the associated influence of OSV noise. Noise sources of multiple OSVs and vehicles would be concentrated at plowed OSV trailheads, and more dispersed along groomed trails and in designated OSV use areas. Approximately 145,420 acres, or 48 percent of the 300,146 acres designated for OSV use, such as areas adjacent to groomed OSV trails and areas with highly desirable slope and vegetation conditions are anticipated to have high to moderate OSV use levels and associated noise impacts.

Alternative 5 would designate OSV use on slightly more acres than alternative 3, but on fewer miles of trail.

With additional areas not designated for OSV use, the opportunities for non-motorized use (in areas not influenced by sounds of OSV use) are enhanced.

Potential impacts from noise would be substantially the same as described in alternative 3 for the Donner Summit and Foresthill East areas. Potential impacts from noise would be similar to those described in alternatives 2 and 4 for the Barker OSV area (figure 9), but on slightly fewer acres than in alternatives 2 and 4.

Quiet recreation opportunities would be maintained to the greatest extent of all alternatives along the PCT by not designating OSV use within the USFS Scenery Management System definition of Foreground for the Pacific Crest National Scenic Trail. This area would be up to one-half mile in the visible lands on each side of the Pacific Crest National Scenic Trail or smaller as the visible landscape along the Trail would be less than one-half mile on each side of the trail due to topography (in the Northeast Yuba, Sierraville West, Donner Summit, Truckee and Barker OSV analysis areas). Alternative 5 does not designate any OSV use areas in the Summit West and Granite Chief Wilderness OSV Analysis areas. This would protect the trail experience for PCT visitors and would eliminate the potential for OSV use to impact the trail experience (other than on the 10 designated OSV trails across the PCT) and reduce the potential for conflict between motorized and non-motorized uses. Overall, alternative 5 would minimize potential impacts from OSVs on the non-motorized trail experience to a similar extent as in alternative 3, and substantially more than in alternatives 1, 2, and 4.to the greatest extent of all alternatives.

**Table 39. Resource indicators and measures for alternative 5 direct and indirect effects**

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Alternative 5 Direct and Indirect Effects |
|---|---|---|---|
| Noise | Opportunities for motorized winter uses | Size of areas (acres) designated for OSV use; percentage change compared to current management<br>Acres and percent of designated acres that are anticipated to have high to moderate OSV use levels and associated noise impacts. | 300,146 acres designated for OSV use, a 53 percent decrease from existing conditions<br>145,420 acres, 48 percent of the designated acres are anticipated to have high to moderate OSV use |

| Resource Element | Resource Indicator | Measure (Quantify if possible) | Alternative 5 Direct and Indirect Effects |
|---|---|---|---|
| Noise | OSV designations | Length of snow trails (miles), groomed and ungroomed, designated and identified for public OSV use | 215 miles of designated trails available for grooming for OSV use<br>25 miles of marked, ungroomed trails for OSV use<br>17 miles of designated OSV trails not available for grooming |

*Cumulative Effects*

Activities contributing to potential cumulative noise effects of alternative 5 would be generally the same as those described for alternative 2; however, with fewer acres designated for cross-country OSV use (with the fewest acres anticipated for moderate to high OSV use), and fewer miles of trail available for grooming, the potential for cumulative noise impacts is reduced to the greatest extent under Alternative 5 of all alternatives.

## Summary of Environmental Effects

Alternatives 1, 3, and 5 provide approximately the same level of groomed motorized OSV trail opportunities, as found in current management, and therefore, the same degree of possible noise impacts associated with trail use. Alternatives 2 and 4 increase the miles of trails available for grooming, and therefore, increase the possibility of noise impacts associated with trail use. Cross-country travel, and use of OSV trails is limited by minimum snow depth requirements for all action alternatives; however, alternative 2 provides most flexibility in applying the snow depth requirements. This flexibility allows OSV access to higher elevations provided snow depths are adequate to avoid resource damage, typically a minimum of 12 inches for cross-country OSV travel. Alternative 4 designates the greatest acreage for OSV use forestwide, compared to alternatives 2, 3, and 5, and therefore, the greatest possibility of noise impacts across the forest. The acres and percentage of designated acres that are anticipated to have high to moderate OSV use in alternative 4, are approximately the same as in alternative 1, existing conditions. Alternative 5 is expected to have the least amount of acres that could be impacted by noise due to fewer acres anticipated to receive high to moderate OSV use.

## Compliance with LRMP and Other Relevant Laws, Regulations, Policies and Plans

Alternative 1 would not comply with Subpart C of the Travel Management rule that requires designation of roads, trails, and areas on National Forest System lands to provide for over-snow vehicle use.

Alternatives 2, 3, 4, and 5 would comply with Subpart C of the Travel Management rule and would require amendments to the Tahoe Forest Plan's standards and guidelines for OSV use designation.

**Table 40. Summary comparison of how the alternatives address the key issues for noise**

| Issue | Indicator/Measure | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| **Noise** | Opportunities for motorized winter uses<br>Size of areas (acres) designated for OSV use that could be affected by noise; percentage change compared to current management<br>Acres and percent of designated acres that are anticipated to have high to moderate OSV use levels and associated noise impacts | 636,002 acres designated for OSV use<br>212,857 acres, 33 percent of the designated acres are anticipated to have high to moderate OSV use.<br>198,271 acres not designated for OSV use and available for quiet recreation<br>1,218 acres seasonally designated for OSV use and available for quiet recreation when OSVs are not present | 406,895 acres designated for OSV use, a 36 percent decrease from existing conditions.<br>191,311 acres, 47 percent of the designated acres are anticipated to have high to moderate OSV use.<br>429,378 acres not designated for OSV use and available for quiet recreation | 275,972 acres designated for OSV use, a 57 percent decrease from existing conditions.<br>161,919 acres, 58 percent of the designated acres are anticipated to have high to moderate OSV use.<br>560,301 acres not designated for OSV use and available for quiet recreation<br>1,408 acres seasonally designated for OSV use and available for quiet recreation when OSVs are not present | 641,105 acres designated for OSV use, a.5 percent increase from existing conditions.<br>212,873 acres, 33 percent of the designated acres are anticipated to have high to moderate OSV use.<br>195,168 acres not designated for OSV use and available for quiet recreation<br>1,218 acres seasonally designated for OSV use and available for quiet recreation when OSVs are not present | 300,146 acres designated for OSV use; a<br>53 percent decrease from existing conditions.<br>145,420 acres, 48 percent of the designated acres are anticipated to have high to moderate OSV use<br>536,127 acres not designated for OSV use and available for quiet recreation |
| | OSV designations<br>Length of snow trails (miles), groomed and ungroomed, designated and identified for public OSV use | 217 miles available for grooming<br>41 miles marked, ungroomed<br>7 miles designated, not available for grooming | 237 miles available for grooming<br>14 miles marked, ungroomed<br>70 miles designated, not available for grooming | 217 miles available for grooming<br>38 miles marked, ungroomed<br>25 miles designated, not available for grooming | 259 miles available for grooming<br>22 miles marked, ungroomed<br>5 miles designated, not available for grooming | 215 miles available for grooming<br>25 miles marked, ungroomed<br>17 miles designated, not available for grooming |

# Air Quality

## Relevant Laws, Regulations, and Policy

### Regulatory Framework

#### *Land and Resource Management Plan*

The Tahoe National Forest Land and Resource Management Plan (LRMP 1990) provides standards and guidelines for Air Quality.

- No quantifiable value is placed on air quality. The Federal Clean Air Act sets standards and guidelines for the attainment and maintenance of air quality (LRMP page 63).

#### *Federal Clean Air Act*

In 1963, Congress passed the Federal Clean Air Act and amended the act in 1970, 1977, and 1990. The purpose of the act is to protect and enhance air quality while ensuring the protection of public health and welfare. The 1970 amendments established National Ambient Air Quality Standards (NAAQS), which must be met by most state and Federal agencies, including the Forest Service.

States are given the primary responsibility for air quality management. Section 110 of the Clean Air Act requires states to develop state implementation plans that identify how the State will attain and maintain NAAQS. The Clean Air Act also allows states, and some counties, to adopt unique permitting procedures and to apply more stringent standards. California has set standards for certain pollutants, such as particulate matter and ozone, which are more protective of public health than respective Federal standards. California has also set standards for some pollutants that are not addressed by Federal standards including sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles.

The Clean Air Act requires that Forest Service actions have "no adverse effect" on air resources by meeting the NAAQS and non-degradation standards for Class 1 areas. Managers are further directed to improve existing substandard conditions and reverse negative trends where practicable. The NAAQS and California Ambient Air Quality Standards (CAAQS) for particle pollution as set by the Clean Air Act and California Air Resources Board can be viewed online at the California Air Resources Board webpage.[10]

#### *National Ambient Air Quality Standards*

NAAQS requirements were established to protect human health and the environment and acceptable maximum air quality concentrations. The NAAQS consist of numerical standards for air pollution, which are broken into "primary" and "secondary" standards for six major air pollutants described below. Primary standards protect public health (including sensitive populations such as asthmatics, children, and the elderly) and represent levels at which there are no known major effects on human health. Secondary standards are intended to protect the nation's welfare, and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the environment. These standards are detailed in table 41 and accompanying footnotes.

#### *California Air Resources Board*

California law authorizes the California Air Resources Board to set ambient (outdoor) air pollution standards (California Health and Safety Code section 39606) in consideration of public health, safety, and welfare. The Air Resources Board has established State Ambient Air Quality Standards (CAAQS) to

[10] http://www.arb.ca.gov/research/aaqs/aaqs2.pdf

identify outdoor pollutant levels considered safe for the public. After State standards are established, State law requires the Air Resources Board to designate each area as attainment, nonattainment, or unclassified for each State standard. The area designations, which are based on the most recent available data, indicate the healthfulness of air quality throughout the State (ARB 2015). The State and National Ambient Air Quality Standards are displayed in table 41 and accompanying footnotes.

The California Air Resources Board is responsible for meeting the Clean Air Act requirements. The Air Resources Board has further delegated the authority to local Air Pollution Control Districts (APCDs) or Air Quality Management Districts (AQMDs) for stationary sources, while retaining the authority for mobile sources. Air quality rules and regulations for California can be found at http://www.arb.ca.gov/homepage.htm. The APCD/AQMD has the primary responsibility for meeting the requirements of the Clean Air Act. This responsibility is carried out through the development and execution of state implementation plans, which must provide for the attainment and maintenance of air quality standards.

State implementation plans are comprehensive plans that describe how an area will attain NAAQS. The 1990 amendments to the Federal Clean Air Act set deadlines for attainment based on the severity of an area's air pollution problem.

State implementation plans are a compilation of new and previously submitted plans, programs, district rules, state regulations and Federal controls. State law makes the Air Resources Board the lead agency for all purposes related to the state implementation plan. Local air districts and other agencies prepare state implementation plan elements and submit them to the Air Resources Board for review and approval. The Air Resources Board forwards state implementation plan revisions to the Environmental Protection Agency (EPA) for approval and publication in the Federal Register. The Code of Federal Regulations Title 40, Chapter I, Part 52, Subpart F, Section 52.220 lists all of the items that are included in the California State Implementation Plan (http://www.arb.ca.gov/planning/sip/background.htm). The Forest Service is required to comply with all requirements of the California State Implementation Plan.

**Table 41. State and National Ambient Air Quality Standards**

| Pollutant | Averaging Time | California Standards[1] | | National Standards[2] | | |
|---|---|---|---|---|---|---|
| | | Concentration[3] | Method[4] | Primary[3,5] | Secondary[3,6] | Method[7] |
| **Ozone ($O_3$)[8]** | 1 hour | 0.09 ppm (180 µg/m$^3$) | Ultraviolet Photometry | --- | Same as Primary Standard | Ultraviolet Photometry |
| | 8 hour | 0.070 ppm (137 µg/m$^3$) | | 0.070 ppm (137 µg/m$^3$) | | |
| **Respirable Particulate Matter ($PM_{10}$)[9]** | 24 hour | 50 µg/m$^3$ | Gravimetric or Beta Attenuation | 150 µg/m$^3$ | Same as Primary Standard | Inertial Separation and Gravimetric Analysis |
| | Annual Arithmetic Mean | 20 µg/m$^3$ | | --- | | |
| **Fine Particulate Matter ($PM_{2.5}$)[9]** | 24 hour | --- | --- | 35 µg/m$^3$ | Same as Primary Standard | Inertial Separation and Gravimetric Analysis |
| | Annual Arithmetic Mean | 12 µg/m$^3$ | Gravimetric or Beta Attenuation | 12.0 µg/m$^3$ | 15 µg/m$^3$ | |
| **Carbon Monoxide (CO)** | 1 hour | 20 ppm (23 mg/m$^3$) | Non-dispersive Infrared Photometry (NDIR) | 35 ppm (40 mg/m$^3$) | --- | Non-dispersive Infrared Photometry (NDIR) |
| | 8 hour | 9.0 ppm(10 mg/m$^3$) | | 9 ppm (10 mg/m$^3$) | --- | |
| | 8 hour (Lake Tahoe) | 6 ppm (7 mg/m$^3$) | | --- | --- | |
| **Nitrogen Dioxide ($NO_2$)[10]** | 1 hour | 0.18 ppm (339 µg/m$^3$) | Gas Phase Chemiluminescence | 100 ppb (188 µg/m$^3$) | --- | Gas Phase Chemiluminescence |
| | Annual Arithmetic Mean | 0.030 ppm (57 µg/m$^3$) | | 0.053 ppm (100 µg/m$^3$) | Same as Primary Standard | |
| **Sulfur Dioxide ($SO_2$)[11]** | 1 hour | 0.25 ppm (655 µg/m$^3$ | Ultraviolet Fluorescence | 75 ppb (196 µg/m$^3$) | --- | Ultraviolet Fluorescence Spectrophotometry (Pararosaniline Method) |
| | 3 hour | --- | | --- | 0.5 ppm (1300 µg/m$^3$) | |
| | 24 hour | 0.04 ppm (105 µg/m$^3$) | | 0.14 ppm (for certain areas)[10] | --- | |
| | Annual Arithmetic Mean | --- | | 0.030 ppm (for certain areas)[10] | --- | |
| | 30 Day Average | 1.5 µg/m$^3$ | | --- | --- | |
| **Lead [12,13]** | Calendar Quarter | --- | Atomic Absorption | 1.5 µg/m$^3$ | Same as Primary Standard | High Volume Sampler and Atomic Absorption |
| | Rolling 3-Month Average | --- | | 0.15 µg/m$^3$ | | |
| **Visibility Reducing Particles[14]** | 8 hour | See footnote 14 | Beta Attenuation and Transmittance through Filter Tape | No National Standards | | |
| **Sulfates** | 24 hour | 25 µg/m$^3$ | Ion Chromatography | | | |
| **Hydrogen Sulfide** | 1 hour | 0.03 ppm (42 µg/m$^3$) | Ultraviolet Fluorescence | | | |
| **Vinyl Chloride[12]** | 24 hour | 0.01 ppm (26 µg/m$^3$) | Gas Chromatography | | | |

Source: California Air Resources Board (5/4/16). (See footnotes on next page.)

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25 °C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.
5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse
7. Reference method as described by the U.S. EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the U.S. EPA.
8. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.
9. On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 $\mu g/m^3$ to 12.0 $\mu g/m^3$. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 $\mu g/m^3$, as was the annual secondary standard of 15 $\mu g/m^3$. The existing 24-hour PM10 standards (primary and secondary) of 150 $\mu g/m^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.
10. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.
11. On June 2, 2010, a new 1-hour $SO_2$ standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

    Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.
12. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
13. The national standard for lead was revised on October 15, 2008, to a rolling 3-month average. The 1978 lead standard (1.5 $\mu g/m^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
14. In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

### *Regional Haze Rule (1990 Clean Air Act Amendments, 40 CFR Part 5)*

The Federal Clean Air Act of 1977 declared a national goal to remedy existing visibility impairment and prevent future haze caused by man-made air pollution at selected national parks and wilderness areas of the United States, known as Class 1 Areas. California has 29 mandatory Class 1 Areas managed by either the National Parks Service or the U.S. Forest Service (more than any other state). In 1999, the Environmental Protection Agency promulgated a regional haze regulation (40 CFR 51.308-309) that calls for states to establish goals and emission reduction strategies to make initial improvements in visibility at their respective Class 1 Areas. Visibility variation occurs as a result of the scattering and absorption of light by particles and gases in the atmosphere. It also mandates each state to develop a Regional Haze State Implementation Plan to incorporate measures necessary to make reasonable progress towards national visibility goals. In 2009, the Air Resources Board prepared a Regional Haze Plan for California demonstrating reasonable progress in reducing haze by 2018, the first benchmark year on the path to improved visibility. The Environmental Protection Agency funded five Regional Planning Organizations throughout the country to coordinate regional haze rule-related activities between states in each region. California belongs to the Western Regional Air Partnership (WRAP), the consensus organization of western states, tribes, and Federal agencies, which oversees analyses of monitoring data and preparation of technical reports regarding regional haze in the western United States. (See figure 11.)

## Criteria Pollutants Regulated by EPA

**Ozone (O3)** is the most widespread air quality problem in the state. It is an important ingredient of smog and is a highly reactive and unstable gas capable of damaging the linings of the respiratory tract. This pollutant forms in the atmosphere through complex reactions between chemicals directly emitted from vehicles, industrial plants, and many other sources. Exposure to levels of ozone above the current ambient air quality standard can lead to human health effects such as lung inflammation and tissue damage and impaired lung functioning. The ozone that California Air Resources Board regulates as an air pollutant is produced close to the ground level, where people live, exercise and breathe. The concern about ozone pollution is its effects on the health of Californians and the environment (ARB 2015).

In April 2005, the Air Resources Board approved a new 8-hour standard of 0.070 ppm and retained the 1-hour ozone standard of 0.09 after an extensive review of the scientific literature. (ARB 2015)

**Particulate Matter 2.5 ($PM_{2.5}$)** is the term for particles found in the air, including dust, dirt, soot, smoke and liquid droplets. Many manmade and natural sources emit PM directly or emit other pollutants that react in the atmosphere to form PM. Particles less than 10 micrometers pose a health concern because they can be inhaled into and accumulate in the respiratory system. $PM_{2.5}$ are referred to as “fine” particles and believed to pose the greatest health risks. Sources include motor vehicles, power plants, wood burning. (Source: EPA.gov)

**Particulate Matter 10 ($PM_{10}$)** are the larger particles between 2.5 and 10 micrometers found in the air including smoke and dust from factories, farming, roads, mold, spores and pollen. Major concerns for human health from exposure to $PM_{10}$ include: effects on breathing and respiratory systems, damage to lung tissue, cancer, and premature death. Acidic $PM_{10}$ can also damage human-made materials and is a major cause of reduced visibility in many parts of the U.S. (Source: EPA.gov)

**Lead (Pb)** is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been from fuels emitted by on-road motor vehicles (such as cars and trucks) and industrial sources. As a result of the EPA's regulatory efforts to remove lead from on-road motor vehicle gasoline, emissions of lead from the transportation sector dramatically declined by 95 percent between 1980 and 1999, and levels of lead in the air decreased by 94 percent between 1980 and 1999. Today, the highest levels of lead in air are usually found near lead smelters. The major sources of lead emissions to the air today are ore and metals processing and piston-engine aircraft operating on leaded aviation gasoline. (Source: EPA.gov)

**Nitrogen Dioxide ($NO_2$)** is emitted from motor vehicles, industrial facilities, and power plants. Home heaters and gas stoves also produce substantial amounts of $NO_2$. In the summer months $NO_2$ is a major component of photochemical smog and an essential ingredient in the formation of ground-level ozone pollution. Exposure to $NO_2$ along with other traffic-related pollutants, is associated with respiratory symptoms, episodes of respiratory illness and impaired lung functioning. In February 2007, the Air Resources Board established a new annual average $NO_2$ standard of 0.030 ppm and lowered the 1-hour $NO_2$ standard to 0.18 ppm, after an extensive review of the scientific literature. (Source: ARB 2015).

**Carbon Monoxide** is a byproduct of incomplete combustion and is emitted directly into the atmosphere, primarily from motor vehicle exhaust. Carbon monoxide concentrations typically peak nearest a source, such as roadways, and decrease rapidly as distance from the source increases. Carbon monoxide is readily absorbed into the body from the lungs. It decreases the capacity of the blood to transport oxygen, leading to health risks for unborn children and people suffering from heart and lung disease. The symptoms of excessive exposure such as headaches, fatigue, slow reflexes, and dizziness also occur in healthy people. (Source: ARB 2015)

**Sulfur Dioxide ($SO_2$)** is primarily a combustion product of coal, fuel oil, and diesel fuel. Only small quantities of $SO_2$ come from gasoline fueled motor vehicle exhaust. Sulfur dioxide is emitted directly into the atmosphere and can remain suspended for days allowing for wide distribution of the pollutant. Sulfur dioxide can trigger constriction of the airways, causing particular difficulties for asthmatics. Children can experience increased respiratory tract infections and healthy people may experience sore throats, coughing, and breathing difficulties. Long-term exposure has been associated with increased risk of mortality from respiratory or cardiovascular disease. (Source: ARB 2015).

The California Air Resources Board has monitored the gaseous criteria pollutants carbon monoxide, nitrogen dioxide, ozone, and sulfur dioxide since its inception in 1968. Monitoring is performed to demonstrate attainment or non-attainment of national and state ambient air quality standards.

### *Desired Condition*

Desired conditions are to manage activities so that air quality meets the standards under Federal, State, and local laws (LRMP page 99). Activities permitted on Tahoe National Forest System lands will support State and local objectives for air quality. As new technology is developed to control automobile and industrial emissions, air quality on the Tahoe should improve (LRMP page 103).

## Resource Indicators and Measures

The air quality analysis is a qualitative discussion of the potential contribution of OSV emissions from the estimated number of visitors to the Tahoe each year.

## Methodology

### Information Sources

Information sources used for this analysis are listed below and represent some of best available information that was available at the time of report writing.

- ArcMap and relevant GIS data layers from the Tahoe National Forest, Environmental Protection Agency and the California Air Resources Board were used. Including county boundaries, air basin boundaries, air district boundaries and class 1 and 2 areas.
- GIS layer of proposed OSV designations and groomed trails.
- Tahoe National Forest Plan (LRMP 1990).
- Scientific literature cited in the "References" section.
- The National Visitor Use Monitoring information for the Tahoe National Forest.
- OSV use was from the 2009 OSV Winter Trailhead Survey conducted in support of the 2010 State OSV Program Environmental Impact Report for Program Years 2010-2020.
- Information and correspondence obtained from the California Air Resources Board.

## OSV Use Assumptions for Analysis

For analysis purposes, snowmobile emission data used was obtained from the Environmental Protection Agency (EPA 2010). Analysis was based on emission estimates for a 2-stroke snowmobile (worst-case scenario). Snowmobile miles traveled per day was estimated at 50 miles per day and was averaged based on the responses received through a survey forum (snowest.com). Assuming a 4 percent average annual increase in use, the projected Seasonal OSV Use-days for the Tahoe National Forest for 2016 would be 20,859 for OSV program trailheads. Primarily day use (generally 10:00 am to 3:00 pm; grooming occurs at night. OSV use is highest on weekends and holidays. Highest concentration of OSV use occurs along groomed trails (supposed by research documented in State EIR (Valentine 2016a).

## Spatial and Temporal Context for Effects Analysis

### Spatial Context:

The spatial boundaries for analyzing the direct and indirect effects to air quality are within the Tahoe National Forest boundary, because the proposed OSV designation decision would apply to OSV use and its possible effects to air quality on the forest.

The spatial boundaries for analyzing cumulative effects to air quality are within the Tahoe National Forest boundary, because the proposed OSV designation decision would apply to OSV use and its potential to cumulatively impact air quality on the forest.

### Effects Timeframe:

The temporal boundaries for analyzing the direct and indirect effects to air quality is one OSV season. This was chosen in order to analyze the effects of OSV emissions within the Tahoe for one winter season and used to compare emissions generated in air districts per year.

## Affected Environment

### Existing Condition

California is divided geographically into air basins for the purpose of managing the air resources of the State on a regional basis. An air basin generally has similar meteorological and geographic conditions throughout. The State is currently divided into 15 air basins, the Tahoe National Forest is located within the Mountain Counties Air Basin, with a small portion of Yuba County within the Sacramento Valley Air Basin (figure 10).

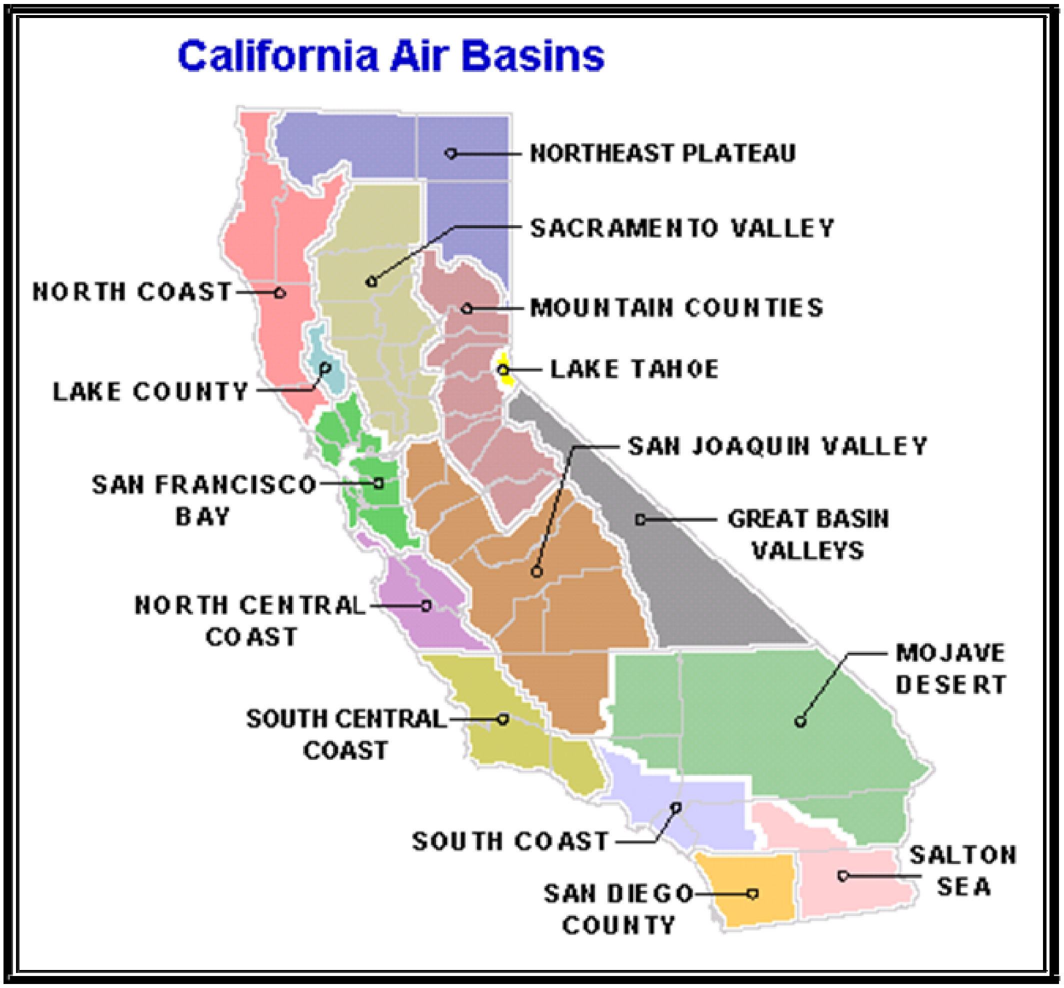


**Figure 10. Designated air basins in California**

#### *Air Pollution Control Districts/Air Quality Management Districts*

Air quality for the forest is managed and regulated by air pollution control or air quality management districts. These districts were created by state law to enforce local, state and Federal air pollution regulations. The Tahoe National Forest lies within Plumas, Placer, Sierra, Nevada and Yuba Counties. The Feather River Air Quality Management District administers air quality management programs for Yuba County within the Sacramento Valley Air Basin and encompasses a small western portion of the Tahoe National Forest. The Northern Sierra Air Quality Management District manages air quality programs for Nevada, Sierra and Plumas Counties. The majority of the Tahoe National

Forest lies within this district. The Placer Air Pollution Control District manages air quality programs and air standards for Placer County and lies within the approximate southern third of the Tahoe National Forest. Air quality rules and regulations for each air pollution control district can be found at their websites. Figure 8 below depicts where the air pollution districts lie within the Tahoe National Forest.

#### *Class I and II Areas*

There is one Class I area, the Desolation Wilderness, lies south of the Tahoe National Forest boundary. All areas within the Tahoe National Forest are classified as Class II, including the Granite Chief Wilderness. The nearest source of local emissions is probably the Lake Tahoe basin, immediately east of the Desolation Wilderness. However, most of the wilderness is not part of the nearby Lake Tahoe airshed, although easternmost east-facing slopes are (ARB 2016). Section 160-169 of the Clean Air Act established a detailed policy and to protect the quality of the air in regions of the United States in which the air is cleaner than required by the NAAQS. One purpose of the Clean Air Act's regulatory program is the Prevention of Significant Deterioration and to preserve, protect and enhance air quality in national parks and national wilderness areas. Through this program, Congress established a land classification scheme for those areas with air quality better than the NAAQS. Class I allows very little deterioration of air quality, Class II allows moderate deterioration and Class III allows more deteriorations. In all cases, the pollution concentrations shall not violate NAAQS.

Visibility impairment is defined as any humanly perceptible change in visual air quality from that which would have existed under natural conditions (in other words, absent anthropogenic influence). Sources for visibility impairment in these Class I areas include, but are not limited to, industrial sources, on-road and off-road vehicle emissions, road dust, windblown dust, and smoke. Sources can be local or very distant. Progress toward better visibility is calculated from data collected at the Interagency Monitoring of Protected Visual Environments (IMPROVE) network. The IMPROVE monitors measure the concentration of each haze-causing pollutant every three days. There are 17 IMPROVE monitors representing one or more of the Class I Areas in California. The BLIS1 monitor location represents two wilderness areas located along the crest of the Sierra Nevada mountain range, just west of Lake Tahoe. The wilderness areas associated with the BLIS1 monitor are Desolation Wilderness area and Mokelumne Wilderness area (within the Stanislaus, Eldorado, and Toiyabe National Forests). The BLIS1 site has been operating since November 1990 (ARB 2016).

However, the Air Resources Board also noted, as evidenced by reductions in anthropogenic source emissions in California and the concurrent improvement in visibility at all of California's Class 1 Area IMPROVE monitors, that the current Regional Haze plan strategies are sufficient for California and its neighboring states to meet their 2018 Reasonable Progress Goals (ARB 2014).

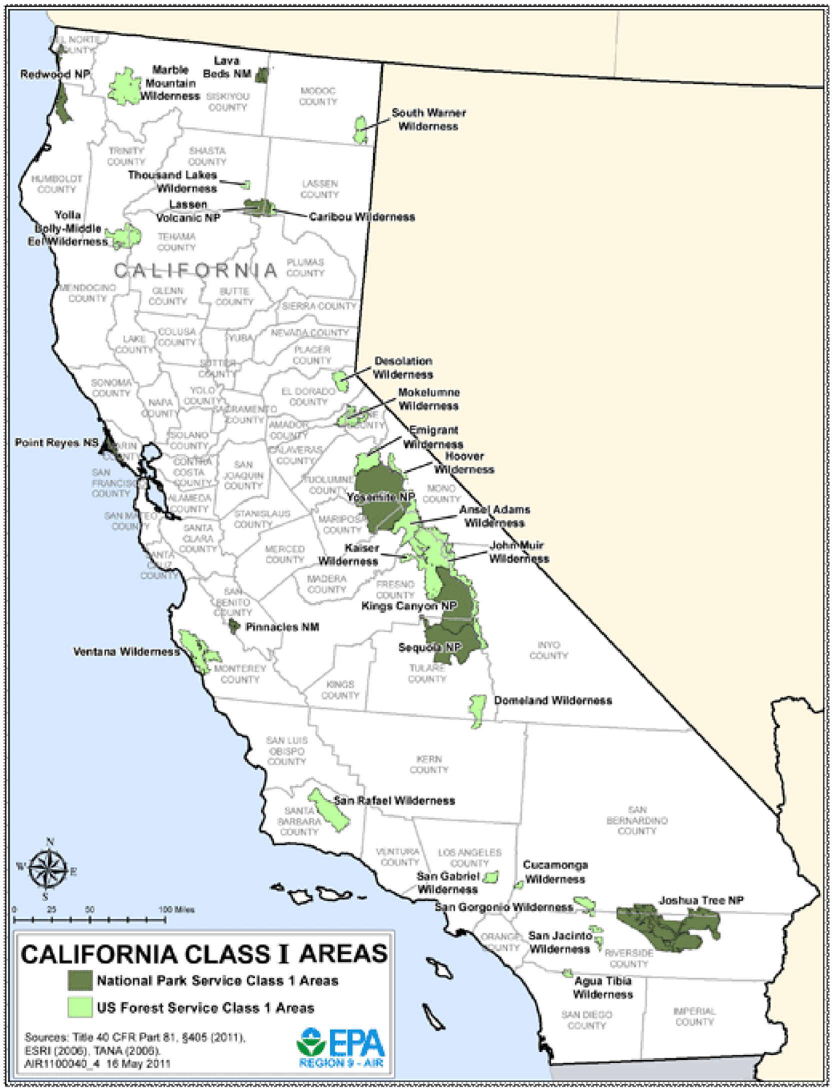


**Figure 11. Class I areas in California**

### *Air Quality Standards*

The Tahoe National Forest must comply with Federal and State ambient air quality standards as mandated by the Clean Air Act of 1963. These standards have been established for seven criteria air pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide ($NO_2$), $PM_{10}$, $PM_{2.5}$, ozone ($O_3$), and sulfur dioxide ($SO_2$). California also has standards in place for sulfates, hydrogen sulfide, visibility-reducing particles and vinyl chloride (ARB 2015).

These pollutants can affect human health, reduce visibility, and lead to acidic deposition in sensitive, high-elevation lakes. Air quality within the Tahoe National Forest could be affected by land management and development activities both on and off the forest. Sources of air pollutants include forest management activities such as wildland fires (both natural and management ignited), road dust, and vehicle emissions. These sources, as well as industrial sources and emissions from urban developments are also found outside Forest Service administered lands.

Currently, the Tahoe National Forest complies with Federal and State standards and there are no known violations of the Clean Air Act. According to the EPA, the Sacramento Metro area of Placer County is in nonattainment for 8-hour ozone and the western portion of Nevada County is also in nonattainment for ozone. The remaining counties and air districts are in attainment or unclassified for the other criteria pollutants. The concern for ozone is in the summer only according to the Air Pollution Specialist at the Air Resources Board (Lopina 2015). Please see table 42.

**Table 42. Federal non-attainment areas for criteria pollutants**

| County and/or Air District | 8-hour Ozone | Carbon Monoxide (CO) | Lead (Pb) | Particulate Matter 2.5 ($PM_{2.5}$) | Particulate Matter 10 ($PM_{10}$) | Nitrogen Dioxide ($NO_2$) | Sulfur Dioxide ($SO_2$) |
|---|---|---|---|---|---|---|---|
| **Placer** | *N (Sacramento Metro area)* | U/A | U/A | U | U | U/A | U |
| **Plumas** | U/A | U/A | U/A | U | U | U/A | U |
| **Nevada** | *N (Western part of Co)* | U/A | U/A | U | U | U/A | U |
| **Sierra** | U/A | U/A | U/A | U | U | U/A | U |
| **Yuba** | U/A | U/A | U/A | U | U | U/A | U |

Source: http://www.arb.ca.gov/ei/gislib/gislib.htm (Accessed: June 2016)
A=Attainment; N=Non-attainment; U=Unclassified

Table 43 shows the California Ambient Air Quality Standards state designations for all criteria pollutants in California. The Air Resources Board makes state area designations for 10 criteria pollutants: ozone, suspended particulate matter ($PM_{10}$), fine suspended particulate matter ($PM_{2.5}$), carbon monoxide, nitrogen dioxide, sulfur dioxide, sulfates, lead, hydrogen sulfide, and visibility-reducing particles (ARB 2015). The Air Resources Board lists three counties in non-attainment for ozone. The remaining counties are in attainment or unclassified for the criteria pollutants.

For ozone, $PM_{2.5}$, and $PM_{10}$, the required minimum number of monitors is based on the population of the Core-Based Statistical Area (CBSA) and the severity of the pollutant concentrations of each CBSA. The table below summarizes the required and existing ozone, $PM_2$.5, and $PM_{10}$ monitors for 11 CBSAs. In all cases, sufficient monitoring exists and no additional monitoring is required (ARB 2015) (see table 44).

**Table 43. State designated non-attainment areas for criteria pollutants**

| County and/ or Air District | Ozone ($O_3$) | Carbon Monoxide (CO) | Lead (Pb) | $PM_{2.5}$ | $PM_{10}$ | Nitrogen Dioxide ($NO_2$) | Sulfur Dioxide ($SO_2$) | Sulfates | Hydrogen Sulfide | Visibility Reducing Particles |
|---|---|---|---|---|---|---|---|---|---|---|
| **Placer** | *N* | U | A | U | A | A | A | A | U | U |
| **Plumas** | U | A | A | U | A | A | A | A | U | U |
| **Nevada** | *N* | U | A | U | A | A | A | A | U | U |
| **Sierra** | U | U | A | U | A | A | A | A | U | U |
| **Yuba** | *N-transitional* | U | A | A | A | A | A | A | U | U |

Source: http://www.arb.ca.gov/ei/gislib/gislib.htm Accessed: June 2016

A=Attainment; N=Non-attainment; U=Unclassified

**Table 44. Number of required and existing sites by CBSA**

| CBSA | Population | Ozone | | $PM_{2.5}$ | | | | $PM_{10}$ (SSI)[3] | |
|---|---|---|---|---|---|---|---|---|---|
| | | Required SLAMS[1] | Existing SLAMS | Required SLAMS | Existing SLAMS | Required Cont.[2] | Existing Cont. | Required SLAMS | Existing SLAMS |
| **Bakersfield*** | 839,361 | 2 | 8 | 2 | 5 | 1 | 3 | 4-8 | 4 |
| **Chico** | 220,000 | 1 | 2 | 0 | 1 | 1 | 3 | N/A | N/A |
| **Los Angeles-Long Beach-Anaheim*** | 12,828,837 | 4 | 16 | 3 | 11 | 2 | 7 | 2-4 | 8 |
| **Redding** | 177,223 | 1 | 4 | 0 | 1 | 0 | 0 | 0 | 3 |
| **Riverside-San Bernardino-Ontario*** | 4,224,851 | 3 | 21 | 3 | 10 | 2 | 8 | 6-10 | 12 |
| **Sacramento- Arden Arcade- Roseville*** | 2,149,127 | 2 | 17 | 3 | 6 | 2 | 9 | 6-10 | 10 |
| **Santa Rosa*** | 483,878 | 1 | 2 | 0 | 1 | 0 | 1 | N/A | N/A |
| **Vallejo-Fairfield^** | 413,344 | 2 | 3 | 0 | 1 | 0 | 1 | 0-1 | 1 |
| **Yuba City** | 166,892 | 1 | 2 | 0 | 1 | 0 | 1 | N/A | N/A |
| **El Centro** | 174,528 | 1 | 3 | 1 | 3 | 1 | 1 | 1-2 | 5 |
| **Oxnard-Thousand Oaks-Ventura** | 823,318 | 2 | 5 | 1 | 5 | 1 | 5 | N/A | N/A |

Source: ARB 2015

2012-2014 air quality data was used in determining the number of required sites. This table excludes tribal monitoring sites.

Population is based on year 2010 Census data.

*Parts of these MSAs are included in the geographical scope of this report, and parts are within the geographical scope of the reports being completed by the districts.

The numbers of sites listed are for the entire CBSA. See Table 3a for a completed list of CBAs in California.

[1] SLAMS: State and Local Air Monitoring Stations.

[2] Cont.: Refers to a continuous $PM_{2.5}$ monitor, i.e., one that measures hourly data.

For this assessment, both continuous FEMs and non-FEMs are counted for each CBSA.

[3] SSI: Size Selective Inlet. The SSI is an FRM for $PM_{10}$. N/A means there is no $PM_{10}$ monitor in the CBSA.

^The $PM_{2.5}$ FRM monitor at Vallejo was discontinued in March 2011 and was replaced with a continuous $PM_{2.5}$ FEM monitor.

The table below displays the annual average emissions (tons per year) generated for the air districts within the Tahoe National Forest (EPA 2013).

**Table 45. Estimated annual average emissions (tons/year) by air district for area-wide, stationary and mobile sources**

| Air District | TOG | ROG | CO | NOx | SOx | PM | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|---|---|
| Placer APCD | 22,403.7 | 7,639.45 | 31,922.9 | 8,230.75 | 98.55 | 9,453.5 | 5,445.8 | 1,781.2 |
| Northern Sierra AQMD (Nevada, Sierra, Plumas Counties) | 10,577.7 | 5,131.9 | 33,572.7 | 4,796.1 | 270.1 | 12,380.8 | 7,577.4 | 1,952.75 |
| Feather River AQMD (Yuba County**) | 11,453.7 | 5,500.55 | 19,520.2 | 73,070.3 | 204.4 | 10,318.55 | 5,653.85 | 1,843.25 |
| **TOTAL Emissions for Air Districts (tons/year)** | 44,435.1 | 18,271.9 | 85,015.8 | 86,097.15 | 573.05 | 32,152.85 | 18,677.05 | 5,577.2 |

Source: http://www.arb.ca.gov/ei/maps/statemap/dismap.htm. Accessed July 19, 2016

**Feather River emissions estimates also includes emissions from Sutter County, not within the Tahoe National Forest.

### *Snowmobile Emission Standards*

In 2002, the EPA issued a regulation that imposed stringent pollution regulations on snowmobiles, requiring that snowmobiles fall under regulations of the Clean Air Act (Jehl 2002). In 2012, snowmobile manufacturers were required to meet one of two alternatives. One would require reductions in emissions of both hydrocarbons and carbon monoxide by 50 percent from current levels. The other is intended to encourage further reductions in hydrocarbons and would require a 70 percent reduction in hydrocarbons, the source of the more urgent health concerns, in return for a 30 percent reduction in carbon monoxide (Jehl 2002)

The EPA also requires that manufacturers ensure each new engine, vehicle, or equipment meets the latest emission standards. Once manufacturers sell a certified product, no further effort is required to complete certification. If products were built before EPA emission standards started to apply, they are generally not affected by the standards or other regulatory requirements (EPA 20153).

**Table 46. Exhaust emission standards for snowmobiles**

| Phase | Model year | Phase-in (percent) | Emission standards | | Maximum allowable family emission limits | |
|---|---|---|---|---|---|---|
| | | | HC | CO | HC | CO |
| Phase 1 | 2006 | 50 | 100 | 275 | | |
| Phase 1 | 2007-2009 | 100 | 100 | 275 | | |
| Phase 2 | 2010 and 2011 | 100 | 75 | 275 | | |
| Phase 3 | 2012 and later | 100 | ([1]) | ([1]) | 150 | 400 |

Source: Code of Federal Regulations, Accessed November 2015

[1] See § 1051.103(a)(2):

(a) * * *

(1) Follow Table 1 of this section for exhaust emission standards. You may generate or use emission credits under the averaging, banking, and trading (ABT) program for HC and CO emissions, as described in subpart H of this part. This requires that you specify a family emission limit for each pollutant you include in the ABT program for each engine family. These family emission limits serve as the emission standards for the engine family with respect to all required testing instead of the standards specified in this section. An engine family meets emission standards even if its family emission limit is higher than the standard, as long as you show that the whole averaging set of applicable engine families meets the applicable emission standards using emission credits, and the vehicles within the family meet the family emission limit. The phase-in values specify the percentage of your U.S.-directed production that must comply with the emission standards for those model years. Calculate this compliance percentage based on a simple count of your U.S.-directed production units within each certified engine family compared with a simple count of your total U.S.-directed production units. Table 1 also shows the maximum value you may specify for a family emission limit, as follows:

(2) For Phase 3, the HC and CO standards are defined by a functional relationship. Choose your corporate average HC and CO standards for each year according to the following criteria:

https://www.federalregister.gov/articles/2008/06/25/E8-14411/exhaust-emission-standards-for-2012-and-later-model-year-snowmobiles

## Best Available Technology

Snowmobiles must be certified by the National Park Service to enter some National Parks (Yellowstone, Grand Teton). Best available technology certification is one of the most stringent standards for air and noise emissions in the world, requiring hydrocarbon emissions of less than 15 g/kW-hr, carbon monoxide emissions of less than 120 g/kW-hr, and sound level limited to 73 decibels (BRP 2011). The use of certified snowmobiles, which result in lower CO and hydrocarbon emissions (NPS 2013), is not currently required on the Tahoe National Forest. The Forest Service has no regulatory jurisdiction over air quality or noise.

### *Motorized Winter Recreation*

Table 47 is derived from the OSV trailhead survey conducted for the State EIR, and based on data summarized in the State EIR (California Department of Park and Recreation 2010). The table shows the average number of vehicles at trailheads, and the average number of OSVs that would be expected on weekends and holidays versus weekdays. Based on this information, estimated use per winter season would be 22,410 OSV users forestwide. However, visitor use levels vary by season depending on the amount of snowfall, adequate snow depths, and length of season. The season is from mid-December through March (approximately 14 weeks), which is equivalent to approximately 33 weekend/holidays and 65 weekdays. In 2010, snowmobiling was reported as a main activity for 1.7 percent, and in 2005 snowmobiling was reported as a main activity for 7 percent (Valentine 2016b).

**Table 47. Tahoe National Forest OSV visitor use**

| Location | Day description | Number of vehicles | Number of OSVs* |
|---|---|---|---|
| Forestwide | Weekend or holiday (approx. 33 per season) | 202 | 404 |
| Forestwide | Weekday (approx. 65 per season) | 40 | 80 |

### *Grooming activities*

Currently, there are approximately 217 miles of National Forest System trails that are groomed for OSV use on the Tahoe National Forest. Snow trail grooming for OSV use typically occurs December through March. Snowcats are used for grooming OSV trails and grooming operations are typically conducted during the night or during low use timeframes. The California OHMVR Division’s snowcat fleet is subject to emission regulation by the California Air Resources Board (CARB) as off-road equipment. The CARB sets an emission limit for the vehicle fleet as a whole rather than for individual pieces of equipment. Based on the total horsepower of the vehicle fleet, and the model and year of the individual equipment within the fleet, CARB determines how much horsepower per year must be repowered, retrofitted, or retired. The California OHMVR Division then determines what modifications to make to its fleet in order to satisfy CARB requirements.

**Table 48. Resource indicators and measures for air quality, existing condition**

| Resource Element | Resource Indicator | Measure | Existing Condition/ Alternative 1 |
|---|---|---|---|
| **Air Quality** | Estimate of change (increase or decrease) in emissions and the possibility of adversely impacting air quality. | Miles of trail designatd for OSV use | 265 |
| | Estimate of change (increase or decrease) in emissions and the possibility of adversely impacting air quality. | Acres designated for OSV use | 636,002 |
| | Potential effects of OSV emissions to create adverse impacts to air quality. | Shifts in OSV use in relation to sensitive areas (Class II and II areas). | No known impacts to air quality or NAAQS/CAAQS violations exist. |

# Environmental Consequences

## Alternative 1

### *Direct and Indirect Effects*

Land management and development activities on and off the forest can affect the air quality on the Tahoe National Forest. Air pollution sources include emissions from mobile and stationary sources including industrial activity, highway vehicles, and off-road vehicles (all-terrain vehicles, aircraft, locomotives,  construction machinery). Airborne dust and smoke from burning can also significantly impact air quality as they occur on and off the forest. These sources can emit a host of regulated pollutants in and around the forest. Currently, good dispersion and topographic influences on the forest have resulted in no violations of Federal and State Ambient Air Quality Standards and have not attained concentrations high enough to warrant measurement or to result in degradation of air quality in the Class I area.

Three factors, largely beyond State control, can interfere with air quality in Class I Areas: wildfire smoke, offshore shipping emissions, and Asian dust. These factors are either from natural sources (wildfire smoke), uncontrollable sources (shipping emissions beyond California's jurisdiction), or both (Asian dust, a combination of anthropogenic and natural sources beyond California's control) (ARB 2014).

Table 49 displays the potential contribution of snowmobile emissions from the estimated 22,410 OSV visitors that recreate on the Tahoe National Forest each year. All calculations were done using emission estimates from a 2-stroke snowmobile (EPA 2010). As shown in table 49, it is estimated current emissions generated as a result of OSV use on the Tahoe National Forest contributes approximately 0.43 percent of carbon monoxide (CO) to the air districts under alternative 1, and less than 0.01 percent of nitrogen oxide (NOx) and particulate matter (PM). These emissions are minor compared to other sources of air pollution impacting the forest. Impacts to air quality include vehicle emissions such as nitrogen oxides, particulate matter, and carbon monoxide from all motorized vehicles including snowmobiles and snowcats. Diesel engines also emit sulfur oxides and particulates. Air quality impacts from vehicle emissions are influenced by the effectiveness of smog control devices on cars, amount of traffic, and how long engines idle. As people recreate in the forest during the winter months, the effects of vehicle exhaust on air quality may become a localized temporary issue where concentrated motorized use conflicts with non-motorized uses and nuisance smell occurs.

**Table 49. Emission estimate (tons per year) for OSV use on the Tahoe National Forest**

| Source | Number of OSVs | Miles* | CO | NOx | PM |
|---|---|---|---|---|---|
| Snowmobile (2-stroke) | 22,410 | 50 | 365.60 | 1.06 | 3.33 |
| % Pollutant Contribution to Air Districts | ------- | ---- | 0.43% | Less than 0.01 | Less than 0.01 |

*Assumes 22,410 OSVs recreate on the Tahoe per year and travel an average of 50 miles.

## Alternative 2

### *Direct and Indirect Effects*

Alternative 2 would designate OSV use on fewer acres than alternative 1 (406,895 acres versus 636,002 acres, respectively). This is approximately a 36 percent reduction in acres designated for OSV use forestwide as compared to the existing condition.

For the Tahoe National Forest, an estimated 22,410 OSV visitors forestwide for the winter season would equate to approximately 229 OSV visitors on the forest per day (using 33 weekend/holidays and 65 weekdays per season) utilizing 321 miles of trail and 406,895 acres for OSV use. That is equivalent to approximately one OSV visitor per 1,776 acres. It is expected OSV emissions would dissipate and the possibility of accumulation would be eliminated based on topographic influences and wind dispersion. Non-motorized users' air quality concerns in parking lots, at trailheads and on trails would continue since non-motorized and motorized users would still share the same parking areas, trailheads and many of the same trails. The odor generated by emissions from combustion engines, particularly two-cycle engines, can diminish a non-motorized user's experience. However, this is likely a recreation (user satisfaction) issue rather than a general air quality issue (see Recreation report for more discussion on the topic of visitor experience). Bishop et al. (2006) found emissions were greatest during initial startup and idling, especially when the engine is cold. They also observed reducing wait times at entrance stations would further lower emissions and exposure. Implementing similar measures or idling limits at parking lots and trailheads, may address public concerns regarding nuisance smell and possible impacts to air quality in those areas. It is anticipated any impacts to air quality from winter motorized recreation under alternative 2 would not result in any violations to National and State Ambient Air Quality Standards.

Musselman and Korfmacher (2007) conducted a study in Wyoming to evaluate the effects of winter recreation snowmobile activity on air quality at a high-elevation site. They measured levels of nitrogen oxides (NOx, NO), carbon monoxide (CO), ozone (O3) and particulate matter ($PM_{10}$ mass). They found nitrogen oxides and carbon monoxide were significantly higher on weekends than weekdays due to higher snowmobile use on weekends. Ozone and particulate matter were not significantly different during the weekend compared to weekdays. Air quality data during the summer were also compared to the winter data and they found carbon monoxide levels at the site were significantly higher during the winter than during the summer. Nitrogen oxides and particulates were significantly higher during the summer compared to winter. Nevertheless, air pollutants were well dispersed and diluted by strong winds common at the site, and snowmobile emissions did not have a significant impact on air quality at the site (Musselman and Korfmacher 2007).

### Class I and II Areas

Implementation of alternative 2 is expected to maintain the same air quality conditions as compared to alternative 1 due to good dispersion characteristics across the forest, low inversion potential, and low emissions generated from OSVs as compared to other potential sources. It is anticipated that air quality of the Class I area and the Granite Chief Wilderness (Class II area) would be similar to the existing condition. Compliance with State and Federal air quality standards is expected to occur under alternative 2. Motorized recreation emission sources on the forest are localized, transient, and not expected to result in any significant air quality impacts under alternative 2. No violations of the Clean Air Act are expected to occur.

#### *Cumulative Effects*

Land management and development activities on and off the forest can affect air quality on the forest. Air pollution sources include emissions from industrial activity, highway vehicles, and off-road vehicles (all-terrain vehicles, aircraft, locomotives, construction machinery). Airborne dust and smoke from burning can also significantly impact air quality as they occur on and off the forest. None of the on-forest sources discussed in the existing condition are expected to increase or impact air quality when combined with alternative 2. In addition, emissions generated from snowcats plowing and grooming parking lots and trailheads could contribute to localized air pollution on the forest. However, it is estimated the contribution of administrative snowcat use to the overall cumulative impacts on air quality would be minimal.

Air quality impacts are expected to grow with continued growth of population around the Tahoe National Forest. Substantial impacts to air quality are not expected to occur during winter months on the forest due to regulations already in place by the EPA and the Clean Air Act. The past, present, and reasonably foreseeable future actions would be the primary contributors to air quality impacts on the forest. Due to the short-term and localized impact of OSV use, this alternative is not expected to result in a significant contribution to the cumulative impacts of other local and regional air pollution sources. However, it is impossible to predict future pollutant discharge from off-forest mobile and stationary sources and how those sources may contribute to, or impact air quality, on the forest. There are no known unavoidable adverse, irreversible, or irretrievable effects to air quality as a result of implementation.

### Alternative 3

#### *Direct and Indirect Effects*

Alternative 3 would designate OSV use on fewer acres than alternative 1 (275,972 acres versus 636,002 acres, respectively). This is approximately a 57 percent reduction in acres designated for OSV use forestwide as compared to the existing condition.

#### *Cumulative Effects*

The cumulative effects discussed for alternative 2 would also apply for alternative 3.

### Alternative 4

#### *Direct and Indirect Effects*

Under alternative 4 there would be an 8 percent increase (approximately 287) of miles of trail designated for OSV use and less than a 1 percent increase of acres designated for OSV use (table 49) as compared to alternative 1 (641,105 acres versus 636,002 acres, respectively). The increase in miles of trails designated for OSV use may cause a shift in OSV use to other areas. The estimated 22,410 OSV visitors forestwide for the winter season would equate to approximately 229 OSV visitors on the forest per day (using 33 weekend/holidays and 65 weekdays per season) utilizing 287 miles of trail and 641,105 acres for OSV use. That is equivalent to approximately one OSV visitor per 2,779 acres. With the acres designated for OSV use, it is likely emissions generated as a result of OSVs would be similar to what is currently estimated under alternative 1.

#### *Cumulative Effects*

The cumulative effects discussed for alternative 2 above would also apply for alternative 4.

### Alternative 5

#### *Direct and Indirect Effects*

Alternative 5 would prohibit OSV use on more acres than alternative 2. This is approximately a 53 percent reduction in acres designated for OSV use forestwide as compared to the existing condition (300,146 acres versus 636,002 acres, respectively). It is likely emissions generated as a result of OSVs would be less than what is currently estimated. Current emissions generated as a result of OSV use on the Tahoe are estimated to contribute less than approximately 0.0043 percent of carbon monoxide (CO) under alternative 1, less than 0.01 percent of nitrogen oxide (NOx), and less than 0.01 percent of particulate matter (PM) pollutants to the air districts within the Tahoe National Forest. These emissions are minor compared to other sources of air pollution impacting the forest.

#### *Direct and Indirect Effects*

The cumulative effects discussed for alternative 2 above would also apply for alternative 5.

## Summary

It is expected the levels of pollutants for the all the alternatives would fall within the ranges currently experienced and no violation of State or Federal ambient air quality standards would occur during the OSV season.

OSV use is not designated in Class I areas in all alternatives, and it is anticipated the impacts of OSV use on Class I areas would be fairly similar for all action alternatives. It is anticipated

## Compliance with Relevant Laws, Regulations, Policies and Plans

No known violations of ambient air quality standards have occurred on the forest, nor have any activities on the forest caused violations of these standards elsewhere. The alternatives comply with the Clean Air Act, the National Ambient Air Quality Standards and California Ambient Air Quality Standards for criteria pollutants.

## Other Relevant Mandatory Disclosures

### Unavoidable Adverse Effects

Authorized OSV use on National Forest System lands, may unavoidably affect the short-term air quality in some areas, specifically at trailheads and parking lots. However, it is likely this is a nuisance smell issue, rather than an air quality issue.

# Hydrology

## Relevant Laws, Regulations, and Policy

### Regulatory Framework

#### *Land and Resource Management Plan*

The 1990 Tahoe National Forest LRMP provides standards and guidelines for water-related concerns. The following list of standards and guidelines, are a subset of all applicable LRMP direction and this plan must be analyzed for consistency to all applicable LRMP standards and guidelines for hydrology.

**Table 50. Tahoe National Forest LRMP guidelines relevant to watershed resources**

| Page | Forestwide Guidelines |
|---|---|
| LRMP, pg. V-35 | Use best management practices (BMPs) to meet water quality objectives and maintain and improve the quality of surface water on the forest. Best Management Practices (BMPs) are implemented as mitigation measures specified in Appendix A (Road Cards) for any motorized trail to be added to the National Forest Transportation or any lands to be established as “Open Areas.” These mitigation measures will meet water quality objectives and maintain and improve the quality of surface water on the forest. |
| LRMP, pg. 27 | (Current Management Direction)<br>The water program mission is to afford optimum protection to the water resources compatible with other program practices, including timber, wildlife and fisheries, range, recreation, engineering, and mining. Where opportunities arise, watershed improvement measures will be implemented and water quantities and timing of flow will be improved The water program on the Tahoe NF has primarily served as a support function for other resource activities. The various types of support include planning, inventories, analyzing project proposals, monitoring, and administration. All existing land management practices use the water quality protection measures that are specified as Best Management Practices (BMPs) in the R-5 document 'Water Quality Management for National Forest System Lands in California,' also referred to as the R-5 Forest Service 208 Plan. |
| LRMP, pg.V-9 | Produce water of sufficient quality and quantity to meet or exceed identified use requirements and improve water quality by the year 2030. Maintain or improve soil productivity and prevent excessive, cumulative watershed impacts. Conserve soil and water resources and prevent activities that will significantly or permanently impair the productivity of the land. Protect streams, lakes, wetlands, streamside management zones, and other riparian areas. |
| LRMP, pg.V-9 | Desired Future Condition<br>Greater emphasis on environmental quality will have positive effects on the soil and water resources. Specific riparian and streamside guidelines will have maintained current riparian conditions. Direct soil and water improvement projects will have stopped the decline and In some cases restored or improved the productivity of key watersheds. Instream flow requirements will have protected riparian-dependent communities against incompatible water resource development. Greater emphasis on water resources, soil, and watershed management will have resulted in greater project success and less impact on soil and water resources. Monitoring will provide Information on management-induced Impacts on soil and water resources. This knowledge will be used to improve project implementation. |

| Page | Forestwide Guidelines |
|---|---|
| LRMP, pg.V-33 | Disturbed Watershed Acres Restored by Limiting intensive Management. Limit intensive management (e g , range, timber management, OW'S, etc.) on lands that are in a declining hydrologic condition |
| LRMP, pg.V-35 | Water Quality Protection- Use Best Management Practices to meet water quality objectives and maintain and improve the quality of surface water on the forest. Methods and techniques for applying the BMP will be identified and documented during project level environmental assessments and Incorporated into the associated project plan and Implementation documents. (See Plan Appendix E.) |
| LRMP, pg.V-38 | Soils/Watershed/Geology Support- Provide watershed input in support of other resource activities. This involves various EAs and planning efforts such as timber sales, recreation site developments, reforestation planning, range planning and improvement, material source development, groundwater development hydroelectric projects, mining explorations and operations, sale preparation and administration, and wildlife habitat improvement projects. Also, develop and administer plans for soil, water, and geologic resource projects (e.g., for special studies, demonstration soil areas, municipal watersheds, groundwater and aggregate sources, and river basin studies). Includes soils and water resource inventories, soils and water resource monitoring, geologic resources and hazards inventory, and water uses management (administration of water uses and water uses inventory) |
| LRMP, pg.V-61 | Water Resource improvement- Implement activities to improve watershed conditions. These are usually major soil erosion and water quality problem areas that are on the forest WIN lnventory Includes erosion reduction: water flow Improvement (e g , reduced surface runoff): channel stabilization works; and sediment retention practices This involves revegetation with grasses, trees, and shrubs, and associated treatments such as mulching, spreading straw and jute: and improvements such as check dams, settling basins, and water spreading structures Involves developing water resource improvement plans, implementing restoration plans, and maintenance. |

### *Sierra Nevada Forest Plan Amendment*

The 2001 Sierra Nevada Framework modified forest plan guidance and established a comprehensive aquatic and riparian conservation strategy for all of the national forest lands in the Sierra Nevada. Key components of this strategy include riparian buffer zones, critical refuges for threatened and endangered aquatic species, special management for large meadows, and a watershed analysis process.

The framework includes standards and guidelines in national forests for construction and relocation of roads and trails and for management of riparian conservation areas. These standards and guidelines require the Forest Service to avoid road construction, reconstruction, and relocation in meadows and wetlands; maintain and restore the hydrologic connectivity of streams, meadows, and wetlands by identify roads and trails that intercept, divert, or disrupt flows paths and implementing corrective actions; and determine if stream characteristics are within the range of natural variability prior to taking actions that could adversely affect streams.

The framework’s standards and guidelines for riparian conservation areas are intended to minimize the risk of activity-related sediment entering aquatic systems. The framework established riparian conservation area widths for all Sierra Nevada forests: 300 feet on each side of perennial streams; 150 feet on each side of intermittent and ephemeral streams; and 300 feet from lakes, meadows, bogs, fens, wetlands, vernal pools, and springs.

### *Riparian Conservation Areas: Activity-related Standards and Guidelines*

Where a proposed project encompasses riparian conservation areas or a critical aquatic refuge, conduct a site-specific project area analysis to determine the appropriate level of management within the riparian conservation area or a critical aquatic refuge. Determine the type and level of allowable management activities by assessing how proposed activities measure against the riparian conservation objectives and their associated standards and guidelines. Areas included in riparian conservation areas are: 300 feet on each side of perennial streams, 150 feet on each side of intermittent and ephemeral streams, and 300 feet from lakes, meadow, bogs, fens, wetlands, vernal pools, and springs.

#### Riparian Conservation Objective 1

Ensure that identified beneficial uses for the water body are adequately protected. Identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses. Beneficial uses describe how water is used and vary by water body. Examples of beneficial uses include water for domestic water supply, fire suppression, fish and wildlife habitat, and contact recreation (swimming).

#### Riparian Conservation Objective 2

Maintain or restore: (1) the geomorphic and biological characteristics of special aquatic features, including lakes, meadows, bogs, fend, wetlands, vernal pools, and springs; (2) streams, including in stream flows; and (3) hydrologic connectivity both within and between watersheds to provide for the habitat needs of aquatic-dependent species.

Standard and Guideline 100: Maintain and restore hydrologic connectivity of streams, meadows, wetlands, and other special aquatic features by identifying roads and trails that intercept, divert, or disrupt natural surface and subsurface water flow paths. Implement corrective actions where necessary to restore connectivity.

Standard and Guideline 101: Ensure that culverts or other stream crossings do not create barriers to upstream or downstream passage for aquatic-dependent species. Locate water drafting sites to avoid adverse effects to stream flows and depletion of pool habitat. Where possible, maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows, wetlands, and other special aquatic features.

Standard and Guideline 102: Prior to activities that could adversely affect streams, determine if relevant stream characteristics are within the range of natural variability. If characteristics are outside of the range of natural variability, implement mitigation measures and short-term restoration actions needed to prevent further declines or cause an upward trend in conditions. Evaluate required long-term restoration actions and implement them according to their status among other restoration needs.

Standard and Guideline 103: Prevent disturbance to stream banks and natural lake and pond shorelines caused by resource activities (e.g., livestock, off-highway vehicles, and dispersed recreation) from exceeding 20 percent of stream reach or 20 percent of natural lake and pond shorelines. Disturbance includes bank sloughing, chiseling, trampling, and other means of exposing bare soil or cutting plant roots. This standard does not apply to developed recreation sites; sites authorized under special use permits, and designated OHV routes.

### Riparian Conservation Objective 4

Ensure that management activities within riparian conservation areas and critical aquatic refuges enhance or maintain physical and biological characteristics associated with aquatic- and riparian-dependent species.

Standard and Guideline 116: Identify roads, trails, OHV trails and staging areas, developed recreation sites, dispersed campgrounds, special use permits, grazing permits, and day-use sites during landscape analysis. Identify conditions that degrade water quality or habitat for aquatic- and riparian-dependent species. At the project level, evaluate and consider actions to ensure consistency with standards and guidelines or desired conditions.

### Riparian Conservation Objective 5

Preserve, restore, or enhance special aquatic features, such as meadows, lakes, ponds, bogs, fens, and wetlands, to provide the ecological conditions and processes needed to recover or enhance the viability of species that rely on these areas.

Standard and Guideline 118: Prohibit or mitigate ground-disturbing activities that adversely affect hydrologic processes that maintain water flow, water quality, or water temperature critical to sustaining bog and fen ecosystems and plant species that depend on these ecosystems. During project analysis, survey, map, and develop measures to protect bogs and fens from such activities as trampling by livestock, pack stock, humans, and wheeled vehicles. Criteria for defining bogs and fens include the presence of plants in the genus *Meesia*, and three sundew species (*Drosera* spp.). Complete initial plant inventories of bogs and fens within grazing allotments prior to re-issuing permits.

### Riparian Conservation Objective 6

Identify and implement restoration actions to maintain, restore, or enhance water quality and maintain, restore, or enhance habitat for riparian and aquatic species.

Standard and Guideline 122: Recommend restoration practices in: (1) areas with compaction in excess of soil quality standards, (2) areas with lowered water tables, or (3) areas that are either actively down cutting or that have historic gullies. Identify other management practices that may be contributing to the observed degradation, such as road building, recreational use, grazing, and timber harvests.

## State Laws

The California Water Code consists of a comprehensive body of law that incorporates all State laws related to water, including water rights, water developments, and water quality. The laws related to water quality (CWC Sections 13000 to 13485) apply to waters on the national forests and are directed at protecting the beneficial uses of water. Of particular relevance to the proposed action is Section 13369, which deals with non-point-source pollution and best management practices.

**The Porter-Cologne Water-Quality Act**, as amended in 2006, is included in the California Water Code. This act provides for the protection of water quality by the State Water Resources Control Board and the Regional Water Quality Control Boards, which are authorized by the U.S. Environmental Protection Agency to enforce the Federal Clean Water Act in California.

Sections 208 and 319 of the Federal Clean Water Act address nonpoint source pollution and require water quality management plans for nonpoint sources of pollution. The Forest Service in the Pacific Southwest Region (Region 5) has worked with the California water quality agencies to meet Clean Water Act requirements. The greatest emphasis in this coordination has been on the management and control of nonpoint sources of water pollution, with sediment, water temperature, and nutrient levels of most concern. The State Water Resources Control Board and Regional Water Quality Control Boards entered into agreements with the Forest Service to control nonpoint source discharges by implementing BMPs. These BMPs, which are set forth in the Forest Service Pacific Southwest Region guidance document, Water Quality Management for Forest System Lands in California, Best Management Practices (2000), constitute a portion of the State's Nonpoint Source Management Plan and comply with the requirements of Sections 208 and 319 of the Clean Water Act. The agreements include BMPs related to OSV use, and to road construction and maintenance. The implementation and effectiveness of the BMPs are reviewed annually. In recent years, the Forest Service has emphasized monitoring in national forests to ensure the implemented projects follow approved control measures (USDA Forest Service, 2004b).

#### *Pacific Southwest Region Best Management Practices, and National Core Best Management Practices*

The State and Regional Water Quality Control Boards entered into agreements with the Forest Service to control non-point-source discharges by implementing control actions certified by the State Water Quality Control Board and the Environmental Protection Agency as best management practices (USDA Forest Service R5 FSH 2509.22 - soil and water conservation handbook, 2011). These are designed to protect and maintain water quality and prevent adverse effects to beneficial uses, both on site and downstream. Further, the Washington Office has generated National Core BMPs that include the following BMP listed below for OSV uses.

Through the execution of a formal Management Agency Agreement with the Forest Service in 1981, the State Water Resources Control Board designated the Forest Service as the Water Quality Management Agency for National Forest System lands in California. The Forest Service BMPs are in conformance with the provisions and requirements of the Federal CWA and within the guidelines of the Basin Plans developed for the nine Regional Water Quality Control Boards in California. The BMPs most relevant to the OSV Program pertain to snow removal and monitoring and include the following:

**BMP 2-25 (USDA Forest Service R5 FSH 2509.22 - Soil and Water Conservation Handbook, 2011): Snow Removal Controls to Avoid Resource Damage**

a. Objective: To minimize the impact of snowmelt runoff on road surfaces and embankments and to consequently reduce the probability of sediment production resulting from snow removal operations.

b. Explanation: This is a preventative measure used to protect resources and indirectly to protect water quality. Forest roads are sometimes used throughout winter for a variety of reasons. For such roads the following measures are employed to meet the objectives of this practice.

1. The contractor will be responsible for snow removal in a manner which will protect roads and adjacent resources.

2. Rocking or other special surfacing and drainage measures will be necessary before the operator is allowed to use the roads.

3. Snow berms will be removed where they result in an accumulation or concentration of snowmelt runoff on the road and erosive fill slopes.

4. Snow berms will be installed where such placement will preclude concentration of snowmelt runoff and serve to rapidly dissipate melt water. If the road surface is damaged during snow removal, the purchaser or contractor will be required to replace lost surface material with similar quality of material and repair structures damaged in snow removal operations as soon as practical unless otherwise agreed to in writing.

c. Implementation: Project location and detailed mitigation will be developed by the interdisciplinary team during environmental analysis and incorporate into the project plan and/or contracts. Project crew leaders and supervisors will be responsible for implementing force account projects to construction specifications and project criteria.

**BMP 4-7 (USDA Forest Service 2000): Water Quality Monitoring of OHV (and OSV) Use According to a Developed Plan**

a. Objective: To provide a systematic process to determine when and to what extent OHV use will cause or is causing adverse effects on water quality.

b. Explanation: Each forest's OHV Plan [Travel Management Plan and LRMP] will:

1. Identify areas or routes where OHV use could cause degradation of water quality.

2. Establish baseline water quality data for normal conditions as a basis from which to measure change.

3. Identify water quality standards and the amount of change acceptable.

4. Establish monitoring measures and frequency.

5. Identify controls and mitigation appropriate in management of OHVs.

6. Restrict OHVs to designated routes.

c. Implementation: Monitoring results are evaluated against the OHV plan objectives for water quality and the LRMP objectives for the area. These results are documented along with actions necessary to correct identified problems. If considerable adverse effects are occurring, or are likely to occur, immediate corrective action will be taken. Corrective actions may include, but are not limited to, reduction in the amount of OHV use, signing, or barriers to redistribute use, partial closure of areas, rotation of use on areas, closure to causative vehicle type(s), total closure, and structural solutions such as culverts and bridges.

### National Core BMP Rec-7. Over-Snow Vehicle Use

Reference: FSM 7718

Objective: Avoid, minimize or mitigate adverse effects to soil, water quality and riparian resources from over-snow vehicle use.

Explanation: An over-snow vehicle is a motor vehicle that is designed for use over snow and that runs on a track or tracks and/or a ski or skis, while in use over snow. Over-snow vehicles include snowmobiles, snow cats, and snow grooming machines. Snowmobiles and snow cats are used for access and for recreational activities. Snow grooming machines are used to prepare snow on trails for downhill or cross-country skiing or snowmobile use.

An over-snow vehicle traveling over snow results in different impacts to soil and water resources than do motor vehicles traveling over the ground. Unlike other motor vehicles traveling cross-country, over-snow vehicles generally do not create a permanent trail or have direct impact on soil and ground vegetation when snow depths are sufficient to protect the ground surface. Emissions from over-snow vehicles, particularly two-stroke engines on snowmobiles, release pollutants like ammonium, sulfate, benzene, PAHs and other toxic compounds that are stored in the snowpack. During spring snowmelt runoff, these accumulated pollutants are released and may be delivered to surrounding waterbodies. In addition, over-snow vehicles that fall through thin ice can pollute waterbodies.

Use of National Forest System lands and/or trails by over-snow vehicles may be allowed, restricted or prohibited at the discretion of the local line officer.

**Practices:**

Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using state BMPs, Forest Service regional guidance, Forest or Grassland Plan direction, BMP monitoring information and professional judgment:

- Use suitable public relations and information tools, and enforcement measures to encourage the public to conduct cross-country over-snow vehicle use and on trails in a manner that will avoid, minimize or mitigate adverse effects to soil, water quality and riparian resources.
    - Provide information on the hazards of running over-snow vehicles on thin ice.
    - Provide information on effects on over-snow vehicle emissions on air quality and water quality.
- Use applicable practices of BMP Rec-4 (Motorized and Non-motorized Trails) when locating, designing, constructing and maintaining trails for over-snow vehicle use.
- Allow over-snow vehicle use cross-country or on trails when snow depths are sufficient to protect the underlying vegetative cover and soil or trail surface.
    - Specify the minimum snow depth for each type or class of over-snow vehicle to protect underlying resources as part of any restrictions or prohibitions on over-snow use.
    - Specify season-of-use to be at times when the snowpack is expected to be of suitable depth.
    - Specify over-snow vehicle class suitable for the expected snowpack and terrain or trail conditions.
- Use closure orders to mitigate effects when adverse effects to soil, water quality or riparian resources are occurring.
- Use applicable practices of BMP Rec-2 (Developed Recreation Sites) and BMP-10 when constructing and operating over-snow vehicle trailheads, parking and staging areas.
    - Use suitable measures to trap and treat pollutants from over-snow vehicle emissions in snowmelt runoff or locate the staging area at a sufficient distance from nearby waterbodies to provide adequate pollutant filtering.

## Resource Indicators and Measures

Resource indicators and measures shown in table 19 will be used to measure and disclose effects to hydrology related to OSV use designations and grooming trails for OSV use.

**Table 51. Resource indicators and measures used to determine impacts on soil and water resources**

| Resource Element | Resource Indicator | Measure (Quantify if possible) |
|---|---|---|
| **Water quality** | Number of snowmobiles per year using trails across the forest | Total amount of use can be compared to use amounts in Yellowstone and other studies to gauge potential water quality effects |
| | Consistency with Riparian Conservation Objectives 1, 2, 4, 5, and 6 | Evaluation of the effects to RCOs, water quality and beneficial uses of water |

## Methodology

Data on OSV routes and uses was compiled from GIS data obtained from the Tahoe National Forest include the following:

- GIS analyses of route miles and stream crossings in hydrologically sensitive areas.
- A variety of reports and assessments of OSV impacts, and professional experience and judgement using scientific literature on OSV impacts.
- Hydrologic data collected by the forest or other agencies, such as United States Geographical Survey (USGS), Environmental Protection Agency (EPA), and California Department of Fish and Game (CDF&G), on streamflow, sediment loads, and stream biota and habitat.
- Air and ground photos and literature–based and anecdotal information documenting the impacts of OSV uses and how they may vary based on precipitation, elevation, aspect, and other factors on the Tahoe National Forest.

## OSV Use Assumptions for Analysis

Assumptions used for the analysis are based on published literature and a Forest Service hydrologist’s professional judgement based on experience. These sources of information framed the issues key indicators used for analyzing the environmental consequences of each alternative on watershed resources. They provide background information and conclusions regarding the effects of OSVs and other factors considered in this analysis, and apply to all alternatives.

### Assumption 1

*Snow Plowing and Removal*. Snow plowing and removal occurs on paved surfaces in snow parks and does not cause soil disturbance, alter existing drainage patterns, or affect soil permeability. It is not part of the proposed action, but is an on-going and reasonably foreseeable action that should be considered especially for cumulative effects. Snow removal at trailhead parking areas has been occurring for decades. BMPs would be applied that ensure that snowmelt from snow storage areas does not result in erosion or impair quality of surface waters. The thaw rate in snow storage areas is typically slow, and snow is placed where the runoff percolates into the soil. High runoff rates are uncommon from snow storage areas. As a result, erosion or siltation from snow storage runoff is minimal. With implementation of BMPs, snow removal would not cause significant impacts from erosion. The snow removal operations at trailhead parking areas would not result in direct impacts on water quality. Snowmelt from snow storage areas could contain a more concentrated level of fuel deposits, oils, sand, and particulates. Snow is removed in designated storage areas where the snowmelt can percolate into the soil and sheet flow across parking areas is avoided; and direct discharge into surface water is avoided. As a result, the potential for water quality impacts associated with contaminants in the snow from plow equipment use is considered minimal. Snow removal operations are subject to BMPs, which ensure compliance with Federal Clean Water Act requirements. Consequently, project activities including snow removal are consistent with LRMP watershed management standard and guidelines and management prescriptions.

### Assumption 2

*Trail Grooming*. Direct project activities of trail grooming occur over an existing road and trail network and do not alter landforms or result in significant soil disturbance that would change water flow patterns or quantities of surface water runoff. Provided there is adequate snow cover to prevent resource damage, trail grooming does not cause substantial impacts to water quality; perennial, intermittent, or ephemeral streams; wetlands; or other bodies of water. Consequently, project activities including snow removal, trail grooming, and OSV travel on groomed trails are consistent with LRMP watershed management standards and guidelines and management prescriptions.

### Assumption 3

*OSV Use on trails.* Most OSV trails are snow-covered unpaved roads and trails. The primary pollutant of concern in forested environments is eroded sediment from unpaved roads, fill slopes, and cut slopes. According to West (2002), roads in forested lands are the primary source of possible non-point source of pollution. Fine-grained sediment from roads and trails that reaches waterbodies impairs water quality.

Much of the OSV use under this plan would occur on groomed trails where the plan calls for adequate snow cover, negligible anticipated contact with bare soil, and minimal disturbance of trail and road surfaces. OSV use on the groomed trail system, given adequate snow coverage, would not substantially impact water quality in perennial, intermittent or ephemeral streams, and in wetlands or other bodies of water.

### Assumption 4

*Cross-country off-trail riding by OSVs*. With adequate snow depths, cross-country use of OSVs would have a negligible effect on ground disturbance that could lead to erosion and sedimentation in streams or other waterbodies, and minimal effect on vegetation, especially along streams and other waterbodies. Some researchers have found that snowmobiles can contribute to erosion of trails and steep slopes. The degree of potential erosion is dependent on site-specific factors such as slope, aspect, elevation, adjacent vegetation, level of use, and weather conditions. Olliff et al. (1999) found that if steep slopes are intensively used, snow may be removed and the ground surface exposed to extreme weather conditions and increased erosion by continued snowmobile traffic. Similar results could occur when snowmobiles use exposed southern exposures. Public OSV use in off-trail open riding areas where there is minimal snow cover or bare patches of ground could possibly result in destruction of vegetation, soil compaction, and erosion in areas of repeated and concentrated use.

Off-trail public OSV use would be generally dispersed and would not result in high concentration of OSV use on bare soil. Also, travel over bare soil can damage machines, so it is generally avoided by operators. With adequate minimum snow levels, this plan would result in no more than incidental soil erosion, and therefore, would not create water quality impacts to streams or waterbodies by introducing sediment in water runoff.

Cross-country OSV use could affect woody riparian species by the bending and breaking of branches as recreationists run over the branches (Neumann and Merriam 1972). This is most likely to occur with lower snow depths, such as the beginning of the winter season, and before sufficient snow has accumulated to protect vegetation, and during spring snowmelt. Regenerating timber could also be affected by bending and breaking of leaders with inadequate snow depth. Vegetation trampling from snowmobiles and impacts to riparian resources from public OSV use would be considered negligible with adequate snowpack coverage.

Widespread snow compaction from cross-country OSV uses can affect snowmelt patterns, and in turn, the hydrologic regime. Studies have found delayed snowmelt in areas compacted by snowmobiles versus areas of uncompacted snow (Keddy et al. 1979, Neumann and Merriam 1972). During spring snowmelt, these effects can reduce the ability of the snow to slow runoff. It is unknown how much OSV-related snow compaction would affect runoff rate and timing, but some studies suggest up to a 2-week delay. Because snow compaction from off-trail cross-country use is currently not extensive on a watershed scale, measureable changes in hydrology are not expected.

When OSVs are operated on adequate snow depths, the effects of plan activities of cross-country OSV uses are consistent with the Tahoe National Forest LRMP including Riparian Conservation Objectives and watershed management standards and guidelines and management prescriptions.

### Assumption 5

*Exhaust emissions* deposited in the snowpack in the amounts anticipated on the Tahoe National Forest from grooming equipment or public OSVs on trails or OSVs travelling cross-country would be considered minor and currently do not functionally impair water quality of adjacent waterbodies. In addition to exhaust emissions, grooming equipment and OSVs can leave behind unburned fuel, lubrication oil, and other compounds on the top layers of snow. Some of the unburned hydrocarbons would accumulate on the snow surface and could eventually wash into streams and lakes. This could cause localized degradation of water quality.

Concentrations of pollutants from OSVs have been observed in snowmelt runoff (Arnold and Koel 2006, McDaniel and Zielinska 2014). Discharge from two-stroke snowmobile engines can lead to indirect pollutant deposition into the top layer of snow and subsequently into the associated surface and ground water (Adams 1975). Hagemann and Van Mouweik (1999) found that there is a potential risk to aquatic life from snowmobile emissions, but that the risk could not be quantified because of a current lack of water quality data. Adams (1975) showed that high concentrations of lead and hydrocarbons were found in pond water adjacent to snowmobile trails during the weeks following ice melt. The study also found that juvenile brook trout had increased hydrocarbon intake and reduced stamina, from surface water and food chain feeding and hydrocarbon uptake.

Studies conducted in the Rocky Mountains region provide some indication of the possible effects of pollution deposition from public OSV use. The U.S. Geological Survey monitored snowpack throughout the northern Rocky Mountains over a period of several years to measure regional water quality trends, as well as the effect of OSV use. The monitoring showed a relationship between OSV use and pollutant deposition in the snowpack, but not more than negligible to minor quantities of OSV-related pollution in snowmelt. Detectable vehicle-related pollution in snowmelt was found to be in the range of background or near-background levels (Ingersoll et al. 2005 as cited in NPS 2007). A study in Yellowstone National Park analyzed snowmelt from four test locations adjacent to roadways and parking lots heavily used by

OSVs between Yellowstone's West Entrance at West Yellowstone, Montana, and the Old Faithful visitor area. No cross-country OSV use was allowed, and OSVs were concentrated on one main trail in to the park. The purpose of the study was to evaluate whether increased snowmobile use within the Park was creating increased potential for emissions to enter pristine surface waters. Specific objectives were to (1) examine snowmelt runoff for the presence of specific volatile organic compounds (VOCs); (2) determine if concentrations of any VOCs exceed safe drinking water criteria; and (3) predict the potential for impacts by VOCs on the fauna of streams near roads heavily used by snowmobiles in the park. In spring 2003 and 2004, water samples were collected and tested. In situ water quality measurements (temperature, dissolved oxygen, pH, specific conductance, and turbidity) were collected; all were found within acceptable limits. Five VOCs were detected (benzene, ethylbenzene, m- and p-xylene, o-xylene, and toluene). The very low concentrations were found to be below EPA criteria and guidelines for the VOCs analyzed and were below levels that would adversely impact aquatic ecosystems (Arnold and Koel 2006).

The number of snowmobiles that entered Yellowstone in 2003 and 2004 at the West Yellowstone trailhead was 47,799 and 22,423, respectively (Arnold and Koel 2006); all routed through a single trailhead. In comparison, the 2009 estimated seasonal day use of OSV trails across the Tahoe National Forest was around 20,000 OSVs, spread over 6 trailheads. These visitations were spread across multiple trailheads and trail systems and did not all occur in the same location. Use patterns based on snowmobile registrations in local counties have remained about the same or slightly increased, and are likely to slowly increase in the future. Even with projected increases in OSV seasonal use levels at any Tahoe National Forest trailhead or trail system are considerably less than OSV use that occurred at Yellowstone National Park during the snowmelt studies, and use at Tahoe National Forest trailheads was considered comparatively low. Since Yellowstone OSV use levels studied had not resulted in impaired water quality, it follows that lower public OSV use at trailheads is not likely to adversely affect water quality of snowmelt. Therefore, due to very low concentrations of pollutants from OSV use such as VOCs, operation of public OSVs on system trails and cross-country is consistent with water quality objectives in the Tahoe National Forest LRMP including Riparian Conservation Objectives and watershed management standards and guidelines and management prescriptions.

### Assumption 6

*Other hydrology impacts*. This plan would (1) not involve the construction of any structures which could impede or redirect flood flows, nor any ground surface modifications which could change drainage patterns, impervious surfaces, soil permeability, or other hydrological characteristics such as surface water volumes; (2) not expose people or property to a risk of flooding nor increase the risk of flooding for existing development in floodplains; (3) not place housing or other structures within a flood hazard area; (4) not involve a change in water use, affect a private or public water supply, or affect the quantity or quality of groundwater recharge, aquifer volume or cause a lowering of the local groundwater table level; (5) not involve an increase in impervious surfaces, and (6) not involve discharges of storm water or wastewater.

### Assumption 7

*The equivalent roaded acre (ERA).* This model (FSH 1990a: chapter 20) was not used for this analysis to show cumulative watershed effects. Direct impacts to watersheds and stream courses that result from this project are limited. There are no new ground-disturbing activities proposed with this project. As long as adequate snow depths are maintained, because there are virtually no direct or indirect effects, using the ERA model will not show any detectable differences between alternatives and is not appropriate for this scale of analysis, which covers nearly a million acres. The ERA model is beneficial at demonstrating changes in ERA for plans that intend to disturb hundreds to thousands of acres for fuels reduction, travel management or timber harvest plans, or to show cumulative effects of wildfires. This plan is not creating a new disturbance on the landscape for any alternative. Changing the overall acreage of areas open for OSVs will not lead to increases or decreases in ground disturbance as long as OSVs are managed appropriately. Finally, the ERA method would not show any detectable differences within the sixth field watersheds in this analysis.

### Assumption 8

*Global climate change.* Climate change is expected to substantially affect California over the next 50 years (http://www.water.ca.gov/climatechange/docs/062807factsheet.pdf). Precipitation is likely to become more variable from year to year. Warmer temperatures will reduce the proportion of precipitation that falls as snow and increase the proportion that falls as rain. This shift will result in later snowmelt accumulation, earlier snowmelt, higher peak flows, more frequent flooding, increased erosion, reduced summer baseflows, more frequent droughts, and increased summertime stream temperatures.

These expected changes have several implications for public OSV use effects on water resources on national forests:

- As floods become more frequent and of greater magnitude, roads and trails used for winter-time OSV use will likely be subjected to greater stresses from higher runoff. Erosion of route surfaces and route/stream crossings will become more common. Ephemeral channels will carry water more frequently than in the past.
- The road and trail networks used for winter-time OSV uses will have a role in increasing runoff and peak flows (Ziemer 1981, Jones and Grant 1996) in the runoff season. Cumulative watershed effects in watersheds near their thresholds of concern may become more common.
- Protection and restoration of meadows and other riparian areas that extend the duration of baseflows will be increasingly important as snowpack diminishes.
- Seasons of use for OSV routes may need to be modified as precipitation and temperature patterns change.

### Assumption 9

*Non-motorized uses.* For the purposes of this analysis, non-motorized uses have very little to no effect on hydrology and will not be considered further in this analysis.

## Spatial and Temporal Context for Effects Analysis

The spatial and temporal bounds for discussing and analyzing direct, indirect, and cumulative effects on water resources and associated riparian areas and wetlands would be the watersheds within the Tahoe National Forest.

Short-term effects are generally around up to one year in duration, and long-term effects are over one year in duration.

## Affected Environment

The Tahoe National Forest is subdivided into 53 6th level watersheds. The watershed average size is about 32,000 acres. The existing condition of watersheds (watershed health) on the forest varies depending upon amount of disturbance found within each watershed and the degree of natural integrity of the system. Disturbance in the form of land management activities, such as timber management, road construction, livestock grazing, mining, recreation, and special-uses can adversely affect a watershed's condition. Past management activities have been concentrated within certain watersheds. Management activity effects are influenced in part by the local terrain, the precipitation regime, and other factors.

**Table 52. Hydrologic characteristics of the OSV analysis area within Tahoe National Forest**

| Resource | Hydrologic Characteristics |
|---|---|
| **Landscape** | Sierra Nevada Mountains<br>Elevation ranges between 1,040 feet (foothills) and 9,120 feet (Sierra Crest). |
| **Climate** | Highly variable across Tahoe National Forest due to elevation and orographic elevation effect of Sierra Nevada Mountain Range.<br>Mediterranean climate, whereby most precipitation occurs between November and April.<br>Winter precipitation below 3,500 feet is primarily rain, mixed rain and snow from 3,500 to 5,000 feet and above 5,000 feet is primarily snow.<br>Mean annual precipitation ranges between: 30-40 inches at the Sacramento Valley foothills, 60-70 inches at the crest of the Sierra Nevada. |
| **Aquatic features** | 1,365 miles of perennial streams.<br>6,480 miles of intermittent streams.<br>4,560 lakes with total acreage of 58,171 acres, ranging between <0.01 acres to 6,909 acres.<br>444 meadows with total acreage of 6,613 acres, ranging between <0.01 acres to 394 acres. |
| **Beneficial Uses*** | Varies by watershed: municipal water supplies for domestic use, fire protection, hydropower generation, irrigation, contact and non-contact recreation, cold freshwater habitat, spawning habitat, stock watering, and wildlife habitat. |
| **Domestic use** | Truckee River, which supplies water to the community of Reno-Sparks. |
| **Watersheds** | 53 sixth-field watersheds on the Tahoe National Forest within the affected environment.<br>Average size of entire watersheds (includes all ownerships): 31,610 acres<br>Average watershed acreage within affected environment: 2,306 acres |

*Source: Cal EPA CVWQCB 2007 or Source: Cal EPA LWRCB 2006

## *Surface Water*

The Tahoe National Forest contains portions of headwaters of the American, Bear, Feather, Truckee and Yuba Rivers. The American, Bear and Yuba Rivers flow westward from the crest of the Sierra Nevada to the Sacramento River in the City of Sacramento. The headwaters of the Middle Fork Feather River are in the Sierra Valley area. The river is formed by the confluence of several streams draining the surrounding mountains and then flows west to join the Sacramento River near Marysville. The American, Bear, Feather, and Yuba rivers and their tributaries provide water for domestic, agricultural, environmental and industrial uses as well as power production. The Truckee River Basin covers an area from Lake Tahoe in California to Pyramid Lake, located approximately 50 air miles away in Nevada. Approximately 760 square miles (almost 25 percent of the basin), lie within California. Most of the precipitation and water storage occur within the California part of the Truckee River Basin. The Truckee River, south of Bear Creek confluence to the area near the California border near Floriston is within the Tahoe National Forest boundary.

Most of the watersheds on the Tahoe National Forest are highly regulated systems. FERC re-licensing is in process for the The American, Yuba, and Bear River.

The hydrology of the plan area is dynamic and evolving. There can be significant annual variations in water availability and quality, seasonal flow rates, and water temperatures. Modern human activities have altered the natural dynamics of water through the construction of dams and diversions, watershed practices that alter water yields, temperature, and sedimentation, and the introduction of pollutants and exotic biota. Surface waters on the forest originate as runoff from snowmelt and rainfall. Snowfall is generally the greatest contributor to total runoff, while intense rainfall events can cause the largest floods. The major runoff season on the forest is from April through June. Snowmelt runoff peaks usually occur from late May into June.

### *Surface water quality*

According to the California Water Plan Update (CA DWR 1998) the Tahoe National Forest is encompassed by three major hydrologic regions. One region is on the western side of the Sierra Nevada crest (the Sacramento River); the North and South Lahontan regions are on the eastern side. The Central Valley Regional Water Quality Control Board oversees and sets the standards for the Feather, Yuba, Bear, and American River systems. The Lahontan Regional Water Quality Control Board oversees and sets the standards for the Truckee River. The Forest Service has a memorandum of understanding with the State that names the Forest Service as a “Designated Management Agency” that will prescribe and implement a water quality control program to protect the waters of the state to meet State and Federal regulations as well as the standards set in the Central Valley Water Quality Control Board Basin Plan as amended for commercial silvicultural practices by Resolution R5-2006-0026 (2006).

Compared to other parts of California and the United States, the Sierra Nevada overall has relatively low sediment yields (Kattelmann 1996). General estimates show that the Sierra Nevada has the lowest sediment yield in California (generally less than 100 $m^3/km^2$/year). Sediment transport measurements in a variety of streams in the eastern Sierra Nevada were generally less than 10 $m^3/km^2$/year. A Soil Conservation Service report classified sediment yield below 150 $m^3/km^2$/year as “low” with respect to nationwide rates (Kattelmann 1996). Table 53 shows some annual sediment yield data for watersheds on the Tahoe National Forest. These figures show that the Truckee River system has lower sediment yields than the rivers on the western side of the forest. The American, Yuba, and Feather River systems appear to have similar sediment yields.

**Table 53. Sediment yields from reservoir surveys, suspended sediment records, and other estimates (Kattelmann 1996)**

| Watershed | Annual Sediment Yield ($m^3/km^2$) |
|---|---|
| American – Ralston | 80 |
| American – Auburn Dam Site | 130 |
| American – Folsom | 250 |
| Bear – Combie | 360 |
| Feather – Oroville | 100 |
| Truckee – Upper Truckee | 21 |
| Squaw Creek | 93 |
| Trout Creek | 12 |
| Yuba – Nonmining | 160 |
| Mining | 3,300 |
| North Yuba – Bullards Bar | 130 |

Quality of surface water is affected by the integrity of the fluvial system. Some concerns exist for watersheds where watershed impacts have affected water quality and stream channel potential, including riparian conditions and streambank stability. These effects are in limited locations, and changes in management could improve existing conditions. Water quality on the Tahoe National Forest can be impacted by many activities. Most pollutants come from non-point sources, i.e., from diffuse sources not concentrated into pipes, drains, flumes, or ditches. Examples include erosion from roads and parking areas, and forest roads potentially adding more sediment to streams than any other forest operation. Sediment at levels above natural rates of erosion is the most common non-point source pollutant in forested ecosystems. Roads can pollute groundwater as well as surface water. Research has shown that 90 percent of the sediment that ends up in surface waters from forested lands is associated with improperly designed and maintained roads. Water quality in lakes, streams, springs, and wetlands can be protected by proper road location and construction and adequate maintenance. A few rural communities and abandoned mining sites within national forests constitute point sources of pollution.

Uses of OSVs has not been extensively monitored on the Tahoe National Forest. However, a monitoring study completed in 2011 (Tahoe National Forest 2011 OHV/OSV Monitoring and Management Program: 2011 Monitoring Results) showed no impact to riparian systems or meadows, and suggests that OSVs have a low risk to water quality under current use levels and levels of management. Monitoring of aquatic resources results are summarized in table 54.

**Table 54. Tahoe National Forest 2011 OHV/OSV Monitoring and Management Program: 2011 Monitoring Results**

| Monitoring Accomplishments | Results | Were Objectives and Success Criteria Met? |
|---|---|---|
| American River RD OSV Monitoring of Aquatic Resources | Groomed OSV routes along the Foresthill Divide were monitored for resource damage during low-snow conditions over wetlands, riparian areas, and streams. No resource damage to aquatic resources was observed. An exceptionally deep snow pack in winter/spring 2011 contributed to the protection of aquatic resources. | Yes, monitoring determined OSV use in relation to aquatic resources. No effects to aquatic resources were identified and no management actions are needed. |

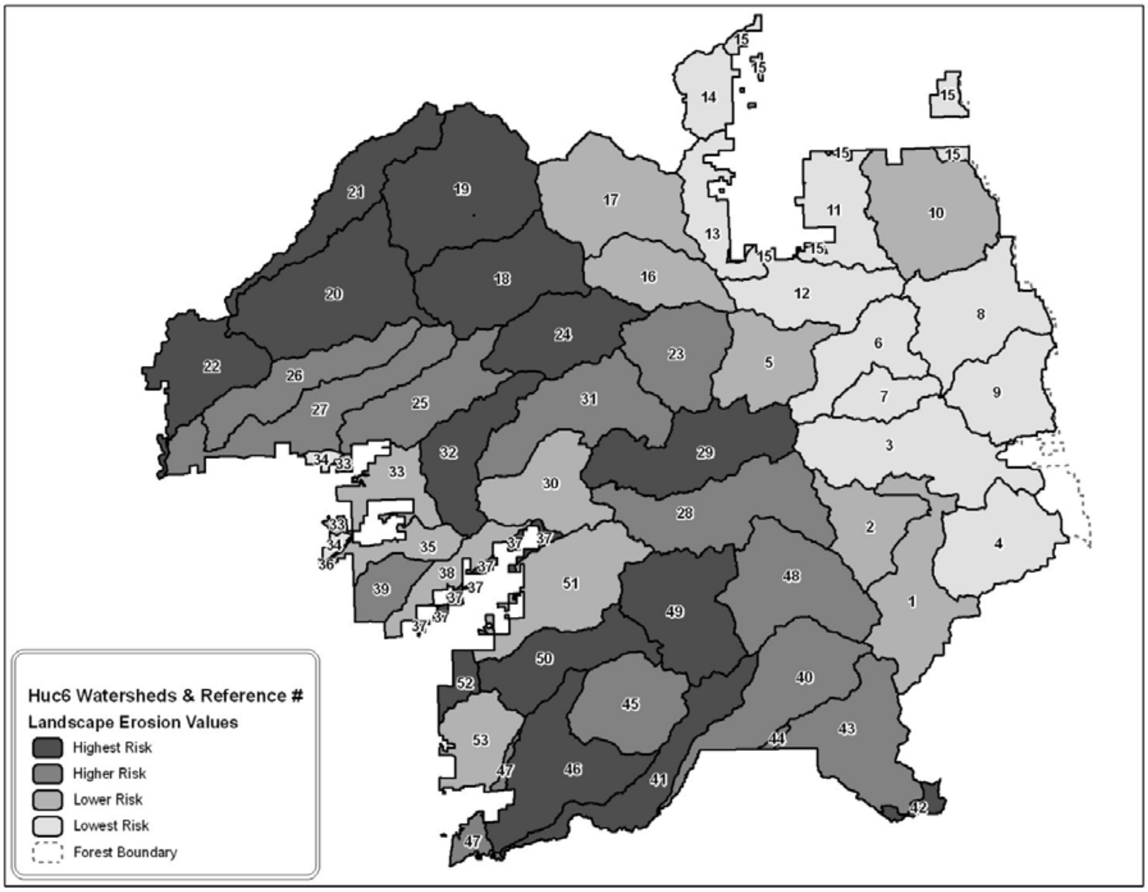


**Figure 12. Modelled landscape erosion values by HUC6 watershed (USDA Forest Service 2012). Higher erosion risk watersheds have a higher risk of stream sedimentation.**

### *Existing Landscape Erosion/Sedimentation Risk*

Many factors can influence the risk of erosion and impacts to watershed resources including: soil erosion/sedimentation; stream density; and the type and density of roads on the landscape. The presence of highly erosive soils/landscapes or a high density of native-surfaced roads does not mean that there would be negative effects to soil resources. But the presence of both high erosion risk and a high density of forest roads indicate that there could be a higher risk of accelerated erosion and sediment production.

The inherent risk of erosion of the soils and subsequent sediment erosion and water quality impacts within the Tahoe National Forest was assessed using two methods: the R-5 soil erosion hazard rating (EHR) found in Tahoe National Forest Soil Resource Inventory and the Ecosystem Management Decision Support Model. The R-5 EHR ratings indicate that 82 percent of the soils on the Tahoe National Forest have a high to very high erosion risk. The model was used to refine the soil erosion risk analysis. The modelled erosion risk scores were averaged by HUC6 watershed to assess the motorized route related erosion risk at the landscape scale. The landscape erosion risk score were compared between individual watersheds. The Truckee River landscape erosion scores were the only average score in the bottom 25 percent, therefore, the Truckee River Basin has the lowest erosion risks on the Tahoe National Forest. Whereas the North Yuba River, which is much steeper, has more geo-debris slides, and more erosive soils, has the highest erosion risks on the Tahoe National Forest (figure 12).

**Table 55. Modelled erosion risk rating by major river basin (USDA Forest Service 2012). Higher erosion rates can lead to increased risk of stream sedimentation.**

| River Basin | Erosion Risk Class |
|---|---|
| ***Middle Truckee River*** | *0.58 (0-25%)* |
| ***Little Truckee River*** | *0.65 (0-25%)* |
| **Subtotal Truckee** | **0.61 (0-25%)** |
| **Feather** | **0.62 (0-25%)** |
| ***North Yuba*** | *0.40 (75-100%)* |
| ***Middle Yuba*** | *0.44 (50-75%)* |
| ***South Yuba*** | *0.48 (25-50%)* |
| **Subtotal Yuba** | **0.44 (50-75%)** |
| **Bear** | **0.44 (50-75%)** |
| ***Middle Fork American*** | *0.45 (50-75%)* |
| ***North Fork American*** | *0.42 (50-75%)* |
| **Subtotal American** | **0.43 (50-75%)** |
| **Tahoe National Forest** | **0.48 (25-50%)** |

Table 55 shows the average modelled erosion risk rating by major river basin. Erosion risk often correlates with increased risk of sedimentation. The erosion risks in the Truckee and Feather River basins are the lowest on the Tahoe National Forest. Erosion risk in the Middle Truckee River basin is in the lowest erosion risk class. The Bear River basin is in the higher erosion risk. The Yuba River and American River basins have similar erosion risks, with the South Yuba having a slightly lower erosion risk than the rest of the Yuba River basin.

Section 305(b) of the Clean Water Act requires states prepare and submit a water quality summary report every two years to the Environmental Protection Agency (EPA). In addition, CWA Section 303(d) requires states to submit to EPA lists of waterbodies that meet 303(d) listing criteria. This list identifies water quality-limited waterbodies. Water quality impacts can be from point and/or nonpoint sources of pollution, and may require additional controls to meet state water quality standards. These waterbodies are prioritized based on the severity of the pollution and other factors. Currently impaired waters include six waterbodies on the Tahoe National Forest that are listed as impaired on the EPA's 303(d) List. These are the Truckee River (sediment); Kanaka Creek (arsenic), Squaw Creek (sedimentation/siltation) and Humbug Creek (lead, sediment, etc.). Table 56 displays the 303(d) listed waterbodies and the reason for listing.

**Table 56. Impaired waterbodies on the Tahoe National Forest listed on the EPA 303(d) List**

| Water Body Name | Pollutant/Stressor | Source | Area Affected |
|---|---|---|---|
| **Humbug Creek** | Copper, Mercury, Zinc, Sedimentation/Siltation | Resource extraction abandoned mines | 9 miles |
| **Kanaka Creek** | Arsenic | Resource extraction abandoned mines | 1 mile |
| **Squaw Creek** | Sedimentation/Siltation | Construction/Land development, Other Urban Runoff, Hydro modification, Drainage/Filling of Wetlands, Highway Maintenance And Runoff, Natural Sources, Recreational Activities, Nonpoint Source | 8 miles |
| **Truckee River** | Sedimentation/Siltation | Source Unknown | 106 miles |

Source: Cal EPA CVWQCB 2007; Source: Cal EPA LWRCB 2006

The Truckee River, Squaw Creek, and Humbug Creek (Middle Yuba River) are currently listed on the Impaired Water Body List (303(d)) for sediment. The Lahontan Regional Water Quality Control Board recently developed a Total Maximum Daily Load (TMDL) for sediment. Effects of this project on these watersheds are discussed under Environmental Consequences in the cumulative effects section.

### *Surface Water Uses*

Surface water from the forest is used both consumptively and non-consumptively. Uses in both categories depend on high quality water. Non-consumptive water uses include recreation, wildlife, fisheries, and the aesthetic quality of this resource. Value on the forest is high for these uses. The Tahoe National Forest contains no municipal watersheds that are managed under any type of agreement. However, water generated from the forest is used for municipal supply for some areas, such as the City of Reno/Sparks, which uses the Truckee River for municipal water supply.

The Tahoe National Forest generally produces surface water of excellent quality, suitable for almost any use. Contaminant levels in most waters are lower than amounts specified in the states of California and Nevada stream quality standards (Kattelmann 1996). Most runoff would be suitable as drinking water except for the risk of bacteria and pathogens, such as Giardia lamblia, Campylobacter ssp., and Cryptosporidium ssp. In the backcountry, inadequate disposal of human waste and pathogens carried by mammals have caused sufficient contamination to make drinking untreated water risky. Low-level release of nutrients from human activities along wilderness lakes may have stimulated increased plant growth on some lake bottoms (Kattelmann 1996) reducing clarity and causing shifts in aquatic communities as well as reducing the aesthetics of natural lake conditions. Generally, very little water from national forests in the Sierra Nevada region is heavily polluted or contaminated by chemicals, bacteria, or parasites at concentrations above background levels (Kattelmann 1996). Most waters satisfy the fishable and swimmable objectives of the Clean Water Act.

### *Surface Water Protection Measures*

Public water supplies are protected by the Safe Drinking Water Act (SDWA), which was amended in 1996. The SDWA does not require source areas to deliver water of potable quality with no need for treatment. In fact, waters in pristine areas usually need treatment due to natural waterborne parasites, such as giardia.

Best management practices have been adopted to protect water quality in compliance with the Clean Water Act. Best management practices cover a wide variety of land management actions on National

Forest System lands, including watershed management, timber, transportation and facilities, pesticide-use, recreation, minerals, fish and wildlife habitat, and fire suppression and fuels management. When best management practices are properly applied, pollutant delivery to streams and lakes is minimal and recovery of waters and aquatic sites should be rapid. The physical, chemical, and biological integrity of waters in all watersheds should be as good as in watersheds that are managed exclusively for domestic and municipal supplies.

### *Groundwater*

Rainfall and snowmelt, as well as producing surface runoff, also recharge groundwater sources on the forest. Groundwater aquifers release water during periods of low precipitation to maintain base flows of streams. Groundwater is of beneficial use both on and off-forest, in the form of water supply wells. Communities use groundwater for part or all of their municipal water supply, while other residents use individual domestic wells. Consumptive use of groundwater on the forest is low. Such use is limited to special-use permittees and Forest Service campgrounds and administrative sites with domestic wells. The existing condition of groundwater on the forest is good, although not all wells provide high quality drinking water. Past management activities on the forest do not appear to have adversely affected groundwater quality. No groundwater contamination from recreation uses (toilets) has been recorded, with all road-accessible toilets being of the pump-vault type. Some potential for such ground water contamination exists at heavily used recreation sites with limited facilities.

### *Riparian Areas and Wetlands*

Riparian areas are the transition zone between uplands and water in lakes and rivers. Riparian ecosystems are characterized by the presence of trees, shrubs, or herbaceous vegetation that require free or unbound water, or conditions that are moister than those of surrounding areas. Riparian ecosystems, aquatic ecosystems, wetlands, lakeside zones, and floodplains will be jointly referred to as riparian areas. The terms riparian zones and riparian areas are used interchangeably, but by strict ecological definition, may not be the same in all instances. Riparian areas occur in stream corridors, along lakeshores, and around springs, wetlands, and wet meadows. Vegetation in riparian areas can include characteristic woody riparian hardwood types such as aspen, alder, or willow, or it can include larger and more vigorous trees of the same species as found on adjacent uplands.

The forest contains a variety of wetlands. Wetlands are defined in the 1987 Corps of Engineers Wetlands Delineation Manual (USDD Army Corps of Engineers 1989) as: “Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, fens, bogs, and similar areas.”

Riparian ecosystems are generally inclusive of wetlands. Healthy riparian areas, with an abundance of trees and other vegetation, slow flood waters and reduce the likelihood of downstream flooding. Riparian areas improve water quality by filtering runoff and sediment from flood flows and adjacent upland slopes. Healthy riparian areas act like a sponge, absorbing water readily during periods of excess. Water slowed by riparian areas enters the groundwater. Some of it is released later, increasing late summer and fall streamflow. Riparian areas produce an abundance of stream cover and shade, which in turn limit the amount of water temperature fluctuation in the stream. This limiting in water temperature is generally advantageous to cold-water fish species. Benefits provided by riparian areas include food, cover, and nesting habitat for birds. Many animals visit and live in riparian areas. They come for water, food, cover, and temperature moderation. Riparian areas often provide sheltered upstream and downstream transportation corridors to other habitats. Fish depend upon healthy riparian areas to provide stable channels, sustained water supply, clean and cool water, food, and streambank cover.

Riparian areas are attractive and inviting to forest visitors. Public OSVs often use existing roads and trails for snowmobile routes. The most serious impacts of roads and motorized trails on the Tahoe National Forest occur where they are in close proximity to streams or wetlands within RCAs. Native surface roads and motorized trails within RCAs can impact water resources including water quality. There are currently 1,054 miles of native surface roads and motorized trails within RCAs. The current density of native surface roads and motorized trails in RCAs on the Tahoe National Forest is 2.6 miles per square mile. The highest number of miles in RCAs is found in the Yuba River Basin and the lowest number of miles in RCAs is in the Feather Basin. The highest density of native surface roads and motorized trails is found in the Truckee and Feather River basins and the lowest in the American River and Bear River basins.

## Environmental Consequences

### Minimization Measures common to all action alternatives

Design features and BMPs will be used to minimize damage to watershed resources from the use of OSVs for action alternatives. BMP’s described in this DEIS, Volume II, Appendix D will be applied to all alternatives. A description of some of these these practices are described below. Additional practices will be included in BMP 2-25 (USDA Forest Service R5 FSH 2509.22 - Soil and Water Conservation Handbook, 2011) and National Core BMP Rec-7 and Road-10 regarding over-snow vehicle use and equipment refueling. The criteria will be applied to the 19 areas on the Tahoe National Forest that may be designated for OSV use under this plan.

#### *Groomed Snow Trails:*

1. Impacts to watershed resources would be minimized by making spill containment equipment available at the facilities where grooming equipment is re-fueled.

2. Impacts to watershed resources would be minimized by designating equipment maintenance and refueling sites to ensure that they are located on gentle slopes, on uplands, and outside of RCAs and sensitive terrestrial wildlife habitats.

#### *Cross-Country OSV Use:*

1. Impacts to watershed resources would be minimized by prohibiting cross-country OSV use when and where there is less snow coverage than sufficient to prevent damage to underlying soil and vegetation resources.

2. Impacts to watershed resources would be minimized as a result of allowing for dispersed use in open areas. Off-trail OSV use would be generally dispersed and would not result in high concentration of OSV use on areas without snow cover. Also, travel over areas without snow cover can damage machines, so it is generally avoided by operators. With adequate snow levels, this plan would result in no soil erosion, and therefore, would not create water quality impacts to streams or waterbodies by introducing sediment in water runoff.

3. Impacts to watershed resources would be minimized by prohibiting OSV use on unfrozen lakes, reservoirs, ponds and any other open surface water.

4. Impacts to watershed resources would be minimized by providing information to the public of the hazards of running over-snow vehicles on thin ice and the effects of OSV emissions on air quality and water quality.

5. Impacts to watershed resources would be minimized by prohibiting OSV use and grooming in wetlands unless protected by adequate snow cover. If OSV trails must enter wetlands, impacts to watershed resources would be minimized by using bridges or raised prisms with diffuse drainage to sustain flow patterns, setting crossing bottoms at natural levels of channel beds and wet meadow surfaces, and avoiding actions that may dewater or reduce water budgets in wetlands.

6. Impacts to watershed resources would be minimized by adhering to Best Management Practices related to Over Snow Vehicle Use from the 2012 USDA Forest Service National Core BMP Technical Guide and the 2011 Region 5 Soil and Water Conservation Handbook.

## All Alternatives

### *Direct, Indirect and Cumulative Effects*

#### Impacts- Projected Water Supply (direct, indirect, cumulative)

None of the action alternatives would increase impacts to water supplies, because this project would not affect water quantity in water supply watersheds.

#### Projected Water Quality

Four waterbodies on the Tahoe National Forest are listed as impaired on the EPA's 303(d) List. Table 56 displays the 303(d) listed waterbodies, the reason for listing, and any possible impacts from the proposed OSV plan that may contribute to the reasons for their listing.

**Humbug Creek** is listed as a 303(d) Impaired Water Body by EPA due to copper, mercury, zinc, sedimentation and siltation. While the source of the copper, mercury and zinc contamination is unknown, it is generally felt to be generated by abandoned mines. There is no change under any of the alternatives to the number of abandoned mines that could contribute to this contamination. The water body is also listed for sedimentation and siltation.

**Kanaka Creek** is listed as a 303(d) Impaired Water Body by EPA due to arsenic. While the source of the arsenic contamination is unknown, it is generally felt to be due to the number of abandoned mines in the area and the type of rock formations. None of the alternatives change the number of abandoned mines nor alter the rock formations.

**Squaw Creek** is listed as a 303(d) Impaired Water Body by EPA due to sedimentation and siltation. Native surface roads and trails and their season of use can contribute to sedimentation and siltation. Virtually all of the native surface roads in this watershed are privately owned. None of the proposed plan alternatives would contribute additional sediment.

The **Truckee River** is listed as a 303(d) Impaired Water Body by EPA due to sedimentation and siltation. Native surface roads and trails and their season of use can contribute to sedimentation and siltation in this watershed. No additional sedimentation is expected from OSV use under any alternative.

## Alternative 1

### *Direct and Indirect Effects*

Incidental direct effects including ground disturbance in low-snow areas may occur under current use. Snowmobiles and other OSVs have low ground pressure. However, in some instances snowmobile tracks have the capacity to break through thinner snowpacks and churn soil, litter or trail surfaces in to the snow, and create isolated ruts in the soil or trail surface. Churned soil may get incorporated in runoff when snow melts. Much of the current OSV use occurs on groomed trails where the California Off-Highway Vehicle Motor Recreation plan (OHVMR) calls for 12 to 18 inches of snow cover before grooming can occur, with low possibility of contact with bare soil and practically no disturbance of trail and road surfaces.

For public OSV use on trails, currently there is no standard minimum snow depth to protect and mitigate effects of OSVs. However, ground disturbance leading to water quality impacts such as stream sedimentation in perennial, intermittent or ephemeral streams, in wetlands or other bodies of water have been observed although effects may have occurred in areas not monitored. It is likely that for current minimum snow levels, current uses have not resulted in more than incidental and isolated direct effects such as soil erosion of groomed trail surfaces, and therefore, have not created indirect water quality impacts to streams or waterbodies by increasing sediment in water runoff.

Alternative 1 does not call for a specified snow depth for public OSV cross-country travel. OSV use in off-trail open riding areas where there is minimal snow cover or bare patches of ground could result in direct effects including destruction of vegetation, soil compaction, and erosion in areas of repeated and concentrated use. However, with adequate snow depths, cross-country use of OSVs would have a negligible effect on ground disturbance that could lead to erosion and sedimentation in streams or other waterbodies, and likely would have a negligible effect on vegetation, especially along streams and other waterbodies. Monitoring has demonstrated that under current conditions, alternative 1, destruction of vegetation, soil compaction, and resulting erosion from OSV use have not occurred.

Under alternative 1, there likely has been and would continue to be incidental and isolated ground contact in areas where OSVs operating cross country would contact the ground surface due to variations in snow depths such as on high wind-exposed ridges, and southern-facing slopes. However, off-trail OSV use currently is generally dispersed and does not result in high concentration of ground disturbance from public OSV use on bare soil. As demonstrated by monitoring information, alternative 1 has not resulted in observed water quality impacts to streams or waterbodies from OSV activity-generated sediment reaching water runoff.

Cross-country OSV use can directly affect woody riparian species by trampling, including bending and breaking of branches by OSVs running over the branches. This could directly affect shade along streams by reducing vegetation cover. Direct effects to vegetation probably do occur under alternative 1 in isolated areas, but at this time, the effects from OSV use are limited. As a result, vegetation trampling from snowmobiles and impacts to riparian resources from OSV use would be considered negligible with adequate snowpack coverage, and no direct or indirect changes to vegetation would be expected from the no-action alternative. Riparian woody shrub species along streamcourses appear unaffected by direct physical trampling from snowmobiles on vegetation.

The direct effect of widespread snow compaction from cross-country OSV uses can create more dense snow that leads to an indirect effect of slower melt rate, and could, in turn, indirectly affect the hydrologic regime by delaying snowmelt rates. It is unknown how much OSV-related snow compaction would affect runoff rate and timing, but some studies suggest up to a 2-week delay. Because snow compaction from off-trail cross-country use is currently not extensive, measureable changes in hydrology on a watershed scale are not expected.

Direct and indirect effects from overall numbers of OSVs can be used to gage water quality effects. In 2009, 20,000 OSV user days per year were estimated to be using Tahoe National Forest trailheads and would have access to cross-country use areas. Use numbers have likely gone up a few percent since 2009. Public OSV users would be spread over 6 trailheads, so actual user numbers will be lower for a particular area. Studies on OSV impacts on water quality indicate that even at much higher use levels, there would be no adverse effects on water quality from OSV exhaust emissions (Assumption 5). The number of snowmobiles that entered Yellowstone in 2003 and 2004 was 47,799 and 22,423, respectively. At Yellowstone, OSVs were confined to a few trails and use levels were monitored of high numbers of OSVs using a single trailhead. Since the much higher Yellowstone OSV use levels studied had not resulted in impaired water quality, it follows that the OSV use in the project area for this alternative would not likely adversely affect water quality of snowmelt from OSV exhaust emissions.

Activities such as “water skipping” or trying to snowmobile across open water have been observed in some areas. These efforts are not always successful resulting in snowmobiles abandoned in lakes or other open water. This increases effects to water quality from lubricants leaking into surface water, which can also affect aquatic biota. Similarly, during spring break-up, snowmobiles will cross open streams and other waterbodies where snow cover is not present, which results in the deposition of pollutants directly in streamcourses and waterbodies.

Even though there is no specific snow depth standard, the effects of current operation of OSVs occurs over a protective layer of snow, and direct and indirect effects to hydrology are isolated and incidental. For existing minimum snow levels, the plan would not result in more than incidental soil erosion, and therefore, would not create water quality impacts to streams or waterbodies by introducing sediment in to water runoff. Therefore, with adequate snow depths current OSV use on trails is consistent with the Tahoe National Forest LRMP including Riparian Conservation Objectives and watershed management standards and guidelines and management prescriptions.

Currently, water quality effects from OSV exhaust stored in snowpack would be negligible and not exceed water quality standards. Therefore, as a result, current operation of public OSV use on system trails and cross-country is consistent with water quality objectives in the Tahoe National Forest LRMP including Riparian Conservation Objectives 1, 2, 4, 5, and 6 and watershed management standard and guidelines and management prescriptions.

The riparian conservation objectives apply to all routes that pass through RCAs and meadows. Under alternative 1, groomed and ungroomed OSV trails and cross-country travel would be allowed within RCAs, but because of the protective layer of snowpack protecting the ground surface, there is currently a very low resource damage potential. No restrictions on OSVs in riparian areas, lakes, or meadows are currently in place. No adverse impacts to these areas have been observed or monitored.

**RCOs 1 and 6**: Under alternative 1, beneficial uses of waterbodies would be protected and enhanced. There would be no changes in water storage, seasonal availability, and quality.

**RCOs 2, 4, and 5**: Under alternative 1, the geomorphic and biological characteristics of meadows, streams and RCAs would be protected. No sedimentation would likely result in no changes to aquatic primary productivity. Growing season water availability would remain unchanged and would not affect ecosystem integrity.

### *Cumulative Effects*

Past, present, and reasonably foreseeable projects in the project area are listed in appendix C, and include the Truckee River Tribuaries project which is designed to decrease sediment sources in the Truckee River Watershed. There are many past, on-going and reasonably foreseeable projects identified by the Tahoe National Forest that may be ground-disturbing and could add sediment or other pollutants to surface waters within the forest. The Forest Service utilizes best management practices in compliance with the Clean Water Act to minimize water quality impacts. The Tahoe National Forest monitors roads and trails used for OSVs and implements best management practices to control erosion and other effects.

The risks of cumulative effects from this alternative are very low because current snow depths appear to be adequate to protect the ground surface. There would continue to be only incidental ground disturbance, low risk of damage to vegetation, and other direct and indirect effects. As a result, there would be no change to cumulative watershed effects or equivalent roaded acres (ERA) calculations for any watersheds under this alternative. There would be negligible effects from exhaust emissions stored in snowpack. This alternative would not implement the recommended mitigations, and has the second highest amount of land area designated for OSV use. However, this alternative appears to have adequate snow cover to protect soils and water resources, and to protect vegetation in riparian areas. This alternative would not directly conflict with LRMP standards and guidelines, and would not result in irreversible or irretrievable effects to soil, water, or riparian resources.

## Alternative 2

### *Direct and Indirect Effects*

The effects of alternative 2 are similar to alternative 1, except for lower number of acres designated for OSVs, and the snow depth requirement for use of OSV trails. Forest monitoring data has shown that under alternative 1, with no minimum snow depth, there has been no observed impacts to aquatic systems. It follows then that with a higher snow depth standard under alternative 2 that there would continue to be negligible resource effects from trail use and cross-country OSV travel. Under this alternative, about 200,000 acres less forest lands are open to public OSV use. Because direct and indirect effects of this alternative are negligible, having less acreage designated for OSVs would not lead to an increase in direct or indirect effects on hydrology.

As in alternative 1, incidental direct effects including ground and vegetation disturbance in low-snow areas may occur under this alternative. One substantial difference in this alternative is the recommended minimum 6 inches snow depth required for the use on designated trails and a minimum 12 inches snow depth for cross-country use. This snow depth is recommended to be either a 6-inch or 12-inch minimum, but the snow depth requirement also requires there to be no resource damage. Resource damage created by OSVs would be primarily impacts to the trail surface or vegetation that could lead to water quality impacts. Because recommended minimum snow levels under alternative 2 are higher than alternative 1 on designated trails, there is a lower risk of ground disturbance and subsequent water quality impacts.

On designated trails with 6 inches of snow cover, snowmobile tracks have a capacity to break through a thinner snowpack and churn soil, litter or trail surfaces in to the snow, and create isolated ruts in the trail surface. Higher snow amounts may be required to reduce the potential for resource damage. Modern OSVs with deep lugs on their treads can easily displace 4 inches of snow each pass, depending on snow moisture amounts. Ruts could channel runoff from road or trail surfaces, leading to stream sedimentation. Churned soil may get incorporated in runoff when snow melts. Currently, there are no studies or monitoring information that can provide information on direct or indirect effects of the recommended 6 inches snow depth on trails proposed for this alternative. However, snowmobile user web forums usually suggest about 6 inches as a minimum snow amount needed before snowmobile use (http://www.snowmobileforum.com/general-sled-chat/25036-whats-minimum-amount-snow-you-should.html). Snowmobilers hesitate to operate machines on soil because it would damage machinery. The 6-inch snow depth may or may not be an adequate depth for hydrology resource protection because direct effects of operation of OSVs on 6 inches of snow on trails may lead to possible trail surface displacement and rutting, leading to a slight chance of sediment erosion from the trail surface. Further, this 6-inch snow depth may be sufficient for operation of a snowmobile, but other OSVs may need more depth to avoid ground disturbance. This alternative requires that snowpack should be sufficient to prevent resource damage. Monitoring of trail surfaces and vegetation and feedback to trail managers would be needed to ensure that resource damage is not occurring and that this standard is met.

For this alternative, as a result of a minimum 6-inch snow depth on trails there likely is a higher risk of causing direct trail impacts such as displacement of the trail surface compared to having a 12-inch minimum snow depth for trail uses. A 6-inch snow depth can become much thinner and may not offer effective protection for the ground surface after several passes by OSVs. Overall however, OSV use in alternative 2 would occur over a protective layer of snow designed to avoid resource damage, and direct and indirect effects to hydrology would likely be isolated and incidental. As a result, for proposed minimum snow levels, alternative 2 would likely not result in more than incidental soil erosion and therefore would not create indirect water quality impacts to streams or waterbodies by introducing sediment in to water runoff. With adequate snow depths, OSV use on trails is consistent with the Tahoe National Forest LRMP including Riparian Conservation Objectives and watershed management standards and guidelines and management prescriptions.

As in alternative 1, much of the OSV use under this alternative would occur on OHVMR groomed trails where the plan calls for 12 to 18 of snow cover before grooming can occur, negligible possibility of contact with bare soil, and practically no disturbance of trail and road surfaces. For OSV use on the groomed OSV trail system, the minimum snow depth standard snow coverage would be adequate to mitigate and eliminate substantial indirect water quality impacts such as stream sedimentation in perennial, intermittent or ephemeral streams, in wetlands or other bodies of water.

Because vehicles would be dispersed, a proposed recommended 12-inch minimum snow depth for cross-country use would not result in more than incidental and isolated direct effects such as ground contact and disturbance to vegetation. Again this standard would require avoidance of resource damage, and would require deeper snowpack if resource damage is occurring. It is not anticipated that indirect water quality impacts to streams or waterbodies by increasing sediment in water runoff would occur as a result of cross-country use of OSVs under this alternative. There would continue to be incidental and isolated ground contact in areas where OSVs operating cross country would contact the ground surface due to variations in snow depths such as on high wind-exposed ridges, and southern-facing slopes. Off-trail OSV use would be generally dispersed and would not result in a high concentration of ground disturbance from OSV use on bare soil. With adequate minimum snow levels, current conditions would result in no more than incidental surface disturbance and soil erosion, and therefore, would not create water quality impacts to streams or waterbodies by introducing sediment to water runoff.

Similar to alternative 1, cross-country OSV use could directly affect woody riparian species by trampling, including bending and breaking of branches by OSVs running over vegetation. This could directly affect shade along streams by reducing vegetation cover. Direct effects to vegetation probably would occur under alternative 2, but the effects would be limited by requiring adequate snow cover before allowing OSV use. As a result, vegetation trampling from snowmobiles and impacts to riparian resources from OSV use would be considered negligible with adequate snowpack coverage, and no direct or indirect changes to vegetation would be expected from this alternative. Riparian woody shrub species along stream courses would continue to be protected by the 12 inch snow cover no resource damage requirement by limiting the direct physical trampling effect from snowmobiles on vegetation.

The direct effect of widespread snow compaction from cross-country OSV uses under alternative 2 would create denser snow that could lead to an indirect effect of slower snowmelt rates, and could in turn indirectly affect the hydrologic regime by delaying snowmelt rates in localized areas. It is unknown how much OSV-related snow compaction would affect runoff rates and timing, and some studies suggest up to a 2-week delay in melting for heavily compacted snow such as on groomed OSV trails. It is not expected that snowmobile cross-country uses would heavily compact snow over large areas. Because the areal extent of snow compaction from off-trail cross-country use combined with compacted snow on groomed trails would not be extensive on a watershed scale, measureable changes in hydrology are not expected.

As described in the assumptions for this plan, water quality effects from OSV exhaust hydrocarbon emissions stored in snowpacks under alternative 2 would be negligible and would not be expected to exceed water quality standards.

Under alternative 2, operation of OSVs on system trails and cross-country is consistent with water quality objectives in the Tahoe National Forest LRMP including Riparian Conservation Objectives 1, 2, 4, 5, and 6 and watershed management standards and guidelines and management prescriptions.

The riparian conservation objectives apply to all routes that pass through RCAs and meadows. Under alternative 2, groomed and ungroomed OSV trails and cross-country travel would be allowed within RCAs, but because of the protective layer of snowpack protecting the ground surface, there is currently a negligible resource damage potential. No restrictions on OSVs in riparian areas, or meadows are currently in place. No adverse impacts to these areas have been observed or monitored.

**RCOs 1 and 6**: Under alternative 2, beneficial uses of waterbodies would be protected and enhanced. There would be no changes in water storage, seasonal availability, and quality.

**RCOs 2, 4, and 5**: Under alternative 2, the geomorphic and biological characteristics of meadows, streams and RCAs would be protected. No sedimentation would likely result in no changes to aquatic primary productivity. Growing season water availability would remain unchanged and would not affect ecosystem integrity.

### *Cumulative Effects*

The Tahoe National Forest utilizes best management practices in compliance with the Clean Water Act to minimize water quality impacts. Projects whose best management practices monitoring results are not effective are addressed and improved.

Because there is a low risk of direct and indirect effects, the risks of cumulative effects from this alternative are negligible. As a result of the 12-inch minimum snow depth/avoid resource damage standard for cross-country use and the 6-inch recommended minimum snow depth/avoid resource damage trail standard there would continue to be only incidental ground disturbance. As a result, there would be no change to equivalent roaded acres (ERA) calculations for any watersheds under this alternative, and no change in detrimental cumulative watershed effects. There would be negligible effects from exhaust emissions stored in snowpack, low risk of damage to vegetation, and other direct and indirect effects. This alternative would implement the recommended project design criteria, or mitigation measures. This alternative would have adequate snow cover to protect soils and water resources to prevent resource damage, and to protect vegetation in riparian areas. This alternative would not directly conflict with Forest Plan standards and guidelines, and would not result in irreversible or irretrievable effects to soil, water, or riparian resources.

## Alternative 3

### *Direct and Indirect Effects*

Alternative 3 will be compared to alternative 2 because alternative 2 has a minimum snow depth. This alternative would have about 131,000 acres less area designated for OSVs compared to alternative 2. The implementation of alternative 3 would have similar direct and indirect effects to alternative 2 in terms of effects to hydrology.

Because minimum snow depths are higher under alternative 3, there is more protection of ground surfaces during the OSV riding season, and during marginal snow depth conditions such as at the beginning and end of the riding season. As in alternative 2, incidental direct effects including ground disturbance in low-snow areas may occur under this alternative. However, for proposed minimum snow levels, alternative 3 would not result in more than incidental ground disturbance or vegetation trampling and would not be likely to create water quality impacts to streams or waterbodies by introducing sediment in to water runoff.

The riparian conservation objectives apply to all routes that pass through RCAs and meadows. Under alternative 3, groomed and ungroomed OSV trails and cross-country travel would be allowed within RCAs, but because of the protective layer of snowpack protecting the ground surface there is currently a negligible resource damage potential. No restrictions on public OSV operations in riparian areas, lakes or meadows are currently in place or are prescribed for this alternative. No adverse impacts to these areas have been observed or monitored.

**RCOs 1 and 6**: Under alternative 3, beneficial uses of waterbodies would be protected and enhanced. There would be no changes in water storage, seasonal availability, and quality.

**RCOs 2, 4, and 5:** Under alternative 3, the geomorphic and biological characteristics of meadows, streams and RCAs would be protected. No sedimentation would likely result in no changes to aquatic primary productivity. Growing season water availability would remain unchanged and would not affect ecosystem integrity.

### *Cumulative Effects*

The risks of cumulative effects from this alternative are negligible. As a result of the 18-inch minimum snow depth for cross-country use, there would continue to be only incidental ground disturbance. As a result, there would be no change to equivalent roaded acres (ERA) calculations for any watersheds under this alternative, and no change in detrimental cumulative watershed effects. There would be negligible effects from exhaust emissions stored in snowpack, low risk of damage to vegetation, and other direct and indirect effects. This alternative would implement the recommended project design criteria, or mitigation measures, and has the lowest amount of land area designated for OSVs. This alternative has adequate snow cover to protect soils and water resources, and to protect vegetation in riparian areas. This alternative would not directly conflict with Forest Plan standards and guidelines. This alternative would not result in irreversible or irretrievable effects to soil, water, or riparian resources.

## Alternative 4

### *Direct and Indirect Effects*

There would be the same number of acres open to OSVs under alternative 4 as in alternative 1. Alternative 4 would provide approximately the same protection for the ground surface as in alternative 2. The end result of implementation of alternative 4 would be similar to alternative 2 because snow levels prescribed in alternative 2 are similar, leading to low risks of direct or indirect effects to hydrology. Risks of resource damage created by OSVs would be primarily impacts to the trail surface or vegetation that could lead to water quality impacts.

Implementation of alternative 4 would have similar direct and indirect effects to alternative 2 in terms of effects to hydrology. However, minimum snow depths in alternative 2 are recommendations only, with a focus on avoiding resource damage. As a result, minimum snow depths under alternative 2 may in fact be deeper than the recommended minimum to protect resources and avoid damage. Alternative 4 differs from alternative 2 because alternative 2 minimum snow depths could be higher (or less) than alternative 4.

Alternative 4 for most conditions would provide protection of ground surfaces, with about the same risk for ground disturbance as in alternative 2. Like alternative 2, alternative 4 provides a minimum snowpack standard compared to current conditions that will likely functionally avoid direct or indirect effects and resource damage from public OSV use. As a result of implementation, direct and indirect effects of this alternative on hydrology in areas designated for OSV use s would be negligible. As in alternative 2, incidental direct effects including ground disturbance in low-snow areas may occur under this alternative. However, for proposed minimum snow levels, alternative 4 would likely not result in more than incidental ground disturbance or vegetation trampling and would not likely to create water quality impacts to streams or waterbodies by introducing sediment to water runoff.

The riparian conservation objectives apply to all routes that pass through RCAs and meadows. Under alternative 4, groomed and ungroomed OSV trails and cross-country travel would be allowed within RCAs, but because of the protective layer of snowpack protecting the ground surface, there is currently a very low resource damage potential. No restrictions on OSVs in riparian areas, or meadows are currently in place. No adverse impacts to these areas have been observed or monitored.

**RCOs 1 and 6**: Under alternative 4, beneficial uses of waterbodies would be protected and enhanced. There would be no changes in water storage, seasonal availability, and quality.

**RCOs 2, 4, and 5**: Under alternative 4, the geomorphic and biological characteristics of meadows, streams and RCAs would be protected. No sedimentation would likely result in no changes to aquatic primary productivity. Growing season water availability would remain unchanged and would not affect ecosystem integrity.

### *Cumulative Effects*

The risks of cumulative effects from this alternative are negligible. As a result of the 12-inch minimum snow depth for cross-country use there would continue to be only incidental ground disturbance. As a result, there would be no change to equivalent roaded acres (ERA) calculations for watersheds under this alternative, and no change in detrimental cumulative watershed effects. There would be negligible effects from exhaust emissions stored in snowpack, low risk of damage to vegetation, and other direct and indirect effects. This alternative would implement the recommended project design criteria, or mitigation measures, and has nearly the highest amount of land area open to OSVs. This alternative has adequate snow cover to protect soils and water resources, and to protect vegetation in riparian areas.

This alternative would not directly conflict with Forest Plan standards and guidelines. This alternative would not result in irreversible or irretrievable effects to soil, water, or riparian resources.

## Alternative 5

### *Direct and Indirect Effects*

Implementation of alternative 5 would have effects similar to alternative 2 in terms of overall effects and risks to hydrology. However, alternative 5 would provide more protection than alternative 2 for ground surfaces and vegetation, especially in situations where snow depth conditions in alternative 2 are near the minimum depths prescribed for that alternative. The end result of implementation of alternative 5 is there would be low risks of direct or indirect effects to hydrology. Resource damage created by OSVs where they occur would be primarily impacts to the trail surface or vegetation that could lead to water quality impacts.

Alternative 5 would provide higher levels of protection for the ground surface compared to alternative 2. The end result of implementation of alternative 5 would lead to low risks of direct or indirect effects to hydrology.

The direct and indirect effects of alternative 5 would be lower than alternative 2. However, like alternative 2, alternative 5 provides a minimum snowpack standard compared to current conditions that would likely avoid direct or indirect effects and resource damage from OSV use. As a result of implementation of this alternative, direct and indirect effects on hydrology in areas designated for OSV use would be negligible. As in alternative 2, incidental direct effects including ground disturbance in low-snow areas may occur under this alternative. However, for proposed minimum snow levels, and decreased area of OSV use, alternative 5 would likely not result in more than incidental ground disturbance or vegetation trampling and would not likely to create water quality impacts to streams or waterbodies by introducing sediment in to water runoff.

The riparian conservation objectives apply to all routes that pass through RCAs and meadows. Under alternative 5, groomed and ungroomed OSV trails and cross-country travel would be allowed within RCAs, but because of the protective layer of snowpack protecting the ground surface, there is currently a very low resource damage potential. No restrictions on OSVs in riparian areas, or meadows are currently in place. No adverse impacts to these areas have been observed or monitored.

**RCOs 1 and 6**: Under alternative 5, beneficial uses of waterbodies would be protected and enhanced. There would be no changes in water storage, seasonal availability, and quality.

**RCOs 2, 4, and 5**: Under alternative 5, the geomorphic and biological characteristics of meadows, streams and RCAs would be protected. No sedimentation would likely result in no changes to aquatic primary productivity. Growing season water availability would remain unchanged and would not affect ecosystem integrity.

### *Cumulative Effects*

The risks of cumulative effects from this alternative are negligible. As a result of the 24-inch minimum snow depth for cross-country use, there would continue to be only incidental ground disturbance. As a result, there would be no change to equivalent roaded acres (ERA) calculations for watersheds under this alternative, and no change in detrimental cumulative watershed effects. There would be negligible effects from exhaust emissions stored in snowpack, low risk of damage to vegetation, and other direct and indirect effects. This alternative has adequate snow cover to protect soils and water resources, and to protect vegetation in riparian areas. This alternative would not directly conflict with Forest Plan standards and guidelines. This alternative would not result in irreversible or irretrievable effects to soil, water, or riparian resources.

## Conclusions

**Alternative 1 appears to protect water resources, but with the lowest level of protection:**
OSV use on trails and cross-country has been observed to be adequate to mitigate and eliminate substantial water quality impacts such as stream sedimentation in perennial, intermittent or ephemeral streams, in wetlands or other bodies of water. This alternative would have a negligible impact on water quality as a result of hydrocarbon emissions from OSVs. Alternative 1 would be consistent with the Clean Water Act and Porter Cologne Water Act as water quality would not be impaired and beneficial uses would be protected.

There would be no watersheds with a risk of cumulative watershed effects as result of this alternative, and would be consistent with all of the applicable RCOs in the 2004 Sierra Nevada Forest Plan Amendment. Beneficial uses of water would be protected.

**Alternatives 2 and 4 would protect water resources:**
The 6-inch minimum on trails and 12-inch cross-country snow depth standard is adequate to mitigate and eliminate substantial water quality impacts such as stream sedimentation in perennial, intermittent or ephemeral streams, in wetlands or other bodies of water. However, consistent and timely monitoring is needed as a mitigation to ensure that damage to trails would not occur. These alternatives would have a negligible impact on water quality as a result of hydrocarbon emissions from OSVs. Beneficial uses of waterbodies would be protected under these alternatives, as only 6 inches of snow would be required for use of designated OSV trails. As a result, alternatives 2 and 4 would be consistent with the Clean Water Act and Porter Cologne Water Act, as water quality and beneficial uses would be protected. There would be no watersheds with a risk of cumulative watershed effects as result of these alternatives, and it would be consistent with applicable RCOs in the 2004 Sierra Nevada Forest Plan Amendment.

**Alternatives 3 and 5 would best protect water resources:**

The 18-inch-minimum snow depth on trails and cross-country is adequate to mitigate and eliminate substantial water quality impacts such as stream sedimentation in perennial, intermittent or ephemeral streams, in wetlands or other bodies of water. However, consistent and timely monitoring is recommended as a mitigation to ensure that damage to trails is not occurring. These alternatives would have a negligible impact on water quality as a result of hydrocarbon emissions from OSVs. Beneficial uses of waterbodies are protected under these alternatives, as 18 inches or more of snow would be required for use of designated OSV trails. As a result, alternatives 2 and 4 would be consistent with the Clean Water Act and Porter Cologne Water Act, as water quality and beneficial uses would be protected. There would be no watersheds with a risk of cumulative watershed effects as result of these alternatives, and it would be consistent with applicable RCOs in the 2004 Sierra Nevada Forest Plan Amendment.

### *Riparian Conservation Objectives Analysis*

The Sierra Nevada Forest Plan Amendment (SNFPA FSEIS ROD) requires that RCO analysis be conducted during environmental analysis for new proposed management activities within CAR‘s and RCA‘s (Standard and Guideline #92). Consistency with the RCOs is an indicator to ensure that goals of the Aquatic Management Strategy are met (USDA FS PSW Region 2004: 32). For this plan allowing use of over-snow vehicles when the ground is covered with a protective layer of snow would have a negligible effect on RCAs because direct and indirect effects would be negligible, and OSV use would result in negligible effects to RCAs. Hydrocarbon pollution derived from OSVs and grooming equipment would have a negligible effect on water quality under this plan.

The above determinations are based on Standard and Guideline #92, which states “Evaluate new proposed management activities within CARs and RCAs during environmental analysis to determine consistency with the riparian conservation objectives at the project level and the AMS goals for the landscape.” Consequently, consistency with the RCOs is an indicator to ensure that goals of the Aquatic Management Strategy are met (USDA FS PSW Regulation 2004: 32).

**Table 57. Riparian conservation areas (RCAs) adjacent to aquatic features as designated by the Sierra Nevada Forest Plan Amendment Record of Decision (SNFP ROD 2004)**

| Aquatic feature | Riparian Conservation Area |
|---|---|
| Perennial stream. | 300 feet on each side of the stream, measured from the bank full edge of the stream. |
| Seasonally flowing streams. | 150 feet on each side of the stream, measured from the bank full edge of the stream. |
| Special aquatic features (includes lakes, wet meadows, bogs, fens, wetlands, vernal pools, and springs). | 300 feet from the edge of the features or riparian vegetation, whichever width is greater. |
| Perennial streams with riparian conditions extending more than 150 feet from the edge of the stream bank or seasonally flow streams extending more than 50 feet from the edge of the stream bank. | 300 feet from the edge of the features or riparian vegetation, whichever width is greater. |
| Streams in inner gorge. | Top of inner gorge. (The inner gorge is defined by stream adjacent slopes greater than 70 percent gradient.) |

### Indicator: Consistency with Riparian Conservation Objectives 1, 2, 4 and 5 (Alternative 1)

The riparian conservation objectives apply to all OSV routes and cross-country use that passes through RCAs and meadows. Cross-country OSV routes would traverse meadows and streams with no restriction, and OSV trails in some areas are located in RCAs.

**RCO 1**: Under alternative 1, beneficial uses of waterbodies are protected. OSV uses do not impact beneficial uses of waterbodies, especially municipal watersheds. Beneficial uses within the major hydrologic areas, units, or creeks on the Tahoe National Forest, designated by the State Central Valley and Lahontan Regional Water Quality Control Boards, have been identified in table 58. OSV uses do not impact CWA 303 (d) waterbodies.

**RCO 2**: Under alternative 1, the geomorphic and biological characteristics of meadows, perennial streams and RCAs are protected under this plan. Under this RCO the goal is to maintain or restore: (1) the geomorphic and biological characteristics of special aquatic features, including lakes, meadows, bogs, fens, wetlands, vernal pools, springs; (2) streams, including in stream flows; and (3) hydrologic connectivity both within and between watersheds to provide for the habitat needs of aquatic-dependent species. For this plan, criteria for establishing consistency are that OSV use would not cause accelerated erosion, such as head-cutting or the formation of gullies in meadows or spring ecosystems. Current OSV use does not lower water tables of meadows, does not alter the movement of surface water in meadows. OSV use does not de-water spring ecosystems, does not capture streams and divert them down roads, and OSV use does not disturb shorelines of natural and man-made lakes and ponds.

**RCO 4**: Under alternative 1, management activities within RCAs would enhance or maintain physical and biological characteristics associated with aquatic- and riparian-dependent species. For this plan, criteria for establishing consistency are that OSV use does not degrade the water quality of hydrologically connected systems, and that OSV use does not modify channel morphology of streams.

**RCO 5**: Under alternative 1, efforts would be made to preserve, restore, or enhance special aquatic features, such as meadows, lakes, ponds, bogs, fens, and wetlands, to provide the ecological conditions and processes needed to recover or enhance the viability of species that rely on these areas

### Indicator: Consistency with Riparian Conservation Objectives 1, 2, 4 and 5 (Alternatives 2, 3, 4, and 5)

The riparian conservation objectives apply to all routes that pass through RCAs and meadows. Cross-country OSV routes would traverse meadows and streams with no restriction. Snow cover would protect these resources, and OSV trails in some areas would be located in RCAs.

**RCO 1**: Under alternatives 2, 3, 4, and 5, beneficial uses of waterbodies would be protected. OSV uses would not impact beneficial uses of waterbodies, especially municipal watersheds. These alternatives would comply with the Clean Water Act. Beneficial uses within the major hydrologic areas, units, or creeks on the Tahoe National Forest, designated by the State Lahontan Regional Water Quality Control Board and Central Valley Regional Water Quality Control Board, have been identified in table 58. OSV uses do not impact CWA 303 (d) waterbodies.

**RCO 2**: Under alternatives 2, 3, 4, and 5, the geomorphic and biological characteristics of meadows, perennial streams and RCAs would be protected under this plan. Under this RCO, the goal is to maintain or restore: (1) the geomorphic and biological characteristics of special aquatic features, including lakes, meadows, bogs, fens, wetlands, vernal pools, springs; (2) streams, including in stream flows; and (3) hydrologic connectivity both within and between watersheds to provide for the habitat needs of aquatic-dependent species. For this plan, criteria for establishing consistency are that OSV use would not cause accelerated erosion, such as head-cutting or the formation of gullies in meadows or spring ecosystems. Current OSV use does not lower water tables of meadows, does not alter the movement of surface water in meadows. OSV use does not de-water spring ecosystems, does not capture streams and divert them down roads, and OSV use does not disturb shorelines of natural and human-made lakes and ponds.

**RCO 4**: Under alternatives 2, 3, 4, and 5, management activities within RCAs would enhance or maintain physical and biological characteristics associated with aquatic- and riparian-dependent species. For this plan, criteria for establishing consistency are that OSV use does not degrade the water quality of hydrologically connected systems, and that OSV use does not modify channel morphology of streams.

**RCO 5**: Under alternatives 2, 3, 4, and 5, efforts would be made to preserve, restore, or enhance special aquatic features, such as meadows, lakes, ponds, bogs, fens, and wetlands, to provide the ecological conditions and processes needed to recover or enhance the viability of species that rely on these areas.

**Table 58. Compliance with beneficial uses of water on the Tahoe National Forest**

| Hydrologic Unit/Watershed | State HUC no. | Municipal and Domestic Supply | Agricultural Supply | Industrial Process Supply | Industrial Service Supply | Ground Water Recharge | Freshwater Replenishment | Navigation | Hydropower Generation | Water Contact Recreation | Non-contact Water Recreation | Commercial and Sport Fishing | Aquaculture | Warm Freshwater Habitat | Cold Freshwater Habitat | Inland Saline Water Habitat | Wildlife Habitat | Spawning, Reproduction and Development | Water Quality Enhancement | Flood Peak Attenuation/Flood Water Storage | Preservation of Biological Habitats of Special Significance | Migration of Aquatic Organisms | Rare, threatened and Endangered Species |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Truckee River | 635.20 | x | x | | x | x | x | x | | x | x | x | | | x | | x | x | x | x | | x | x |
| [1]Humbug Creek | 517 | x | x | | | x | x | | x | x | x | | | | x | | x | x | | | | | |
| [1]Kanaka Creek | 517 | x | x | | | x | x | | x | x | x | x | | | x | | x | x | | | | | |
| Donner Lake | 635.20 | x | x | | | | | | x | x | x | x | | | x | | x | x | | | | | |
| Stampede Res. | 635.20 | x | x | | | | | | x | x | x | | | | x | | x | x | | | | | |
| Squaw Creek | 635.20 | x | x | | | | x | | | x | x | x | | | x | | x | x | | | | x | x |

[1] Cal LRWQCB EPA 1995

**Table 59. Water quality standards of concern for OSVs**

| Category | Standard | Beneficial Uses Potentially Affected |
|---|---|---|
| Floating Material | Water shall not contain floating material in amounts that cause nuisance or adversely affect beneficial uses. | Domestic or municipal<br>Contact Recreation<br>Non-contact<br>Recreation Power |
| Oil and Grease | Waters shall not contain oils, greases, waxes, or other materials that causes nuisance, a visible film or coating on the surface or on objects in water, or otherwise adversely affect beneficial uses. | All |
| Total Dissolved Solids | Shall not exceed 125 mg/l (90 percentile). | Domestic or municipal<br>Contact Recreation<br>Aquatic organisms |
| Sediment | The suspended sediment load and discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses. | All |
| Settleable Materials | Waters shall not contain substances in concentrations that result in the deposition of material that causes nuisance or adversely affects beneficial uses. | Domestic or municipal<br>Power<br>Aquatic organisms |
| Suspended Material | Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses. | All |
| Turbidity | Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases in turbidity shall not exceed the following Nephelometric Turbidity Units (NTU)s:<br><br>**For natural turbidity between: Increases shall not exceed**<br>0 and 5 NTUs — 1 NTU<br>5 and 50 NTUs — 20 percent<br>50 and 100 NTUs — 10 NTUs<br>Greater than 100 NTUs — 10 percent. | All |

### Compliance with Relevant Laws, Regulations, Policies and Plans

This project is consistent with the Tahoe National Forest LRMP, which provides standards and guidelines for water-related concerns. The 2004 Sierra Nevada Forest Plan Amendment modified the forest plan guidance.

All alternatives would be consistent with the Clean Water Act and Porter Cologne Water Act as water quality and beneficial uses would be protected. Alternatives would be consistent with all applicable RCOs in the Sierra Nevada Forest Plan Amendment once mitigation measures have been implemented. Beneficial uses of waterbodies and water quality are protected for all alternatives. Physical and biological properties of RCAs would be protected for all alternatives.

All alternatives are consistent with the 2004 Sierra Nevada Forest Plan Amendment. The riparian conservation objectives apply to all routes that pass through RCAs and meadows. Under all alternatives, groomed and un-groomed OSV trails and cross-country travel would be allowed within RCAs, but because of the protective layer of snowpack protecting the ground surface, there is currently a very low resource damage potential. No restrictions on OSVs in riparian areas, on frozen lakes or meadows are currently in place. No adverse impacts to these areas have been observed or monitored.

**RCOs 1 and 6**: Under all alternatives, beneficial uses of waterbodies would be protected and enhanced. There would be no changes in water storage, seasonal availability, and quality.

**RCOs 2, 4, and 5**: Under all alternatives, the geomorphic and biological characteristics of meadows, streams and RCAs would be protected. No sedimentation would likely result in no changes to aquatic primary productivity. Growing season water availability would remain unchanged and would not affect ecosystem integrity.

This project would comply with the Clean Water Act as enforced through the Porter-Cologne Water-Quality Act for the State of California.

### Short-term Uses and Long-term Productivity

There would be no impacts from short-term uses and long term productivity on hydrologic resources.

### Unavoidable Adverse Effects

There would be no unavoidable adverse effects from the effects of any alternative.

### Irreversible and Irretrievable Commitments of Resources

There would be no irreversible or irretrievable commitment of resources for any alternatives.

# Soils

## Relevant Laws, Regulations, and Policy

### Regulatory Framework

#### *Land and Resource Management Plan*

The Tahoe National Forest LRMP provides standards and guidelines for activities on the forest including OSV management.

- LRMP Standards and Guidelines pertinent to OSV management (USDA Forest Service 1990: Chapter 4):
    - Maintain or improve long term soil productivity on at least 85 percent of an activity area. Soil productivity includes three soil characteristics including soil porosity, soil cover and soil organic matter.
        - Soil Porosity: The soil is considered to be in an acceptable condition when compaction or puddling reduce total soil porosity by no more than 10 percent as compared to the undisturbed soil.
        - Soil Cover: The soil is considered to be in acceptable condition after a land-disturbing activity when the effective soil cover on an activity area is (1) the minimum amount shown in the following table, or (2) the minimum amount prescribed for a specific site by a qualified earth science specialist after an on-site investigation. The minimum effective soil cover prescribed for a specific site will vary from the values shown in the table due to local differences in slope, micro relief, surface rock fragments, detachability, and other factors that vary within soil types.

Minimum effective soil cover (percent) by slope group and soil group (LRMP Page V.37)

| Slope (%) | < 35 | 35 to 50 | >50 |
|---|---|---|---|
| Soil Group A | 70 | 80 | 90 |
| Soil Group B | 50 | 60 | 75 |
| Soil Group C | 40 | 50 | 65 |
| Soil Group D | 30 | 40 | 55 |

- Soil Group A: These soils are highly erodible, have developed from granitic parent material, have a short timber rotation length, and are at lower elevations on the west side of the Forest. Included are the Hoda. Holland, Hotaw, and Musick series.
- Soil Group B: These soils have developed from a variety of parent materials. These soils erodibility, geographic location, and climate varies, and they have short to moderate timber rotation lengths. Included are the Alken, Boomer, Boomer Variant, Chalx, Cohasset, Delieker, Dubakella, Euer, Euer Variant, Forbes, Fugawee, Horseshoe. Hotaw Variant, Huysink, Jocal, JocalVariant, Jorge, Kinkel Variant, Lorack Variant, Mariposa. McCarthy. Ponto Variant, Putt, Sattley, Slerraville, Sltes, and Trojan series.
- Soil Group C: These soils have developed from a variety of parent materials. The erodibility, geographic location, and climate varies across these soil types, and they have moderate to long timber rotation lengths. Included are the Aspen Variant, Bucking Variant, Chaix Variant. Crozier, Haypress, Hurlbut, Jorge Variant Kyburz, Ledford, Ledford Variant, Neer, Smokey. Tahoma Variant, Tallac, Tinker, and Zeibright series.
- Soil Group D: These soils occur primarily in the true fir zone, have low erodibilities and have long timber rotations. Included are the Ahart, Bucking, Ceiio Variant, Lorack, Smokey Variant, Tahoma, Umpa, Waca, and Windy series.
    - Soil Organic Matter:
        - Maintain an average of 5 logs per acre

- Maintain forest duff over 80 percent of an activity area

## Regional Direction

### *Pacific Southwest Region Soil Management Handbook Supplement (Pacific Southwest Region FSH Supplement No. 2509.18-95-1)*

This supplement establishes regional soil quality analysis standards. The analysis standards address three basic elements for the soil resource: (1) soil productivity (including soil loss, porosity and organic matter), (2) soil hydrologic function, and (3) soil buffering capacity. The analysis standards are to be used for areas growing vegetation. They are not applied to lands with other dedicated uses, such as developed campgrounds, administrative facilities, or in this case, the actual land surface of routes authorized for travel by OSVs. This standard does apply to cross-country OSV travel.

## Federal Law

### *National Forest Roads and Trails Act of 1964 (78 Stat. 1089; 16 U.S.C. 532-538)*

Section 1 of the National Forest Roads and Trails Act states “Congress hereby finds and declares that the construction and maintenance of an adequate system of roads and trails within and near the national forests and other lands administered by the Forest Service is essential.” This system of roads is needed “to provide for intensive use, protection, development, and management of these lands under principles of multiple use and sustained yield of products and services.” (16 U.S.C. 532)

Section 2 of this act states, “The Secretary is authorized, under such regulations as he may prescribe, subject to provisions of this Act, to grant permanent or temporary easements for specified periods or otherwise for road rights-of-way (1) over national forest lands administered by the Forest Service.” (16 U.S.C. 533)

Implicit in this legal direction is Forest Service authority to withdraw lands from vegetation production and related soil productivity on the national forest for dedication to road and trail corridors for transportation and access uses.

### *National Environmental Policy Act of 1969*

This report was developed using the principal elements from the National Environmental Policy Act (NEPA) of 1969 and the regulations for implementing the procedural provisions of the NEPA from the Council on Environmental Quality (40 CFR Parts 1500-1508) and Regulation 36 CFR Part 220.

### *National Forest Management Act of 1976 (90 Stat. 2949; 16 U.S.C. 1608)*

Section 8(b) of the National Forest Management Act states, “any road constructed on land of the National Forest System in connection with a timber contract or other lease shall be designed with the goal of reestablishing vegetation cover on the roadway and areas where vegetation cover has been disturbed by the construction of the road, within ten years after the termination of the contract, permit, or lease.” This section of the act further states, “Such action shall be taken unless it is determined that the road is needed for use as a part of the National Forest Transportation System.”

This legal direction states that lands no longer needed for, and dedicated to, transportation or access uses should be returned to a vegetated state. Implicit in this legal direction is Forest Service responsibility to recover soil productivity on these lands, to the extent that vegetation can be re-established. Type and degree of soil recovery necessary for re-establishment of vegetation would depend on site-specific conditions and land management objectives for that area.

Section 8(c) of this act states "Roads constructed on National Forest System lands shall be designed to standards appropriate for the intended uses, considering safety, cost of transportation, and impacts on land resources."

## Resource Indicators and Measures

Resource indicators and measures shown in table 19 will be used to measure and disclose effects to soils related to OSV use designations and grooming trails for OSV use.

**Table 60. Resource indicators and measures used to determine impacts on soil resources**

| Resource Element | Resource Indicator | Measure (Quantify if possible) |
|---|---|---|
| **Soil Productivity and Soil Stability** | OSV use on sensitive soils to include include wet meadows, areas with low stability or erosion hazards. | Acres of cross-country travel open to OSV use on sensitive soils |
| **Soil Stability** | Minimum snow depths on trails designated for public OSV use | Depth of snow (inches) |
| **Soil Productivity** | Minimum snow depths in areas designated for cross-country OSV use | Depth of snow (inches) |

## Methodology

The soil resources were analyzed within the project area using GIS data, soils survey data, corporate soils data layers including the geology and geomorphology layers for the Tahoe National Forest, a variety of reports and assessments of OSV impacts, and professional experience and judgement using scientific literature on OSV impacts. To determine where sensitive soils might be located on the forest, the soils data and other corporate GIS layers were used to determine where wet meadow soils, soils with low stability, and soils with erosion potential might be located.

## Spatial and Temporal Context for Effects Analysis

### Direct/Indirect and Cumulative Effects Boundaries

The spatial boundaries for analyzing the direct, indirect, and cumulative effects to the soil resource are the area of land managed by the Tahoe National Forest.

The short-term temporal boundary for analyzing the direct, indirect, and cumulative effects to the soil resource is 1 year; the long-term temporal boundary is 10 years because climate changes, unforeseeable future projects, and other factors make assumptions beyond this timeframe speculative.

## Affected Environment

### Existing Condition

The Tahoe National Forest has diverse vegetation because of its wide ranges in precipitation and elevation. In the upper elevations between 3,500 and 6,000 feet on the western slopes of the Sierra Nevada Mountains, mixed conifer stands dominate. On the lower elevation areas and on south-facing slopes, ponderosa pine are most commonly found. California black oak, madrone and tanoak are hardwood species that are commonly found within the mixed conifer stands within the forest. Jeffrey pine is commonly found in association with the serpentine ultra-mafic soil types on the forest.

### *Soils and Geology*

The western third of the Tahoe National Forest contains deep canyons separated by nearly level to sloping, broad ridgetops. Soils on the steep canyon side slopes have developed mainly from metasedimentary and ultrabasic (ultramafic) bedrock; soils on the ridgetops have developed primarily from andesitic tuff breccia mudflows of the Meherten Formation (approximately 168,232 acres or 20 percent of the forest). Soils in the vicinity of Bullards Bar Reservoir have developed mainly from granitic bedrock. The western third of the forest contains the most productive soils. Soils in the east third of the forest occur on gentle to steep slopes and in broad valleys. These soils have developed from rhyolitic and granitic bedrock and from alluvial deposits. Low precipitation is a major limitation to productivity in this area. Soils at higher elevations (5,500 to 9,500 feet) along the crest of the Sierra have developed from volcanic, metasedimentary, and granitic rocks, and from glacial-alluvial deposits. Steep slopes and shallow, rocky soils limit productivity in much of this central third of the forest.

Elevations throughout the forest range from 2,500 to 8,700 feet. The western and southern sections are composed of gentle to steep slopes; the northern and eastern sections have larger swaths of gently sloping and flatter stretches of land. The higher elevation portions of the forest were glaciated in the last ice age.

#### Soil Productivity

Soil organic matter and soil porosity are two indicators of soil productivity. The importance of soil organic matter cannot be overstated (Jurgensen et al. 1997). This organic component contains a large reserve of nutrients and carbon, and it is dynamically alive with microbial activity. The character of forest soil organic matter influences many critical ecosystem processes, such as the formation of soil structure, which in turn influences soil gas exchange, soil water infiltration rates, and soil water-holding capacity. Soil organic matter is also the primary location of nutrient recycling and humus formation, which enhances soil cation exchange capacity and overall fertility. Organic matter including the forest floor and large woody material are essential for maintaining ecosystem function by supporting moderate soil temperatures, improved water availability and bio-diversity (Page-Dumroese et al. 2010).

Soil porosity refers to the amount and character of void space within the soil. In a “typical” soil, approximately 50 percent of the soil volume is void space. Pore space is lost primarily through mechanical compaction. Three fundamental processes are negatively impacted by compromised soil pore space:

- Gas exchange;
- Soil water infiltration rates; and
- Water-holding capacity.

#### Gas Exchange

Soil oxygen is fundamental to all soil biologic activity. Roots, soil fauna, and fungi all respire, using oxygen while releasing carbon dioxide. When gas exchange is compromised, biologic activity is also compromised. Maintaining appropriate soil biologic activity is paramount when considering long-term forest vitality.

#### Soil Water Infiltration Rates

Severely compacted soils do not allow appropriate water infiltration, leading to overland flow and associated erosion, sediment delivery, spring flooding, and low summer flows. Activities on moist soils are especially damaging. Activities on dry or frozen soils maintains much more of a soil's natural ability to quickly restore pore spaces.

Soil productivity within the Tahoe National Forest could be most affected by OSV use within sensitive soil types including wet meadow areas and soils that are prone to erosion. Wet meadows are located on less than one percent of the Tahoe National Forest (approximately 2,487 acres). Maintaining a minimum snow depth to not disturb the organic matter at the soil surface or compact the soil and reduce soil porosity are essential to reducing the effects of OSV use on the soil resource in these sensitive areas.

#### *Soil Stability*

Shallow debris slides are the most common and most destructive type of landslide found on the Tahoe National Forest, but deeper mass movements, road cut failures, stream channel instability, and rockfalls also occur. Land instability is not extensive on the forest. Most instability features are found in the steep canyons and inner gorges in the lower elevations of the western part of the forest. Preliminary landslide hazard work shows a higher rate of occurrence of land sliding in various contact zones beneath the Meherten Formation (volcanic mudflows, 168,232 acres or approximately 22 percent of the forest), more often on north-facing slopes where springs occur. Other potentially unstable areas on the forest include scree and talus deposits (1,691 acres). Generally, the instability and slumping only occurs when soils are excavated deeper than 2 feet. Most of the remaining portions of the forest have low-relief volcanic topography where the stability hazard is low. Old landslides are present within the project area on less than 1 percent of the forest (2,314 acres). None of the actual proposed snowmobile trails (groomed or ungroomed) occur on any mapped landslide deposits.

Approximately 285,134 acres (approximately 34 percent of the area) across the forest have a very severe erosion hazard rating when the soils have no vegetation present.

Existing roads could also have soil erosion (Cacek 1989). The dominant processes in roaded areas are surface erosion from bare soil areas of roads, including the cutslope, fillslope, and travelway. Snow cover on roads is an important component in reducing risks of erosion from roads due to OSV use.

## Environmental Consequences

### Alternative 1

#### *Direct and Indirect Effects*

**Soil Productivity**

Incidental direct effects of OSV use on and off trails could include compaction, rutting, and disturbance of the forest floor and organic matter within the soil in low-snow areas. Although snowmobiles generally have low ground pressure, the tracks on snowmobiles could churn soil and cause compaction with repeated travel over areas with low-snow conditions (Baker and Buthmann 2005; Gage and Cooper 2009). This type of incidental contact with the soil surface or low-snow conditions would likely occur during the fall or spring season, would more likely be found on ridges that are windy and exposed or on south-facing slopes, and would be very limited. Repeated compaction of snow can also alter soil temperatures potentially changing or reducing microbial activity, but some research has shown that with repeated compaction, soil temperatures were not affected (Gage and Cooper 2009; Keller et al. 2004).

Currently, grooming generally occurs when there is 12 to 18 inches of snow on trails, meaning that there is little to no chance that soil will be exposed on groomed OSV trails.

Soils within the Tahoe National Forest that may be most prone to compaction and rutting include the soils located within the wet meadows. These soils tend to have more soil moisture for longer periods throughout the year with finer soil textures. Monitoring of wet meadow areas is recommended to ensure that OSV use is not occurring without adequate snow levels to protect these sensitive soil types that cover less than 1 percent of the forest.

Moderate snowpack levels have been shown to minimize the potential compaction from OSV use (Gage and Cooper 2009). With adequate snow depth, on-trail and off-trail OSV use would have minimal to no impact on the soil resource and would not likely lead to any loss of soil productivity. Because there is no minimum snow depth, loss of soil productivity is likely to occur in areas where the snow depth is less than 12 inches and cross-country OSV travel is occurring.

## Soil Stability

With adequate snow depths, cross-country OSV use is unlikely to affect soil stability. There are approximately 127,627 acres with landslide potential that are designated for OSV use. Landslides within the Tahoe National Forest are generally caused by excavating soil to a depth greater than 2 feet. OSV use on these soils would not lead to excavated soils and would likely be widely spread out throughout the forest versus concentrated on landslide-prone areas. Even with concentrated use on sites where landslide potential is high, OSV use would not likely cause landslides.

Cross-country use of OSVs could have an effect on ground disturbance that could lead to erosion, especially on soils derived from granitic or rhyolitic parent materials where OSV use is allowed (61,388 acres). Depending on site-specific factors including slope, aspect, elevation, level of use, and weather conditions, trails and off-trail riding on steep slopes could contribute to erosion (Baker and Buthmann 2005, Olliff et al. 1999). Adequate snowpack would likely mitigate erosion on these sites, but with no minimum snow depth required under the current management, risk of erosion is increased if OSV use occurs on bare soil or in areas with less than 12 inches of snow. Generally, OSV operators avoid traveling over bare soil because it can damage their machines.

### *Trail Grooming*

Trail grooming occurs over a National Forest System road or trail. Adequate snowpack is present on the trail prior to grooming and grooming is not likely to cause impacts to the soil resource on trails or roads.

**Table 61. Resource indicators and measures for alternative 1**

| Resource Element | Resource Indicator (Quantify if possible) | Measure (Quantify if possible) | (Alternative 1) |
|---|---|---|---|
| Soil Productivity and Soil Stability | OSV use on sensitive soils including wet meadows, areas with low stability or erosion hazards. | Acres of cross-country travel open to OSV use on sensitive soils | 190,169 |
| Soil Stability | Minimum snow depths on trails | Inches of snow | 0 |
| Soil Productivity | Minimum snow depths for cross-country travel | Inches of snow | 0 |

## Alternatives 2, 3, 4, and 5

### Minimization Measures common to all action alternatives

Minimization measures will be used to minimize damage to soil resources including soils from the use of OSVs for all action alternatives. Appendix E and F of the DEIS displays the minimization criteria for the soil resource.

#### Groomed Snow Trails:

- Impacts to soil would be minimized by grooming over the existing road and trail network, would not alter landforms or result in perceptible soil disturbance and therefore does not cause substantial impacts to water quality, perennial, intermittent or ephemeral streams, wetlands or other bodies of water.
- Impacts to soil would be minimized by grooming only when the ground surface is covered with adequate snowpack to prevent soil damage or soil rutting. The operator shall consider recent, current, and forecasted weather and snow conditions to ensure these conditions are met.
- Impacts to soils are minimized by OSV use of groomed trails where adequate snow cover ensures negligible potential for contact with bare soil and practically no disturbance of trail and road surfaces, and therefore, would not cause substantial impacts to water quality in perennial, intermittent, or ephemeral streams, or in wetlands or other bodies of water.

#### Cross-Country OSV use:

- Impacts to soil are minimized by requiring that cross-country OSV use only occur when and where there is adequate snow coverage would minimize the likelihood of adverse impacts to soil and water resources from OSV use on routes and open areas.
- Impacts to soil from cross-country use are minimized by clearly delineated and marked areas in the field where practical.
- Soil impacts are minimized by managing designated OSV areas to mitigate adverse effects to soil, water quality, and riparian resources from over-use by adaptive management, changing season-of use periods as necessary to allow rehabilitation of an area, particularly hill climb areas.
- Soil impacts are also minimized by closing an area if the designated use is causing unacceptable adverse effects to soil, water quality, and riparian resources.

### *Direct and Indirect Effects*

The direct and indirect effects for these alternatives are similar to alternative 1 except that alternative 1 has more acreage open to cross-country OSV use (except under alternative 4, which has slightly greater acreage designated for OSV use) with no minimum snow depth required to travel cross country or on trails and could have the most impacts to the soil resource. Under alternatives 2, 3, 4 and 5, OSV use can occur cross country and on existing roads and trails with a minimum snow depth. Under alternative 1, there is no minimum snow depth and could have the most impacts to the soil resource, which could lead to localized soil disturbance where there is repeated use at lower snow depths. Under alternative 2, minimum snow depths are recommendations only, with a focus on avoiding resource damage. As a result, minimum snow depths under alternative 2 may in fact be deeper than the recommended minimum in order to protect resources and avoid damage. The effects of trail grooming would be similar to those effects described under alternative 1.

### Soil Productivity

Impacts of OSV use on soil productivity would be similar to the impacts described under alternative 1. No new trail or road construction would occur under any of the alternatives. Because OSV use would occur with sufficient amounts of snow to protect the soil resource, there would not likely be soil disturbance including compaction or effects to soil porosity or the disturbance of organic matter including forest floor litter and large woody debris present on the soil surface. Existing regulations would allow the issuance of a closure order if snow cover had the potential to become inadequate during the open season. During times of the year when snowpacks are potentially more variable, there could be incidental indirect effects including some minor ground disturbance in low-snow areas. Under alternative 4, the acres open to cross-country OSV travel on sensitive soils would be slightly greater than under alternative 1, but that acreage would decrease under alternatives 2, 3 and 5 (table 62). Alternative 3 would have the least impact on sensitive soils, but alternative 5 would have slightly more acres of sensitive soils designated for OSV use, but with a greater minimum snow depth of 24 inches, this alternative would likely have the least impact on soil productivity overall.

### Soil Stability

Impacts of OSV use on soil stability would be similar to the impacts described under alternative 1. OSV use would not increase landslide potential on low stability sites across the forest. Erosion would likely not increase with adequate snow cover, although there is slightly more risk of having exposed bare soil on trails and roads under alternatives 2 and 4, because the minimum snow depth for OSV travel on existing roads and trails is reduced to 6 inches of unpacked snow. Monitoring under these alternatives is important to determine the site-specific effects of a reduced minimum snow depth on the soil resource.

**Table 62. Resource indicators and measures for soil resources direct and indirect effects, alternatives 2, 3, 4 and 5**

| Resource Element | Resource Indicator | Measure | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| Soil Productivity and Soil Stability | OSV use on sensitive soils including wet meadows, areas with low stability or erosion hazards. | Acres and percent designated for OSV use on sensitive soils | 141,205 (35%) | 89,037 (32%) | 193,213 (30%) | 92,429 (31%) |
| Soil Stability | Minimum Snow Depths on trails | Inches of snow | 6 | 18 | 6 | 24 |
| Soil Productivity | Minimum snow depths for cross-country travel | Inches of snow | 12 | 18 | 12 | 24 |

## Cumulative Effects

### Vegetation Management

Several current and future vegetation management activities are occurring on the Tahoe National Forest. These ground-disturbing activities could have cumulative effects on the soil resource if the soil disturbance occurs in the same location as potential soil disturbance from OSV use. This is very unlikely, as effects of OSV use would be minimal throughout the forest. Potential road building, reconstruction, decommissioning and maintenance activities associated with vegetation management activities could increase soil disturbance and decrease soil productivity and stability where the roads are located. These vegetation management activities are regulated by Forest Plan standards and guidelines, Regional Standards, and best management practices to ensure soil productivity is maintained.

In general, snowmobiling is the primary winter recreational use in the action area. Snowmobiling primarily occurs on existing trails, naturally unforested areas, or in areas with limited forest cover or associated structural complexity at the ground level. Because snowmobiles operate over snow that protects the ground, it is unlikely that OSV use has a significant direct impact upon soils, and therefore, cumulative effects are not expected.

### Parking Improvements for Winter Recreation

The parking lot at the Little Truckee Summit parking area is proposed for expansion to increase parking capacity. Approximately 10 acres of area will be disturbed during the expansion, but 5 of those acres will be temporarily disturbed and rehabilitated following the activities. Approximately 5 acres of soil disturbance will be permanent. These activities would occur during the spring/summer/fall when there is no snow on the ground, therefore, the impacts from parking lot improvements would not occur at the same time as the impacts from OSV use. Adequate snow levels on the disturbed but rehabilitated soil areas would prevent further resource damage by OSV use.

#### Meadow Restoration Projects

Three meadow restoration projects are proposed on the Tahoe National Forest; Deer, Beartrap and Folchi. The restoration project planned in Deer Meadow would encompass approximately 15 acres of the meadow, Beartrap would also encompass approximately 15 acres. Both of these restoration projects would overlap in time and space with OSV use within the meadows, but OSV use would occur when sufficient snow is present to the protect the soil resource and no cumulative impacts are expected.  No cross country OSV is permitted in the Flochi area; therefore, no overlap in time and space exists and no cumulative effects are expected.

### Other Recreation Activities

Disturbance from general motorized use and recreational access occurs and will continue to occur throughout the forest indefinitely. We anticipate no changes in the existing recreation profile. Other recreational activities that take place off the developed roads, such as the gathering of miscellaneous forest products and hunting, occur within the project area, but because OSV use would generally occur on minimum snowpack, we anticipate no cumulative effects from other ongoing recreational activities.

### Climate Change

Climate change affects and would continue to affect California and the Tahoe National Forest in the future. Precipitation events would likely become more unpredictable and warmer temperatures will decrease the amount of precipitation that falls as snow, likely decreasing the total snowpack and the amount of time that snow will be on the ground (State of California 2007). This could increase the amount of time the soil would be exposed to OSV impacts, and increase the impacts on sensitive soil sites including wet meadows and erosive sites because of increased soil exposure.

### Compliance with Relevant Laws, Regulations, Policies and Plans

This project is consistent with the Tahoe National Forest Land and Resource Management Plan, which provides standards and guidelines to protect the soil resource and the Southwest Regional Soils Quality Standards by maintaining soil productivity.

### Short-term Uses and Long-term Productivity

There would be no impacts from short-term uses and long-term productivity on the soil resource.

### Unavoidable Adverse Effects

There would be no unavoidable adverse effects of any of the alternatives to the soil resource.

### Irreversible and Irretrievable Commitments of Resources

There would be no irreversible and irretrievable commitments of resources for any alternatives.

# Terrestrial Wildlife

The Fish and Wildlife Service list of Threatened, Endangered, and Proposed wildlife species for the Tahoe National Forest was obtained through the FWS Information for Planning and Conservation website (https://ecos.fws.gov/ipac/) from the Sacramento, and Nevada Fish and Wildlife Service offices, dated April 13, 2016 and again on August 21, 2016.

## Relevant Laws, Regulations, and Policy

### Regulatory Framework

#### *Land and Resource Management Plan*

The Tahoe National Forest LRMP provides standards and guidelines for activities on the forest including OSV management.

- LRMP Standards and Guidelines pertinent to OSV management (USDA Forest Service 1990: Chapter 4):
    - Coordination includes all activities needed to meet Regional standards and guidelines, legal mandates, planning direction for fish and wildlife, and to establish or maintain structural and nonstructural habitat improvements
    - Cooperation includes interactions with the US Fish and Wildlife Service, other Federal agencies, California Department of Fish and Game, County agencies, development interests, and universities
    - A biological evaluation will be prepared for each project involving suitable threatened and endangered or sensitive species habitat. The biological evaluation will address measures for maintaining viable population, potential impacts to the species, and possible alternatives to mitigate or avoid impacts
    - Develop programs for endangered, threatened, and sensitive fish and wildlife species as outlined in appendix D. Implement recovery plans and species management plans for threatened and endangered species

*Land Allocations and Desired Conditions*

## California Spotted Owl Protected Activity Centers

### Designation

California spotted owl protected activity centers (PACs) are delineated surrounding each territorial owl activity center detected on National Forest System lands since 1986. Owl activity centers are designated for all territorial owls based on: (1) the most recent documented nest site, (2) the most recent known roost site when a nest location remains unknown, and (3) a central point based on repeated daytime detections when neither nest or roost locations are known.

PACs are delineated to: (1) include known and suspected nest stands and (2) encompass the best available 300 acres of habitat in as compact a unit as possible. The best available habitat is selected for California spotted owl PACs to include: (1) two or more tree canopy layers; (2) trees in the dominant and co-dominant crown classes averaging 24 inches diameter at breast height (dbh) or greater; (3) at least 70 percent tree canopy cover (including hardwoods); and (4) in descending order of priority, CWHR classes 6, 5D, 5M, 4D, and 4M and other stands with at least 50 percent canopy cover (including hardwoods). Aerial photography interpretation and field verification are used as needed to delineate PACs.

As additional nest location and habitat data become available, boundaries of PACs are reviewed and adjusted as necessary to better include known and suspected nest stands and encompass the best available 300 acres of habitat.

PACs are maintained regardless of California spotted owl occupancy status. However, after a stand-replacing event, habitat conditions are evaluated within a 1.5-mile radius around the activity center to identify opportunities for re-mapping the PAC. If there is insufficient suitable habitat for designating a PAC within the 1.5-mile radius, the PAC may be removed from the network.

### Desired Conditions

Stands in each PAC have: (1) at least two tree canopy layers; (2) dominant and co-dominant trees with average diameters of at least 24 inches dbh; (3) at least 60 to 70 percent canopy cover; (4) some very large snags (greater than 45 inches dbh); and (5) snag and down woody material levels that are higher than average.

## Northern Goshawk Protected Activity Centers

### Designation

Northern goshawk PACs are delineated surrounding all known and newly discovered breeding territories detected on National Forest System lands. Northern goshawk PACs are designated based upon the latest documented nest site and location(s) of alternate nests. If the actual nest site is not located, the PAC is designated based on the location of territorial adult birds or recently fledged juvenile goshawks during the fledgling dependency period.

PACs are delineated to: (1) include known and suspected nest stands and (2) encompass the best available 200 acres of forested habitat in the largest contiguous patches possible, based on aerial photography. Where suitable nesting habitat occurs in small patches, PACs are defined as multiple blocks in the largest best available patches within 0.5 mile of one another. Best available forested stands for PACs have the following characteristics: (1) trees in the dominant and co-dominant crown classes average 24 inches dbh or greater; (2) in west side conifer and east side mixed conifer forest types, stands have at least 70 percent tree canopy cover; and (3) in east side pine forest types, stands have at least 60 percent tree canopy cover. Non-forest vegetation (such as brush and meadows) should not be counted as part of the 200 acres.

As additional nest location and habitat data become available, PAC boundaries are reviewed and adjusted as necessary to better include known and suspected nest stands and to encompass the best available 200 acres of forested habitat.

PACs are maintained regardless of northern goshawk occupancy status. PACs may be removed from the network after a stand-replacing event if the habitat has been rendered unsuitable as a northern goshawk PAC and there are no opportunities for re-mapping the PAC near the affected PAC.

#### Desired Conditions

Stands in each PAC have: (1) at least two tree canopy layers; (2) dominant and co-dominant trees with average diameters of at least 24 inches dbh; (3) at least 60 to 70 percent canopy cover; (4) some very large snags (greater than 45 inches dbh); and (5) snag and down woody material levels that are higher than average.

### Great Gray Owl Protected Activity Centers

#### Designation

PACs are established and maintained to include the forested area and adjacent meadow around all known great gray owl nest stands. The PAC encompasses at least 50 acres of the highest quality nesting habitat (CWHR types 6, 5D, and 5M) available in the forested area surrounding the nest. The PAC also includes the meadow or meadow complex that supports the prey base for nesting owls.

#### Desired Conditions

Meadow vegetation in great gray owl PACs supports a sufficiently large meadow vole population to provide a food source for great gray owls through the reproductive period.

### Forest Carnivore Den Site Buffers

#### Designation

Marten den sites are 100-acre buffers consisting of the highest quality habitat in a compact arrangement surrounding the den site. CWHR types 6, 5D, 5M, 4D, and 4M in descending order of priority, based on availability, provide highest quality habitat for the marten.

#### Desired Conditions

Areas surrounding marten den sites have (1) at least 2 conifers per acre greater than 24 inches dbh with suitable denning cavities, (2) canopy closures exceeding 60 percent, (3) more than 10 tons per acre of coarse woody debris in decay classes 1 and 2, and (4) an average of 6 snags per acre on the west side and 3 per acre on the east side.

### California Spotted Owl Home Range Core Areas

#### Designation

A home range core area is established surrounding each territorial spotted owl activity center detected after 1986. The core area amounts to 20 percent of the area described by the sum of the average breeding pair home range plus one standard error. Home range core area sizes are 1,000 acres on the Almanor Ranger District, and 2,400 acres on the Hat Creek and Eagle Lake Ranger Districts.

Aerial photography is used to delineate the core area. Acreage for the entire core area is identified on National Forest System lands. Core areas encompass the best available California spotted owl habitat nearest the owl activity center. The best available contiguous habitat is selected to incorporate, in descending order of priority, CWHR classes 6, 5D, 5M, 4D and 4M, and other stands with at least 50 percent tree canopy cover (including hardwoods). The acreage in the 300-acre PAC counts toward the total home range core area. Core areas are delineated within 1.5 miles of the activity center.

When activities are planned adjacent to lands of other ownership, circular core areas are delineated around California spotted owl activity centers. Using the best available habitat as described above, any part of the circular core area that lies on National Forest System lands is designated and managed as a California spotted owl home range core area.

#### Desired Conditions

Home range core areas consist of large habitat blocks that have: (1) at least two tree canopy layers; (2) at least 24 inches dbh in dominant and co-dominant trees; (3) a number of very large (greater than 45 inches dbh) old trees; (4) at least 50 to 70 percent canopy cover; and (5) higher than average levels of snags and down woody material.

### *Sierra Nevada Forest Plan Amendment*

The following standards and guidelines applicable to terrestrial biota will be considered during the analysis process. Standards and guidelines described in this section apply to all land allocations, other than wilderness and wild and scenic river areas, unless stated otherwise.

#### Habitat Connectivity for Old Forest Associated Species

- 27. Minimize old forest habitat fragmentation. Assess potential impacts of fragmentation on old forest associated species (marten) in biological evaluations.
- 28. Assess the potential impact of projects on the connectivity of habitat for old forest associated species.
- 29. Consider retaining forested linkages (with canopy cover greater than 40 percent) that are interconnected via riparian areas and ridge top saddles during project-level analysis.
- 30. If fishers are detected outside the southern Sierra fisher conservation area, evaluate habitat conditions and implement appropriate mitigation measures to retain suitable habitat within the estimated home range. Institute project-level surveys over the appropriate area, as determined by an interdisciplinary team.

#### Wolverine Detections

- 32. Detection of a wolverine or Sierra Nevada red fox will be validated by a forest carnivore specialist. When verified sightings occur, conduct an analysis to determine if activities within 5 miles of the detection have a potential to affect the species. If necessary, apply a limited operating period from January 1 to June 30 to avoid adverse impacts to potential breeding. Evaluate activities for a 2-year period for detections not associated with a den site. Limited operating periods for old forest-dependent species apply only to vegetation management activities

#### Wheeled Vehicles.

- 69. Prohibit wheeled vehicle travel off of designated routes, trails, and limited off-highway vehicle (OHV) use areas. Unless otherwise restricted by current forest plans or other specific area standards and guidelines, cross-country travel by over-snow vehicles would continue.

### Standards and Guidelines for California Spotted Owl and Northern Goshawk Protected Activity Centers

- 75. For California spotted owl PACs: Maintain a limited operating period, prohibiting vegetation treatments within approximately ¼ mile of the activity center during the breeding season (March 1 through August 31), unless surveys confirm that California spotted owls are not nesting.
- 76. For northern goshawk PACs: Maintain a limited operating period, prohibiting vegetation treatments within approximately ¼ mile of the nest site during the breeding season (February 15 through September 15) unless surveys confirm that northern goshawks are not nesting.
- 77. The [CSO or NGO] limited operating period may be waived for vegetation treatments of limited scope and duration, when a biological evaluation determines that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing and specific location. Where a biological evaluation concludes that a nest site would be shielded from planned activities by topographic features that would minimize disturbance, the LOP buffer distance may be modified.
- 82. Mitigate impacts where there is documented evidence of disturbance to the [CSO or NGO] nest site from existing recreation, off-highway vehicle route, trail, and road uses (including road maintenance). Evaluate proposals for new roads, trails, off-highway vehicle routes, and recreational and other developments for their potential to disturb nest sites.

### Standards and Guidelines for Great Gray Owl Protected Activity Centers

- 83. Apply a limited operating period, prohibiting vegetation treatments and road construction within ¼ mile of an active great gray owl nest stand, during the nesting period (typically March 1 to August 15). The limited operating period may be waived for vegetation treatments of limited scope and duration, when a biological evaluation determines that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing and specific location. Where a biological evaluation concludes that a nest site would be shielded from planned activities by topographic features that would minimize disturbance, the LOP buffer distance may be reduced.

### Standards and Guidelines for Marten Den Sites

- 87 and 89. Mitigate impacts where there is documented evidence of disturbance to the [fisher or marten] den site from existing recreation, off highway vehicle route, trail, and road uses (including road maintenance). Evaluate proposals for new roads, trails, off-highway vehicle routes, and recreational and other developments for their potential to disturb den sites.
- 88. Protect marten den site buffers from disturbance from vegetation treatments with a limited operating period (LOP) from May 1 through July 31, as long as habitat remains suitable or until another regionally approved management strategy is implemented. The LOP may be waived for individual projects of limited scope and duration, when a biological evaluation documents that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing, and specific location. Limited operating periods for old forest-dependent species apply only to vegetation management activities.

## Federal Law

### *Endangered Species Act*

The Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.) requires that any action authorized by a Federal agency not be likely to jeopardize the continued existence of a threatened or endangered species, or result in the destruction or adverse modification of critical habitat for these species. Section 7 of the Endangered Species Act, as amended, requires the responsible Federal agency to consult the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service concerning any project or action that may affect a threatened or endangered species under their jurisdiction. It is Forest Service policy to analyze impacts to threatened or endangered species to ensure management activities are not likely to jeopardize the continued existence of a threatened or endangered species, or result in the destruction or adverse modification of critical habitat for these species. This assessment is documented in a biological assessment located in the project record.

### *Bald Eagle Protection Act*

The Bald Eagle Protection Act of 1940 provides for the protection of the bald eagle and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession, and commerce of such birds. The 1972 amendments increased penalties for violating provisions of the act or regulations issued pursuant thereto and strengthened other enforcement measures. The act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." Disturb means to agitate or bother a bald or golden eagle to a degree that causes, based on the best scientific information available, (1) injury, to an eagle; (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior (USFWS 2007).

# Resource Indicators and Measures

Resource indicators and measures shown in table 19 will be used to measure and disclose effects to terrestrial wildlife related to OSV use designations and grooming trails for OSV use.

**Table 63. Resource indicators and measures for assessing effects to terrestrial wildlife**

| Resource Indicator | Measure (Quantify if possible) |
|---|---|
| **Resource Element:** Federally Listed, Proposed Species – North American wolverine | |
| Potential for disturbance to individuals from OSV use and increased human presence, or injury or mortality of individuals | Acres designated for OSV use and conducive to OSV use of habitat affected by OSV use |
| **Resource Element:** R5 Sensitive species – Pacific Marten | |
| Potential for injury or mortality of individuals from OSV use or related activities[11] | Acres designated for OSV use and conducive to OSV use of habitat affected by OSV use |
| Potential for loss of habitat connectivity | Acres of corridors impacted by OSV use |

[11] Related activities include snow plowing of roads, parking lots, and trailheads (i.e., staging areas)

| Resource Indicator | Measure (Quantify if possible) |
|---|---|
| **Resource Element:** R5 Sensitive species – California spotted owl (CSO), Northern goshawk (NGO), | |
| Potential for disturbance to or displacement of individuals from noise and increased human presence, injury or mortality of individuals | Acres designated for OSV use and conducive to OSV use of important habitat impacted by OSV use |
| | Acres designated for OSV use and conducive to OSV use of buffered CSO and NGO activity centers impacted by OSV use |
| **Resource Element:** R5 Sensitive species – Bald Eagle | |
| Potential for disturbance to individuals from noise and increased human presence, injury or mortality of individuals | Acres open to OSV use and conducive to OSV use of high value reproductive habitat impacted by OSV use |
| **Resource Element:** R5 Sensitive species – Great Gray Owl | |
| Potential for disturbance to individuals from noise and increased human presence, injury or mortality of individuals, or habitat modification | Acres open to OSV use and conducive to OSV use of high-reproductive habitat impacted by OSV use |
| **Resource Element:** R5 Sensitive species – Willow Flycatcher, Greater Sandhill Crane, Western bumblebee, and Bats (Fringed Myotis, Pallid Bat, and Townsend's Big-eared Bat) | |
| Potential for habitat degration | Qualitative comparison |

## Methodology

Species biology, habitat information, and potential for OSV-related effects, from the best available scientific information, were discussed in species account sections. Species occurrence information specific to the Tahoe National Forest was disclosed. For quantitative assessment, the amount of suitable habitat that could be impacted by OSV use was used to measure effects to species for t comparison by alternative. Specific reproductive site information, when available, was also used to measure effects to species.

### Analysis Process

Using Geographic Information Systems, modeled habitat and reproductive sites, when available, for each species was intersected with areas conducive to OSV use assumptions criteria (canopy cover less than 70 percent, slopes less than 20 percent; see below) and areas in which OSV use would be permitted under each alternative. The resulting total acres and percentages of habitat, by assumption and alternative, were disclosed and compared. Using best available scientific information, known reproductive sites were buffered [California spotted owl activity center points (0.70 mile), goshawk PACS (0.25 mile), and bald eagle nest site points (660 feet)] to identify habitats with the greatest potential to be impacted by OSV use and associated activities.

## Assumptions Specific to the Wildlife Resources Analysis

Snowmobile use patterns vary by day of the week, time of the day, topography, terrain, and vegetation. With assistance from Tahoe National Forest staff, we developed the following use patterns and categories to create a more accurate description of potential impacts of each alternative to species and habitats. Refer to the DEIS for mapped assumptions.

### General OSV use patterns:

- Primarily day use (generally 10:00 am to 3:00 pm; grooming occurs at night).
- OSV use is highest on weekends and holidays.
- Highest concentrations of OSV use occur along groomed trails (this is supported by research documented in State Environmental Impact Report (EIR). Generally, groomed routes are used to access cross-country areas.
- Use is concentrated at trailheads.
- Higher use occurs in open meadows adjacent to groomed trail access and in flatter areas.
- OSV “high marking” occurs primarily on slopes with open vegetation, near groomed trails.
- Lower elevations generally have less OSV use – snow occurs at lower elevations less frequently and persists for short periods of time (2 to 5 days).
- Ungroomed routes receive 50 percent less use than groomed routes (only 25,000 registered OSVs in California per State EIR, most use on groomed trails).
- OSV use is assumed to be very low (fewer than 10 riders per site per day on a weekend), depending on specific snow depths and daily temperatures, after the March 31 termination date closing roads for exclusive OSV use. Based on surveys of Forest Snow Parks and designated OSV route access points, OSV use was documented until the end of April, at which point snow levels no longer allow continued use of designated OSV routes (California Department of Parks and Recreation 2010). Therefore, for the purpose of this analysis, April 30 is used as a cut-off date for the maximum period of interaction between snowmobiles and wildlife.

### Areas Conducive to OSV Use (Moderate to High Use):

- Canopy cover less than 70 percent: CWHR vegetation (California Department of Fish and Wildlife 2014) 1S, 1P, 1M, 2S, 2P, 2M, 3S, 3P, 3M, 4S, 4P
- Slope less than or equal to 20 percent

#### *High Use:*

- Areas within 0.5 mile of snowmobile staging areas
- Areas within 0.5 mile of groomed trails
- Meadows within 0.5 mile of a designated OSV trail

#### *Moderate Use:*

- Areas within 0.5 mile of marked (not groomed) OSV trails

- Areas between 0.5 and 1.5 miles from groomed trails
- Meadows 10 acres or greater in size, or 0.5 to 1.5 miles from an OSV trail

### Areas Not Conducive to OSV Use (Low-to-No Use):

*Low Use:*

- Areas below 3,500 feet elevation
- Canopy cover greater than 70 percent: CWHR vegetation 2D, 3D, 4D, 4M; vegetation size 5 and 6
- Slope greater than or equal to 20 percent
- Meadows 30 acres or greater, 1.5 miles or more from an OSV trail
- Areas more than 1.5 miles from a groomed OSV trail
- Areas more than 0.5 mile from a marked (not groomed) OSV trail

*Potential Use:*

- CWHR vegetation open areas (annual grass, barren, lacustrine, mixed chaparral, montane chaparral, perennial grass, sagebrush, wet meadow and urban).

#### *Indirect Effects (Snow Compaction)*

Potential indirect effects, including snow compaction and vehicle emissions, are likely to be concentrated in areas conducive to OSV use.

## Spatial and Temporal Context for Effects Analysis

### Direct, Indirect, and Cumulative Effects Boundaries

The spatial boundaries for analyzing the direct, indirect, and cumulative effects to all of the species under consideration for analysis, including threatened, endangered, proposed, candidate, Forest Service sensitive species, and species of public interest is the Tahoe National Forest boundary (unless otherwise specified) for the following reasons: the forest boundary is large enough to address wide-ranging species and Forest Service Sensitive Species' viability is assessed at the Forest Plan area. The temporal boundary for this analysis is 10 years from the signing of the decision document and is based on adequate time for an effectiveness monitoring program to be designed and implemented and for results to be assessed.

## Affected Environment and Environmental Consequences for Endangered, Threatened or Proposed Species and/or their Designated Critical Habitat

Table 64 identifies wildlife species to consider because they may be present within the general area of the Tahoe National Forest.

**Table 64. Terrestrial threatened, endangered, proposed, and candidate (TEPC) species and designated or proposed critical habitat considered within this analysis**

| Species Name | TEPC Status[12] | Project Area Within Species' Range | Detections in or Near the Project Area | Suitable Habitat Present | Species Addressed Further/Rationale | Determination |
|---|---|---|---|---|---|---|
| Yellow-billed cuckoo (*Coccyzus americanus*) | FT | No | No | No | No; Project area is outside the known distribution of this species | NA |
| Yellow-billed cuckoo proposed critical habitat | NA | No | No | No | No; Project area is outside the proposed critical habitat | NA |
| California wolverine (*Gulo gulo luteus*) | FP/FSS | Yes | Yes | Yes | Yes | May affect individuals, but are not likely to lead to a loss of viability or a trend toward Federal listing |

## Species Analyzed in Detail

### *Direct and Indirect Effects*

According to Gaines et al. (2003), the interactions between snowmobile routes and focal wildlife species are poorly documented for many species and these interactions need to be further refined with additional research and monitoring. The most common interactions between snowmobile routes and wildlife that Gaines et al. (2003) documented from the literature included trapping as facilitated by winter human access, disturbance-based displacement and avoidance,[13] and disturbance at a specific site,[14] usually wintering areas. To a lesser degree, hunting, trapping, poaching, collection, and habitat loss and fragmentation[15] were other interactions identified. Specific types of habitat modification that occurred on winter recreation routes include the effect of snow compaction[16] on the subnivean sites used by small mammals and alteration of competitor/predator communities.[17] The same types of responses would be expected off of designated routes (i.e., cross country). Other interactions facilitated by linear recreation routes in general, but not specific to OSV use include vehicle collision and physiological response.[18]

[12] FE = federally endangered; FT = federally listed as threatened; FP = federal proposed for listing; FC = federal candidate for listing; FSS = Forest Service sensitive. Sources: Official federally endangered, threatened, proposed, and candidate species list obtained on August 21, 2016, from the Sacramento, and Nevada U.S. Fish and Wildlife Service (USFWS) Field Offices and USDA Forest Service, Pacific Southwest Region, Sensitive Animal Species by Forest, June 30, 2013.
[13] Spatial shifts in populations or individual animals away from human activities on or near roads, trails, or networks
[14] Displacement of individual animals from a specific location that is being used for reproduction and rearing of young
[15] Loss and resulting fragmentation of habitat owing modification to the establishment of roads, trails, or networks, and associated human activities
[16] Direct mortality of animals crushed or suffocated as a result of snow compaction from snowmobile routes or groomed ski trails
[17] A physical human-induced change in the environment that provides access for competitors or predators that would not have existed otherwise
[18] Increase in heart rate or stress hormones when near a road or trail or network of roads or trails

### *Trapping*

Trapping of marten or wolverine or any of the special-status species under consideration is not legal in California. Poaching and collecting without a valid permit are also illegal activities. These types of activities, facilitated by OSV use, are expected to be rare and addressed as a law enforcement issue. Therefore, they will not be examined in this analysis.

### *Disturbance*

#### Breeding Disruption

This type of disruption could impact late-successional species or wide-ranging carnivores. If the winter season overlaps with the beginning of breeding, the presence of OSVs or grooming equipment could disrupt courtship and nesting or denning activities due to noise and/or visual disturbance that result in behavioral changes in the animals.

#### Winter Range and/or Home Range Use

This type of impact could impact late-successional species or wide-ranging carnivores. Noise and extended human presence from OSV activities could reduce the size of the winter home range for several wildlife species. The home range provides food, shelter, and breeding opportunity, and if it is reduced, could compromise species survival, particularly during stressful survival conditions in the winter.

Many of the species that may be active or present during the OSV Program season are nocturnal and may not be affected by daytime snowmobile activities at all. However, 29 percent of snowmobilers report some nighttime riding (California Department of Parks and Recreation 2010) and resulting human disturbance could disrupt home range use by nocturnal species. Trail grooming activities occur at night, are infrequent, and move slowly enough that grooming is not expected to have a substantial negative effect on wildlife home range. For nocturnal and crepuscular species, trail grooming and OSV use may also result in animals avoiding areas frequented by snowmobilers and groomers.

#### Physiological Response

Single or repeated interactions between OSVs and wildlife could lead to energy expenditures from flight or vigilance (orienting) reactions. The energetic cost of flight can be significant for predatory animals. Quantifying these physiological responses in wildlife is extremely difficult.

The grooming equipment operates infrequently and moves slowly, so it is estimated that it results in fewer flight or vigilance reactions. Grooming is not expected to have a substantial negative effect on wildlife populations as a result of physiological stress. Snowmobile use likely results in more flight or vigilance reactions because there are more vehicles, they move faster, and they are generally louder than grooming equipment. Physiological stress may impact individuals, but not populations as a whole.

### *Vehicle Collision*

As previously discussed, the likelihood of a collision between snow grooming equipment and wildlife is extremely low because the equipment travels slowly (3 to 6 mph). There is an increased likelihood of collision with OSVs due to higher frequency of OSV use and higher speeds. This effect would be most specific to mammals. Vehicle collision would be expected to be rare and would impact individuals rather than populations as a whole.

### *Habitat Modification*

**Trails as Routes for Competitors and Predators**

Packed trails resulting from snowmobile use facilitate coyote incursion into deep snow areas (Bunnell et al. 2006) and can negatively impact marten or other mammal populations through increased competition and predation. A study in Utah found that 90 percent of coyote movement was made within 1,150 feet of packed trails (Bunnell et al. 2006).

Competition and predation, if occurring, would be predictably restricted to areas in the immediate vicinity of trails. The use of OSV trails and regular grooming is an existing condition that has been in operation for numerous years; and no new trail expansion is proposed at this time. Therefore, coyote incursion, if occurring, would continue, but would not increase as a result of OSV program activities.

**Avoidance**

For diurnal species, OSV use of the trails may result in animals avoiding areas used by snowmobilers.

**Snow Compaction**

Mechanical snow compaction can crush, suffocate, or alter the movements of subnivean fauna (small mammals, such as shrews, voles, pocket gophers, and mice that remain active throughout the winter with much of their activity occurring in the subnivean space beneath the snowpack) and medium sized mammals that den under the snow, such as marten. Snow compaction may impact individuals. However, small mammals' population densities are dependent on numerous factors.

### *Threatened, Endangered, and Proposed Species, and Critical Habitat*

## Wide-ranging Carnivores

### *North American Wolverine (Gulo gulo luscus)*

### *Species Account*

There have been 21 verified detections of wolverine on the forest and 12 are within one-quarter mile of snowmobile routes on the Tahoe National Forest. On February 28, 2008, a lone male wolverine was photographed at baited camera stations on the Tahoe National Forest and adjacent Sierra Pacific Industries land in 2008 through 2014 (Moriarity et al. 2009; USFWS 2010; USDA Forest Service NRIS records database 2012, CDFW 2014). These records are north of Interstate 80 in Nevada and Sierra counties, west and south of Sierraville, California. This was the first verified record of a wolverine in California since 1922. Although incidental, unconfirmed sightings of wolverine have been reported throughout the Sierra Nevada there is no evidence that California currently hosts a wolverine population or that female wolverines have made, or are likely to make, similar dispersal movements (USFWS 2013). The USFWS considers the Sierra Nevada Mountains to be part of the wolverine's current range, but a population has not been reestablished (the single male identified in 2008 does not make a population) (USFWS 2010).

In February 2013, the USFWS published a proposed rule to list the North American Wolverine as a threatened distinct population segment (DPS) in the contiguous United States (Federal Register / Vol. 78, No. 23 / Monday, February 4, 2013 / Proposed Rules). On August 13, 2014, the USFWS withdrew its previous proposal (Federal Register / Vol. 79, No. 156 / Wednesday, August 13, 2014 / Proposed Rules). On April 14, 2016, the Court remanded the matter to the U.S. Fish and Wildlife Service for further consideration consistent with order CV 14-246-M-DLC (Consolidated with Case

Nos.14-247-M-DLC and 14-250-M-DLC). The species is currently considered proposed for Federal listing.

### Habitat Status

Results of a 5-year study (Copeland et al. 2007) show wolverines used modestly higher elevations in summer versus winter, and they shifted use of cover types from whitebark pine (*Pinus albicaulis*) in summer to lower elevation Douglas-fir (*Pseudotsuga menziezii*) and lodgepole pine (*Pinus contorta*) communities in winter. In general, wolverines live at or above timberline, in areas relatively free from human disturbance, moving to lower elevations in winter likely due to prey availability. The average size of wolverine's home range is between 300 and 500 square kilometers (186 to 310 square miles, USFWS 2013). Home range sizes within the Sierra Nevada remain unknown.

Wolverines have been known to occupy habitats from 4,000 to over 10,000 feet elevation in the Sierra Nevada. The presence of deep and persistent snow appears be a major contributing factor to habitat selection by wolverines. Wolverine select areas that are cold and receive enough winter precipitation to reliably maintain deep persistent snow late into the warm season (Copeland et al. 2010). No records exist of wolverines denning in snow-free habitats, despite the wide availability of these habitats within their range (USFWS 2013). Wolverines also appear to select areas that are free of significant human disturbance (summarized in USDA Forest Service 2001). A major threat to this species is loss of alpine habitat from climate change. Other possible threats to this species include habitat loss and fragmentation and increasing human presence.

Breeding occurs from late spring to early fall and females give birth in natal dens that are excavated in the snow and require persistent, stable snow conditions greater than 5 feet deep (Magoun and Copeland 1998, Copeland et al. 2010) presumably as thermal and predation protection (USFWS 2013). These dens are typically found at higher elevations than the average elevation used by non-reproductive wolverines (Magoun and Copeland 1998). Natal dens described in California were under rock 'shelves' at elevations above 10,000 feet (summarized in USDA Forest Service 2001). Females may use natal dens through late April or early May and may move kits to multiple maternal dens during May. Den abandonment is related to water accumulation from snowmelt, the maturation of offspring, and disturbance (USFWS 2013).

For this analysis, a total of 317,976 acres of habitat, based on the aforementioned criteria, is found within the project area (based on years of snow coverage greater or equal to one year to seven years).

### Threats

Potential threats to this species include habitat loss and fragmentation, loss and alteration of alpine (snow) habitat from climate change, and increasing human presence (disturbance). The USFWS (2013) noted climate change as the threat with the greatest potential to impact wolverine. A warming climate would likely result in a loss of suitable habitat due to increased summer temperatures and a reduced incidence of persistent spring snowpack. The USFWS (2013) noted recreation as an additional threat to wolverines because mother wolverines tend to move their kits to alternate denning areas once humans are detected nearby.

#### *Direct and Indirect Effects*

Resource indicators and measures (FSH 1909.15, 12.5) used in this analysis to measure and disclose effects to wolverine are listed in table 65.

**Table 65. Resource indicators and measures for assessing effects to wolverine**

| Resource Indicator and Effect | Measure (Quantify if possible) | Alternatives 1 and 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|
| Potential for disturbance to individuals from OSV use and increased human presence, or injury or mortality of individuals | Acres of habitat affected by OSV use | 32,546 | 32,479 ( | 39,941 | 29,829 |

The most common interactions between snowmobile routes and wildlife that Gaines et al. (2003) documented from the literature included trapping as facilitated by winter human access, disturbance-based displacement and avoidance,[19] and disturbance at a specific site,[20] usually wintering areas.

Snowmobile use and associated activities within habitats for wide-ranging carnivores, such as wolverine, can affect individuals or their habitat (Gaines et al. 2003). Direct effects include: (1) displacement from or avoidance of human activity on or near roads; (2) displacement of individual animals from breeding or rearing habitat; and (3) physiological response to disturbance resulting in changes in heart rate or level of stress hormones.

There is also potential for injury or mortality to individuals from vehicle collision. As previously discussed, the likelihood of a collision between snow grooming equipment and wildlife is extremely low because the equipment travels slowly (3 to 6 mph). There is an increased likelihood of collision with OSVs due to higher frequency of OSV use and higher speeds. Vehicle collision with a wolverine would negatively affect that particular animal, but the likelihood of occurrence is assumed to be rare.

Direct effects include behavioral modification such as altered or dispersed movement as caused by a route or human activities on or near a route.

Although recreational activities such as snowmobiling and backcountry skiing can affect wolverines (USFWS 2013), OSV use and related activities would not physically modify suitable wolverine habitat. Wolverines, if present, would be expected to have little interaction with snowmobiles or snow grooming equipment, whereas the majority of snowmobile use occurs during the daytime, wolverine are highly nocturnal and snow grooming equipment moves at a very slow speed not likely to impact individuals. In addition, wolverines are known to avoid roads and areas of human habitation; areas within 0.5 mile of OSV trails and staging areas receive the highest use and no new trails are proposed under any of the alternatives.

### Comparison of the Alternatives

Table 66 shows the amounts of wolverine habitat in which a wolverine, on the Tahoe National Forest, could be subject to direct or indirect effects of OSV use and associated activities. Forty-four percent of suitable wolverine habitat is designated for OSV use in alternatives 1 and 2. OSV-related noise-based disturbance, injury, or mortality impacting individual wolverines would be most likely to occur within that 44 percent of suitable habitat. In addition, of that 44 percent of habitat, high OSV use is concentrated within 0.5 mile of snowmobile staging areas, on and within 0.5 mile of groomed trails, and in meadows within 0.5 mile of a designated OSV trail, so the majority of OSV

[19] Spatial shifts in populations or individual animals away from human activities on or near roads, trails, or networks
[20] Displacement of individual animals from a specific location that is being used for reproduction and rearing of young

use occurs within less than that 44 percent of wolverine habitat. Similarly, under alternatives 3 and 4, 45 percent and 48 percent, respectively, of wolverine habitat would be open and conducive to OSV use. Under alternative 5, 41 percent of wolverine habitat would be open to and conducive to OSV use.

**Table 66. Acres of wolverine habitat with potential to be impacted by OSV use and related activities, by alternative**

| | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|
| Designated OSV Acres | 315,209 | 315,209 | 315,734 | 315,079 | 305,423 |
| Total acres of wolverine habitat | 317,976 | 317,976 | 317,976 | 317,976 | 317,976 |
| Designated for OSV use and conducive to OSV use | 142,139 | 142,139 | 145,484 | 155,302 | 132,499 |
| Total | 144,906 | 144,906 | 147,726 | 158,199 | 145,052 |

### *Cumulative Effects*

Wolverine habitat overlaps with areas vegetation management projects, areas open to Christmas tree and firewood cutting and use of roads within wolverine suitable habitat after the termination date of the Forest Order closing roads for exclusive OSV use could occur. Due to their secretive nature, wolverines are likely to avoid roaded or heavily used roaded areas where disturbance or displacement would be more likely. Similarly, most non-motorized winter recreation occurs along designated trails and wolverine would probably avoid heavily used trails. Similar activities on State and private lands within the forest boundary may impact habitat availability outside of National Forest System lands and may increase disturbance locally. However, the possibility of this type of disturbance is unknown.

In summary, ongoing and reasonably foreseeable actions may be additive locally, but are not expected to contribute significantly to impacts to wolverine discussed for the project under any of the alternatives. However, the cumulative effects would be slightly different by alternative, though not enough to be measurably different with alternative 5 having the least and alternative 4 having the most cumulative impacts.

### *Determination Statement*

Alternatives 1, 2, 3, 4, and 5 of the Tahoe National Forest Over-snow Vehicle Use Designation Project *may affect, but are not likely to adversely affect* wolverine based on the following rationale:

- The single male wolverine detected near Truckee, California, is genetically most closely related to, and most likely came from, a population on the western edge of the Rocky Mountains, rather than either the historic California population. There is no evidence that California currently hosts a wolverine population or that female wolverines have made, or are likely to make, similar dispersal movements into the area.
- Vegetative composition or structure of suitable wolverine habitat would not be physically modified by OSV use or related activities.
- Although the potential for noise-based disturbance to individuals within suitable habitat ranges from 41 to 48 percent of suitable habitat under all of the alternatives, the percentage of suitable wolverine habitat impacted would actually be lower considering that the concentration of OSV use is not equal across the landscape.

- Wolverines, would be expected to have little interaction with snowmobiles or snow grooming equipment: whereas the majority of snowmobile use occurs during the daytime, wolverine are highly nocturnal and snow grooming equipment moves at a very slow speed not likely to impact individuals. In addition, wolverines are known to avoid roads and areas of human habitation.

## Affected Environment and Environmental Consequences for Sensitive Species and/or their Suitable Habitat

Table 67 identifies sensitive wildlife species to consider, because they may be present within the general area of the Tahoe National Forest.

**Table 67. Terrestrial Forest Service Sensitive Species considered in this analysis**

| Species Name | Project Area Within Species' Range | Detections in or Near the Project Area | Suitable Habitat Present | Species Addressed Further/ Rationale | Determination |
|---|---|---|---|---|---|
| **Late-successional Forest species** | | | | | |
| Fisher (*Pekania pennanti*) | No | No | No | No Project area is outside the known distribution of this species | NA |
| Pacific marten (*Martes caurina*) | Yes | Yes | Yes | Yes | May affect individuals, but are not likely to lead to a loss of viability or a trend toward Federal listing |
| California spotted owl (*Strix occidentalis occidentalis*) | Yes | Yes | Yes | Yes | May affect individuals, but are not likely to lead to a loss of viability or a trend toward Federal listing |
| Northern goshawk (*Accipiter gentilis*) | Yes | Yes | Yes | Yes | May affect individuals, but are not likely to lead to a loss of viability or a trend toward Federal listing |
| **Bats** | | | | | |
| Fringed myotis (*Myotis thysanodes*) | Yes | Yes | Yes | Yes | May affect individuals, but are not likely to lead to a loss of viability or a trend toward Federal listing |
| Pallid bat (*Antrozous pallidus*) | Yes | Yes | Yes | Yes | May affect individuals, but are not likely to lead to a loss of viability or a trend toward Federal listing |
| Townsend's big-eared bat (*Corynorhinus townsendii*) | Yes | Yes | Yes | Yes | May affect individuals, but are not likely to lead to a loss of viability or a trend toward Federal listing |
| **Species that Utilize Riparian or Wetland Habitats** | | | | | |
| Bald eagle (*Haliaeetus leucocephalus*) | Yes | Yes | Yes | Yes | May affect individuals, but are not likely to lead to a loss of viability or a trend toward Federal listing |

| Species Name | Project Area Within Species' Range | Detections in or Near the Project Area | Suitable Habitat Present | Species Addressed Further/ Rationale | Determination |
|---|---|---|---|---|---|
| Great gray owl (*Strix nebulosa*) | Yes | Yes | Yes | Yes | May affect individuals, but are not likely to lead to a loss of viability or a trend toward Federal listing |
| Willow flycatcher (*Empidonax traillii*) | Yes | Yes | Yes | Yes | May affect individuals, but are not likely to lead to a loss of viability or a trend toward Federal listing |
| Greater Sandhill crane (*Grus canadensis tabida*) | Yes | Yes | Yes | Yes | May affect individuals, but are not likely to lead to a loss of viability or a trend toward Federal listing |
| **Terrestrial Invertebrates** | | | | | |
| Western bumble bee (*Bombus occidentalis*) | Yes | No | Yes | Yes | May affect individuals, but are not likely to lead to a loss of viability or a trend toward Federal listing |

## Late-successional Forest Species

## Pacific Marten (*Martes caurina*)

### Species Account

There are numerous marten detections documented on the Tahoe National Forest, although there are currently no known marten dens sites identified. Moriarty (2011) indicates that various 4M habitat types (lodgepole pine, montane riparian, red fir, subalpine conifer, and white fir) are considered "high quality habitat" for marten. CWHR also classifies some 4M habitat as high quality denning habitat for marten.

### Habitat Status

In the Sierra Nevada, this species is known to inhabit high-elevation (4,500 to 10,500 feet) late-successional, mature red fir and lodgepole pine forests with large, decadent live trees and snags, and complex physical structure near the ground composed of an abundance of large dead and downed wood (Buskirk and Powell 1994 *in* Ruggiero et al. 1994, Zielinski 2014). Martens can inhabit younger forests if important elements of the mature forest are still present, especially structures for resting and denning (Purcell et al. 2012, Zielinski 2014). Riparian areas, especially near mature forest, are important for foraging (Zielinski 2014). There are 203,242 acres of suitable marten winter habitat on National Forest System lands within the Tahoe National Forest boundary.

Because marten predictive denning habitat models are currently lacking, the best that can be done at this point is to use the marten landscape-level habitat model produced by Kirk and Zielinski (2009) that identifies high predictability areas for martens. In doing so, one would assume that areas of high predicted suitability would also be indicative of where den sites would occur. However, this model has low spatial resolution and is probably no better than using the reproductive component of CWHR as a predictive model (B. Zielinksi, pers. comm.). Based on CWHR habitat types, currently, there are 154,081 acres of high-capability reproduction habitat[21] on Tahoe National Forest.

### Threats

Martens are sensitive to recreation activities, particularly snow activities (e.g., ski facilities). Much of the information presented on marten and ski resorts comes directly from Zielinski (2013). Ski resorts are considered likely to affect marten populations because they remove and fragment high-elevation fir forest habitat. The operation of ski resorts includes the continued compaction of snow, presence of high densities of skiers, and nocturnal grooming activities. These factors can have negative effects on marten both directly (females may avoid these areas) or indirectly (snow compaction and forest fragmentation facilitate high predation by coyotes) (Slauson et al. 2008). Skiers and staff are active during the day, and grooming and some skiing activity occur during the night. Thus, martens that are sensitive to these activities may not find time for important foraging activities.

There are approximately 25 ski resorts in the Sierra Nevada, and nearly all occur within the range of the marten (Zielinski 2013). The Lake Tahoe region includes approximately half of these resorts (not all found on the Lake Tahoe Basin Management Unit), constituting the highest density of resorts in the Sierra Nevada and one of the highest in North America (Zielinski 2013).

Other snow activities may affect marten, but data from the Lake Tahoe Basin Management Unit indicate that OHV/OSV use did not affect marten occupancy or probability of detection and that overall OHV/OSV use in the study areas was low (1 OHV/OSV pass every 2 hours) and exposure occurred in less than 20 percent of a typical home range (Zielinski et al. 2008).

In a study of marten in northeastern California, Kirk and Zielinksi (2009) reported that marten populations detected are associated with areas that contain the largest amount of reproductive habitat consisting of mature, old forest. The highest density of detections was located in the largest protected area in the study region. Moriarty (2011) reported approximately 60 percent fewer detections of marten at Sagehen Experimental Forest on the Tahoe National Forest than those in the 1980s. These results, although on a smaller spatial scale, are similar to those reported by Kirk and Zielinksi (2009). Although the cause of the decreased detections is unclear, Moriarty (2011) hypothesized that this was associated with loss and fragmentation of habitat; during the same period 39 percent of forested areas at Sagehen Experimental Forest experienced some form of timber harvest (11 percent clearcut or shelterwood and 28 percent salvage). Habitat and occupancy models developed by Spencer and Rustigian-Romsos (2012) indicate that habitat connectivity for marten south of the Plumas National Forest, does not appear to be greatly limiting for martens, although the authors suggest that Interstate 80 may be a significant barrier to movement.

Under the assumption that OSV use would disrupt marten movement within connectivity corridors (even though there would be no changes in habitat), functional habitat connectivity for martens on the Tahoe National Forest was assessed using GIS cost-distance and least-cost corridor modeling (Kirk and Zielinski 2010). This effort involved two primary steps. First, the landscape was modeled as a permeability surface, which described the relative costs to dispersing martens for moving across each linkage from known source and destination locations. Second, least-cost algorithms were used to determine the least-cost movement corridors, using the “corridor” function, and least-cost path, using the “costdistance” function (see Kirk and Zielinski 2010 for a full description). Dispersal corridors calculated using the “costdistance” and “corridor” functions mapped every possible

[21] Jeffrey pine, lodgepole pine, montane hardwood, montane hardwood-conifer, montane riparian, ponderosa pine, red fir, Sierran mixed conifer, subalpine conifer, and white fir CWHR types 4M, 4D, 5M, 5D, 6 mixed above 5,000 feet.

movement pathway across the landscapes defined by each linkage. Corridors with the lowest total resistance costs were assumed to be the most essential for successful movement. Corridors that depicted the most likely dispersal routes, the top 10 percent and 25 percent, respectively, were extracted from the model. The top 10 percent corridors were generally within the middle of the wider 25 percent corridors. For this analysis, the 25 percent corridors model was used to assess the potential for impact to marten functional habitat connectivity. There are 79,583 acres of 25 percent corridors on National Forest System lands within the Tahoe National Forest boundary.

### *Direct and Indirect Effects*

Resource indicators and measures (FSH 1909.15, 12.5) used in this analysis to measure and disclose effects to marten (utilizing the methodology conducive to OSV use outltlined above) are listed in table 68. Acres per alternative are derived from high, moderate and low criteria analysis. Alternative 5 has the least amount of OSV trails proposed.

**Table 68. Resource indicators and measures for assessing effects to marten**

| Resource Indicator and Effect | Measure (Quantify if possible) | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| Potential for disturbance to individuals from noise and increased human presence, injury or mortality of individuals, habitat modification (i.e., altered movement due to OSV use), or snow compaction effects to foraging or denning individuals | Acres of suitable habitat impacted by OSV use | 4,831 | 4,831 | 4,826 | 4,831 | 4,460 |
| Potential for loss of habitat connectivity | Acres of corridors impacted by OSV use | 18,297 | 18,297 | 18,107 | 18,411 ( | 17,511 |

Marten associated with late-successional forests can be impacted by activities associated with routes. Gaines et al. (2003) conducted a literature review of 71 late-successional forest-associated wildlife species and identified negative effects on these species that can result from route-associated factors. These impacts include direct loss of habitat from type conversion, diminished quality of habitat attributes or fragmentation, and road avoidance or displacement resulting from direct harassment or noise disturbance. Individuals, environmental groups, and agency biologists have expressed growing concern over habitat fragmentation for late-successional forest-associated species. Various studies have shown that this species group is vulnerable to disturbance, changes in habitat, or displacement by habitat generalists.

The most common interactions between snowmobile routes and wildlife that Gaines et al. (2003) documented from the literature included trapping as facilitated by winter human access, disturbance-based displacement and avoidance,[22] and disturbance at a specific site,[23] usually wintering areas. To

[22] Spatial shifts in populations or individual animals away from human activities on or near roads, trails, or networks.
[23] Displacement of individual animals from a specific location that is being used for reproduction and rearing of young.

a lesser degree, hunting, trapping, poaching, collection, and habitat loss and fragmentation were other interactions identified. Trapping of marten, or any of the special-status species under consideration, is not legal in California and, therefore, will not be considered as an impact in this analysis.

Snowmobile use within late-successional forest habitats can have direct effects to individuals or their habitat (Gaines et al. 2003) by disturbance and possible injury or mortality to individuals from vehicle collisions.

**Disturbance:**

- Displacement of populations or individual animals from a route, related to human activities.
- Disturbance and displacement of individuals from breeding or rearing habitats.
- Physiological response to disturbance, resulting in changes in heart rate or level of stress hormones.

**Potential for Injury or Mortality to Individuals from Vehicle Collision:**

As previously discussed, the likelihood of a collision between snow grooming equipment and wildlife is extremely low because the equipment travels slowly (3 to 6 mph). There is an increased likelihood of collision with OSVs due to higher frequency of OSV use and higher speeds. This effect would be most specific to mammals.

### Possible indirect effects include:

- Altered or dispersed movement as caused by a route or human activities on or near a route
- Creation of a vector pathway for competitors or predators
- Snow compaction impacts to den sites or subnivean prey

In addition to the roads and trails themselves and associated infrastructure, human use of the trails and roads for dispersed recreation activities (e.g., driving, hiking, mountain biking, OHV and OSV use) can lead to direct mortality and injury in the form of vehicle strikes; temporary and permanent displacement of wildlife; alteration of normal behavior and activities by wildlife species (e.g., foraging, nesting, denning, etc.); and spread of noxious weeds. Prolonged or consistent use of trails and roads can lead to permanent displacement of individuals from territories, nest or den abandonment, and/or alteration of foraging behavior and species-specific effects can lead community-wide effects. Higher trophic level species, such as marten, may be particularly vulnerable to disturbances from dispersed recreation activities (Manley et al. 2004). OSV use does not modify vegetative composition or structure.

**Disturbance**

As OSV trail use is an existing condition, animals that occur in the areas affected by OSV use during winter may be habituated to OSV disturbance or may have already modified their behavior to avoid areas adjacent to trails or OSV noise resonating in the forest may cause an alert or startle response in individual animals or may be accepted as ambient noise conditions of the environment as suggested by the study on martens (Zielinski et al. 2007). Although Zielinski et al. (2007), in investigating the response of marten to OHV and OSV-related disturbance in the Sierra Nevada Mountains in California, did not demonstrate an effect of OHV and OSV use on marten occupancy, probability of detection, sex ratio, or activity patterns, the study did not measure behavioral, physiological, or demographic responses, so it is possible that OHVs and OSVs may have effects, alone or in concert with other threats (e.g., timber harvest) that were not quantified in this study. However, those types of responses would be expected to affect individuals rather than the population as a whole.

### Potential for Injury or Mortality to Individuals from Vehicle Collision

Although there is an greater likelihood of collision of individual martens with OSVs than trail grooming equipment due to higher frequency of OSV use and higher speeds, OSV use occurs in more open areas (canopy cover less than 70 percent) and martens generally avoid habitats that lack overhead cover (canopy cover less than 30 percent) such as trails and meadows, where OSV use would be most pronounced. Presumably, a marten would hear an OSV and flee prior to injury or collision.

### Competition and Predation

OSV use compacts snow and some predators may use compacted snow for travel, changing the spatial pattern of their movements and predation (Manley et al. 2004). Buskirk and Powell (1994) documented predation on marten by coyotes, red foxes, and great-horned owls. Roads driven during the winter months provide travel corridors for coyotes to enter into marten winter habitat, affecting marten through competition or direct predation. Since marten have unique morphology that allows them to occupy deep snow habitats where they have a competitive advantage over carnivores, such as coyotes and bobcats, human modifications of this habitat, such as winter road use, over-the-snow travel, and snowmobile trails, can eliminate this advantage and increase access for predators and competitors. Perrine et al. (2010) reported in the Sierra Nevada red fox conservation assessment that coyotes appear to be expanding their winter season range and identified this as a risk factor to the endemic red fox, needing further investigation. However, the recent species report (USFWS 2015b) noted there isn’t any information to indicate that coyotes are increasing at any of the Sierra Nevada red fox sighting areas that overlap with marten observation areas. It is unknown if or how much competition with or predation on martens by coyotes is occurring on the Tahoe National Forest as the result of OSV-related snow compaction or other OSV-related activities.

### Snow Compaction Effects to Denning Individuals or Subnivean Prey

Martens access subnivean space beneath the snow to prey on subnivean species and use a variety of structures including rock crevices, for maternal den sites. Impacts related to OSV use on marten den sites are unknown at this time, but could be an issue given the overlap marten whelping (March/April) season with the OSV use season and the potential for compaction of subnivean habitat where natal and maternal dens may be found (B. Zielinski, pers. comm.). Although there currently are no documented marten den sites on the Tahoe National Forest, as they are located, Sierra Nevada Forest Plan Amendment standards and guidelines designed to protect marten den sites[24] would apply. OSV-related impacts to marten dens that consist of underground squirrel middens, snags, or logs for denning sites would be expected to be minor and primarily noise disturbance-based due to their structure. Rock crevice-based dens could be subject to a greater degree of impact if the rocks are small enough to compact under the weight of an OSV, in which case they could lead to crushing or burying of individuals.

Although OSV use or related activities would not physically alter the vegetative composition or structure of marten habitat, martens, or their prey species, could be subject to OSV-related impacts from snow compaction, including suffocation or alteration of movement while foraging in the

[24] “Mitigate impacts where there is documented evidence of disturbance to the den site from existing recreations, off-highway vehicle routes, trail, and road uses (including road maintenance). Evaluate proposals for new roads, trails, off-highway vehicle routes, and recreational and other developments for their potential to disturb den sites.”

subnivean space beneath the snow. In addition, some small mammals (i.e., voles) may have difficulty navigating through compact snow layers (Manley et al. 2004). Alternative 5 is least impactive for subnivean habitat, with alternative 4 having the most impact.

### Comparison of the Alternatives

The potential for impacts to marten habitat would be greatest in areas most conducive to OSV use (high OSV-use areas). As described in the assumptions section, flatter areas with slopes less than 20 percent and canopy cover less than 70 percent, including the routes and staging areas, themselves, are more conducive to OSV than others and, therefore, likely to receive the highest use. Those assumptions have been incorporated into the following analysis.

Based upon the information displayed in table 69, 95 percent of marten winter habitat is currently designated for OSV use (alternative 1). Under alternative 2, the acres represented are over 5,000 feet, therefore, marten winter habitat is slightly different for alternatives 3, 4, and 5 because the amount of acres not designated for OSV use varies by alternative. OSV-related noise-based disturbance, injury or mortality, competition or predation, or snow compaction effects (den sites or subnivean prey) impacting individual martens would be most likely to occur within that 9 percent of winter habitat. The amount of habitat under the remaining alternatives is similar to alternative 1: alternative 2, 9 percent; alternative 3, 9 percent; alternative 4, 8 percent; and alternative 5, 9 percent.

There are no known marten den sites within the Tahoe National Forest.

**Table 69. Acres of marten winter habitat[25] by alternative**

| | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|
| Designated for OSV use | 193,071 | 193,071 | 194,359 | 222,053 | 171,178 |
| Total acres of marten winter habitat | 203,424 | 203,424 | 203,843 | 233,800 | 205,323 |
| Designated and conducive to OSV use | 18,708 | 19,612 | 19,588 | 25,607 | 17,846 |

Marten whelping season (March – April) overlaps with the latter portion of the OSV season. Den sites occurring within the subnivean space could be physically impacted; minimum snow depth could be used to analyze impacts to marten denning and subnivean habitat by alternative to determine whether disturbance is occurring and if changes in management are necessary. As previously described, once OSV trail grooming season ends on March 31, trail use declines by roughly 50 percent and, therefore, the possibility of direct and indirect effects to marten dens is expected to be low.

Of the modeled marten connectivity habitat (dispersal corridors) on the Tahoe National Forest, 95 percent is currently designated for OSV use (table 70). Under alternative 2, the acres represented are over 5,000 feet, therefore, acres of marten connectivity habitat is slightly different for alternatives 3, 4, and 5 because the amount of acres not designated for OSV use varies by alternative. However, 23 percent (38 percent under alternative 2) is designated and conducive to OSV use. Of that 23 percent (and 38 percent) of habitat, high OSV use is concentrated within 0.5 mile of snowmobile staging areas, on and within 0.5 mile of groomed trails, and in meadows within 0.5 mile of a designated OSV trail, so the majority of OSV use occurs within less than 23 percent of marten habitat. This would be the same under alternative 2. There is little difference in the amount of marten

[25] Rustigian-Romsos and Spencer (2010) Conservation Biology Institute Marten Habitat Suitability Model.

connectivity habitat that would be open to and conducive to OSV use under the other three alternatives (23 percent under alternative 3, 23 percent under alternative 4, and 21 percent under alternative 5), but alternative 5 would have the least impact on marten connectivity habitat overall.

**Table 70. Acres of marten habitat connectivity corridors[26], by alternative**

| | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|
| Designated for OSV use | 75,401 | 75,401 | 74,868 | 75,671 | 70,391 |
| Total acres of marten habitat connectivity corridors | 79,583 | 79,583 | 78,364 | 79,853 | 81,392 |
| Designated and conducive to OSV use | 18,297 | 18,297 | 18,107 | 18,411 | 17,511 |

As previously noted, data from the Lake Tahoe Basin Management Unit indicate that OHV and OSV use did not affect marten occupancy or probability of detection when overall OHV and OSV use in the study areas washigh. OSV use is concentrated within 0.5 mile of snowmobile staging areas, on and within 0.5 mile of groomed trails, and in meadows within 0.5 mile of a designated OSV trail and moderate use occurs within 0.5 mile of marked trails and in areas between 0.5 and 1.5 miles of groomed trails. Therefore, the majority of OSV use would occur within less than 8 to 9 percent of marten winter habitat or 21 to 23 percent of connectivity habitat. Similar to the results of natal and maternal den research, the results of other types of research, as it becomes available, would be used to determine whether or not disturbance is occurring and if changes in management are necessary.

### *Cumulative Effects*

Actions that could result in a cumulative impact to marten, when combined with alternatives 1, 2, 3, 4, or 5 include vegetation management projects and firewood and Christmas tree cutting. Vegetation management projects are very small in comparison to OSV areas and/or do not overlap with groomed and ungroomed OSV routes or staging areas where the highest OSV use occurs.

Other ongoing and foreseeable future activities include livestock grazing, recreation, timber harvest, fuel reduction, woodcutting activities, wildfire suppression, and other activities. These activities may affect some individuals, but no trends toward Federal listing or loss of species viability are expected due to protective measures deemed necessary during environmental analysis and implemented as required. Disturbance to individuals may be expected by the increase in OSV activities as the numbers of national forest visitors' rise. In general, most non-motorized winter recreation occurs along designated trails, where individuals would either avoid a specific area, if too great a disturbance, or habituate to the noise. Timber harvest, fuel reduction, fire suppression, emergency responses, and other actions carried out by Federal workers or contractors are typically able to provide adequate protection for species. In addition, seasonal limited operating periods that prevent disturbance to marten denning sites would be used to minimize disturbance to these sites once they have been identified.

### *Determination Statement*

Alternatives 1, 2, 3, 4 and 5 of the Tahoe National Forest Over-snow Vehicle Use Designation Project *may affect individuals, but are not likely to lead to a loss of viability or a trend toward Federal listing* for marten based on the following rationale:

[26] Least Cost 25% Corridor Modeling (Kirk and Zielinski 2010).

- Vegetative structure or composition of marten habitat would not be physically modified by OSV use and related activities under any of the alternatives.
- Although the potential for impacts to individuals within winter habitat ranges from 8 to 9 percent under all of the alternatives, and connectivity habitat ranges from 21 to 23 percent, it is unknown if OSV use or related activities on the Tahoe National Forest is negatively impacting marten using winter habitat or connectivity habitat, and the percentage of winter habitat and connectivity habitat impacted by OSV use would actually be lower considering that the concentration of OSV use is not equal across the landscape, with the highest use occurring on or within 0.5 mile of groomed routes and staging areas. Available research suggests that OHV and OSV use did not affect marten occupancy or probability of detection when overall OHV and OSV use in the study areas was low.
- Martens tend to avoid the open areas preferred by OSV users. Therefore, the potential for disturbance or collisions along existing roads and trails is expected to be low under all alternatives.
- Den sites within above-ground structures (trees, snags) would not be physically impacted due to the types of structures that are used.
- Marten prey species in meadow areas may be affected by OSV compaction with varying effects depending on minimum snow depth. Cross country snow depth varies depending on the alternative, between 12 to 24 inches.
- Marten whelping season (March – April) overlaps with the latter portion of the OSV season. Den sites occurring within the subnivean space could be physically impacted, minimum snow depth could be used to analyze impacts to marten denning and subnivean habitat by alternative to determine whether or not disturbance is occurring and if changes in management are necessary, thereby minimizing impacts to marten.
- It is unknown if or how much competition with or predation on martens by coyotes is occurring on the Tahoe National Forest as the result of OSV-related snow compaction or other OSV-related activities.

## California Spotted Owl (*Strix occidentalis occidentalis*)

### *Species Account*

Natural Resource Manager (NRM)[27] currently has 190 recorded activity centers on the Tahoe National Forest. There are 663,936 acres of California spotted owl important habitat,[28] including high reproductive habitat, on the Tahoe National Forest.

### *Habitat Status*

In the Sierra Nevada Province, spotted owls use the following five vegetation types in the Sierra Nevada: foothill riparian hardwood, ponderosa pine hardwood, mixed-conifer forest, red fir forest, and east side pine forest (USDA Forest Service 2001). Mixed-conifer forest is used most frequently

[27] The Natural Resource Manager (NRM) is a system of database tools for managing agency data across the Forest Service. NRM includes: Forest Service ACtivity Tracking System (FACTS), Infrastructure (Infra), Natural Resource Information System (NRIS), and Timber Information Manager (TIM) applications. NRM applications provide tools for most of the agency's natural resource business areas.

[28] Habitat types important for late-successional forest species include stands typed as 4M, 4D, 5M, 5D, and 6 by California Wildlife Habitat Relationship (CWHR), which are all stands of trees greater than 11 inches dbh with greater than 40 percent canopy cover (Sierra Nevada Forest Plan Amendment, USDA Forest Service 2004). In addition, a 7,600-foot elevational limit was included based upon species elevational range (CDFW 2015).

by this species in the Sierra Nevada: approximately 80 percent of known sites are found in mixed-conifer forest, 10 percent in red fir forest, 7 percent in ponderosa pine/hardwood forest, and the remaining 3 percent in foothill riparian/hardwood forest and eastside pine (Ibid). In northern California, the species' elevational range extends from sea level to approximately 7,600 feet (CDFW 2015b).

Spotted owl home ranges, and nesting and roosting locations are strongly associated with mature coniferous forests with high tree canopy cover (70 percent or greater), multi-layered canopies, and an abundance of large trees and snags (Forsman et al. 1984, Bias and Gutierrez 1992, Call et al. 1992, Verner et al. 1992, Bond et al. 2004, Chatfield 2005). Spotted owl foraging habitat consists of a broader range of vegetation types that may include younger, more open habitat (Williams et al. 2011, Roberts and North 2012, Keane 2013). Large coarse woody debris is a key habitat feature of spotted owl prey.

Spotted owl nest stands may be occupied by breeding spotted owls from February until October. Nesting behavior is initiated in February or early March when pairs begin roosting together and calling to each other more frequently at dusk before foraging or when returning to roost before dawn (Forsman 1976, Forsman et al. 1984). Egg laying occurs in March or April (Ibid). Hatching peaks May 7 to 21 (Sierra Nevada), and fledging (young leaving the nest) occurs generally when the nestlings are 34 to 36 days old (Forsman et al. 1984). The post-fledging dependency period extends through late summer; dispersal from the natal site occurs in September or October (Gutierrez et al. 1995b, Miller 1989). A spotted owl ecology study found that approximately 90 percent of juveniles fledged by July 8 (Blakesley et al. 2010).

Throughout the Sierra Nevada, California spotted owl nesting habitat is protected in California spotted owl protected activity centers (csoPACs). A csoPAC includes 300 acres of the highest quality nesting habitat available, and the most recent nest site or activity center within a spotted owl breeding territory as described in management direction for the forest (USDA Forest Service 2004b).

A home range core area includes its associated PAC, is 1,000 acres in size, and is composed of the best available contiguous habitat. The core area corresponds with 20 percent of a breeding pair home range plus one standard error. Home ranges vary substantially across the range of this subspecies. Home range sizes of California spotted owls tend to be smallest in lower-elevation hardwood forests, intermediate in size in conifer forests of the central Sierra Nevada, and largest in true fir forests in the northern Sierra Nevada (Verner et al. 1992). Neal et al. (1990) reported that California spotted owl home ranges in Sierra Nevada mixed conifer forests averaged 3,400 acres, including about 460 acres in stands with 70 percent or greater canopy cover, and about 1,990 acres in stands with 40 to 69 percent canopy cover. Verner et al. (1992) generally concur with these data, indicating that Sierra National Forest owls were found to have a median home range for pairs of approximately 3,000 to 5,000 acres. However, Verner et al. (1992) cite an overall mean home range size of owl pairs during the breeding period in Sierran conifer forests of about 4,200 acres.

Focused studies on northern spotted owls (Shasta-Trinity and Mendocino National Forests), have been conducted to evaluate direct effects of noise on the species during its breeding timeframes. Behavioral responses to disturbance, such as leaving an area, can be readily observed (Tempel and Gutierrez 2003). Physiological responses to disturbance are not as easy to detect because they are not necessarily associated with behavioral responses (Tempel and Gutierrez 2003). Results from this study indicate that there were reduced reproductive success, particularly in adult males in response to acute traffic exposure (Hayward et al. 2011). The highest sensitivity appeared to occur among males in May when they were the sole providers for their mates and offspring, suggesting that spring may be a particularly important time to limit motorized recreation near northern spotted owl territories (Ibid.).

### *Threats*

Potential threats and stressors to spotted owls include high-severity stand-replacing fires, expansion of barred owls (*Strix varia*), loss of large trees and dense canopy cover, habitat fragmentation, climate change, and disease.

### *Direct and Indirect Effects*

Resource indicators and measures (FSH 1909.15, 12.5) used in this analysis to measure and disclose effects to California spotted owl are listed in table 71.

**Table 71. Resource indicators and measures for assessing effects to California spotted owl**

| Resource Indicator and Effect | Measure (Quantify if possible) | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| Potential for disturbance to or displacement of individuals from noise and increased human presence, injury or mortality of individuals | Acres of important habitat impacted by OSV use | 6,262 | 3,757 | 6,262 | 8,453 | 5,411 |
| Potential for disturbance to or displacement of individuals from OSV use and increased human presence, injury or mortality of individuals | Acres of buffered CSO activity centers impacted by OSV use | 11,885 | 7,131 | 11,885 | 16,293 | 12,108 |

Gaines et al. (2003) conducted a literature review of 71 late-successional-forest-associated wildlife species and identified negative effects on these species that can result from route-associated factors. Impacts included road avoidance or displacement resulting from direct harassment or noise disturbance. Individuals, environmental groups, and agency biologists have expressed growing concern over habitat fragmentation for late-successional forest-associated species. Various studies have shown that this species group is vulnerable to disturbance, changes in habitat, or displacement by habitat generalists.

Snowmobile use within late-successional forest habitats can have direct effects to individuals or their habitat (Gaines et al. 2003) by disturbance and injury or mortality to individuals from vehicle collisions.

**Disturbance:**

- Displacement of populations or individual animals from a route, related to human activities.
- Disturbance and displacement of individuals from breeding or rearing habitats.
- Physiological response to disturbance, resulting in changes in heart rate or level of stress hormones.

### Potential for Injury or Mortality to Individuals from Vehicle Collision:

Although California spotted owlscould collide with OSVs or grooming equipment, the likelihood is very low for the following reasons: spotted owls spend little time at ground level; they are nocturnal and most OSV use on the Tahoe occurs during daytime hours; and although snow grooming equipment operates during darkness, the equipment travels slowly (3 to 6 mph).

### Potential Indirect effects include:

- Altered or dispersed movement as caused by a route or human activities on or near a route.
- Snow compaction (prey base for several of the other late-successional forest species under consideration).

In addition, Gaines et al. (2003) found an interaction that occurred on winter recreation routes was the indirect effect of snow compaction on the subnivean sites used by small mammals in which small mammals can either be suffocated as a result of the compaction, or their subnivean movements can be altered owing to impenetrable compact snow. Adverse effects to subnivean animals could indirectly affect the prey base for many Forest Service sensitive species, including California spotted owl.

According to Forsman et al. (1984) spotted owl courtship behavior usually begins in February or March with the timing of nesting and fledging varying by elevation and latitude. April 1 coincides with incubation in most areas (USFWS 2012a). The OSV grooming season generally begins in mid-December and continues through March. Start and stop times vary by trail location and are dependent upon the presence and depth of snow. As described in the assumptions section for the purpose of this analysis, April 30 will be used as the cut-off date for the maximum period of interaction between California spotted owls and OSV use and related activities.

The Forest Service considers activities farther than 0.25 mile (400 meters) from a spotted owl nest site to have little chance of affecting nesting spotted owls. Snowmobiles passing within 0.25 mile of unsurveyed nesting/roosting habitat or an active nest could disturb nesting California spotted owls.

OSV use can affect California spotted owls either directly through disturbance or displacement of individuals from routes, breeding or rearing habitats, physiological response to disturbance or potential for injury or mortality from collision, or indirectly through altered or dispersed movement caused by a route or human activities on or near a route. However, due to the structural nature of suitable habitat (i.e., dense forested stands), the level of cross-country travel in California spotted owl suitable habitat is expected to be relatively low, and most disturbance is likely to occur primarily along existing roads and trails. Based on the OSV use assumptions, once OSV trail grooming ends, it is estimated that use of those trails declines by 50 percent. Therefore, the possibility of direct and indirect effects to csoPACs within 0.25 mile of groomed trails would decrease after March 31. Habitat would not be physically modified by OSV use and related activities.

Under all alternatives, groomed and ungroomed routes and staging areas occur within 0.25 mile of California spotted owl activity centers and/or important habitat. However, OSV use is not consistent across all available habitat. Although we don’t know specifically where impacts will occur at any given time and we cannot quantify the amount of impact, we know the impacts would be greatest in areas most conducive to OSV use (high OSV-use areas). As described in the assumptions section, flatter areas with slopes less than 20 percent and canopy cover less than 70 percent, including the routes and staging areas, themselves, are more conducive to OSV than others and, therefore, likely to receive the highest use. Those assumptions have been incorporated into the following analysis.

Behavioral responses to disturbance, such as leaving an area, can be readily observed in spotted owls (Tempel and Gutierrez 2003) and sensitivity in adult male spotted owls in response to acute traffic exposure was highest in May (Hayward et al. 2011). The intensity and duration of noise-generating activities tested by Hayward et al. (2011) are not expected to occur as a result of the proposed action because the maximum period of interaction between OSVs and related activities occurs before May when breeding adult males are most sensitive to noise. Noise associated with snowmobile use and associated activities in the action area is expected to be of short duration (amount of time it would take to travel through any given area) and of intermittent intensity (amount of concentrated noise).

Based upon OSV use patterns described in the assumptions section, once OSV trail grooming ends, it is estimated that use of those trails declines by 50 percent. Therefore, the potential for direct and indirect effects to activity centers within 0.25 mile of groomed trails would decrease substantially after March 31 for alternatives 1 through 3, but not necessarily for alternative 4. Due to the structural nature of important spotted owl habitat (i.e., dense forested stands), the level of cross-country travel occurring in this habitat is less than the amount of available habitat. The potential for noise-based disturbance is actually expected to be lower because use, and therefore, the highest potential for disturbance is expected within 0.5 mile of existing roads, trails and staging areas, under all alternatives. Habitat would not be physically modified by OSV use and related activities.

Trail grooming occurs on existing roads and trails and primarily occurs at night when fewer species are active, but when spotted owls are more active. Trail grooming would not physically modify habitat. Under all alternatives the grooming season generally begins in mid-December and continues through March. Start and stop times vary per trail location dependent upon snow presence. Grooming starts in most locations with minimum snow depth of 12 inches. Trails are prioritized for grooming based on visitor use. Grooming on priority trails occurs several times per week and after major storms. Trail grooming occurs as soon as possible after a storm in which snow accumulations have been substantial. The ideal air temperature for grooming is 35 degrees Fahrenheit or less with the temperature dropping. Wet snow requires a lower temperature to set and is best groomed at night. Potential effects of noise disturbance would be the same as those noted due to OSV use. In addition, trail grooming and night riding could disturb owls that forage at night. A passing trail grooming machine or OSV may interrupt owl foraging, result in owl prey taking refuge, or cause owls to redirect their foraging away from trail areas. However, due to the limited frequency[29] and duration of trail grooming at any trail segment location, as well as grooming activity being an ongoing operation for many years on the same trail routes, the noise disturbance from trail grooming would not have a significant impact on breeding or foraging spotted owls.

Although OSV use or related activities would not physically alter the vegetative structure of spotted owl habitat, spotted owl prey species that use the subnivean space could experience OSV-related impacts from snow compaction, including suffocation or alteration of movement while foraging in the subnivean space beneath the snow. The degree of this impact is unknown, but would be more likely in areas most conductive to OSV use.

### Comparison of the Alternatives

Table 72 and table 73 show and compare, by alternative, the acres of known activity centers buffered by 0.70 mile and important California spotted owl habitats, respectively, with the potential for direct and indirect effects from OSV use and related activities. The 0.70 mile buffer covers the protected

[29] Grooming operations at most trail systems currently operate near a maximum level. Trails are prioritized for grooming based on visitor use. Grooming on priority trails occurs several times per week and after significant storms. Snow removal on access roads and trailhead parking areas, serving the OSV Program trail systems, occurs several times during storm events as necessary dependent upon weather conditions (California Department of Parks and Recreation 2010).

activity center plus .25 miles to estimate potential impacts within the protected activity centers, the buffer, and the core area. Table 72 shows that approximately 30 percent of the total amount of important CSO habitat across the Forest falls within the criteria used for the alternatives. Eight percent of California spotted owl activity centers buffered by 0.70 mile are currently designated for OSV use (alternative 1). However, only 2 percent is designated and conducive to OSV use. Similarly, under alternative 2, 13 percent of important California spotted owl habitat would be designated for OSV use, but only 1 percent would be designated and conducive to OSV use. The potential for OSV-related impacts to California spotted owls, including noise-based disturbance, snow compaction impacting subnivean space of prey species, or injury/mortality, would be most likely to occur in those areas conducive to OSV use. In addition, the buffered activity centers and the important habitat open to and conducive to OSV use, high OSV use would be concentrated within 0.5 mile of snowmobile staging areas, on and within 0.5 mile of groomed trails, and in meadows within 0.5 mile of a designated OSV trail, so the majority of OSV use occurs within an even smaller percentage of each of those habitats. This would be similar under the other three alternatives.

**Table 72. Acres of known California spotted owl activity centers, buffered by 0.70 mile, with potential to be impacted by OSV use and related activities, by alternative**

| | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|
| Designated for OSV Use | 6,262 | 10,174 | 6,262 | 8,453 | 5,411 |
| Total acres of California spotted owl activity center, buffered by 0.70 miles | 75,684 | 75,684 | 75,684 | 84,542 | 74,833 |
| Designated for OSV use and conducive to OSV use | 1,605 | 2,388 | 1,605 | 2,093 | 1,344 |

Under alternative 2, 41 percent of important California spotted owl habitat designated for OSV use, and 1 percent of important California spotted owl habitat would be designated for and conducive to OSV use, over 5,000 feet elevational limit. The Forest would use the results of ongoing inventory and monitoring of California spotted owl activity centers to determine whether or not disturbance is occurring and if changes in management are necessary. The potential for noise-based disturbance would largely overlap with roughly the first 20 percent, or the pair bonding, mating, and egg laying stages, of the March 1 through August 15 California spotted owl breeding season under all alternatives. As previously described, once OSV trail grooming season ends on March 31, trail use declines by roughly 50 percent and, therefore, the potential for direct and indirect effects to activity centers within 0.25 mile of groomed trails would decrease by an estimated 50 percent after March 31 for all alternatives.

**Table 73. Acres of important California spotted owl habitat with potential to be impacted by OSV use and related activities, by alternative**

| | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|
| Designated for OSV use | 188,610 | 81,718 | 189,959 | 218,213 | 166,943 |
| Total acres of important CSO habitat | 199,519 | 199,519 | 200,235 | 230,722 | 201,659 |
| Designated and conducive to OSV use | 6,262 | 2,388 | 6,262 | 8,453 | 5,411 |

### *Cumulative Effects*

Ongoing and reasonably foreseeable actions may be additive locally to individual California spotted owls, but, given the small scale for the potential of overlap of cumulative effects in time and space with any of the alternatives, they are not expected to contribute substantial impacts to effects discussed for the project under any of the alternatives.

### *Determination Statement*

Based upon the best available data and scientific information, all of the alternatives of the Tahoe National Forest Over-Snow Vehicle Use Designation Project *would impact individuals, but are not likely to lead to a trend toward Federal listing or a loss of viability* for California spotted owl in the Forest Plan area based on the following rationale:

- OSV proposed actions would not physically modify the vegetative structure or composition of any suitable (nesting, roosting or foraging), dispersal, or capable habitat within the project area.
- Due to the structural nature of suitable habitat (i.e., dense forested stands), the level of cross-country OSV travel in California spotted owl suitable habitat is expected to be relatively low, and most disturbance is likely to occur primarily along existing roads and trails. Although the potential for noise-based disturbance to individuals within important habitat ranges from 82 to 94 percent, and individuals within buffered PACs ranges from 2 to 3 percent, under all of the alternatives, the percentage of habitats impacted would actually be lower considering that the concentration of OSV use is not equal across the landscape.
- OSV-related noise-based disturbance would overlap with only the early part of the March 1 through August 31 California spotted owl breeding season.
- OSV use is most common on trails. Once OSV trail grooming season ends on March 31, trail use declines by roughly 50 percent and, therefore, the possibility of direct and indirect effects to activity centers within 0.25 mile of groomed trails would decrease by an estimated 50 percent after March 31 for alternatives 1 through 3 (and not long, thereafter, for alternative 4, with the exception of extremely high snowfall years).
- The forest would use the results of ongoing inventory and monitoring of spotted owl activity centers to determine whether disturbance is occurring and if changes in management are necessary, thereby minimizing impacts to California spotted owl.
- Other than a single OHV study, with uncharacteristically high disturbance exposure times, there is no evidence of a disturbance impact to individuals or reproductive output.
- There is no evidence linking OSV noise-based disturbance to long-term population declines.
- Disturbance to California spotted owl foraging behavior would be limited primarily to areas adjacent to OSV trails and short-term in nature during trail grooming because the species is nocturnal and most OSV use occurs in the daytime.
- The potential for OSV collision with individual California spotted owls is very low due to the unlikeliness that an individual would stay in an area with the high noise disturbance.

## Northern Goshawk (*Accipiter gentilis*)

### *Species Account*

Goshawk territories on Tahoe National Forest are managed as protected activity centers (ngoPAC) under direction prescribed by the Sierra Nevada Forest Plan Amendment (USDA Forest Service 2004). Based upon the best available data, there are 16,085 acres of ngoPACs. Each of the 128 ngoPACs is buffered by 0.25 miles, and 673,767 acres of goshawk important habitat,[30] including high-reproductive habitat, on the Tahoe National Forest.

### *Habitat Status*

The northern goshawk prefers mature forests with large trees on moderate slopes with open understories. They nest in coniferous, deciduous, or mixed-pine forests, depending on availability (Squires and Reynolds 1997). The northern goshawk is a year-round resident throughout most of California.

Northern goshawk nesting habitat at the nest stand scale has consistently greater canopy cover, greater basal area, greater numbers of large-diameter trees, fewer small-diameter trees, less understory cover, and gentle to moderate slopes relative to non-used, random sites (USDA Forest Service 2001). The northern goshawk breeding season is February 15 through September 15.

Goshawks are morphologically adapted to foraging in forested habitats, but are also adapted to ambushing prey in open habitats (summarized in Squires and Reynolds 1997). In California, mature and old-growth habitat (20.8 inches and greater dbh, canopy closure 40 percent and greater) were used, whereas open habitats such as meadows and early seral areas were avoided in mixed-conifer forests (Austin 1993).

Northern goshawk nest areas may be occupied by breeding goshawks from mid-February until late September, and are the focus of all movements and activities associated with nesting. Goshawks may have multiple nest areas within their home range, and nest areas may be used intermittently for many years. Nest areas have relatively high canopy cover (typically greater than 50 percent) and a high density of large trees.

The home range increases in size from the breeding season to the non-breeding season and is generally larger for males than for females throughout the year. During the breeding season, the average home range of northern goshawks in the Lake Tahoe area is 6,745 acres for males and 5,040 acres for females. Non-breeding season home ranges averaged 23,448 acres for males and 13,888 acres for females (Keane 1999). Home ranges include areas with a greater proportion of larger tree size classes and higher density classes than that randomly available across the landscape. The area within the home range, but outside the post-fledging family area, is often referred to as the foraging area (Reynolds et al. 1992).

Goshawks are well known to be territorial and exhibit high site fidelity (Detrich and Woodbridge 1994). In the Sierra Nevada, northern goshawk nesting habitat is protected by the delineation of ngoPACs. Northern goshawk PACs are delineated to include the best available 200 acres of nesting habitat, and the most recent nest site and alternate nests within a goshawk breeding territory as described in management direction for the forest (USDA Forest Service 2001, USDA Forest Service 2004). The size of the PACs corresponds with criteria reported by Detrich and Woodbridge (1994) such that territory occupancy rates of approximately 100 percent were associated with clusters of nest stands totaling 150 to 200 acres (USDA Forest Service 2001).

It is important to note that goshawk PACs and territories do not correlate on a one-to-one basis. The territories currently recognized are based on retrospective examination of approximately 34 years (1977 to 2010) of surveys, whereas goshawk PACs are delineated prospectively as nesting and/or

[30] Habitat types important for late-successional forest species include stands typed as 4M, 4D, 5M, 5D, and 6 by California Wildlife Habitat Relationship (CWHR), which are all stands of trees greater than 11 inches dbh with greater than 40 percent canopy cover (Sierra Nevada Forest Plan Amendment, USDA Forest Service 2004).

occupancy are discovered. The prospective delineation of PACs is a conservative management approach. The forest also follows a conservative approach in eliminating goshawk PACs, which in some cases results in multiple PACs within a single territory. To keep consistency for this analysis, a 0.25 buffer was used around a goshawk activity center, at the center of the ngoPAC.

### Threats

A study conducted by Morrison et al. (2011) in the Lake Tahoe Basin indicated that northern goshawks are susceptible to human disturbance; human activity was twice as high within infrequently occupied territories as compared to frequently occupied territories. Many kinds of human activities have been documented to affect raptors by altering habitats; physically harming or killing eggs, young, or adults; and by disrupting normal behavior (Postovit and Postovit 1987, Delany et al. 1999 as cited in Morrison et al. 2011). A recent study on nesting northern goshawk response to logging truck noise found that while goshawks alerted (turned their head in the direction of the noise) to the noise, they did not flush and response was inversely proportional to the distance of the nest from the road (Grubb et al. 2012).

Little is known about the goshawk's sensitivity or responses to human disturbance (Dunk et al. 2011). Human disturbance, including noise disturbance generated by OSVs and associated trail grooming equipment, could cause goshawks to abandon nests during the nesting and post-fledging period (February 15 through September 15). As a result, Dunk et al. (2011) experimentally tested whether ATVs and hikers disturb goshawks in Plumas National Forest of the Sierra Nevada. More specifically, they analyzed whether there was evidence of an effect of ATVs or hikers on the behavior or reproduction of goshawks. Given the absence of OSV/goshawk studies, this study is the closest to potential for disturbance from OSV use because sound levels are similar. ATVs in this study produced sound in the range of 70 to 110 dBA; noise from snowmobiles manufactured after June 30, 1976, have a noise emission of 73 dBA at 50 feet while traveling at 15 mph, when tested under SAE J1161 procedures,[31] and noise generated by snowplows and snowcats used for OSV program operations ranges from 80 to 85 dBA[32] (California Department of Parks and Recreation 2010). Dunk et al. (2011) evaluated the possible effects of three kinds of recreational activity: (1) sustained activity by ATVs on roads near nests and fledglings (Sustained-ATV experiments), (2) direct approaches by ATVs or hikers toward nests (Direct-approach experiments), and (3) sustained activity below nests by hikers and a dog (Intensive-hiker experiments). For the purpose of this analysis, we will focus on Sustained-ATV experiments for nesting goshawks, because the OSV use period is outside of the fledgling period, and Direct-approach ATV experiments.

Sustained-ATV treatments were designed to evaluate whether, and how, nesting goshawks and their young respond to sound from ATVs operated on nearby roads. Treatments consisted of driving an ATV for approximately 1 hour back and forth on transects on established roads near the nest, exposing the nest to multiple ATV passes during each treatment. Each sustained-ATV treatment during the nesting phase consisted of two portions: slower driving (ca. 16 kilometers per hour) and faster driving (ca. 24 to 32 kilometers per hour) to expose goshawks to a realistic variety of sound levels associated with ATV use on these kinds of roads.

[31] This is the equivalent of a single passenger vehicle or motorcycle on a roadway. A snowmobile under full throttle emits the same sound level as a truck pulling a camper at a constant highway speed applying very little throttle. In a worst case scenario, a snowmobile leaving a stop sign and applying full throttle, the noise produced is still about the same as a passenger vehicle driving down the road (International Snowmobile Manufacturers Association 2008). The effect is audible but not long lasting (California Department of Parks and Recreation 2010).

[32] This is similar to typical construction equipment (backhoe, excavator, grader). Typical hourly average noise levels from this equipment are 75 to 80 dBA at a distance of 100 feet. These noise levels drop off at a rate of 6 dBA per doubling of distance between the noise source and receptor.

Three metrics of ATV impacts on goshawks were used to compare sustained-ATV treatment and control territories: (1) percentage of time females spent off the nest, (2) frequency of kekking [calls are also typically associated with alarm or agonism in goshawks (Squires and Reynolds 1997)] bouts, and (3) frequency of prey deliveries. There were no significant differences in the mean percentage of time that females spent off nests, mean number of kekking bouts, or mean number of prey deliveries per hour during control experiments and during sustained ATV treatments. However, a significant difference between treatment and control territories in the percentage of time that female goshawks spent off the nest during the treatment/control hour and the pre-treatment/control hour was found. This was interpreted to mean that sustained ATV use near nests had an effect on goshawks. However, based on the researchers' extensive personal observations, the kind of activity goshawks were exposed to during sustained ATV treatments was more intensive than was typical recreational use of ATVs on the Plumas National Forest. The same would be expected of OSV use on the Tahoe National Forest.

The ATV used in direct nest approaches followed a pre-determined transect that, at its midpoint, passed directly below or as close as possible to the nest, and then returned by the same route. The total (round-trip) transect length was 800 meters. Direct-ATV approach treatments did not include slower and faster driving phases. Because they were often located on rough terrain, direct-ATV approaches generally required driving in lower gears at relatively slow speeds. The mean transect duration was 7 minutes (range 4 to 15 minutes). Nesting females did not appear to respond negatively to direct approaches by ATVs.

In addition, Dunk et al. (2011) evaluated whether a relationship existed between the number of young produced by a territory and the type(s) of experiments that occurred within it during that year and whether there was any evidence that the frequency or duration of research activities influenced reproduction. No evidence was found indicating experimental treatments, or research visits in general, influenced goshawk reproduction. Longer-term and more rigorous reproductive data, including physiological data, are needed to fully address whether recreational or research activities can impact goshawk reproduction. However, data suggest that recreational and research activities would have to be more intensive and extensive than those conducted to negatively affect goshawk reproduction (Dunk et. al 2011).

### *Direct and Indirect Effects*

Resource indicators and measures (FSH 1909.15, 12.5) used in this analysis to measure and disclose effects to goshawk are listed in table 74.

**Table 74. Resource indicators and measures for assessing effects to northern goshawk**

| Resource Indicator and Effect | Measure (Quantify if possible) | Alternatives 1 and 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|
| Potential for disturbance to individuals from noise and increased human presence, or injury or mortality of individuals | Acres of important habitat impacted by OSV use | 2,234 | 2,234 | 3,981 | 1,927 |
| Potential for disturbance to individuals from OSV use and increased human presence, or injury or mortality of individuals | Acres of buffered NGO PACs impacted by OSV use | 14,369 | 14,322 | 16,409 (100%) | 14,661 |

Snowmobile use within late-successional forest habitats can have direct effects to individuals or their habitat (Gaines et al. 2003) by disturbance and injury or mortality to individuals from vehicle collisions.

### Disturbance

- Displacement of populations or individual animals from a route, related to human activities.
- Disturbance and displacement of individuals from breeding or rearing habitats.
- Physiological response to disturbance, resulting in changes in heart rate or level of stress hormones.

### Potential for Injury or Mortality to Individuals from Vehicle Collision:

The likelihood of a collision between snow grooming equipment and wildlife is extremely low because the equipment travels slowly (3 to 6 mph). There is an increased likelihood of collision with OSVs due to higher frequency of OSV use and higher speeds. However, the potential for this effect on goshawks would be low, given that they spend little time at ground level.

### Possible indirect effects include:

Altered or dispersed movement as caused by a route or human activities on or near a route.

In addition, Gaines et al. (2003) found an interaction that occurred on winter recreation routes was the indirect effect of snow compaction on the subnivean sites used by small mammals in which small mammals can either be suffocated as a result of the compaction, or their subnivean movements can be altered owing to impenetrable compact snow. Adverse effects to subnivean animals could indirectly affect the prey base for many Forest Service sensitive species, including goshawk.

Activities greater than 0.25 mile (400 meters) from a goshawk nest site have little potential to affect nesting goshawks. The OSV season overlaps with the courtship through incubation phases of the goshawk breeding season (Woodbridge and Hargis 2006), so snowmobiles passing within 0.25 mile of unsurveyed nesting/roosting habitat or an active nest could disturb nesting goshawks. Although Dunk et al. (2011) found sustained ATV use near nests had a significant effect on the percentage of time that female goshawks spent off the nest during the treatment, they also noted the kind of activity goshawks were exposed to during sustained ATV treatments was more intensive than was typical recreational use of ATVs on the Plumas National Forest. The same would be expected of OSV use on the Tahoe National Forest. In addition, Dunk et al. (2011) found no evidence indicating experimental treatments, or research visits in general, influenced goshawk reproduction. As previously described in the California spotted owl section, monitoring and analysis specific to California spotted owl and northern goshawk PACs and OSV use was conducted on the Lassen National Forest. Lassen National Forest had 174 northern goshawk PACs, at the time, of which 33 (19 percent) were within 400 meters of designated OSV routes. Twenty-three northern goshawk PACs fell within the scope of the GIS analysis conducted. No relationship was apparent between a PAC’s distance from a snow park and whether it was recently occupied.

Although the possibility of OSV-related noise-based disturbance overlaps with only the early part of the February 15 through September 15 goshawk breeding season, once OSV trail grooming season ends on March 31, trail use declines by roughly 50 percent. Therefore, the risk of direct and indirect effects to ngoPACs within 0.25 mile of groomed trails would decrease by an estimated 50 percent after March 31 for alternatives 1 through 3 (and not long thereafter, for alternative 4, with the exception of extremely high snowfall years).

Although OSV use or related activities would not physically alter the vegetative structure of goshawk habitat, goshawk prey species that use the subnivean space could be subject to OSV-related impacts from snow compaction, including suffocation or alteration of movement while foraging beneath the snow. The degree of this impact is unknown, but would be more likely in areas most conductive to OSV.

### Comparison of the Alternatives

Table 75 and table 76 show and compare, by alternative, the amount of northern goshawk acres within a buffered activity center and important habitat, respectively, with the potential for direct (disturbance or displacement, injury or mortality from collision) and indirect (snow compaction effects to subnivean prey) effects, as previously described, and taking slope and canopy cover assumptions into account. Due to the structural nature of important goshawk habitat (i.e., dense forested stands), the level of cross-country travel in goshawk important habitat is less than the amount of available habitat. Ninety-nine percent of goshawk activitiy centers buffered by 0.25 mile are currently designated for OSV use (alternative 1). However, 12 percent is designated and conducive to OSV use. OSV-related impacts to goshawk, including noise-based disturbance, snow compaction impacting subnivean space of prey species, or injury/mortality, would be most likely to occur in those areas conducive to OSV use. In addition, of the 12 percent of buffered activity centers and the 12 percent of important habitat open to and conducive to OSV use, high OSV use is concentrated within 0.5 mile of snowmobile staging areas, on and within 0.5 mile of groomed trails, and in meadows within 0.5 mile of a designated OSV trail, so the majority of OSV use occurs within in an even smaller percentage of each of those habitats; 62 goshawk activity centers buffered by 0.25 mile (48 percent) fall within 0.5 mile of a groomed trail or OSV staging area. This would be similar under the other four alternatives.

**Table 75. Acres of goshawk activity centers, buffered by 0.25 mile, by alternative**

| | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|
| Designated for OSV use | 5,643 | 2,258 | 5,519 | 6,393 | 5,546 |
| Total acres of goshawk PACs, buffered by 0.25 mile | 5,655 | 5,655 | 5,529 | 6,409 | 5,655 |
| Designated and conducive to OSV use | 700 | 420 | 700 | 778 | 632 |

Under alternative 2, with the 5,000-foot elevational limit, 4 percent of important northern goshawk habitat and 7 percent of buffered activity centers would be open and conducive to OSV use. Similarly, 6 percent of important habitat and 12 percent of buffered activity centers would be open and conductive to OSV under alternative 3, 6 percent of important habitat and 12 percent of buffered activity centers under alternative 4, and 5 percent of important habitat and 11 percent of buffered PACs under alternative 5. The forest would use the results of ongoing inventory and monitoring of northern goshawk activity centers to determine whether disturbance is occurring and if changes in management are necessary. Noise-based disturbance would overlap with roughly the first 20 percent, or the courtship (formation of breeding pairs, nest building, and copulation) phase of the February 15 through September 15 northern goshawk breeding season under all alternatives. The risk of direct and indirect effects to activity centers within 0.25 mile of groomed trails would decrease by an estimated 50 percent after March 31 for all alternatives.

**Table 76. Acres of important goshawk habitat by alternative**

| | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|
| Designated for OSV use | 365,625 | 288,632 | 356,624 | 365,625 | 279,058 |
| Total acres of important goshawk habitat | 481,053 | 481,053 | 481,053 | 481,053 | 481,053 |
| Designated and conducive to OSV use | 31,160 | 18,540 | 29,898 | 31,160 | 25,543 |

### *Cumulative Effects*

Vegetation management and salvage projects are very small in comparison to the OSV use area and/or do not overlap with groomed and ungroomed OSV routes or staging areas where the highest OSV use occurs.

Goshawk habitat overlaps with areas open to Christmas tree cutting and firewood cutting. There would be minimal overlap between the Christmas tree and firewood cutting season (annually between November 1 and December 31) and OSV trail grooming season (beginning December 26), and disturbance or displacement from this activity would occur outside of the northern goshawk breeding season under all alternatives. Use of roads within goshawk habitats after the March 31 termination date of the Forest Order closing roads for exclusive OSV use can contribute additional disturbance during the early part of the goshawk breeding season, particularly for nests within 0.25 mile of roads. However, current research shows no evidence that recreational vehicle use influences goshawk reproduction. In general, most non-motorized winter recreation occurs along designated trails, and northern goshawk would either avoid roosting in those areas, if too great a disturbance, or habituate to the noise. Similar activities on State and private lands within the forest boundary and within 0.25 mile of goshawk habitats may impact habitat availability outside of National Forest System lands and may increase disturbance locally. However, the potential for this type of disturbance is unknown. In summary, ongoing and reasonably foreseeable actions may be additive locally to individual goshawks, but are not expected to contribute substantial impacts to those discussed for the project under any of the alternatives.

### *Determination Statement*

Alternatives 1, 2, 3, 4, and 5 of the Tahoe National Forest Over-snow Vehicle Use Designation Project *may affect individuals, but are not likely to lead to a trend toward Federal listing or loss of viability* for the northern goshawk in the Forest Plan area based on the following rationale:

- Vegetative structure or composition of habitat would not be physically modified by OSV use and related activities under any of the alternatives.
- Due to the structural nature of suitable habitat (i.e., dense forested stands), the level of cross-country OSV travel in northern goshawk suitable habitat is expected to be relatively low, and most disturbance is likely to occur primarily along existing roads and trails under all alternatives.
- Although the potential for noise-based disturbance to individuals within important habitat ranges from 8 to 9 percent, and individuals within buffered activity centers ranges from 11 to 12 percent, under all of the alternatives, the percentage of habitats impacted would actually be lower considering that the concentration of OSV use is not equal across the landscape; 30 percent of

buffered goshawk activity centers fall within 0.5 mile of a groomed trail or OSV staging area, the highest OSV use areas.

- OSV-related noise-based disturbance would overlap with only the early part of the February 15 through September 15 goshawk breeding season.
- OSV use is most common on trails and once OSV trail grooming season ends on March 31, trail use declines by roughly 50 percent. As a result, the possibility of direct and indirect effects to goshawk activity centers within 0.25 mile of groomed trails would decrease by an estimated 50 percent after March 31 for all alternatives.
- The potential for OSV collision with individual northern goshawks is very low.

## Bats

### Fringed Myotis (*Myotis thysanodes*)

#### *Species Account*

Most *Myotis thysanodes* in California are referable to *M. t. thysanodes*; populations in the northwestern part of the state (Humboldt, Siskiyou, and Shasta Counties) have recently been placed in the new subspecies, *M. t. vespertinus* (Manning and Jones 1988), although relatively few specimens have been examined and the boundary between subspecies has not been clearly delineated.

In California, the species is found the length of the state, from the coast (including Santa Cruz Island) to over 1,800 meters (5,900 feet) in the Sierra Nevada. Records exist for the high desert and east of the Sierra Nevada. However, the majority of known localities are on the west side of the Sierra Nevada. Museum records suggest that while *M. thysanodes* is widely distributed in California, it is rare everywhere. Available museum records offer documentation for only six maternity sites: two in Kern County (including the type locality at Old Fort Tejon), and one each in Marin, Napa, Tuolumne, and Tulare counties. Investigation of four of these sites since 1990 has shown that while the roosts are still available, this species is no longer present at any of these sites.

#### *Habitat Status*

*M. thysanodes* occurs in xeric woodland (oak and pinyon-juniper most common) (Cockrum and Ordway 1959, Hoffmeister and Goodpaster 1954, Jones 1965, O’Farrell and Studier 1980, Roest 1951), hot desert-scrub, grassland, sage-grassland steppe, spruce-fir, mesic old growth forest, coniferous and mixed deciduous/coniferous forests (including multi-aged sub-alpine, Douglas-fir, redwood, and giant sequoia) (O’Farrell and Studier 1980, Pierson and Heady 1996, Weller and Zabel 2001).

Although nowhere common, the species occurs primarily from sea level to approximately 3,900 to 6,900 feet (O’Farrell and Studier 1980) with an isolated record from 9,500 feet in New Mexico (Barbour and Davis 1969). A lack of records makes it difficult to assess habitat preferences for this species in California. Orr (1956), in reviewing specimens held at the California Academy of Sciences, notes two localities from the coastal region (Carmel in Monterey County and Woodside in San Mateo County). More recently, records have accumulated from the upper Sacramento River (Rainey and Pierson 1996).

### Roosting Habitat

Studies conducted in California, Oregon, and Arizona, have documented that *M. thysanodes* roosts in tree hollows, particularly in large conifer snags (Cross and Clayton 1995, Chung-MacCoubrey 1996, Rabe et al. 1998, Weller and Zabel 2001). *M. thysanodes* is also known to use a variety of roost sites, including rock crevices (Cryan 1997), caves (Baker 1962, Burt 1934, Commissaris 1961, Easterla 1966, 1973), mines (Cahalane 1939, Cockrum and Musgrove 1964), buildings (Barbour and Davis 1969, Musser and Durrani 1960, O'Farrell and Studier 1980, Orr 1956, Studier 1968), and bridges. It is also one of the species thought to be most reliant on abandoned mines (Altenbach and Pierson 1995).

*M. thysanodes* is a colonial roosting species. Colonies can be up to 2,000 individuals (Barbour and Davis 1969). Within buildings, this species tends to roost in the open in tightly packed clusters, mostly using the sides of ceiling joists (O'Farrell and Studier 1980). Any of these types of structures are used as both day and night roosts (Barbour and Davis 1969). Barbour and Davis (1969) noted that this species was readily captured at the entrances to night roosts in buildings, mines, and caves. In a 5-year study on the upper Sacramento River, *M. thysanodes*, though one of the least commonly encountered bats, was more readily detected at bridge night roosts than in netting surveys conducted over water (Rainey and Pierson 1996).

### Foraging Habitat

*M. thysanodes* often forages along secondary streams, in fairly cluttered habitat. It also has been captured over meadows (Pierson et al. 2001). Limited information is available on diet. Relatively heavy tooth wear on animals examined in a 5-year study on the Sacramento River suggests that in that area the species feeds primarily on heavy-bodied insects, such as Coleopterans and Hemipterans.

### Reproduction

Maternity roosts have been found in sites that are generally cooler and wetter than is typical for most other Vespertilionids. Recent radio-tracking studies in the forested regions of northern California have shown that this species forms nursery colonies in predominantly early to mid-decay stage, large-diameter snags 23 to 66 inches dbh) (Weller and Zabel 2001).

Mating occurs in the fall following break-up of the maternity colony. Ovulation, fertilization, and implantation occur from April to May and are followed by a gestation of 50 to 60 days. One young is born from May to July, capable of flight in 16 days, and volant within 20 days.

### Migration and Hibernation

Winter behavior is even more poorly understood than summer behavior. *M. thysanodes* is thought to migrate short distances to lower elevations or more southern areas (O'Farrell and Studier 1980). Scattered winter records suggest, however, that the species does not complete long-distance migrations, and like many species in the more temperate parts of California, may be intermittently active throughout the winter (O'Farrell and Studier 1980). The species has been found hibernating in buildings and mine tunnels along the coast in the San Francisco Bay area and in the coast range north of San Francisco.

### Threats

#### Anthropogenic Roosts

Although *M. thysanodes* does not occur in urban areas, it has often been found in buildings in rural and semi-rural settings (e.g., wineries, Hearst Castle, Big Bear attic, Bale Grist Mill State Historic

Park). These colonies are typically at high risk for negative human interactions. Urban expansion often leads to removal of older buildings that can provide roosts. Newer buildings generally do not provide suitable roosting habitat. Intervention by pest control operators and public health departments can result in the elimination of many roost sites.

### *Direct and indirect Effects*

Public OSV use on the Tahoe National Forest would not change the habitat for fringed bat as no habitat modifications are anticipated

Very little is known about the wintering behavior of fringed myotis bats. Some limited migration to lower elevation may occur. However, if fringed myotis remain on the landscape in winter, there is a low likelihood that behavior of individuals could be modified by the noise or disruption associated with OSV use or grooming of OSV trails. This would be entirely dependent on the location of the winter roost in proximity to a bridge, building, cavity, mine, or tree. Since there are no known winter roosts on the Tahoe, noise cannot be mitigated should there be a noise impact from OSV activities. Should OSV activities create a temporary disturbance, breeding could be impacted, however, it would not preclude breeding at a later time. There should be no impact to the maternal roosts, as they would start in April or May, following snowmelt.

Fringed myotis bats drink water from streams or lakes when they emerge from roosts. In addition, they forage in riparian areas and meadows. Emissions from OSVs, particularly two-stroke engines on snowmobiles, release pollutants like ammonium, sulfate, benzene, PAHs, and other toxic compounds that are stored in the snowpack; during spring snowmelt runoff, these accumulated pollutants are released and may be delivered to surrounding waterbodies (USDA Forest Service National Core BMP Rec-7: Over-Snow Vehicle Use; please refer to the project hydrology report for additional information). However, the minimum cross-country snow depth of 12 inches for all of the action alternatives is expected to be adequate to protect aquatic and riparian habitats from measurable impacts to vegetation or water quality (McNamara 2017).

### *Cumulative Effects*

*M. thysanodes* habitat would have minimal overlap with areas open to Christmas tree cutting and firewood cutting (annually between November 1 and December 31) and OSV trail grooming season (beginning December 26), minimizing possible disturbance or displacement of roosting bats. Use of roads within fringed myotis bat habitats after the March 31 termination date of the Forest Order closing roads for exclusive OSV use can contribute additional disturbance during the early part of the *M. thysanodes* breeding season. There is a slight possibility of an additive effect of vehicle fluids from wheeled vehicles used to access firewood and Christmas trees, as well as from the use of wheeled vehicles during the overlap season between OSVs and wheeled vehicles, to enter waterways, modifying pallid bat prey/food base. However, the risk for this impact is low because vehicle use does not occur in waterways and fluids would not normally reach waterways.

In general, most non-motorized winter recreation occurs along designated trails, and individual bats would either avoid roosting in those areas, if too great a disturbance, or habituate to the noise. Similar activities on State and private lands may impact habitat availability outside of National Forest System lands and may increase disturbance locally. However, the potential for this type of disturbance is unknown. In summary, ongoing and reasonably foreseeable actions may be additive locally to individual bats, but are not expected to contribute substantial impacts to those discussed for the project under any of the alternatives.

#### *Determination Statement*

All alternatives of the Tahoe National Forest Over-snow Vehicle Use Designation Project *may impact individuals, but are not likely to lead to a loss of viability or a trend toward Federal listing* for fringed myotis in the Forest Plan area based on the following:

- Proposed actions would not physically modify fringed myotis bat habitat.
- Proposed actions would generally occur when the species is hibernating and is generally inactive. However, individuals that emerge to forage during warmer weather could experience missed feeding when snow grooming activities occur during the early evening.
- Depending upon the location of winter roost structures with respect to OSV use, individual bats within winter roosts could be disturbed by noise associated with OSVs and human presence, and missed breeding attempts could result.
- The low risk of modification of the prey/food base or impact on drinking water quality from oil, gas, or other vehicle fluids entering waterways would be mitigated by the 12-inch minimum snow depth that would protect aquatic and riparian habitats from measurable impacts to vegetation or water quality.

### Pallid Bat (*Antrozous pallidus*)

#### Species Account

Pallid bat has been documented on the Tahoe National Forest.

#### Habitat Status

*A. pallidus* occurs in a number of habitats ranging from rocky arid deserts to grasslands into mid-elevation mixed deciduous/coniferous forests. In California, they are most commonly found in low-elevation desert washes, western sycamore (*Plantanus racemosa*) open riparian habitat, coast live oak (*Quercus agrifolia*) and valley oak (*Q. lobata*) savannah, mid-elevation black oak (*Quercus kelloggii*) and mixed deciduous/coniferous forest (black oak, incense cedar (*Libocedrus decurrens*) and ponderosa pine (*Pinus ponderosa*) habitat (Barbour and Davis 1969, Johnston et al. 2006, Orr 1954, Pierson et al. 2001, Pierson et al. 2002, Rainey and Pierson 1996). It is also associated with both coast redwood and giant sequoia forests (Pierson and Heady 1996, Orr 1954, Rainey et al. 1992).

#### Roosting Habitat

Tree roosting appears to be preferred in the forested regions of northern California, and has been documented in large conifer snags (e.g., incense cedar, ponderosa pine, sugar pine) (Baker et al. 2008, Johnston and Gworek 2006), inside basal hollows of redwoods (Orr 1954, Rainey et al. 1992) and giant sequoias (Pierson and Heady 1996), and bole cavities in oaks and other trees (e.g., cottonwood, cypress) (Hall 1946, Orr 1954, Pierson et al. 2004, Rainey and Pierson 1996).

Compared to some other California bat species, *A. pallidus* are relatively intolerant of disturbance (O'Shea and Vaughan 1977, Lewis 1996, Johnston et al. 2004) and may abandon a roost when disturbed. Lewis (1996) noted that distances between day and nighttime roosts were usually less than 200 meters, but ranged from 40 to 1,850 meters.

This is one of the species most likely to be found night-roosting under bridges (Barbour and Davis 1969, Johnston et al. 2004, Pierson et al. 2001), but it can also be found in shallow caves, cliff overhangs, and other human-made structures (Hermanson and O'Shea 1983, Lewis 1994). Lewis

(1994) also noted that bridges used by pallid bats as night roosts were wooden, or concrete girder. Pallid bats show a higher fidelity toward night roosts than day roosts (Lewis 1994). Night roosts are typically located within 1 to 2 kilometers of the day roost. When using anthropogenic roosts in northern California, reproductive female A. pallidus generally occupy maternity roosts in April or May, and move to winter roosts in September, October, or even later if weather is moderate.

### Foraging Habitat

Pallid bats forage close to the ground and vegetation in desert washes, open grassland, oak savannah, and/or forest with limited understory (e.g., ponderosa pine parkland or granite slabs with sparse vegetation) (Hermanson and O'Shea 1983). Johnston et al. (2006) found that male and female *A.pallidus pacificus* foraged intermittently through the winter months along and in riparian corridors with western sycamore (*Plantanus racemosa*), California bay (*Umbellularia californica*), and coast live oak (*Quercus agrifolia*) within canyon bottoms in central California; and during summer months, females and males foraged along ridges with grasslands, high open meadows and oak savannah habitats. Johnston and Gworek (2006), and Baker et al. (2008) determined that pallid bats frequently foraged on logging roads and in open and semi-open short grass meadows in the northern Sierra Nevada. Foraging appears to be concentrated in two periods – one just after emergence and one prior to returning to the roost (Hermanson and O'Shea 1983).

Lewis (1996) recorded distances of between 1 and 4 kilometers (0.6 to 2.5 miles) traveled between roost sites and foraging areas and Johnston et al. (2006) found similar distances (0.2 to 4.0 kilometers) for males and females during winter months.

### Reproduction

Pallid bats are gregarious, and often roost in colonies of between 20 and several hundred individuals. Males and females congregate in a central winter roost often associated with smaller satellite roosts in late fall and winter months (Johnston et al. 2006) when breeding occurs (Hermanson and O'Shea 1983). During spring months, pregnant females leave the winter roost and gather in summer maternity colonies (Johnston et al. 2006), with parturition generally occurring between May and July, depending on local climate (Barbour and Davis 1969). Males often leave the winter roost and use a variety of solitary roosts, but they sometimes form a bachelor colony (Johnston et al. 2006). Maternity colonies generally form in early April (Barbour and Davis 1969) and disband between August and October (Hermanson and O'Shea 1983, Lewis 1994.

### Migration/Hibernation

Pallid bats are relatively inactive during the winter; however, Johnston et al. (2006) found that males and females foraged intermittently throughout the winter months, in central California.

They are not known to migrate long distances (Barbour and Davis 1969), and Johnston et al. (2004) determined that the primary female/male winter roost of a large colony in central California was approximately 1 mile from the primary maternity colony roost. During January and February, pallid bats foraged about once every six nights, at temperatures down to 4 degrees C (39 degrees F) and on rainy nights.

### Threats

#### Anthropogenic Roosts

Due to their propensity for using a wide range of buildings as well as bridges, their highly visible roosting habits, urine stains and odor, as well as visible insect prey remains at night roosts, these bats are highly susceptible to negative human contact. Because pallid bats frequently roost in buildings and bridges, display considerable roost loyalty in such roosts, and are often found roosting together with *T. brasiliensis* and *M. yumanensis*, two species that form large colonies (several hundreds to thousands), often where they are highly visible (e.g., open rafters), they are frequently subjected to vandalism, exclusion (humane or otherwise), even illegal poisoning.

### *Direct and indirect Effects*

OSV use and related activities on the Tahoe National Forest would not change the habitat for pallid bat, as no habitat modifications are anticipated. Due to the behavior of pallid bats that they can be seen in winter on warmer nights (39 degrees F), or males moving between winter roosts, or an occasional feeding (once every six nights), there is a low likelihood that pallid bat behavior could be modified by OSV noise or disruption of grooming trails for OSV use.

OSV noise could cause disturbance at the winter roost. This would be entirely dependent on the location of the winter roost in proximity to a bridge, building, cavity, mine or tree. Since there are no known winter roosts on the Tahoe, no reduction of noise can be mitigated should there be a noise impact from OSV activities. Should OSV activities have a temporary disturbance, breeding could be impacted; however, it would not preclude breeding at a later time. There should be no impact to the maternal roosts, as they would start in April or May, following snowmelt.

Pallid bats forage on invertebrates in areas with riparian and/or aquatic environments. Emissions from OSVs, particularly two-stroke engines on snowmobiles, release pollutants like ammonium, sulfate, benzene, PAHs, and other toxic compounds that are stored in the snowpack; during spring snowmelt runoff, these accumulated pollutants are released and may be delivered to surrounding waterbodies (USDA Forest Service National Core BMP Rec-7: Over-Snow Vehicle Use; please refer to the project hydrology report for additional information). However, the minimum cross-country snow depth of 12 inches under all of the action alternatives is expected to be adequate to protect aquatic and riparian habitats from measurable impacts to vegetation or water quality (McNamara 2016).

### *Cumulative Effects*

Cumualtive effects for the pallid bat is the same as fringed myotis (*Myotis thysanodes*).

### *Determination Statement*

All alternatives of the Tahoe National Forest Over-snow Vehicle Use Designation Project *may impact individuals, but are not likely to lead to a loss of viability or a trend toward Federal listing* for pallid bat in the Forest Plan area based on the following:

- Proposed actions would not physically modify pallid bat habitat.
- Proposed actions would generally occur when the species is hibernating and is typically inactive. However, individuals that emerge to forage during warmer weather could experience missed feeding when snow grooming activities occur during the early evening.
- Depending upon the location of winter roost structures with respect to OSV use, individual bats within winter roosts could be disturbed by noise associated with OSVs and human presence and missed breeding attempts could result.
- The low risk of modification of the prey/food base from oil, gas, or other vehicle fluids entering waterways would be mitigated by the 12-inch minimum snow depth that would protect aquatic and riparian habitats from measurable impacts to vegetation or water quality.

## Townsend's Big-eared Bat (*Corynorhinus townsendii*)

### Species Account

There are historical and fairly recent (1997) records of Townsend's big-eared bat near the Tahoe National Forest as well as a documented maternity and hibernaculum in lava tubes on the Hat Creek Ranger District.

### Habitat Status

*C. townsendii* occurs from the inland deserts to the cool, moist coastal redwood forests; in oak woodlands of the inner coast range and Sierra Nevada foothills; and lower- to mid-elevation mixed coniferous-deciduous forests. Distribution is patchy, and strongly correlated with the availability of caves and cave-like roosting habitat, with population centers occurring in areas dominated by exposed, cavity-forming rock and/or historic mining districts (Genter 1986, Graham 1966, Humphrey and Kunz 1976, Kunz and Martin 1982, Pierson and Rainey 1996). Its habit of roosting on open surfaces makes it readily detectable, and it is often the species most frequently observed (commonly in low numbers) in caves and abandoned mines throughout its range.

### Roosting Habitat

*C. townsendii* prefers open surfaces of caves or cave-like structures, such as mines (vertical and horizontal) (Barbour and Davis 1969, Graham 1966, Humphrey and Kunz 1976). It has also has been reported in such structures as buildings, bridges, and water diversion tunnels that offer a cavernous environment (Barbour and Davis 1969, Dalquest 1947, Howell 1920, Kunz and Martin 1982, Pearson et al. 1952, Perkins and Levesque 1987, Brown et al. 1994, Pierson and Rainey 1996). Roosting structures often contain multiple openings. It seems to prefer dome-like areas, possibly where heat or cold is trapped (warm pockets for maternal roosting, cold pockets for hibernation). It has also been reported in rock crevices and large hollow trees (Fellers and Pierson 2002).

Specific roosts may be used only one time of year or may serve many different functions throughout the year (i.e., maternal, hibernation, dispersal, bachelor, breeding, etc.). Roosting surfaces often occur in twilight conditions; however, some have been located very deep inside caves or mines. There is evidence that maternity colonies may use multiple sites for different stages (pregnancy, birthing, or rearing) (Sherwin et al. 2000). Males remain solitary during the maternity season.

*C. townsendii* is very sensitive to human disturbance; however, in some instances it can habituate to reoccurring and predictable human activity.

### Foraging Habitat

Foraging associations include edge habitats along streams and areas adjacent to and within a variety of wooded habitats (Brown et al. 1994, Fellers and Pierson 2002, Pierson et al. 2002). Recent radio-tracking and light-tagging studies have found *C. townsendii* foraging in a variety of habitats. Brown et al. (1994) showed that on Santa Cruz Island in California, they avoided the lush introduced vegetation near their day roost, and traveled up to 3 miles to feed in native oak and ironwood forest. Radio-tracking and light-tagging studies in northern California found *C. townsendii* foraging within forested habitat (Rainey and Pierson 1996). *C. townsendii* has been known to travel up to 15 miles from roost sites while foraging (Dobkin et al. 1995). They forage as long as weather permits in the fall, and are periodically active in winter (Pierson et al. 1991).

### Reproduction

*C. townsendii* is a colonial species with maternity aggregations forming between March and June (based on local climate and latitude). Colony size ranges from a few dozen to several hundred. Mating generally takes place in both migratory sites and hibernacula between September or October and February. Young bats are capable of flight at 2.5 to 3 weeks of age and are fully weaned at 6 weeks (Pearson et al. 1952). Nursery colonies start to disperse in August about the time the young are weaned, and break up altogether in September and October (Pearson et al. 1952, Tipton 1983). Pearson et al. (1952) estimated annual survivorship at about 50 percent for young, and about 80 percent for adults. Band recoveries have yielded longevity records of 16 years, 5 months (Paradiso and Greenhall 1967).

### Migration/Hibernation

*C. townsendii* is a relatively sedentary species, for which no long-distance migrations have been reported (Barbour and Davis 1969, Humphrey and Kunz 1976, Pearson et al. 1952). The longest movement known for this species in California is 20 miles (Pearson et al. 1952). There is some evidence of local migration, perhaps along an altitudinal gradient.

Hibernation sites are generally caves or mines (Pearson et al. 1952, Barbour and Davis 1969), although animals are occasionally found in buildings (Dalquest 1947, E. Pierson pers. obs.). Winter roosting is typically composed of mixed-sexed groups from a single individual to several hundred or several thousand, however, behavior varies with latitude. In areas with prolonged periods of non-freezing temperatures, *C. townsendii* tends to form relatively small hibernating aggregations of single to several dozen individuals (Barbour and Davis 1969, Pierson et al. 1991, Pierson and Rainey 1996). Larger aggregations (75 to 460) are confined to areas that experience prolonged periods of freezing temperatures (Pierson and Rainey 1996). Studies in the western United States have shown that *C. townsendii* selects winter roosts with stable, cold temperatures, and moderate air flow (Humphrey and Kunz 1976, Kunz and Martin 1982). Temperature appears to be a limiting factor in roost selection. Recorded temperatures in *C. townsendii* hibernacula range from minus 2.0 to 13.0 degrees C (28 to 55 degrees F) (Humphrey and Kunz 1976, Genter 1986, Pearson et al. 1952, Pierson et al. 1991, Twente 1955), with temperatures below 10 degrees C (50 degrees F) being preferred (Pierson and Rainey 1996). The period of hibernation is shorter at lower elevations and latitudes.

### Threats

Surveys conducted by Pierson and Rainey (1996) show marked population declines for both subspecies in California. This species has been petitioned for listing as threatened or endangered status in the state. Over the past 40 years, there has been a 52 percent loss in the number of maternity colonies, a 45 percent decline in the number of available roosts, a 54 percent decline in the total number of animals, and a 33 percent decrease in the average size of remaining colonies for the species as a whole statewide. The status of particular populations is correlated with amount of disturbance to or loss of suitable roosting sites. The populations that have shown the most marked declines are along the coast, in the Mother Lode country of the western Sierra Nevada foothills, and along the Colorado River.

The combination of restrictive roost requirements and sedentary behavior suggests that *C. townsendii* is roost limited, and that roost loss, through disturbance or destruction, has been primarily responsible for population declines in most areas. Although fire, winter storms, or general deterioration are sometimes responsible, in all but 2 of 39 documented cases, roost loss in California can be directly linked to human activity (e.g., demolition, renewed mining, entrance closure, human-induced fire, renovation, or roost disturbance). Population declines are most highly correlated with roost destruction in the San Francisco Bay area, along the northern coast, and in San Diego County, and with roost disturbance in the Mother Lode country and along the Colorado River.

**Anthropogenic Roosts**

Although *C. townsendii* is often found using human-made structures, such as barns, large houses, historic buildings, and bridges, they are very sensitive to disturbance, and will readily abandon a day roost, particularly a maternity roost, if disturbed. Bats are often not tolerated in historic structures, even those that are not open to the public, due to concerns over damage to the historic fabric of a building, so even a rare species such as *C. townsendii*, one that forms relatively small colonies, is subject to permanent loss of critical roost habitat. Because *C. townsendii* is a large cavity-roosting species, and not a crevice-roosting species, they will not use bat houses as replacement habitat, so loss of structure roosts is highly significant for this species.

### Caves

Maternity colonies are impacted by inappropriate cave closures or disturbance during human visitation.

The increasing and intense recreational use of caves in California provides the most likely explanation for why most otherwise suitable, historically significant roosts are currently unoccupied. It is well documented that *C. townsendii* is so sensitive to human disturbance that simple entry into a maternity roost can cause a colony to abandon or move to an alternate roost (Pearson et al. 1952; Graham 1966; Stebbings 1966; Mohr 1972; Humphrey and Kunz 1976; Stihler and Hall 1993).

#### *Direct and Indirect Effects*

OSV use on the Tahoe National Forest would not change the habitat for Townsend’s big-eared bat, as no habitat modifications are anticipated

Very little is known about Townsend’s big-eared bats’ wintering behavior. Some limited migration to lower elevation may occur. However, if Townsend’s big-eared bats remain on the landscape in winter, there is a low likelihood that their behavior could be modified by the noise or disruption associated with OSV use or grooming of OSV trails. This would be entirely dependent on the location of the winter roost in proximity to a bridge, building, cavity, mine or tree. Since there are no known winter roosts on the Tahoe, no reduction of noise can be mitigated should there be a noise impact from OSV. Should OSV activities have a temporary disturbance, breeding could be impacted, however it would not preclude breeding at a later time. There should be no impact to the maternal roosts, as they would start in April or May, following snowmelt.

Townsend’s big-eared bats forage in riparian areas and meadows outside of the hibernation period. Emissions from OSVs, particularly two-stroke engines on snowmobiles, release pollutants like ammonium, sulfate, benzene, PAHs and other toxic compounds that are stored in the snowpack; during spring snowmelt runoff, these accumulated pollutants are released and may be delivered to surrounding waterbodies (USDA Forest Service National Core BMP Rec-7: Over-Snow Vehicle Use; refer to the project hydrology report for additional information). However, the minimum cross-country snow depth of 12 inches under all of the action alternatives is expected to be adequate to protect aquatic and riparian habitats from measurable impacts to vegetation or water quality (McNamara 2017).

#### *Cumulative Effects*

Cumualtive effects for Townsend’s big-eared bats is the same as fringed myotis (*Myotis thysanodes*).

### *Determination Statement*

All alternatives of the Tahoe National Forest Over-snow Vehicle Use Designation Project *may impact individuals, but are not likely to lead to a loss of viability or a trend toward Federal listing* for Townsend's big-eared bat in the Forest Plan area based on the following:

- Proposed actions would not physically modify Townsend's big-eared bat habitat.
- Proposed actions would generally occur when the species is hibernating and is typically inactive.
- Depending upon the location of winter roost structures with respect to OSV use, individual bats within winter roosts could be disturbed by noise associated with OSVs and human presence, and missed breeding attempts could result.
- The low risk of modification of the prey/food base from oil, gas, or other vehicle fluids entering waterways would be mitigated by the 12-inch minimum snow depth that would protect aquatic and riparian habitats from measurable impacts to vegetation or water quality.

## Species that Utilize Riparian or Wetland Habitats

### Bald Eagle (*Haliaeetus leucocephalus*)

#### Species Account

The bald eagle, (*Haliaeetus leucocephalus*), was federally de-listed on August 8, 2007 (Federal Register Vol. 72, No. 130, pp. 37346-37372) and then placed on the USDA Forest Service Region 5 Regional Forester's sensitive species list.

This species occurs and winters throughout California, except in desert areas. Migratory individuals from northern and northeastern parts of the state arrive between mid-October and December, and remain until March or early April. Most bald eagle breeding in California occurs in the northern counties (Butte, Lake, Tahoe, Modoc, Plumas, Shasta, Siskiyou, and Trinity Counties), typically at low elevations; breeding in the high Sierra Nevada is rare (USDA Forest Service 2001).

#### Habitat Status

Bald eagles winter near lakes, reservoirs, riverine, and marsh habitats. They breed mainly in the northern portion of the state near coastlines, rivers, large lakes or streams that support an adequate food supply. Bald eagles require open water with juxtaposed mature trees or steep cliffs for nesting, perching, foraging, and roosting (Bent 1961 in Murphy and Knopp 2000). They often nest in mature or old-growth trees; snags (dead trees); cliffs; rock promontories; rarely on the ground; and with increasing frequency on human-made structures such as power poles and communication towers. On the Tahoe National Forest, bald eagles initiate breeding in January. Incubation begins in late February to mid-March with the nesting period extending as late as the end of June (USDA Forest Service 2010).

Bald eagles are usually monogamous and pair for life, though repairing may occur if either of the pair dies. The mating season varies by latitude. Pair initiation begins in January and egg-laying occurs in early May. Breeding home ranges vary substantially by location from 58 acres in Alaska to 5 acres in Arizona. Migration distances of up to 1,712 miles have been recorded. Fidelity to wintering grounds is strong (summarized in USDA Forest Service 2001).

There are 18 nest sites (565 acres) buffered by 660 feet[33]and 22,022 acres of bald eagle reproductive habitat[34] on National Forest System lands within the Tahoe National Forest boundary.

### Threats

The Recovery Plan for the Pacific Bald Eagle (USFWS 1986) states that the main threats to this species in Sierra Nevada Mountains (Zone 28) are disturbance at wintering grounds and loss of potential nesting habitat to logging or development. The Plan's proposed management directions are maintenance of winter habitat and evaluation of reintroduction/expansion of 'breeders.' The most urgent site-specific task (1.3211) identified for the Forest Service in the Sierra Nevada Mountains is to prohibit logging of known nest, perch, or winter roost trees (USFWS 1986).

Bald eagles are also sensitive to human or recreation disturbance. Numerous studies have reported that eagles avoid or are adversely affected by human disturbance during the breeding period, which may result in nest abandonment and reproductive failure (Stalmaster and Newman 1978, Andrew and Mosher 1982, Fraser et al. 1985, Knight and Skagen 1988, Buehler et al. 1991, Grubb and King 1991, Chandler et al. 1995). The response of bald eagles to human activities is variable. Individual bald eagles show different thresholds of tolerance for disturbance. This variability may be related to a number of factors, including visibility, duration, noise levels, extent of the area affected by the activity, prior experiences with humans, and tolerance of the individual nesting pair (USFWS 2007). Forested habitats can mute noise generated by vehicles and screen the vehicle from sight. Disturbance effects are greatest during nest building, courtship, egg laying, and incubation. However, disruption, destruction, or obstruction of roosting and foraging areas can also negatively affect bald eagles. Disruptive activities in or near eagle foraging areas can interfere with feeding, reducing chances of survival or productivity (number of young successfully fledged). Migrating and wintering bald eagles often congregate at specific sites, usually in mature trees where the eagles are somewhat sheltered from the wind and weather, for purposes of feeding and sheltering because of their proximity to sufficient food sources. Human activities near or within communal roost sites may prevent eagles from feeding or taking shelter, especially if no other undisturbed and productive feeding and roosting sites are available.

Stalmaster and Newman (1978) found that wintering bald eagles were adversely affected by human disturbance and distribution patterns were significantly changed by human activity. Eagles were displaced in areas of high human activity and moved to areas of lower human activity. Flush distances were lower when the disturbance was on land than in the water and lower still if the eagle couldn't see the cause of the disturbance.

Additional studies indicate that animals, including bald eagles, infrequently demonstrated active responses to OSVs and associated human presence (NPS 2013). In a study based on approximately 5,688 interactions[35] over four winters between groups of wildlife and groups of snowmobiles and/or snowcoaches, White et al. (2009) found the following observed responses of bald eagles to OSV use: no apparent response (17 percent), look-resume (64 percent), alert (9 percent), travel (4 percent), flight (6 percent), and defensive (0 percent). Based on these findings, it would appear that eagles

[33] 660 foot nest site buffers based on USFWS (2007)
[34] Ponderosa pine [CWHR (2014) types 5S, 5P, 5M, 5D)] and Sierran mixed conifer and white fir [CWHR (2014) types 5S, 5P, 5M, 5D, and 6)] within 1 mile of waterbodies and major rivers. Buffered nest sites are not included in total to prevent double counting with nest site analysis.
[35] An interaction sampling unit was defined as the interaction between a group of OSVs and associated humans and a group of bison or elk within 1,500 feet (500 meters) of the road.

have become desensitized to OSV use and other human disturbance in the park during winter to some extent (NPS 2013).

White et al. (2009) also assessed the relationship between wildlife behavioral responses and factors including wildlife group size or distance from road, interaction time, group size of snowmobiles or snowcoaches, type of habitat, and cumulative winter OSV traffic. For bison, elk, swans, and bald eagles, the odds of a movement response (travel, flight) decreased with increasing distance of the animals from the road.

National Bald Eagle Management Guidelines (USFWS 2007) include a buffer of 100 meters (330 feet) for off-road vehicle use, including snowmobiles, in forested landscapes and/or variable terrain, and 200 meters (660 feet) in open landscapes where line of sight to nest trees may be a concern.

### *Direct and Indirect Effects*

Resource indicators and measures (FSH 1909.15, 12.5) used in this analysis to measure and disclose effects to bald eagle are listed in table 77.

**Table 77. Resource indicators and measures for assessing effects to bald eagles**

| Resource Indicator and Effect | Measure (Quantify if possible) | Alternatives 1 and 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|
| Potential for disturbance to individuals from noise and increased human presence, injury or mortality of individuals | Acres of high value reproductive habitat impacted by OSV use | 4,124 | 4,748 | 4,259 | 4,124 |
| Potential for disturbance to individuals from OSV use and increased human presence or injury or mortality of individuals | Acres of buffered bald eagle nests impacted by OSV use | 18 | 18 | 18 | 18 |

The majority of associated risk factors within wetland and riparian habitats apply to roads and trails and primarily include the following direct effects (Gaines et al. 2003): site disturbance and possible injury or mortality to individuals from vehicle collisions. Site disturbance includes (1) displacement or avoidance by populations or individual animals away from human activities; and (2) disturbance and displacement of individuals from breeding or rearing habitats. Possible injury or mortality to individuals from vehicle collision: The likelihood of a collision between snow grooming equipment and bald eagles is extremely low because the equipment travels slowly (3 to 6 mph) and snow grooming occurs at night when eagles are roosting. There is an increased likelihood of collision with OSVs due to higher frequency of OSV use and higher speeds, but the risk is still very low. OSV proposed actions would not physically modify any suitable bald eagle habitat within the project area.

### Comparison of the Alternatives

Table 78 and table 79 show and compare, by alternative, the amount of buffered bald eagle nest sites and high value reproductive habitat, respectively, with the potential for direct and indirect effects (disturbance, injury, or mortality) from OSV use and related activities.

Nine percent of eagle nest sites buffered by 660 feet are designated  and conducive to OSV use under all alternatives. Similarly, 3 percent of buffered nest sites are currently designated and conducive to OSV use for all alternatives. The risk of OSV-related impacts to bald eagle, including noise-based disturbance or injury/mortality, would be most likely to occur in those areas conducive to OSV use. In addition, of the 9 percent of buffered activity centers and the 3 percent of buffered activity centers open to and conducive to OSV use, high OSV use is concentrated within 0.5 mile of snowmobile staging areas, on and within 0.5 mile of groomed trails, and in meadows within 0.5 mile of a designated OSV trail, so the majority of OSV use occurs within in an even smaller percentage of each of those habitats; no nest sites are located within high OSV-use areas and only 1 nest site is located within 1.5 miles of designated OSV trails, where moderate use would be expected to occur. The Fish and Wildlife Service (2007) recommended nest buffer for off-road vehicle use to prevent impacts to nesting bald eagles is 660 feet. In addition, bald eagles and their habitat are subject to the Bald Eagle Protection Act of 1940 that prohibits disturbance to bald eagles that results in injury, a decrease in productivity, or nest abandonment. The forest would use the results of ongoing inventory and monitoring of bald eagle nest sites to determine whether disturbance is occurring and if changes in management are necessary

**Table 78. Acres of bald eagle nest sites, buffered by 660 feet by alternative**

| | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|
| Designated for OSV Use | 29 | 29 | 29 | 29 | 29 |
| Designated for OSV use and conducive to OSV use | 18 | 18 | 18 | 18 | 18<br>(3%) |

Under alternatives 3, 4, and 5, reproductive habitat (9 percent) could be impacted by OSV use similar to alternative 1. Under alternative 2, above the 5,000-foot elevation, 4 percent of the reproductive habitat could be impacted by OSV use. Under all alternatives, only one eagle nest site is located within OSV moderate use areas and this nest site is located 1.3 miles away of any groomed OSV trails. No bald eagle nest sites are within 660 feet of high OSV use areas under all alternatives. Therefore, disturbance impacts to breeding bald eagles are expected to be low under any of the alternatives.

**Table 79. Acres of high-value bald eagle reproductive habitat, by alternative**

| | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|
| Designated for OSV use | 45,878 | 30,586 | 51,913 | 46,953 | 45,878 |
| Total acres of high-value bald eagle reproductive habitat | 45,878 | 30,586 | 51,913 | 46,953 | 45,878 |
| Designated and conducive to OSV use | 4,124 | 1,375 | 4,748 | 4,259 | 4,124 |

### *Cumulative Effects*

Bald eagle habitat overlaps with areas open to Christmas tree and firewood cutting. There would be minimal overlap between the Christmas tree and firewood cutting season (annually between November 1 and December 31) and OSV trail grooming season (beginning December 26), and disturbance or displacement from this activity would occur outside of the bald eagle breeding season under all alternatives. Use of roads within bald eagle habitats after the March 31 termination date of the Forest Order closing roads for exclusive OSV use can contribute additional disturbance during the early part of the bald eagle breeding season, particularly for nests within 0.25 mile of roads. In general, most non-motorized winter recreation occurs along designated trails, where birds would either avoid the area, if too great an impact, or habituate to the noise. Similar activities on State and private lands within the forest boundary and within 0.25 mile of bald eagle nests may impact habitat outside of National Forest System lands and may increase disturbance locally. However, the potential for this type of disturbance is unknown. In summary, ongoing and reasonably foreseeable actions may locally increase disturbance to or displacement of bald eagles, but are not expected to contribute substantial impacts to those discussed for the project under any of the alternatives.

#### *Determination Statement*

Alternatives 1, 2, 3, 4 and 5 of the Tahoe National Forest Over-snow Vehicle Use Designation Project *may affect individuals, but are not likely to lead to a loss of viability or a trend toward Federal listing* for bald eagle in the Forest Plan area for the following reasons:

- OSV proposed actions would not physically modify the structure or composition of suitable bald eagle habitat within the project area.
- The forest would use the results of ongoing inventory and monitoring of bald eagle nest sites to determine whether disturbance is occurring and if changes in management are necessary, thereby minimizing impacts to bald eagle.
- No bald eagle nest sites are within 660 feet of high OSV use areas under any of the alternatives. Although one nest site is located with the moderate use area, it is located 1.3 miles away from any groomed OSV trails. Therefore, disturbance to any individual is expected to be low.
- The potential for injury or mortality from OSV collision with individual bald eagles is very low under all of the alternatives.

## Great Gray Owl (*Strix nebulosa*)

### Species Account

The great gray owl population estimate for California is fewer than 300 individuals (Wu et al. 2015). The present known population is centered in and adjacent to Yosemite National Park. There have also been several recent sightings on the Sierra National Forest, including a successful nest site in 2002. Recent sightings of great gray owls have also been recorded in or near Modoc, Plumas, Tahoe, Eldorado, and Toiyabe National Forests. There is one great gray owl PAC on the forest although the nest is on private land adjacent to the forest.

### Habitat Status

As described by Beck and Winter (2000), great gray owls (*Strix nebulosa*) require mid- or late-succession conifer forests at size class 4 (dominant and co-dominant trees 12 to 23 inches), containing large (over 24 inches dbh), broken-top snags in the forest matrix in sufficient numbers (5 to 6 snags per acre) to provide nest sites. Located suitable nest sites were near (less than 440 yards or approximately 400 meters) montane meadows between 2,000 and 8,000 feet in elevation. Forest canopy closures are greater than 60 percent in at least some portion of the forest stands adjacent to meadows or other natural or managed herbaceous openings (i.e., patch cut regenerated forest).

Foraging areas include meadows and openings that have sufficient herbaceous cover to support pocket gophers and meadow voles; pocket gophers and meadow voles are believed to comprise the majority of the owl’s diet (Kalinowski et al. 2014). Likely territories include meadows that total 10 acres or more adjacent to these mature closed canopy forest stands (Beck and Winter 2000). Van Riper et al. (2013) found that human recreational activities seem to have a negative influence on great gray owl distribution in Yosemite National Park, particularly in remote natural areas of the park, largely avoiding those areas where people are present; in the park, owls primarily use meadows with lower levels of human activity. Loss of mature forest habitat for nesting and the degradation of montane meadows remain the major sources of habitat loss.

Suitable habitat for the great gray owl is scattered across the Tahoe National Forest. There are 32,062 acres of great gray owl high-value reproductive habitat[36] on National Forest System lands within the project area.

### *Direct and Indirect Effects*

Resource indicators and measures (FSH 1909.15, 12.5) used in this analysis to measure and disclose effects to great gray owl are listed in table 80.

### *Resource Indicators and Measures for Assessing Effects to Great Gray Owl*

**Table 80. Resource indicators and measures for assessing effects to great gray owl**

| Resource Indicator and Effect | Measure (Quantify if possible) | Alternatives 1 and 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|
| Potential for disturbance to individuals from noise and increased human presence, injury or mortality of individuals, or habitat modification | Acres of high-reproductive habitat impacted by OSV use | 914 | 640 | 924 | 841 |

The majority of associated risk factors within wetland and riparian habitats apply to roads and trails and primarily include the following direct effects (Gaines et al. 2003): site disturbance and possible injury or mortality to individuals from vehicle collisions. Site disturbance includes (1) displacement or avoidance by populations or individual animals away from human activities; and (2) disturbance and displacement of individuals from breeding or rearing habitats.

Although great gray owls have not been confirmed nesting on the Tahoe National Forest, they have been observed nearby and, over time, could be affected by forest OSV activities. Snowplay in meadows may prevent great gray owl use of in or adjacent to those meadows. Like the other raptor species under consideration in this analysis, noise-based disturbance to breeding individuals is the primary concern. If great gray owls are present on the Tahoe National Forest, the disturbance to breeding individuals would be limited to the early portion of the March 1 through August 15 great gray owl breeding season that overlaps with the OSV use season.

Owls are nocturnal, whereas the majority of OSV use and associated activities on the Tahoe National Forest, with the exception of trail grooming, occur during the daytime, so the risk of collisions of OSVs with great gray owls, should they be present, would be negligible and foraging behavior would generally not be interrupted.

[36] Areas less than 440 yards (approximately 400 meters) to montane meadows greater than 10 acres in size and between 2,000 and 8,000 feet in elevation with forest canopy closures greater than 60 percent (CWHR closure class “D”) in at least some portion of the forest stands adjacent to meadows; habitat query includes adjacent meadows that are foraging habitat.

Effects of noise disturbance would be the same as those noted due to OSV use. In addition, trail grooming and night riding could disturb owls that forage at night. Trails are generally located away from meadows, but the passage of a trail grooming machine on a trail adjacent to or nearby a meadow, may interrupt owl foraging, result in owl prey taking refuge, or cause owls to redirect their foraging away from that particular area. However, due to the limited frequency[37] and duration of trail grooming at any trail segment location, noise disturbance from trail grooming would probably not significantly impact breeding or foraging great gray owls. Although night riding could have similar impacts to foraging owls, it would be uncommon, because most OSV use on the Tahoe National Forest occurs during daytime hours.

Based upon OSV use patterns described in the assumptions section, once OSV trail grooming ends, it is estimated that use of those trails declines by 50 percent. Therefore, the direct and indirect effects to activity centers within 0.25 mile of groomed trails would decrease substantially after March 31 for all alternatives.

Although OSV use or related activities would not physically alter the vegetative structure of spotted owl habitat, spotted owl prey species that use the subnivean space could be subject to OSV-related impacts from snow compaction, including suffocation or alteration of movement while foraging in the subnivean space beneath the snow. The degree of this impact is unknown, but would be more likely in areas most conductive to OSV, including meadows used by great gray owls for foraging.

**Comparison of the Alternatives**

Table 81 displays, by alternative, the acres of great gray owl reproductive habitat, with the potential for direct and indirect effects from OSV use and related activities. Ninety-four percent of great gray owl reproductive habitat is currently designated for OSV use (alternative 1). However 3 percent is designated and conducive to OSV use. OSV-related impacts (noise-based disturbance, snow compaction impacting subnivean space of prey species, or injury/mortality) to great gray owls, should they be present, would be most likely to occur in those areas conducive to OSV use. In addition, of the 3 percent of habitat open to and conducive to OSV use, high OSV use is concentrated within 0.5 mile of snowmobile staging areas, on and within 0.5 mile of groomed trails, and in meadows within 0.5 mile of a designated OSV trail, so the majority of OSV use occurs within an even smaller percentage of each of those habitats. This would be true under the other four alternatives.

Under alternative 2, 2 percent of great gray owl reproductive habitat would be open and conducive to OSV use, and under alternatives 3, 4, and 5, 3 percent of great gray owl reproductive habitat would be open and conducive to OSV use. In the event that great gray owls are found on the forest, as previously noted, the OSV-related noise-based disturbance would overlap with only the early part of the March 1 through August 15 great gray owl breeding season. In addition, nest sites could be impacted would be monitored to determine whether disturbance is occurring and if changes in management, including a limited operating period around nest sites, are necessary, thereby minimizing impacts to the great gray owl.

[37] Grooming operations at most trail systems currently operate near a maximum level. Trails are prioritized for grooming based on visitor use. Grooming on priority trails occurs several times per week and after significant storms. The total hours of trail grooming occurring expected at each site for an average season vary from 94 annual snowcat hours at Swain Mountain to 680 hours at Bogard and Fredonyer on the Lassen National Forest. Snow removal on access roads and trailhead parking areas, serving the OSV Program trail systems, occurs several times during storm events, as necessary dependent upon weather conditions (California Parks and Recreation 2010).

**Table 81. Acres of high-value great gray owl reproductive habitat with highest potential to be impacted by OSV use and related activities, by alternative**

| | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|
| Designated for OSV Use | 30,193 | 21,135 | 30,193 | 30,193 | 30,264 |
| Total acres of high-value great gray owl reproductive habitat | 30,299 | 30,299 | 30,299 | 30,299 | 30,793 |
| Designated for OSV use and conducive to OSV use | 914 | 640 | 912 | 924 | 841 |

### *Cumulative Effects*

Vegetation management and salvage projects are very small in comparison to the OSV use area and/or do not overlap with groomed and ungroomed OSV routes or staging areas where the highest OSV use occurs. However, limited operating periods required for vegetation management and road construction prevent impacts to breeding great gray owls. In addition, vegetation and fuels management activities in recent years have included primarily thinned, masticated, and/or burned vegetation to reduce the risk of catastrophic wildfires that benefit the great gray owl. These projects are usually excluded from larger CWHR types.

Great gray owl habitat also overlaps with areas open to Christmas tree and firewood cutting. There would be minimal overlap between the Christmas tree and firewood cutting season (annually between November 1 and December 31) and OSV trail grooming season (beginning December 26), and disturbance or displacement from this activity would occur outside of the great gray owl breeding season under all alternatives. Use of roads within great gray owl habitats after the March 31 termination date of the Forest Order closing roads for exclusive OSV use could contribute additional disturbance during the early part of the great gray owl breeding season, particularly for nests within 0.25 mile of roads. However, no great gray owl nests have been identified on the Tahoe National Forest.

In general, most non-motorized winter recreation occurs along designated trails, where birds would avoid roosting in the area, if too great a disturbance, or habituate to the noise. Similar activities on State and private lands within the forest boundary and within 0.25 mile of great gray owl habitats may impact habitat availability outside of National Forest System lands and may increase disturbance locally. However, the potential for this type of disturbance is unknown. In summary, ongoing and reasonably foreseeable actions could be additive locally to individual great gray owls, but are not expected to contribute substantial impacts to those discussed for the project under any of the alternatives.

### *Determination Statement*

Alternatives 1, 2, 3, 4 and 5 of the Tahoe National Forest Over-snow Vehicle Use Designation Project *may affect individuals, but are not likely to lead to a loss of viability or a trend toward Federal listing* for the great gray owl in the Forest Plan area for the following reasons:

- Structure or composition of great gray owl habitat would not be physically modified by OSV use and related activities.
- Although the potential for noise-based disturbance to individuals within high-reproductive habitat is 3 percent under all of the alternatives, great gray owl nesting has not been confirmed on the Tahoe National Forest. In the event that great gray owls nesting is found on the forest, the

OSV-related noise-based disturbance would overlap with only the early part of the March 1 through August 15 great gray owl breeding season, and nest sites with potential to be impacted would be monitored to determine whether disturbance is occurring and if changes in management, including a limited operating period around nest sites, are necessary, thereby minimizing impacts to the great gray owl.

- Due to their nocturnal behavior, great gray owls, if present, would be expected to have little interaction with snowmobiles or snow grooming equipment, resulting in minimal direct effects from snowmobiles or grooming equipment.

## Willow Flycatcher (*Empidonax trailii*)

### Species Account

This neotropical migrant species breeds within the contiguous United States, except the Southeast, and the southern margins of Canada (Green et al. 2003) and winters from Mexico to northern South America (USDA Forest Service 2001).

Historically, this species likely occurred in suitable habitats throughout California and portions of Nevada including the central coast, Central Valley, Sierra Nevada, and Great Basin (summarized in USDA Forest Service 2001). Willow flycatchers were common in the Sierra Nevada until as recently as 1910, and locally abundant through 1940 (Ibid). However, this species has declined precipitously in the Sierra Nevada since 1950 (summarized in Green et al. 2003). Urbanization and the draining, channelization, and filling of wetlands; grazing; mining; and pesticide use are likely responsible for the decline in range and abundance of this species. Nest predation is the leading cause of nest failure in willow flycatcher nests (Mathewson et al. 2011). Human activity (presence of people, dogs, and vehicles) has also been found to be a significant impact to land birds, surpassing that of habitat loss from development (Schlesinger et al. 2008).

Willow flycatchers currently occur and breed on the Tahoe NF, primarily in the upper Truckee River watershed where some of the largest montane meadow complexes occur, such as Perazzo Meadows.. The recent extirpation of this species from Yosemite National Park, where suitable habitats are presumably better preserved than those located outside the park suggests that other factors may be contributing to the decline of this species in the Sierra Nevada (Siegel et al. 2008). Siegel et al. (Ibid) tentatively suggested that severe habitat degradation during the 19th century (due to grazing, which was discontinued in Yosemite National Park decades ago), meadow desiccation (due to global warming and resulting in earlier spring melts and a reduction in site wetness), disrupted meta-population dynamics, or conditions on the wintering grounds or along migration routes may explain the decline in Yosemite National Park.

### Habitat Status

Suitable habitat (i.e., the combination of resources and environmental conditions required to survive and reproduce) for this species in the Sierra Nevada is defined by site elevation, shrub coverage, foliar density, wetness, and meadow size (summarized in Green et al. 2003). Known willow flycatcher sites range in elevation from 1,200 to 9,500 feet, though most (88 percent, 119 of 135) are located between 4,000 and 8,000 feet (Stefani et al. 2001). Willow flycatchers are closely associated with meadows that have high water tables in the late spring and early summer, and abundant shrubby, deciduous vegetation (especially *Salix* spp.).

This species typically nests from June 1 to August 31 and fledges young between July 15 and August 31. Fledglings remain in territories for 2 for 3 weeks after fledging (USDA Forest Service

2004). However, these dates vary due to factors such as when willow flycatchers arrive on the breeding grounds, snowpack, late spring and summer weather, nest predation, and brown-headed cowbird parasitism (Green et al. 2003).

This species may attempt nesting as many as three times during a single breeding season in the Sierra Nevada (USDA Forest Service 2004). Nest predation has been positively associated with edge effects, distance of the nest to edges and isolated trees, and aspects of meadow size and wetness (Cain and Morrison 2003).

#### *Direct and Indirect Effects*

There would be no direct effects to willow flycatchers from OSV use, since willow flycatchers arrive on their breeding grounds within the project area in mid to late May. The minimum cross-country snow depth varies between 12 to 24 inches under all the action alternatives and is expected to be adequate to protect vegetation from measurable impacts (McNamara 2017). Alternatives 3 and 5 have the highest minimum snow depth and would likely protect willow flycatcher habitats the most compared to alternatives 1, 2 and 4.

#### *Cumulative Effects*

The Tahoe National Forest Over-snow Vehicle Use Designation Project would not result in measurable direct or indirect impacts to the willow flycatcher and, therefore, there would be no cumulative impacts to this species.

#### *Determination Statement*

None of the alternatives of the Tahoe National Forest Over-snow Vehicle Use Designation Project would impact the willow flycatcher or its habitat for the following reasons:

- Willow flycatcher is a neotropical migrant that arrives well past the end of the OSV season of use, so no direct impacts to the species would occur.
- OSV use has not been identified as a factor in meadow degradation for this species, and the minimum cross-country snow depth of 12 inches under all of the action alternatives is expected to protect meadow and riparian habitats from measurable impacts to water quality or vegetation. However, the potential for snow compaction in willow flycatcher meadows is moderate to high particularly in larger meadows adjacent to OSV routes, with alternatives 3 and 5 providing the most protection.

## Greater Sandhill Crane (*Grus Canadensis tabida*)

### Species Account

Greater sandhill cranes have been documented on the Tahoe National Forest. Sandhill cranes are known to breed on the Sierraville Ranger District at Kyburz Meadow and Perazzo Meadow, and on private land at Sardine Valley.

### Habitat Status

The California breeding population of sandhill cranes winters chiefly in the Central Valley and peak breeding occurs between May and July. High reproductive habitats for sandhill crane include fresh emergent wetland, irrigated hayfield, and wet meadow (CWHR, CDFW 2013).

Much of the acres classified as wetlands on Tahoe National Forest, which are important to waterfowl and sandhill crane, are seasonal; breeding occurs in spring and early summer. Threats to greater sandhill crane include destruction and degradation of structurally diverse wet meadow and shallow emergent wetland habitats used for nesting and rearing habitat by conversions for road development, croplands, water diversions; predation; human disturbance of crane pairs during the nesting season; and the spread of invasive plants into greater sandhill crane habitats (USFWS 2015).

#### *Direct and Indirect Effects*

Emissions from OSVs, particularly two-stroke engines on snowmobiles, release pollutants like ammonium, sulfate, benzene, PAHs and other toxic compounds that are stored in the snowpack; during spring snowmelt runoff, these accumulated pollutants are released and may be delivered to surrounding waterbodies (USDA National Forest Service National Core BMP Rec-7: Over-Snow Vehicle Use; refer to the project hydrology report for additional information). However, the minimum cross-country snow depth varies between 12 to 24 inches under all the action alternatives is expected to be adequate to protect aquatic and riparian habitats from measurable impacts to vegetation or water quality (McNamara 2017).

#### *Cumulative Effects*

The Tahoe National Forest Over-snow Vehicle Use Designation Project would not result in measurable direct or indirect impacts to greater sandhill crane and, therefore, there would be no cumulative impacts to this species.

#### *Determination Statement*

None of the alternatives of the Tahoe National Forest Over-snow Vehicle Use Designation Project would impact the greater sandhill crane or its habitat for the following reasons:

- Greater sandhill crane is a migratory species that breeds outside of the OSV season of use, so no direct impacts to the species would occur.
- OSV use has not been identified as a factor in meadow degradation for this species, even though the minimum cross-country snow depth varies between 12 to 24 inches under all the action alternatives and is expected to be adequate to protect wet meadow and fresh emergent wetland habitats utilized by this species from measurable impacts to vegetation or water quality.

## Terrestrial Invertebrates

### Western Bumble Bee (*Bombus occidentalis*)

**Species Account**

Historically, the western bumble bee was one of the most broadly distributed bumble bee species in North America (Cameron et al. 2011). The species was broadly distributed across western North America along the Pacific Coast and westward from Alaska to the Colorado Rocky Mountains (Thorp and Shepard 2005, Koch et al. 2012). Currently, the western bumble bee occurs in all states adjacent to California, but is experiencing severe declines in distribution and abundance due to a variety of factors including diseases and loss of genetic diversity (Tommasi et al. 2004, Cameron et al. 2011, Koch et al. 2012).

The overall status of populations in the West largely depends on geographic region: populations west of the Cascade and Sierra Nevada mountains are experiencing dire circumstances with steeply declining numbers, while those to the east of this dividing line are more secure with relatively unchanged population sizes. The reasons for these differences are not known. The western bumble bee (*Bombus occidentalis*) has 94 collection records on 11 national forests in Region 5 (Hatfield 2012) including the Tahoe National Forest.

### Habitat Status

Bumble bees are threatened by many kinds of habitat alterations that may fragment or reduce the availability of flowers that produce the nectar and pollen they require and decrease the number of abandoned rodent burrows that provide nest and hibernation sites for queens. Major threats that alter landscapes and habitat required by bumble bees include agricultural and urban development. Exposure to insecticides has recently been identified as a major contributor to the decline of many pollinating bees, including honey bees and bumble bees (Hopwood et al. 2012). In the absence of fire, native conifers encroach upon meadows and this can also decrease foraging and nesting habitat available for bumble bees.

Queens overwinter in the ground in abandoned rodent (i.e., mouse, chipmunk or vole) burrows at depths from 6 to 18 inches. In the late winter or early spring, the queen emerges from hibernation and then selects a nest site, which is often a pre-existing hole, such as an abandoned rodent hole. Bumble bees require habitats with rich supplies of floral resources with continuous blooming from spring to autumn. Isolated patches of habitat are not sufficient to fully support bumble bee populations. Bumblebee colonies are annual.

#### *Direct and Indirect Effects*

Habitat loss and fragmentation may be playing a role in the decline of these bumble bee species. Habitat alterations that destroy, fragment, degrade, or reduce their food supplies, nest sites (e.g., abandoned rodent burrows or undisturbed grass), and hibernation sites for overwintering queens can harm these species (Evans et al. 2008). The minimum cross-country snow depth varies between 12 to 24 inches under all the action alternatives and is expected to be adequate to protect vegetation from measurable impacts (McNamara 2017).

#### *Cumulative Effects*

The Tahoe National Forest Over-snow Vehicle Use Designation Project would not result in measurable direct or indirect impacts to the western bumble bee and, therefore, there would be no cumulative impacts to this species.

#### *Determination Statement*

None of the alternatives of the Tahoe National Forest Over-snow Vehicle Use Designation Project would impact the western bumble bee or its habitat based on the following rationale:

- Colonies are annual outside of the OSV season.
- Queens of the species hibernate during the OSV season of use and, therefore, proposed actions would not result in noise impacts or impacts to foraging or breeding.
- Known information suggests that bumble bee queens burrow under duff under trees and on steeper slopes where OSV use does not occur (refer to OSV use assumptions).
- OSV use is not expected to degrade terrestrial habitat based upon a minimum cross-country snow depth which varies between 12 to 24 inches to be maintained under all the action alternatives.

# Terrestrial Wildlife Species of Public Interest

**Table 82. Additional terrestrial species of interest identified during public scoping**

| Species Name | TEPCS Status | Project Area Within Species' Range | Detections in or Near the Project Area | Suitable Habitat Present | Species Addressed Further/Rationale |
|---|---|---|---|---|---|
| Mule deer (*Odocoileus hemionus*) | MIS | Yes | Yes | Yes | Yes/Addressed with respect to impacts associated with winter range. |
| Subnivean species: Shrews (*Sorex* spp.), Voles (*Microtus* spp.), and Deer mouse (*Peromyscus maniculatus*) | None | Yes | Yes | Yes | Yes |

## Mule Deer

*Management indicator species for oak-associated hardwood and hardwood conifer in the Sierra Nevada bioregion.*

Potential effects to mule deer on their winter range was identified as a non-significant issue during public scoping. Please refer to the Management Indicator Species section for mule deer population status and trend, habitat status and trend, and project-level habitat impacts.

**Table 83. Resource indicators and measures for assessing effects to mule deer on winter range**

| Resource Indicator and Effect | Measure (Quantify if possible) | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| Potential for disturbance to individuals from OSV use and increased human presence, injury or mortality of individuals, or habitat modification (i.e., altered movement due to OSV use) | Acres of winter range affected by OSV use | 2,915 | 2,915 | 2,915 | 3,975 | 2,337 |

### *Species Account*

Mule deer range and habitat include coniferous forest, foothill woodland, shrubland, grassland, agricultural fields, and suburban environments (CDFW 2014). Many mule deer migrate seasonally between higher elevation summer range and low-elevation winter range (Ibid). On the west slope of the Sierra Nevada, oak-associated hardwood and hardwood/conifer areas are an important winter habitat (CDFW 1998).

### *Mule Deer Habitat Status*

Tahoe National Forest contains 194,973 acres of mule deer winter range, with 32,674 (16 percent) acres conducive to OSV use.

### *Direct and Indirect Effects*

Wintering deer are sensitive to disturbances of all kinds. Both snowmobiles and cross-country skiers are known to cause wintering ungulates to flee (Freddy et al. 1986). Dorrance et al. (1975) found that snowmobile traffic resulted in increased home range size, increased movement, and displacement of deer from areas along trails. Direct environmental impacts of snowmobiles include collisions causing mortality and harassment that increased metabolic rates and stress responses (Gaines et al 2003). Based upon Freddy et al. (1986), the distance at which mule deer have been shown to be displaced by OSVs is 133 meters (436 feet).

Snowmobile use within mule deer winter range can have the following direct effects on individual mule deer or their habitat (Gaines et al. 2003): (1) displacement of populations or individual animals from a route, related to human activities; (2) disturbance and displacement of individuals from breeding or rearing habitats; (3) physiological response to disturbance, resulting in changes in heart rate or level of stress hormones; and (4) potential for injury or mortality to individuals from vehicle collision. Possible indirect effects include altered or dispersed movement as caused by a route or human activities on or near a route.

Table 84 displays the amount of deer winter range, by alternative, with the potential for direct (disturbance and vehicle collision) and indirect (habitat modification) effects as described above. As previously discussed, the likelihood of a collision between snow grooming equipment and wildlife is extremely low because the equipment travels slowly (3 to 6 mph). There is an increased likelihood of collision with OSVs due to higher frequency of OSV use and higher speeds. Vehicle collision with a mule deer would negatively affect the individual, but the likelihood of occurrence is assumed to be rare.

**Table 84. Acres of mule deer winter range with potential to be impacted by OSV use and related activities**

| | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|
| Designated for OSV use | 64,808 | 12,884 | 74,089 | 69,324 | 64,808 |
| **Total** | 194,973 | 194,973 | 194,973 | 194,973 | 194,973 |
| Designated and conducive to OSV use | 32,658 | 8,226 | 2,915 | 3,975 | 2,337 |

OSV use of existing linear routes and cross-country travel is allowed within winter range, at some level, under all alternatives. Under the current condition (alternative 1), 130,165 acres (66 percent) of mule deer winter range is not designated for OSV use. Therefore, deer using that portion of winter range would not be impacted by authorized OSV use. Roughly 34 percent of winter range is designated for OSV use. However, only 32,658 acres or 50 percent of winter range are designated and conducive to OSV use (slopes less than 20 percent and canopy cover less than 70 percent).

## Subnivean Species

Subnivean habitats are important for small mammal species and may be indirectly affected by OSV use through snow compaction. For the alternatives, minimum snow depths was used to analyze the potential for snow compaction on subnivean habitat.

**Table 85. Resource indicators and measures for assessing effects to subnivean species**

| Resource Indicator and Effect | Measure (Quantify if possible) | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| Potential for effects of snow compaction on subnivean species habitat | Acres and percentage of habitat impacted by OSV use [addressed under each applicable predator species (marten, CSO)] | With no minimum snow depth, damage to subnivean habitat could occur where snow levels are not sufficient to protect subnivean habitat. | Snow compaction on subnivean habitat is unlikely to occur when snow depth is at least 12 inches. | Snow compaction on subnivean habitat is least likely to occur when snow depth is least 18 inches. | Snow compaction on subnivean habitats is unlikely to occur when snow depth is at least 12 inches | Snow compaction on subnivean habitat is least likely to occur when snow depth is at least 24 inches. |

### *Species Account*

Subnivean species [shrews (*Sorex* spp.), voles (*Microtus* spp.), and deer mouse *Peromyscus maniculatus*)] do not warrant special status at this time because populations are assumed to be secure. However, Gaines et al. (2003) found an interaction that occurred on winter recreation routes was the indirect effect of snow compaction on the subnivean sites used by small mammals in which small mammals can either be suffocated as a result of the compaction, or their subnivean movements can be altered owing to impenetrable compact snow.

### *Habitat Status*

Adaptations to snowpack are an important component of the ecology of small mammals in temperate climates. Some small mammals, such as chipmunks (*Tamias* spp), hibernate and have limited interaction with the snowpack environment. However, shrews and voles stay active throughout the winter, and much of their activity occurs in the subnivean space under the snowpack. Other species (deer mouse) undergo bouts of torpor between periods of activity. Subnivean mammals are dependent on the subnivean space between the basal layer of snow and the ground for shelter, foraging and travel.

Subnivean space may be formed in one of two ways: mechanically or thermally, and varies by region and type of snow. Subnivean space forms mechanically when the weight of the snowpack is supported by vegetation, woody debris, or complex rocky environments. Extensive subnivean space may be formed thermally in environments with a temperature gradient between the bottom and top of the snowpack. As water vapor migrates up from warmer to colder regions of the snow, depth hoar forms just above the ground at the base of the snowpack. Depth hoar is brittle, loosely arranged crystals that create space in the subnivean environment and facilitate travel by small mammals that readily move through the fragile crystals. Depth hoar commonly forms and is most well-developed in cold, continental-type regions where temperature throughout the snowpack varies significantly. Depth hoar is rare to nonexistent in snow classified as maritime, such as that in the Sierra Nevada, which also tends to be more isothermal.

Studies cited as the basis for impacts to the subnivean environment and subnivean animals have generally been conducted in locations with continental snowpacks (e.g., alpine) where depth hoar develops (Wildlife Resource Consultants 2004). A lack of studies investigating the distribution of subnivean space and the effects of winter recreation on subnivean space in maritime snowpack conditions, such as those found in the Sierra Nevada Mountains, resulted in the Forest Service commissioning a study (Wildlife Resource Consultants 2004) designed to examine the distribution of subnivean space in Sierra meadows, how it is formed, and the impacts of winter recreation on snowpack characteristics and subnivean space. Key findings from the 65 snow pits examined for subnivean space, density characteristics, temperature, vegetation type, and the presence of small mammal sign included the following:

- The subnivean space did not contain depth hoar.
- Vegetation community types should be considered in managing winter recreation use in the Sierra Nevada; wet meadows at low elevations (1,917 to 1,933 meters; 6,289 to 6,342 feet in study) with low snow depth probably have the most subnivean space.
- Findings were not as conclusive regarding the effects of recreational use on subnivean space. But there is some suggestion that winter recreation may impact subnivean space at low elevations [pooled data for all sites were analyzed by recreational use category; pits classified as concentrated over-snow vehicle use had the least subnivean space, an average of 6.0 percent (n=7)].Winter recreation probably has the greatest effect at low snow depths (0 to 64 centimeters; 0 to 25 inches).

The habitat of species active in the winter includes mesic and dry meadows throughout the Sierra Nevada. With the exception of trails, meadows are where some of the highest OSV use occurs and, therefore, riskfor effects to subnivean species is greatest.

### *Direct and Indirect Effects*

Gaines et al. (2003) found an interaction that occurred on winter recreation routes was the indirect effect of snow compaction on the subnivean sites used by small mammals, in which small mammals can either be suffocated as a result of the compaction, or their subnivean movements can be altered because of the impenetrable compact snow. As reflected in public comments during scoping, any adverse effects to subnivean animals could indirectly affect the prey base for many Forest Service sensitive species, including California spotted owl, northern goshawk, and marten.

Alternative 1 provides the least protection for subnivean species, where damage to subnivean resources could occur, since no minimum snow depth is required under existing Forest Plan direction. Under alternative 2, adequate snow cover (generally about 12 inches) is required to prevent resource damage, and would potentially protect subnivean resources. Similarly, alternative 4 would likey protect subnivean habitat with a minimum snow depth of 12 inches. Alternatives 3 and 5 provide the greatest protection of subnivean habitat with at least 18 and 24 inches snow depth, respectively.

## Management Indicator Wildlife Species

The purpose of this analysis is to evaluate and disclose the impacts of the Tahoe National Forest Over-snow Vehicle Designation Project on the habitat of the 13 management indicator species (MIS) identified in the Land and Resource Management Plan (USDA Forest Service 1992) as amended by the Sierra Nevada Forests Management Indicator Species Amendment Record of Decision (USDA Forest Service 2007a).

## Direction Regarding the Analysis of Project-level Effects on MIS Habitat

MIS are animal species identified in the SNF MIS Amendment Record of Decision (ROD) signed December 14, 2007, which was developed under the 1982 National Forest System Land and Resource Management Planning Rule (1982 Planning Rule) (36 CFR 219). Guidance regarding MIS set forth in the 1990 LRMP as amended by the 2007 SNF MIS Amendment ROD directs Forest Service resource managers to (1) at project scale, analyze the effects of proposed projects on the habitat of each MIS affected by such projects, and (2) at the bioregional scale, monitor populations and/or habitat trends of MIS, as identified in the 1990 LRMP as amended.

Adequately analyzing project effects to MIS generally involves the following steps:

- Identifying which habitat and associated MIS would be either directly or indirectly affected by the project alternatives; these MIS could be affected by the project.
- Summarizing the bioregional-level monitoring identified in the LRMP, as amended, for this subset of MIS.
- Analyzing project-level effects on MIS habitat for this subset of MIS.
- Discussing bioregional scale habitat and/or population trends for this subset of MIS.
- Relating project-level impacts on MIS habitat to habitat and/or population trends at the bioregional scale for this subset of MIS.

These steps are described in detail in the Pacific Southwest Region's draft document MIS Analysis and Documentation in Project-Level NEPA, R5 Environmental Coordination (May 25, 2006) (USDA Forest Service 2006a). This MIS Report documents application of the above steps to select project-level MIS and analyze project effects on MIS habitat for the Tahoe OSV Use Designation.

## Direction Regarding Monitoring of MIS Population and Habitat Trends at the Bioregional Scale

The bioregional scale monitoring strategy for the Tahoe National Forest's MIS is found in the Sierra Nevada Forests Management Indicator Species Amendment Record of Decision (ROD) of 2007 (USDA Forest Service 2007a). Bioregional scale habitat monitoring is identified for 12 of the terrestrial MIS. In addition, bioregional scale population monitoring, in the form of distribution population monitoring, is identified for all of the terrestrial MIS except for the greater sage-grouse. For aquatic macroinvertebrates, the bioregional scale monitoring identified is Index of Biological Integrity and Habitat. The current bioregional status and trend of populations and/or habitat for each of the MIS is discussed in the 2010 Sierra Nevada Forests Bioregional Management Indicator Species Report (USDA Forest Service 2010a).

### MIS Habitat Status and Trend

All habitat monitoring data are collected and/or compiled at the bioregional scale, consistent with the LRMP as amended by the 2007 SNF MIS Amendment ROD (USDA Forest Service 2007a).

Habitats are the vegetation types (for example, early seral coniferous forest) or ecosystem components (for example, snags in green forest) required by an MIS for breeding, cover, and/or feeding. MIS for the Sierra Nevada National Forests represent 10 major habitats and 2 ecosystem components (USDA Forest Service 2007a), as listed in table 86. These habitats are defined using the

CWHR System (CDFG 2005). The CWHR System provides the most widely used habitat relationship models for California's terrestrial vertebrate species (ibid). It is described in detail in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a).

Habitat status is the current amount of habitat on the Sierra Nevada Forests. Habitat trend is the direction of change in the amount or quality of habitat over time. The methodology for assessing habitat status and trend is described in detail in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a).

### Aquatic Macroinvertebrate Status and Trend

For aquatic macroinvertebrates, condition and trend is determined by analyzing macroinvertebrate data using the predictive, multivariate River Invertebrate Prediction and Classification System (RIVPACS) (Hawkins 2003) to determine whether the macroinvertebrate community has been impaired relative to reference condition within perennial waterbodies. This monitoring consists of collecting aquatic macroinvertebrates and measuring stream habitat features according to the Stream Condition Inventory manual (Frasier et al. 2005). Evaluation of the condition of the biological community is based upon the "observed to expected" (O/E) ratio, which is a reflection of the number of species observed at a site versus the number expected to occur there in the absence of impairment. Sites with a low O/E scores have lost many species predicted to occur there, which is an indication that the site has a lower than expected richness of sensitive species and is therefore impaired.

## Selection of Project-level MIS

Management Indicator Species (MIS) for the Tahoe National Forest are identified in the 2007 Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment (USDA Forest Service 2007a). The habitats and ecosystem components and associated MIS analyzed for the project were selected from this list of MIS, as indicated in table 86. In addition to identifying the habitat or ecosystem components (1st column), the CWHR type(s) defining each habitat/ecosystem component (2nd column), and the associated MIS (3rd column), the table discloses whether or not the habitat of the MIS is potentially affected by the Tahoe OSV Use Designation (4th column).

**Table 86. Selection of MIS for Project-Level Habitat Analysis for the Tahoe OSV Use Designation**

| Habitat or Ecosystem Component | CWHR Type(s) defining the habitat or ecosystem component[1] | Sierra Nevada Forests Management Indicator Species *Scientific Name* | Category for Project Analysis[2] |
|---|---|---|---|
| Riverine & Lacustrine | lacustrine (LAC) and riverine (RIV) | aquatic macroinvertebrates | 2 |
| Shrubland (west-slope chaparral types) | montane chaparral (MCP), mixed chaparral (MCH), chamise-redshank chaparral (CRC) | fox sparrow *Passerella iliaca* | 2 |
| Sagebrush | Sagebrush (SGB) | greater sage-grouse *Centrocercus urophasianus* | 2 |
| Oak-associated Hardwood & Hardwood/conifer | montane hardwood (MHW), montane hardwood-conifer (MHC) | mule deer *Odocoileus hemionus* | 2 |
| Riparian | montane riparian (MRI), valley foothill riparian (VRI) | yellow warbler *Dendroica petechia* | 2 |
| Wet Meadow | Wet meadow (WTM), freshwater emergent wetland (FEW) | Pacific tree (chorus) frog *Pseudacris regilla* | 2 |

| Habitat or Ecosystem Component | CWHR Type(s) defining the habitat or ecosystem component[1] | Sierra Nevada Forests Management Indicator Species *Scientific Name* | Category for Project Analysis[2] |
|---|---|---|---|
| Early Seral Coniferous Forest | ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree sizes 1, 2, and 3, all canopy closures | Mountain quail *Oreortyx pictus* | 2 |
| Mid Seral Coniferous Forest | ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 4, all canopy closures | Mountain quail *Oreortyx pictus* | 2 |
| Late Seral Open Canopy Coniferous Forest | ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 5, canopy closures S and P | Sooty (blue) grouse *Dendragapus obscurus* | 2 |
| Late Seral Closed Canopy Coniferous Forest | ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), tree size 5 (canopy closures M and D), and tree size 6. | California spotted owl *Strix occidentalis occidentalis* | 2 |
| | | American marten *Martes americana* | |
| | | northern flying squirrel *Glaucomys sabrinus* | |
| Snags in Green Forest | Medium and large snags in green forest | hairy woodpecker *Picoides villosus* | 2 |
| Snags in Burned Forest | Medium and large snags in burned forest (stand-replacing fire) | black-backed woodpecker *Picoides arcticus* | 2 |

[1] All CWHR size classes and canopy closures are included unless otherwise specified; **dbh** = diameter at breast height; **Canopy Closure classifications:** S=Sparse Cover (10-24% canopy closure); P= Open cover (25-39% canopy closure); M= Moderate cover (40-59% canopy closure); D= Dense cover (60-100% canopy closure); **Tree size classes:** 1 (Seedling)(<1" dbh); 2 (Sapling)(1"-5.9" dbh); 3 (Pole)(6"-10.9" dbh); 4 (Small tree)(11"-23.9" dbh); 5 (Medium/Large tree)($\geq$24" dbh); 6 (Multi-layered Tree) [In PPN and SMC] (Mayer and Laudenslayer 1988).

[2] **Category 1:** MIS whose habitat is not in or adjacent to the project area and would not be affected by the project.

**Category 2:** MIS whose habitat is in or adjacent to project area, but would not be either directly or indirectly affected by the project.

**Category 3:** MIS whose habitat would be either directly or indirectly affected by the project.

# Migratory Landbirds

Under the National Forest Management Act, the Forest Service is directed to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives." (P.L. 94-588, Sec 6 (g) (3) (B)). The January 2000 USDA Forest Service (FS) Landbird Conservation Strategic Plan, followed by Executive Order 13186 in 2001 and the January 2004 Partners in Flight North American Landbird Conservation Plan all reference goals and objectives for integrating bird conservation into forest management and planning.

In late 2008, a *Memorandum of Understanding between the USDA Forest Service and the U.S. Fish and Wildlife Service to Promote the Conservation of Migratory Birds* was signed. The intent of the MOU is to strengthen migratory bird conservation through enhanced collaboration and cooperation between the Forest Service and the Fish and Wildlife Service as well as other Federal, State, Tribal and local governments. Within the national forests, conservation of migratory birds focuses on providing a diversity of habitat conditions at multiple spatial scales and ensuring that bird conservation is addressed when planning for land management activities.

Likely impacts to habitats the migratory birds depend on have been assessed in further detail within the Biological Assessment, Biological Evaluation and the Management Indicator Species reports for the Tahoe National Forest Over-snow Vehicle Designation Project. All reports found that effects to various habitats would be minimal to none considering that forested cover is not modified. Similarly, OSV use is concentrated between December 26 through and March 31, which predominately avoids overlap with the active breeding season for most migratory bird species. These reports found that the Tahoe National Forest Over-snow Vehicle Designation Project would not cause adverse effects (Biological Assessment), would not cause a trend toward a loss of viability (Biological Evaluation), nor would it degrade various MIS habitats to a level that affects trends in the Sierra Nevada bioregion. Also, possible impacts to migratory species are minimized through the adherence of LRMP standards and guidelines for snags and down woody debris, avoidance of streamside management zones, and no degradation in riparian areas and wetlands.

Therefore, the Tahoe National Forest Over-snow Vehicle Designation Project would have minimal impacts to individual migratory birds and would not adversely affect migratory landbird conservation. This finding is based on the results of analysis conducted in the Biological Assessment, Biological Evaluation, and Management Indicator Species reports, and that adherence to LRMP standards are adhered to, which in turn would maintain habitat diversity. The project meets the intent of the Migratory Landbird MOU.

# Aquatics

## Relevant Laws, Regulations, and Policy

### Regulatory Framework

#### *Land and Resource Management Plan*

The Tahoe National Forest LRMP provides direction specific to management of fish, water and riparian areas, and is found as goals, objectives, and standards and guidelines in chapter 4 of the LRMP as well as in the Northwest Forest Plan and SNFPA, both of which include aquatic conservation strategies (including a long-term strategy in the SNFPA for management of anadromous fishes on the Tahoe National Forest. Aquatic Conservation Strategies are found in their entirety in each of the aforementioned amendments to the LRMP.

#### *Endangered Species Act*

The Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.) requires that any action authorized by a Federal agency not be likely to jeopardize the continued existence of a threatened or endangered species, or result in the destruction or adverse modification of critical habitat for these species. Section 7 of the Endangered Species Act, as amended, requires the responsible Federal agency to consult the USFWS and the National Marine Fisheries Service concerning threatened or endangered species under their jurisdiction. It is Forest Service policy to analyze impacts to threatened or endangered species species to ensure management activities are not likely to jeopardize the continued existence of a threatened or endangered species, or result in the destruction or adverse modification of critical habitat for these species. This assessment is documented in a biological assessment.

#### *Forest Service Manual and Handbooks (FSM/H 2670)*

Forest Service sensitive species are species identified by the Regional Forester for which population viability is a concern. The Forest Service develops and implements management practices to ensure that rare plants and animals do not become threatened or endangered and ensure their continued viability on national forests. It is Forest Service policy to analyze impacts to sensitive species to ensure management activities do not create a significant trend toward Federal listing or loss of viability. This assessment is documented in a biological evaluation.

#### *Forest Service Manual 2670.32 (USDA Forest Service 2005)*

The manual directs the forest to avoid or minimize impacts to species whose viability has been identified as a concern, and therefore, listed as sensitive by the Regional Forester. If impacts cannot be avoided, then the forest must analyze the significance of the potential adverse effects on the population or its habitat within the area of concern and on the species as a whole. Impacts may be allowed, but the decision must not result in a trend toward Federal listing.

#### *Forest Service Manual 2670.22 (USDA Forest Service 2005)*

The manual directs national forests to "maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands." To comply with this direction, forests are encouraged to track and evaluate effects to additional species that may be of concern even though they are not currently listed as sensitive. Such plant species are referred to as species of interest or watch list species.

#### *Sierra Nevada Forest Plan Amendment*

The Sierra Nevada Forest Plan Amendment (2004b) amended each of the forest plans in the Sierra Nevada and provides regional direction to restore aquatic, riparian, and meadow ecosystems and provide for the viability of native plant and animal species associated with these ecosystems. This includes mountain yellow-legged frogs, Yosemite toads, and their habitats. This regional direction is represented by an array of features that, in their entirety, constitute an aquatic management strategy for the Sierra Nevada. The fundamental principle of the aquatic management strategy is to retain, restore, and protect the processes and landforms that provide habitat for aquatic and riparian-dependent organisms. Accomplishment of these objectives are achieved through a combination of tactics such as standards and guidelines and policies that are intended to work collectively, and include a suite of interrelated actions that work together to manage and conserve aquatic habitats.

#### *Riparian Conservation Areas: Activity-related Standards and Guidelines*

Where a proposed project encompasses a riparian conservation area or a critical aquatic refuge, conduct a site-specific project area analysis to determine the appropriate level of management. Determine the type and level of allowable management activities by assessing how proposed activities measure against the riparian conservation objectives and their associated standards and guidelines. Areas included in riparian conservation areas are: 300 feet on each side of perennial streams; 150 feet on each side of intermittent and ephemeral streams; and 300 feet from lakes, meadow, bogs, fens, wetlands, vernal pools, and springs.

## Resource Indicators and Measures

Resource indicators and measures shown in table 19 will be used to measure and disclose effects to aquatic wildlife related to OSV use designations and grooming trails for OSV use.

**Table 87. Aquatic indicators and measures for assessing effects**

| Resource Element | Resource Indicator | Measure |
|---|---|---|
| Threatened and Endangered Species | Aquatic habitat | Acres designated for cross-country OSV in critical and suitable habitat |
| | | Critical and suitable habitat (acres) within 100 feet of OSV trails |

## Methodology

This analysis uses relevant GIS data layers from the Tahoe National Forest. The GIS layers of proposed OSV designations and groomed trails were overlain with the aquatic resource (i.e., species distribution, critical habitat, surveys) layers to identify areas of potential effects.

One of four possible determinations is chosen based on the available literature, a thorough analysis of the potential effects of the project, and the professional judgment of the biologist who completed the evaluation. The four possible determinations (from FSM 2672.42) are:

1. "No impact" – where no impact is expected;
2. "Beneficial impact" – where impacts are expected to be beneficial;
3. "May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area" – where impacts are expected to be immeasurable or extremely unlikely; and
4. "May affect individuals, and is likely to result in a trend toward Federal listing or loss of viability in the planning area" – where impacts are expected to be detrimental and substantial.

Similar categories for federally listed threatened and endangered species are:

1. No effect
2. Beneficial effect
3. May affect, not likely to adversely affect
4. May affect, likely to adversely affect

## OSV Use Assumptions for Analysis

Assumptions used for the analysis are based on published literature and professional judgement based on experience by an aquatics specialist with the USDA Forest Service. These sources of information framed the issues key indicators used for analyzing the environmental consequences of each alternative on aquatic resources. They provide background information and conclusions regarding the effects of OSVs and other factors considered in this analysis, and apply to all alternatives.

- Aquatic species are unlikely to be directly affected by authorized OSV use (OSVs are not authorized to operate over bare ground or areas with inadequate snow depth that would cause resource damage as described in 36 CFR part 261.15).
- Indirect effects, such as those possibly resulting from snow compaction and vehicle emissions, are likely to be concentrated in the corridors along designated OSV trails (groomed or ungroomed) because OSV use is concentrated. Therefore, an area within

100 feet of designated OSV trails has the greatest risk of being affected by snow compaction, emissions, or other contamination. Areas designated for OSV use outside these concentrated use corridors are much less likely to experience measurable indirect effects.

- Only authorized OSV uses will be analyzed. Concerns arising from unauthorized uses will be addressed as law enforcement issues and may prompt corrective actions.
- Future aquatic resource-related monitoring may identify unexpected types or levels of impacts to aquatic resources, and may prompt corrective actions as warranted.

## Spatial and Temporal Context for Effects Analysis

### Direct and Indirect Effects Boundaries

The spatial boundary for analyzing the direct and indirect effects to aquatic resources is the project area boundary, because all expected effects relevant to this resource would occur and remain within this area.

Effects to aquatic species or their habitat would be expected to have occurred or become evident within one or two years of disturbance and this constitutes the short term. Effects that linger beyond two years are considered long-term effects. Long-term effects beyond two years become increasingly difficult to predict due to unknown interactions and the many environmental variables with numerous possible outcomes.

### Cumulative Effects Boundaries

Because effects from the proposed activities would interact with effects from other ongoing or future projects only within the project area boundary, the cumulative effects boundary is also the project area boundary. The project area boundary is the national forest boundary for the Tahoe National Forest for the following reasons: the forest boundary is large enough to address wide-ranging species and Forest Service sensitive species' viability is assessed at the Forest Plan area. The temporal boundary for this analysis is 10 years from the signing of the decision document and is based on adequate time for an assumed effectiveness monitoring program to be designed and implemented and for results to be assessed.

## Affected Environment and Environmental Consequences for Endangered, Threatened, Sensitive or Proposed Species and/or their Designated Critical Habitat

### Threatened, Endangered, and Proposed Aquatics Species

Official species lists for the Tahoe National Forest Over-snow Vehicle Use Designation Project were obtained on April 13, 2016, and August 21, 2016 from the Sacramento, and Nevada Field Offices of the U.S. Department of the Interior, Fish and Wildlife Service (USFWS 2016a, 2016b). An updated list was obtained on September 9, 2016, and in December of 2017, through the FWS Information for Planning and Conservation website (https://ecos.fws.gov/ipac/) from the Sacramento, and Nevada Fish and Wildlife Service office. The lists identify aquatic species to consider because they may be present within the general area of the Tahoe National Forest.

Table 88 identifies aquatic species to consider, because of their possible presence in the general area of the Tahoe National Forest. Species that are not known or suspected to occur in areas that are designated for OSV use are not carried forward into the effects analysis.

**Table 88. Threatened, endangered, proposed, and sensitive (TEPS) aquatic species considered and designated or proposed critical habitat considered in this analysis**

| | Species | Status | Known or Potential Occurrence | Species Addressed Further/Rationale |
|---|---|---|---|---|
| | **Amphibians/Reptiles** | | | |
| 1 | California Red-legged Frog (*Rana draytonii*) | USFWS Threatened | Potential Occurrence | Yes, discussed further in this document |
| 2 | Western Pond Turtle (*Actinemys marmorata*) | USFS Sensitive | Known Occurrence | Yes, discussed further in this document |
| 3 | Foothill Yellow-legged Frog (*Rana boylii)* | USFS Sensitive | Known Occurrence | Yes, discussed further in this document |
| 4 | Sierra Nevada Yellow-legged Frog (*Rana sierrae*) | USFWS Endangered | Known Occurrence | Yes. Exist in only a few populations in ponds and streams and generally in small numbers on the forest. |
| | **Fishes** | | | |
| 5 | Lahontan Cutthroat Trout *(Oncorhynchus clarkii henshawi)* | USFWS Threatened | Known Occurrence | Yes, discussed further in this document |
| 6 | Hardhead (*Mylopharodon conocephalus)* | USFS Sensitive | Known Occurrence | Yes, discussed further in this document |
| 7 | Cui-ui (*Chasmistes cujus)* | USFWS Endangered | No Potential Occurrence | No Effect. Species and habitat does not exist on Tahoe National Forest. |
| 8 | Lahontan Lake Tui Chub (*Siphatales bicolor pectinifer)* | USFS Sensitive | Potential Occurrence | Yes, discussed further in this document |
| 9 | Delta smelt (*Hypomesus transpacificus*) | USFWS Threatened | No Potential Occurrence | No Effect. Species and habitat does not exist on Tahoe National Forest. |
| 10 | Central Valley Steelhead (*Oncorhynchus (=salmo) mykiss*) | USFWS Threatened | No Potential Occurrence | No Effect. Species and habitat does not exist on Tahoe National Forest. |
| | **Aquatic Invertebrates** | | | |
| 11 | Great Basin Rams-horn snail (*Helisoma newberryi)* | USFS Sensitive | Potential Occurrence | Yes, discussed further in this document |
| 12 | California Floater *(Anodonta californiensis)* | USFS Sensitive | Potential Occurrence | Yes, discussed further in this document |
| 13 | Black Juga (*Juga nigra)* | USFS Sensitive | Potential Occurrence | Yes, present within stream located within project boundaries; considered in analysis. |
| | **CRITICAL HABITATS WITHIN THE PROJECT AREA** | | | |
| | **Species** | **Status** | **Occurrence** | **Analysis** |
| | California Red-legged Frog (*Rana draytonii*) | Final Designated | Known Occurrence on private land adjacent to NFS land | Yes |
| | Sierra Nevada Yellow-legged Frog (*Rana sierrae*) | Final Designated | Known Occurrence | Yes |

### *California Red-legged Frog (USFWS Threatened)*

On June 24, 1996, the California red-legged frog, *Rana draytonii*, was listed as federally threatened (USFWS 1996). The final California Red-legged Frog Recovery Plan was released on September 12, 2002 (USFWS 2002; 67 FR 57830). On March 17, 2010, the USFWS finalized designation of critical habitat within three locations in or adjacent to the Tahoe National Forest (USFWS 2010; 75 FR 12816).

The western portion of the Tahoe National Forest falls within the Sierra Nevada recovery unit (recovery unit #1) (USFWS 2002). The Plumas and Tahoe National Forests share core area #2 Yuba River-South Fork Feather River located in Yuba County (USFWS 2002). This core area includes a portion of the North Yuba River around New Bullards Bar Reservoir. While the goal of the recovery plan is to protect the long-term viability of all existing populations within each recovery unit, recovery actions would be focused within, but not limited to, core areas (USFWS 2002).

In the Sierra Nevada, the California Red-legged Frog historically occupied portions of the lower elevations west of the crest from Shasta County south to Tulare County (USFWS 2002). Almost all known California Red-legged Frog populations have been documented at elevations below 1,050 meters (3,500 feet) with some historical sightings documented at elevations up to 1,500 meters (5,200 feet) (USFWS 2002). The Tahoe National Forest's definition of suitable California Red-legged Frog breeding habitat includes all ponds, lakes and reservoirs on the west slope of the forests that contain water through July in years with average precipitation, and low gradient stream reaches (less than 4 percent) that do not receive peak runoff flows from snowmelt during May or June. Sites need to provide: suitable water depth for breeding (most years), presence of still or slow moving water, good water temperature for egg laying and larval development, presence of emergent aquatic vegetation or woody debris for egg deposition braces. Habitats are of a higher quality if they are not occupied by non-native predators.

Due to habitat alteration, and exotic species, overall there is limited suitable habitat for California red-legged frog in the Tahoe National Forest. In 1997, Dr. Gary Fellers, USGS, Point Reyes, California, surveyed all known suitable California Red-legged Frog habitat on the forest. His conclusion on the suitability of Tahoe National Forest lands for California Red-legged Frog was, "I am pretty comfortable with saying that there are few or no populations remaining on Federal land that we visited. There remains a fair possibility that a few populations may exist on private lands, but those are largely inaccessible to us."

The Tahoe National Forest currently has two Critical Aquatic Refuges: Upper Independence Creek and Sierra Buttes, neither of which includes known populations of California Red-legged Frog. Critical Aquatic Refuges are small subwatersheds that contain either (1) known locations of threatened, endangered or sensitive species; (2) highly vulnerable populations of native plant or animal species; or (3) localized populations of rare native aquatic- or riparian-dependent plant or animal species.

Tahoe National Forest biologists regularly note amphibians found in aquatic habitats and annually conduct stream surveys across portions of the forests. Suitable habitat such as marshes, ponds and low gradient streams occur on a number of sites within the historical range of this species in the Tahoe National Forest. Intensive surveys for California Red-legged Frogs have occurred on the Tahoe National Forest (1996 to present). Within suitable habitat, most of these surveys have followed the USFWS California Red-legged Frog survey protocol (1997, 2005). Since the release of the 2005 protocol, surveys that are conducted would follow the new 8-visit protocol.

### *Western Pond Turtle (R5 Sensitive)*

In California, the western pond turtle, *Actinemys marmorata*, can be found on all national forests, except the Inyo and Lake Tahoe Basin. Few turtle-specific surveys have been conducted in the Tahoe National Forest. Primarily, northwestern pond turtle observations have been made during aquatic surveys or other forest activity surveys. Western pond turtles have been observed at approximately 28 locations within the Tahoe National Forest boundary. Fourteen of these locations are on National Forest System lands. The remaining locations are on private or Bureau of Land Management lands. All Tahoe National Forest recorded sightings are from the Yuba River drainage. Most of the observations have been associated with pond habitats, although several observations were of turtles walking distant from an aquatic habitat (e.g., turtle walking across a road).

Western pond turtles have significantly declined in number with many populations representing less than 10 percent of the historical population. In California alone, there has been a loss of 80 to 85 percent of western pond turtles since the 1850s. The major threat to this species is habitat loss or degradation. Most of the historical habitat for this species has been permanently lost as a result of development for human occupancy.

### *Foothill Yellow-legged Frog (R5 Sensitive)*

Foothill yellow-legged frogs (*Rana boylii*) have suffered significant population declines across the majority of their known range of southwestern Oregon west of the Cascades Mountains crest south through California to Baja California (Fellers 2005; Jennings and Hayes 1994). Populations of foothill yellow-legged frogs in the Pacific Northwest are considered to be the most stable with approximately 40 percent of streams occupied, 30 percent are occupied in the Casade Mountains, 30 percent in the south Coast Range south of San Francisco and 12 percent in the Sierra Nevada foothills (Fellers 2005).

On the Tahoe National Forest, foothill yellow-legged frog surveys have been conducted in cooperation with the USGS Biological Division, Pt. Reyes from 1997 through 2000. In addition, California Academy of Sciences, San Francisco, has conducted herpetological surveys including areas likely to provide habitat for mountain yellow-legged frogs (1997, 1998, and 1999). Amphibian occurrence is documented during fish stream surveys and incidental to various other field activities and surveys. Although species-specific surveys for foothill yellow-legged frog are limited on the forest, this species tends to be easily observed during stream surveys and sightings are recorded. Perennial streams or intermittent streams with perennial pools and ponds below 6,000 feet in elevation on the west slope of the Sierra Nevada should be considered suitable for foothill yellow-legged frogs.

### *Sierra Nevada Yellow-legged Frog (USFWS Endangered)*

The Sierra Nevada yellow-legged frog, *Rana sierra*, can be found on the El Dorado, Inyo, Lassen, Plumas, Sierra, Stanislaus, Tahoe and Lake Tahoe Basin National Forests. This species is found from around 4,500 feet to over 12,000 feet elevation, and inhabit ponds, lakes, and streams of sufficient depth for overwintering (Jennings and Hayes 1994).

Once abundant in aquatic ecosystems of the mid to high elevation Sierra Nevada from southern Plumas County to southern Tulare County (Jennings and Hayes 1994), the mountain yellow-legged frog has undergone a range-wide decline in the Sierra Nevada (USFWS 2003). Over 90 percent of historically occupied sites in the Sierra Nevada are now unoccupied (Vredenburg et al. 2007).

The decline of mountain yellow-legged frogs in the Sierra Nevada has largely been attributed to the introduction of salmonid fishes during the last century (USFWS 2003). More recently, the disease chytridiomycosis has emerged as a significant threat to the species (Briggs et al. 2005, Oullet et al. 2005, Wake and Vredenburg 2008).

Sierra Nevada yellow-legged frogs are known to have been present within a number of locations in the Tahoe National Forest, but now exist in only a few populations in ponds and streams and generally in small numbers (USFWS 2003, the Tahoe National Forest GIS database). The Tahoe National Forest GIS database shows that since 1993 there have been mountain yellow-legged frogs documented in 4 general localities on Truckee Ranger District, 6 general localities on Sierraville Ranger District, and 10 general localities on Yuba River Ranger District.

### *Lahontan Cutthroat Trout (USFWS Threatened)*

The USFWS is in the process of revising the 1995 Recovery Plan for Lahontan cutthroat trout, *Siphatales bicolor pectinifer*. A technical team has assembled to develop restoration and recovery actions for the Truckee River basin. A primary purpose of the team is to identify and prioritize actions for the improvement of ecosystem function to facilitate the restoration and recovery of Lahontan cutthroat trout.

Important recovery areas identified as having immediate potential include: Independence Creek, upstream of Independence Lake; Pole Creek; Hunter Creek; Donner Creek; Perazzo Creek; Prosser Creek; and the Truckee River from its confluence with Donner Creek to the State line; Upper Truckee River; Truckee River from Tahoe Dam to Donner Creek; and, Independence Creek downstream from Independence Lake to the Little Truckee River. The Truckee River Basin Implementation Team has identified Macklin and East Fork Creeks and an unnamed tributary to the East Fork Creek in the Yuba River system as necessary for recovery of Lahontan cutthroat trout because they contain remnants of indigenous Truckee River Basin strains.

Within Tahoe National Forest, recovery populations of Lahontan cutthroat trout occur in one lake and five streams. Tahoe National Forest has designated the Independence Lake and Upper Independence Creek flowing into it as a Critical Aquatic Refuge. Management decisions and actions in a Critical Aquatic Refuge should reflect the unique and important nature of the aquatic and riparian resources in these areas. Periodically, stream surveys are conducted to determine Lahontan cutthroat trout population trends. All populations in Tahoe National Forest have been stable and vary in numbers at carrying capacity for the habitat in the streams, However, the populations are small and may not be large enough to support genetic diversity in the long term, and may be at risk for genetic drift and bottlenecks (Somer, CDFW, pers. comm., 2014).

### *Hardhead (R5 Sensitive)*

Historically, hardhead, *Mylopharodon conocephalus*, have been regarded as a widespread and locally abundant species (Ayres 1854, Jordan and Evermann 1896, Evermann 1905, Rutter 1908, Murphy 1947, Soule 1951, Reeves 1964). Hardhead are still widespread in the foothill streams, but their specialized habitat requirements, combined with widespread alteration of downstream habitats have resulted in isolation and localization of populations. These conditions increase the chance for localized extinctions. Hence, hardhead are less abundant than they once were, especially in the southern half of their range.

The Tahoe National Forest LRMP, as amended, does not provide specific management guidelines for this species. SNFPA standards and guidelines for Riparian Conservation Areas, listed under California red-legged frog, provide for the needs of this species.

### Lahontan Lake Tui Chub (R5 Sensitive)

The Lahontan Lake tui chub, *Siphatales bicolor pectinifer,* are a cyprinid subspecies found in Lake Tahoe and Pyramid Lake, Nevada, which are connected to each other by the Truckee River and in nearby Walker Lake, Nevada. Populations of chub occurring in Stampede, Boca, and Prosser reservoirs may also be Lahontan Lake tui chub due to morphological similarities (Marrin and Erman 1982, Moyle et al. 1995).

The Lake Tahoe population is the only confirmed population in the Sierra Nevada, with a probable population in Stampede, Boca, and Prosser Reservoirs in the Tahoe National Forest. Little study has occurred on the Lake Tahoe population since Miller (1951). Zooplankton levels have changed over this period. Daphnia, an important prey of adult chubs, have been nearly eliminated (Richards et al. 1975) by the introduced Kokanee salmon (*Oncorhynchus nerka*) and opossum shrimp (*Mysis relicta*), both of which feed on zooplankton. Marshland degradation along the lake may be taking away vital spawning and nursery areas.

Based on occurrence within such widely diverse habitats as Lake Tahoe and Pyramid Lake, it is believed this species can tolerate a wide range of physicochemical water conditions. Surveys for this species have not been conducted in the Tahoe National Forest. Populations of plankton-feeding chub occur in Stampede, Boca, and Prosser Reservoirs; these may be Lahontan Lake tui chub due to morphological similarities (Marrin and Erman 1982, Moyle et al. 1995).

### Great Basin Rams-horn Snail (R5 Sensitive)

Historically, the Great Basin rams-horn snail, *Helisoma newberryi*, has been observed in the Truckee River directly downstream of Lake Tahoe, on the Lake Tahoe Basin Management Unit. Currently, this snail has not been sighted or surveyed for in the Tahoe National Forest. Suitable habitat occurs within slow segments of the Truckee and Little Truckee Rivers and their tributaries.

Currently, this snail has not been sighted or surveyed for in the Tahoe National Forest. Suitable habitat occurs within slow-flowing segments of the Truckee and Little Truckee Rivers and associated tributaries.

### California Floater (F5 Sensitive)

The current distribution of the California floater, *Anodonta californiensis*, indicates this species has probably been eliminated from much of its former range (Taylor 1981). The California floater has been reported to occur in locations adjacent to the Tahoe National Forest, but no occurrences have been documented on National Forest system lands within the boundary of the Tahoe National Forest.

### Black Juga (R5 Sensitive)

The black juga, *Juga nigrina,* is restricted to the upper Sacramento system in California. The type-locality populations in Clear Creek, Shasta County, tributary to the Sacramento River, have been decimated by gold mining activities (Frest and Johannes 1995), but the species still persists in Clear Creek above the town of French Gulch, the epicenter for mining operations (Johannes 2010). The authors further concluded that this species has been extirpated from several sites based on its apparent absence at many historic sites in the upper Sacramento River system (Frest and Johannes 1995)

## Environmental Consequences Common to all Alternatives

Because the alternatives are very similar, with the same activities proposed, and the differences are mainly the spatial extent of OSV use, most of the effects are described in this section. The varying areas of authorized OSV use would result in mostly small differences in the degree of possible effects. Therefore, each alternative's effects described below will mainly summarize the extent of aquatic resources affected, and provide the basis for determinations.

### *Direct and Indirect Effects*

Direct impacts to fish, amphibians, and other aquatic species would be nonexistent to extremely rare as amphibians are typically dormant during the winter, and OSVs would have to travel through water to collide with fish and other aquatic species. Due to the infrequency of this occurring, direct impacts to fish, amphibians, and aquatic species are expected to be minor or discountable.

Indirect impacts would include snow compaction and impaired water quality or pollutants entering waterways.

#### Snow Compaction

Snow compaction could indirectly affect aquatic species through delayed snowmelt, affecting the hydrologic regime, and altering habitat or riparian vegetation and possibly leading to erosion and sediment into waterways.

Widespread snow compaction from cross-country OSV uses can affect melt patterns, and in turn, the hydrologic regime. Studies have found delayed snowmelt in areas compacted by snowmobiles versus areas of uncompacted snow (Keddy et al. 1979; Neumann and Merriam 1972). During spring snowmelt, these effects can reduce the ability of the snow to slow runoff. It is unknown how much OSV-related snow compaction would affect runoff rate and timing, but some studies suggest up to a 2-week delay. Because snow compaction from off-trail cross-country use is currently not extensive on a watershed scale, measureable changes in hydrology are not expected (McNamara 2017).

Riparian vegetation important to aquatic species could be affected by snow compaction. Early spring growth of some plant species may be slowed or may not occur under an OSV trail; however, the current and proposed OSV trails are underlain by existing roads and trails that are already compacted and/or disturbed and little, if any, additional impacts are expected to the vegetation. Trail grooming on the Tahoe National Forest occurs over an existing road and trail network and does not alter landforms or result in significant soil disturbance that would change water flow patterns or quantities of surface water runoff. Trail grooming does not cause substantial impacts to water quality, perennial, intermittent or ephemeral streams, wetlands or other bodies of water (Hydrology report, McNamara 2017).

Cross-country OSV use can affect woody riparian species by bending and breaking of branches by recreationists running over the branches (Neumann and Merriam 1972). This is most likely to occur with lower snow depths, such as the beginning of the winter season and before sufficient snow has accumulated to protect vegetation, and during spring snowmelt. Regenerating timber could also be affected by bending and breaking of leaders with inadequate snow depth. However, both the hydrology report (McNamara 2017) and botany report (Davidson 2017) concluded that vegetation trampling from snowmobiles and impacts to riparian resources from OSV use would be discountable and extremely unlikely to occur with adequate snowpack coverage.

Disturbance to soil and vegetation by OSV use is reduced as snowpack depths increase. Damage to soil and low-growing vegetation is much more likely when OSV use occurs under low-snow conditions (Greller et al. 1974, Fahey and Wardle 1998). Thus, the minimum snow depth requirements of all alternatives are expected to prevent or minimize damage to soil and vegetation (Botany Report, Davidson 2017). On the Tahoe National Forest, OSV travel on snow-free areas is prohibited in the current and proposed scenarios. By not allowing cross-country OSV use when and where there is not adequate snow depth, the Tahoe National Forest minimizes the possibility of direct damage to soils and ground vegetation.

Similarly, the hydrology analysis (McNamara 2017) found that with adequate snow depth, cross-country use of OSVs would have discountable effect on ground disturbance that could lead to erosion and sedimentation in streams or other waterbodies, and discountable effect on vegetation, especially along streams and other waterbodies.

It further states "…off-trail OSV use would be generally dispersed and would not result in high concentration of OSV use on bare soil. Also, travel over bare soil can damage machines so is generally avoided by operators. With adequate minimum snow levels, this plan would result in no more than incidental soil erosion and therefore would not create water quality impacts to streams or waterbodies by introducing sediment in water runoff."

These conclusions are generally attributed to the fact that OSV use on the Tahoe National Forest is considerably less than Yellowstone National Park, where detailed studies were conducted on OSV use and their potential effects to the aquatic environment and hydrologic regime.

The number of snowmobiles that entered Yellowstone in 2003 and 2004 was 47,799 and 22,423, respectively (Arnold and Koel 2006), all routed through a single trailhead. In comparison, the 2009 estimated seasonal day use of OSV Program trails across the Tahoe National Forest was around 20,000 OSVs, spread over 6 trailheads. These visitations are spread across multiple trailheads and trail systems and do not all occur in the same location. As a result, OSV seasonal use levels at any Tahoe National Forest trailhead or trail system are considerably less than OSV use that occurred at Yellowstone National Park, and are considered very low. Since Yellowstone OSV use levels studied had not resulted in impaired water quality, due to much lower use numbers, it follows that the OSV use as proposed in the project area would not adversely affect water quality of snowmelt.

There are no direct effects to aquatic species from snow compaction along designated OSV trails because aquatic species are not present. Outside the designated OSV trail corridors, dispersed cross-country OSV travel is much less likely to compact snow with enough intensity and repetition to measurably or predictably affect ground vegetation or the hydrologic regime, and therefore, snow compaction is not considered further in this analysis as a reasonably foreseeable source of indirect effects to aquatic species.

Snow compaction may affect aquatic species habitat, if present, however, the magnitude, timing, and location affected are difficult to determine because of the large area designated for OSV use and its dispersed nature.

### Pollutants

Emissions from over-snow vehicles, particularly two-stroke engines on snowmobiles, release pollutants including ammonium, sulfate, benzene, nitrogen oxides, ozone, carbon dioxide, carbon monoxide, aldehydes, polycyclic aromatic hydrocarbons and other toxic compounds into the air. A portion of these compounds may become trapped and stored in the snowpack, to be released during spring runoff. Four-stroke snowmobile engines produce considerably lower amounts of pollutants.

Some of the airborne pollutants would enter the snowpack and be released during snowmelt. Similar responses can be assumed to occur in aquatic species that ingest these compounds from snowmelt, although the compounds may undergo chemical changes while in the snowpack, confounding the predictability of effects.

Airborne pollutants can enter the snowpack from both local and regional sources, including but not limited to vehicle emissions, dust storms, and smog. The concentrations of basic cations and acidic anions in the snowpack can be altered and, when released quickly during snowmelt, can temporarily lower the pH of surface waters in a process known as “episodic acidification” (Blanchard et al. 1988).

Demonstrating that snowpack chemistry can be used as a quantifiable indicator of airborne pollutants from vehicular traffic, a correlation was shown between pollutant levels and vehicle traffic in Yellowstone National Park (Ingersoll et al. 1997). Ammonium and sulfate levels were consistently higher for the in-road snow compared to off-road snow, but nitrate concentrations did not decrease within a distance of 100 meters from the emission source; thus, the nitrate ion may be used to distinguish between local and regional emission sources (Ingersoll et al. 1997). Studying snow chemistry in Yellowstone National Park, Ingersoll (1998) found that concentrations of ammonium, nitrate, sulfate, benzene, and toluene were positively correlated with snowmobile use. Concentrations of ammonium were up to three times higher for the in-road snow compared to off-road snow. Concentrations decreased rapidly with distance from roadways.

Arnold and Koel (2006) also examined volatile organic compounds in Yellowstone National Park, and found that the snow in heavily used areas contained higher levels of benzene, ethylbenzene, m- and p-xylene, o-xylene, and toluene compared with a control site only 100 meters from the traveled roadways. Even at the most heavily used area (Old Faithful) they found that the concentrations of volatile organic compounds were considerably below Environmental Protection Agency’s water quality criteria for these compounds.

In situ water quality measurements (temperature, dissolved oxygen, pH, specific conductance, and turbidity) were collected; all were found within acceptable limits. Five volatile organic compounds were detected (benzene, ethylbenzene, m- and p-xylene, o-xylene, and toluene). The concentrations were found below EPA criteria and guidelines for the volatile organic compounds analyzed and were below levels that would adversely impact aquatic ecosystems (Arnold and Koel 2006).

Studying air quality and snow chemistry effects from snowmobiles in the Snowy Range, Wyoming, Musselman and Korfmacher (2007) found that heavier snowmobile use resulted in higher levels of nitrogen oxides and carbon monoxide, but ozone and particulate matter were not significantly different. When compared with air quality during the summer, they found that carbon monoxide levels were higher in the winter, but nitrogen oxides and particulate matter were higher in the summer. Air pollutants were well-dispersed and diluted by winds, and air quality was not perceived as being significantly affected by snowmobile emissions. Pollutant concentrations were generally low in both winter and summer. These results differ from those studies examining air pollution from snowmobiles in Yellowstone National Park. However, snow chemistry observations did agree with studies from Yellowstone National Park. Compared with off-trail snow, the snow sampled from snowmobile trails was more acidic with higher amounts of sodium, ammonium, calcium, magnesium, fluoride, and sulfate. Snowmobile activity apparently had no effect on nitrate levels in the snow.

In the winter, overwintering amphibians are typically hibernating. Airborne compounds would only be taken up by respiring species. Airborne pollutants normally disperse quickly in mountain environments that are prone to windy conditions, such as the Sierra Nevada. The levels of OSV exhaust contaminants on the Tahoe National Forest (considerably less than those observed in Yellowstone National Park) are not expected to impair water quality (McNamara 2016).

The available research on OSV pollutants (both airborne and in the snowpack) indicate that some effects to aquatic species may occur in the immediate vicinity of heavy use areas. Pollutants that become trapped in the snowpack are also concentrated in areas of heavy OSV use.

Outside the designated OSV trail corridors, dispersed OSV travel is much less likely to contribute harmful contaminants with high enough levels and repetition to measurably or predictably affect aquatic resources, and therefore, is not considered in this analysis as a possible source of indirect effects.

Based on multi-year studies in Yellowstone National Park, researchers concluded that Yellowstone OSV use levels have not resulted in impaired water quality. Given that OSV use levels on the Tahoe National Forest at OSV trailheads are less than OSV use levels occurring at Yellowstone during the study period, it is determined that water quality is not impaired by the OSV Program (Hydrology report, McNamara 2016).

There are few studies regarding effects of snowmobiles on aquatic biota but, Adams (1975) addressed the effects of high levels of lead and hydrocarbons from snow machine exhaust on brook trout, *Salvelinus fontinalis*. His study found that that high-level exposure to lead and hydrocarbon can lower activity levels and feeding. The alternatives of the project are expected to have discountable effects to water quality and fish because snowmobile use on the Tahoe National Forest is widely dispersed and does not occur at concentrations that have been shown to cause adverse effects to water quality or aquatic organisms. The results of the Adam's study support this contention and state that the levels of hydrocarbons found in the study are "unrealistic for all but a few small lakes in well populated areas."

### Pollutants Effects Summary

The uptake of harmful pollutants is not expected to result in the death of any individual aquatic species on the Tahoe National Forest, based on the studies described, and the findings related to water quality impacts. Therefore, the level of effect to TEPS aquatic species from OSV pollutants is expected to be minimal, and would not result in loss of individuals.

Based on findings on studies of OSV related effects to aquatic species and/or their habitat, adverse impacts to special-status fish and amphibians due to impaired water quality would be expected to be less than significant.

In addition, effects are more likely to occur along designated OSV trails compared to areas open to cross-country OSV use because dispersed OSV travel is much less likely to contribute harmful contaminants with high enough levels and repetition to measurably or predictably affect aquatic resources.

#### *Monitoring*

Use of OSVs has not been extensively monitored on the Tahoe National Forest. However, a monitoring study completed in 2011 showed no impact to aquatic resources, riparian systems, or meadows, and suggests that OSVs have a low risk to aquatic resources under current use levels and levels of management. Monitoring of aquatic resources results are summarized in table 89. Impacts to watershed resources would be minimized by periodically visually monitoring native surface roads used as OSV trails during spring runoff to determine if additional road drainage is needed. Visual Monitoring of wet meadow areas, trail stream crossings, hill climb areas and other areas with sensitive resources and/or concentrated use would occur when snow depth is less than 24 inches periodically to determine if resource damage was occurring, which could prompt corrective actions.

**Table 89. Tahoe National Forest 2011 OHV/OSV Monitoring and Management Program: 2011 Monitoring Results**

| Monitoring Accomplishments | Results | Were Objectives and Success Criteria Met? |
|---|---|---|
| American River RD OSV Monitoring of Aquatic Resources | Groomed OSV routes along the Foresthill Divide were monitored for resource damage during low-snow conditions over wetlands, riparian areas, and streams. No resource damage to aquatic resources was observed. An exceptionally deep snow pack in winter/spring 2011 contributed to the protection of aquatic resources. | Yes, monitoring determined OSV use in relation to aquatic resources. No effects to aquatic resources were identified and no management actions are needed. |

## Environmental Consequences

### California Red-legged Frog (USFWS Threatened)

#### *Direct and Indirect Effects (All Alternatives)*

There would be no direct effects because OSV use would prohibited over areas with inadequate snow depth or areas exposed to bare ground that would cause resource damage as described in 36 CFR part 261.15, therefore, no direct impacts to individuals would occur.

Direct effects from OSV collision could occur from cross-country use when breeding occurs. However, the probability of collision is very low and considered discountable for the following reasons:

1. *R. draytonii* breed at temperatures above freezing and in snow-free areas where OSV use is unlikely to occur.
2. *R. draytonii* critical habitats on the Tahoe National Forest are not located in high OSV use areas. *R. draytonii* populations are typically found at elevations below 3,500 feet.
3. *R. draytonii* typically breed in snow-free areas in pond and stream pools exceeding 0.7 meter depths in areas away from any roads or trails and where OSV use would generally be dispersed and away from areas with inadequate snow depth or exposed ground that might cause resource damage.
4. Alternatives vary minimum snow depth so some alternatives would protect aquatic habitats better than others by preventing the compaction of soil and vegetation which affects water quality. However, cross-country OSV operators avoid travel over bare ground and soil because it can damage their machines.

Pollutants that are trapped and then later released during snowmelt may have some adverse effects; however, the extent and direction of specific effects is unknown. Impacts to water quality are assessed in the Hydrology Section, which concluded that water quality is not impaired by the Tahoe National Forest OSV Project for any of the alternatives. For this reason, it is expected that pollutant concentrations would be low enough that water quality would not be impaired for aquatic species, and thus it is likely that *R. draytonii* response would be discountable.

### California Red-legged Frog Critical Habitat

There are a total of 2,246 acres of California red-legged frog critical habitat within the Tahoe National Forest. These acres are contained within the NEV-1 and PLA-1 critical habitat subunits (75 FR 12816).

For alternatives 1 and 4 the total acres of designated critical habitat within areas open to cross-country OSV use are the same at 930 acres or approximately 41 percent of the total acres of critical habitat on the Tahoe National Forest. Alternatives 2, 3, and 5 have no acres open to cross-country OSV use inside critical habitat on the Tahoe NF. For alternatives 2, 3, and 5, critical habitat is over 5 miles in distance to the nearest open OSV use area (table 90).

**Table 90. Alternatives comparison of possible effects to California red-legged frog critical habitat on the Tahoe National Forest**

| California red-legged frog | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|
| Critical habitat (acres) within 100 feet of OSV trails | 0 | 0 | 0 | 0 | 0 |
| Critical habitat (acres) within areas designated for cross-country OSV use | 930 | 0 | 0 | 930 | 0 |

There are no proposed designated OSV trails within California red-legged frog designated critical habitat for any of the alternatives. Therefore, there would be no effect to aquatic breeding and aquatic non-breeding habitat within California red-legged frog critical habitat from OSV trail use.

### California Red-legged Frog Suitable Habitat

Suitable habitat in relation to OSV trails and areas open to cross-country OSV use are shown in table 91. In general, sutiable habitat was defined as streams and waterbodies below 5,200 feet in elevation and 300 feet around these water features.

**Table 91. Alternatives comparison of possible effects to California red-legged frog suitable habitat on the Tahoe National Forest**

| California red-legged frog | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|
| Suitable habitat (acres) within 100 feet of OSV trails | 40 | 330 | 40 | 91 | 40 |
| Suitable habitat (acres) within areas designated for cross-country OSV use | 48,212 | 2,065 | 4,908 | 48,212 | 2,082 |

Alternative 2 has the least amount of suitable habitat acrage within areas open to cross-country OSV use. However, the acrage of suitable habitat affected by OSV trails is high for alternative 2 relative to the other alternatives becauseit has a greater mileage of designated OSV trails within suitable habitat. It is highly unlikely that OSV use would adversely affect suitable habitat because OSVs are restricted to operating on the existing roadbed only, where California red-legged frog habitat does not exist.

There would be no construction of any structures that could impede or redirect flood flows, nor any ground surface modifications that could change drainage patterns, impervious surfaces, soil permeability, or other hydrological characteristics such as surface water volumes (McNamara 2017).

OSV use during the winter is not expected to result in habitat disturbance because restriction of OSV use that causes resource damage and establishing minimum snow depths in alternatives 2, 3, 4, and 5 are expected to be sufficient to prevent contact between OSVs and the soil surface. Implementation of water quality best management practices outlined in Volume II of this DEIS, Appendix D, further ensure controls to avoid resource damage. Additionally, it is likely that most OSV owners would not ride with less than adequate snow depth to prevent damage to their OSVs.

However, more direct studies examining snow depth and OSV use in relation to the potential effects to aquatic species or their habitat are needed. Continued monitoring procedures by recreation and forest staff, law enforcement, and Investigation Officers will further add to a better understanding of the relation between OSV use and aquatic species or their habitat.

### *Cumulative Effects - Alternative 1*

The risks of cumulative effects from this alternative are very low because existing requirements of adequate snow depths for OSV use appear to be sufficient to protect the ground surface. There would continue to be only incidental ground disturbance, low risk of damage to vegetation, and other direct and indirect effects. As a result, there would be no change to cumulative watershed effects or equivalent roaded acres calculations for any watersheds under this alternative as described in the Hydrology section. There would be negligible effects from exhaust emissions stored in snowpack.

This alternative would not implement the recommended mitigation measures, and has the second highest amount of land area open to OSVs. However, this alternative appears to have adequate snow cover requirements to protect soils, water, and aquatic resources, and to protect vegetation in riparian areas. This alternative would not directly conflict with Forest Plan standards and guidelines, and would not result in irreversible or irretrievable effects to soil, water, aquatic, or riparian resources.

### *Cumulative Effects - Alternatives 2, 3, 4, and 5*

Alternatives 2, 3, 4, and 5 are discussed together because they have minor differences in terms of possible effects to the species or their habitat.

Because there is a low risk of direct and indirect effects, the risks of cumulative effects from these alternatives are negligible. As a result of the alternatives ranging in 12 to 24-inch minimum snow depth for cross-country use and a 6- to -24-inch recommended minimum snow depth on trails, there would continue to be only incidental ground disturbance. As a result, there would be no change to equivalent roaded acres calculations for any watersheds under any alternative, and no change in detrimental cumulative watershed effects as described in the Hydrology section. Alternatives 2, 3, 4, and 5 would implement recommended mitigation measures. These alternatives would have adequate snow cover to protect soils, water, vegetation and aquatic habitats to prevent resource damage. These alternatives would not directly conflict with Forest Plan standards and guidelines, and would not result in irreversible or irretrievable effects to soil, water, or vegetation of aquatic resources.

### Sierra Nevada Yellow-legged Frog (USFWS Endangered)

#### *Direct and Indirect Effects (All Alternatives)*

Direct effects would not occur during the majority of the OSV operating period because (1) OSV use is not allowed over snow-free areas that would cause resource damage to the underlying ground; and (2) *R. sierrae* overwinter underwater and are restricted to deep lakes (over 5 feet deep) that do not freeze solid in winter, and therefore, are not located in areas where OSV use would typically occur.

Direct effects from OSV collision could occur from cross-country use during spring thaw when breeding occurs from April at lower elevations to June or July in high elevations. Adults can travel over ice or snow to reach preferred breeding sites early in the breeding season (USDA Forest Service 2014b). However, the probability of vehicle collision was considered low based on the following reasons:

1. *R. sierrae* typically breed in snow free areas away from any road or trails. Additionally, OSV use is generally dispersed away from areas with inadequate snow depth or exposed ground that might cause damage to *R. sierrae* habitat.
2. Snow depth vary by alternatives, therefore some alternatives would protect aquatic habitats better than others by preventing compaction of soil and vegetation which affects water quality. However, cross-country OSV operators avoid travel over bare ground or soil because it can damage their machines.

Pollutants that are trapped and then later released during snowmelt may have some adverse effects. However, the extent and direction of these effects are unknown. Impacts to water quality was assessed in the Hydrology Section, which concluded that water quality is not impaired by this project for any of the alternatives. For this reason, it is expected that pollutant concentrations would be low enough that water quality would not be impaired for aquatic species, and thus it is likely that *R. sierrae* response would be discountable.

### Sierra Nevada Yellow-legged Frog Critical Habitat

There are a total of 99,882 acres of *R. sierrae* critical habitat within the Tahoe National Forest. These acres are contained within critical habitat subunits 2B, 2C, 2D and 2E (81 FR 59045).

Approximately 76,241 acres of critical habitatoccur within areas open to cross country OSV use under alternative 2. Alternatives 1 and 4 have similar acrages of critical habitat in areas open to OSV use, however the acres of critical habitat likely affected by OSV trails c is slightly higher under alternative 4. Alternative 5 has the lowest number of critical habitat acres within areas open to cross country OSV use (table 92).

**Table 92. Alternatives comparison of potential effects to Sierra Nevada Yellow-legged frog critical habitat on the Tahoe National Forest**

| Sierra Nevada Yellow legged Frog Critical Habitat | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|
| Critical habitat (acres) within 100 feet of OSV trails | 657 | 665 | 573 | 707 | 626 |
| Critical habitat (acres) within areas designated for cross-country OSV use | 84,795 | 76,241 | 47,520 | 84,846 | 33,125 |

In general, it is unlikely that OSV trail use would adversely affect critical habitat because OSVs are restricted to operating on the existing roadbed only. Further, OSV use during the winter is not expected to result in habitat disturbance because restriction of OSV use that causes resource damage (e.g., establishing minimum snow depths) are expected to be sufficient to prevent contact between OSVs and the soil surface. Implementation of water quality Best Management Practices outlined in Volume II, Appendix D, further ensure controls to avoid resource damage. Additionally, it is likely that most OSV owners would not ride with less than adequate snow depth to prevent damage to their OSVs.

### Sierra Nevada Yellow-legged Frog Suitable Habitat

Suitable habitat in relation to OSV trails and areas open to cross-country OSV use are shown in table 93. In general, suitable habitat was defined using the Regional Suitable Habitat dataset, which was derived using streams, lakes, ponds reservoirs, and meadows within the species' range or distribution as defined by Roland Knapp during the summer of 2014.

**Table 93. Alternatives comparison of possible effects to Sierra Nevada yellow-legged frog suitable habitat on the Tahoe National Forest**

| Sierra Nevada Yellow-legged Frog suitable habitat | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|
| Suitable habitat (acres) within 100 feet of OSV trails | 301 | 342 | 299 | 327 | 292 |
| Suitable habitat (acres) within areas designated for cross-country OSV use | 30,750 | 23,212 | 17,320 | 30,949 | 15,600 |

Alternative 5 would have the least amount of potential effects to Sierra Nevada yellow-legged frog suitable habitat because it would affect the least amount of acres open to cross country OSV use and has the least number of OSV trails within suitable habitat.

Construction of any structures would not occur that could impede or redirect flood flows, nor any ground surface modifications which could change drainage patterns, impervious surfaces, soil permeability, or other hydrological characteristics such as surface water volumes (McNamara 2017).

OSV use during the winter is not expected to result in habitat disturbance because minimum snow depths and restriction of OSV use that causes resource damage are expected to be sufficient to prevent contact between OSVs and the soil surface. However, snow depth requirements vary by alternative, therefore alternatives requiring with the greatest snow depths (alternatives 3 and 5) would likely have the least risk to aquatic habitat impacts compared to the alternatives 1, 2, and 4, with alternative 1 likely to have the greatest risk to Sierra Nevada yellow-legged frog aquatic habitat. Implementation of water quality best management practices outlined in Volume II of this DEIS, Appendix D, further ensure controls to avoid resource damage. Additionally, it is likely that most OSV owners would not ride with less than adequate snow depth to prevent damage to their OSVs.

However, more direct studies examining snow depth and OSV use in relation to the possible effects to aquatic species or their habitat are needed. Continued monitoring procedures by recreation and forest staff, law enforcement, and Investigation Officers will further add to a better understanding of the relation between OSV use and aquatic species or their habitat.

#### *Cumulative Effects - Alternative 1*

Same as California red-legged frog description above.

#### *Cumulative Effects - Alternatives 2, 3, 4, and 5*

Same as California red-legged frog description above.

### Western Pond Turtle (R5 Sensitive)

#### *Direct and Indirect Effects (All Alternatives)*

There would be no direct effects because OSV use would not be allowed over areas with inadequate snow depth or areas exposed to bare ground that would cause resource damage as described in 36 CFR part 261.15, therefore, no direct impacts to individuals would occur.

For western pond turtle, hatchlings emerge in the spring, during snowmelt. The short delay of snowmelt and colder soil temperatures from OSV-compacted snow would not likely delay or reduce western pond turtle emergence. The effects of snow compaction and OSV emissions are concentrated in areas of heavy use, such as along designated OSV trails.

No western pond turtle occurrences are present within 100 feet of existing or proposed designated OSV trails; therefore, it is anticipated that there would be no measurable or predictable indirect effects to the occurrences.

#### *Cumulative Effects - Alternative 1*

Same as California red-legged frog description above.

#### *Cumulative Effects - Alternatives 2, 3, 4, and 5*

Same as California red-legged frog description above.

### Lahontan Cutthroat Trout (USFWS Threatened)

#### *Direct and Indirect Effects – (All alternatives)*

There would be no direct effects to Lahontan cutthroat trout because OSV use would not be allowed over areas with inadequate snow depth or areas exposed to bare ground that would cause resource damage as described in 36 CFR part 261.15, and OSVs would have to travel through water to collide with fish, therefore, no direct impacts to individuals would occur. Additionally, there are no areas of Lahontan cutthroat trout recovery populations in Independence Lake that are open to cross-country OSV use under any of the alternatives.

There are no crossings of designated OSV roads with Lahontan cutthroat trout recovery populations in the Tahoe National Forest for the proposed action or any of the other alternatives.

Pollutants that are trapped and then later released during snowmelt could have some adverse indirect effects if in close proximity to Lahontan cutthroat trout occupied streams. However, the probability of this occurring and resultant pollutant concentration would be low because of the widely dispersed nature of cross-country OSV use in space and time.

Impacts to water quality are assessed in the Hydrology section, which concluded that water quality is not impaired by the Tahoe National Forest OSV Use Designation Project for any of the alternatives. For this reason, it is expected that pollutant concentrations would be low enough that water quality would not be impaired for aquatic species, and thus, it is likely that Lahontan cutthroat trout response would be discountable.

#### *Cumulative Effects - Alternative 1*

Same as California red-legged frog description above.

#### *Cumulative Effects - Alternatives 2, 3, 4, and 5*

Same as California red-legged frog description above.

### Foothill Yellow-legged Frog (R5 Sensitive)

#### *Direct and Indirect Effects – (All alternatives)*

There would be no direct effects as described in the California red-legged frog description above with the following differences:

The probability of vehicle collision is very low and considered discountable for the following reasons:

1. *R. boylii* breed at temperatures above freezing and in snow-free areas where OSV use is unlikely to occur.
2. *R. boylii* on the Tahoe National Forest are not located in high OSV use areas (see map). *R. boylii* populations are typically found at elevations below about 6,000 feet.
3. *R. boylii* typically breed in streams containing cobble-sized or larger rock substrates, which are areas generally avoided by OSV use since they are typically snow-free and in areas with inadequate snow depth or exposed ground that might cause resource damage.
4. Cross-country OSV operators typically avoid travel over bare ground or soil because it can damage their machines.

Compacted snow generally causes delayed snowmelt and increases the transfer of freezing temperatures to the ground due to reduced insulating air spaces (Keddy et al. 1979, Fahey and Wardle 1998, Davenport and Switalski 2006, Eagleston and Rubin 2012, Gage and Cooper 2013). For *R. boylii*, breeding occurs when snow begins to melt. The short delay of snowmelt and colder soil temperatures from OSV-compacted snow would not likely delay or reduce *R. boylii*. The effects of snow compaction and OSV emissions are concentrated in areas of heavy use, such as along designated OSV trails. No *R. boylii* frog occurrences are present within 100 feet of existing or proposed designated OSV trails; therefore, it is anticipated that there would be no meaningfully measurable or predictable indirect effects to *R. boylii*.

#### *Cumulative Effects-(Alternative 1)*

Same as California red-legged frog description above.

#### *Cumulative Effects – (Alternatives 2, 3, 4, and 5*

Same as California red-legged frog description above.

### Hardhead (R5 Sensitive)

#### *Direct and Indirect Effects – (All Alternatives)*

There would be no direct effects to hardhead because OSV use would not be allowed over areas with inadequate snow depth or areas exposed to bare ground that would cause resource damage as described in 36 CFR part 261.15 and OSVs would have to travel through water to collide with fish, therefore, no direct impacts to individuals would occur.

Indirect effects are unlikely to occur because hardhead are typically found in undisturbed areas of larger middle and low-elevation streams up to 4,390 feet in elevation (Moyle and Nichols 1973, Moyle 1976).

The effects of snow compaction and OSV emissions are concentrated in areas of heavy use, such as along designated OSV trails. No hardhead occurrences are present within 100 feet of existing or proposed designated OSV trails; therefore, it is anticipated that there would be no measurable or predictable indirect effects.

In addition, indirect effects to hardhead from cross-country OSV use are highly unlikely because of implementation of a required minimum snow depth, dispersed nature of cross-country OSV use, lack of hardhead presence close to designated OSV areas or routes and the conclusions of the hydrology analysis that little change is expected to soils, vegetation, or hydrology of aquatic habitats.

#### *Cumulative Effects-(Alternative 1)*

Same as California red-legged frog description above.

#### *Cumulative Effects – (Alternatives 2, 3, 4, and 5)*

Same as California red-legged frog description above.

### Lahontan Lake Tui Chub (R5 Sensitive)

#### *Direct and Indirect Effects – (All Alternatives)*

There would be no direct effects to the Lahontan Lake tui chub because OSV use would not be allowed over areas with inadequate snow depth or areas exposed to bare ground that would cause resource damage as described in 36 CFR part 261.15 and OSVs would have to travel through water to collide with fish, therefore no direct impacts to individuals would occur.

Pollutants that are trapped and then later released during snowmelt could have some adverse indirect effects if in close proximity to the Lahontan Lake tui chub. However, the probability of this occurring and resultant pollutant concentration would be very low because of the widely dispersed nature of cross-country OSV use in space and time. Similar conclusions are supported by the hydrology analysis, which determined that pollutant concentrations from OSV use entering waterways would be low enough that water quality would not be impaired.

Indirect effects to the Lahontan Lake tui chub from cross-country OSV use are expected to be highly unlikely because of the dispersed nature of cross-country OSV use, lack of Tui chub presence close to OSV open use areas or routes and the conclusions of the hydrology analysis that little change is expected to soils, vegetation, or hydrology of aquatic habitats.

#### *Cumulative Effects-(Alternative 1)*

Same as California red-legged frog description above.

#### *Cumulative Effects – (Alternatives 2, 3, 4, and 5)*

Same as California red-legged frog description above.

### Great Basin Rams-horn Snail (R5 Sensitive)

#### *Direct and Indirect Effects – (All Alternatives)*

Direct or indirect effects to Great Basin rams-horn snail from OSV use would likely not occur because OSV use is prohibited over bare ground that would cause resource damage as described in 36 CFR part 261.15, and Great Basin rams-horn snail typically occurs in larger lakes and slow rivers and the probability of effects to individuals is highly unlikely and considered discountable.

This snail has not been sighted in the Tahoe National Forest, though no specific surveys have been conducted on the forest. Limited information exists on their behavior and distribution during winter months and studies examining snow depth and OSV use in relation to the possible effects to aquatic species or their habitat is needed.

#### *Cumulative Effects-(Alternative 1)*

Same as California red-legged frog description above.

#### *Cumulative Effects – (Alternatives 2, 3, 4, and 5)*

Same as California red-legged frog description above.

### California Floater (R5 Sensitive)

#### *Direct and Indirect Effects – (All Alternatives)*

Direct or indirect effects to California floater from OSV use would likely not occur because OSV use is prohibited over bare ground that would cause resource damage as described in 36 CFR part 261.15, and California floater occurs in lakes and slow rivers where the probability of effects to individuals is highly unlikely and is therefore, considered discountable.

#### *Cumulative Effects*

There are no interrelated or interdependent actions, therefore, no cumulative effects would occur to *California floater.*

### Black Juga (R5 Sensitive)

#### *Direct and Indirect Effects – (All Alternatives)*

Black juga would not be directly affected by current or proposed OSV uses because OSVs are not authorized to operate over bare ground that would cause resource damage as described in 36 CFR part 261.15 where black juga may be present.

Pollutants that are trapped and then later released during snowmelt may have some adverse effects; however, the extent and direction of specific effects is unknown. It is expected that pollutant concentrations would be low enough that water quality would not be impaired, and thus, it is likely that *Juga nigrina* responses would not be noteworthy.

*Cumulative Effects-(Alternative 1)*

Same as California red-legged frog description above.

*Cumulative Effects – (Alternatives 2, 3, 4, and 5)*

Same as California red-legged frog description above.

*Determination Statements*

### California Red-legged Frog (*Rana draytonii*)

Although occurrences for *R. draytonii* are located within the proposed project area, proposed activities are not expected to adversely affect the population because authorized activities would occur at a time of year when the amphibians are hibernating and occurrences are located in areas with inadequate snow depth or areas exposed to bare ground that are prohibited from OSV use if they cause resource damage. For all alternatives, OSV use on the required minimum snow depths respectively is not expected to result in any meaningful measurable changes to soils, vegetation, or hydrology of their aquatic habitats. Therefore, the Tahoe National Forest OSV Use Designation project **may affect, not likely to adversely affect** *R. draytonii*.

### California Red-legged Frog (*Rana draytonii*) Critical Habitat

Critical habitat for *R. draytonii* is located within the project area, proposed activities are not expected to adversely affect critical habitat because OSV use is prohibited over areas with inadequate snow depth or exposed ground that would cause resource damage under all of the alternatives and OSV use on required minimum snow depths in alternatives 2, 3, 4, and 5 are not expected to result in any changes to soils, vegetation, or hydrology of their aquatic habitats. Therefore, the Tahoe National Forest OSV Use Designation project **may affect, not likely to adversely affect** *R. draytonii* critical habitat.

### Sierra Nevada Yellow-legged Frog (*Rana sierrae*)

The proposed activities may adversely affect individuals because OSVs may collide with adults traveling over ice or snow during the early portion of the breeding season. However, the probability of vehicle collision is likely low because authorized activities would mostly occur at a time of year when the amphibians are likely hibernating. In general, thespecies' breeding season occurs when temperatures are above freezing and breeding occurs in snow-free areas where OSV use is unlikely to occur.

The findings of the soils, hydrology, and botany reports concluded that OSV use is not expected to result in any meaningfully measurable changes to soils, vegetation, or hydrology.

OSV use is prohibited over areas with inadequate snow depth or exposed ground that would cause resource damage under all of the alternatives. In addition, alternatives 2, 3, 4, and 5 have required minimum snow depths under which OSV use can operate that would provide further protection to the underlying ground or habitat.

Therefore, the Tahoe National Forest OSV Use Designation project **may affect, likely to adversely affect** R. sierrae based on the potential to directly impact individuals.

### Sierra Nevada Yellow-legged Frog (*Rana sierra*) Critical Habitat

Critical habitat for *R. sierrae* is located within the project area. Proposed activities are not expected to adversely affect critical habitat because OSV use is prohibited over areas with inadequate snow depth or exposed ground that would cause resource damage under all of the alternatives and OSV use on required minimum snow depths under alternatives 2, 3, 4, and 5 are not expected to result in any changes to soils, vegetation, or hydrology of their aquatic habitats. Therefore, the Tahoe National Forest OSV Use Designation project **may affect, not likely to adversely affect *R. sierrae* critical habitat**.

### Lahontan Cutthroat Trout (*Oncorhynchus clarkii henshawi*)

Although occurrences for *O. clarkii henshawi* are located within the project area, proposed activities are not expected to adversely affect the population because occurrences are located in areas with inadequate snow depth or exposed ground that would cause resource damage under all of the alternatives and OSV use on required minimum snow depths in alternatives 2, 3, 4, and 5 are not expected to result in any changes to soils, vegetation, or hydrology of their aquatic habitats. Therefore, the Tahoe National Forest OSV Use Designation project **may affect, not likely to adversely affect** *O. clarkii henshawi*.

### Western Pond Turtle (*Actinemys marmorata*)

Because *A. marmorata* are not active and/or present during the period of OSV use, *A. marmorata* effects would be minimized by the prohibition of OSV use in areas that would cause resource damage and required minimum snow depths proposed in alternatives 2, 3, 4, and 5. OSV use is not expected to result in a trend toward Federal listing or loss of viability for *A. marmorata*. Therefore, the Tahoe National Forest OSV Designation project **may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area**.

### Foothill Yellow-legged Frog (*Rana boylii*)

Because *R.boylii* are not active and/or present during the period of OSV use, *R. boylii* would not be directly affected. Indirect effects are expected to be minor, and all effects would be minimized by the prohibition of OSV use in areas that would cause resource damage (all alternatives) and the required minimum snow depths proposed in alternatives 2, 3, 4, and 5. OSV use is not expected to result in a trend toward Federal listing or loss of viability for *R.boylii*. Therefore, the Tahoe National Forest OSV Designation project **may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area**.

### Hardhead (*Mylopharodon conocephalus*)

Although occurrences for *M. conocephalus* are located within the project area, proposed activities are not expected to adversely affect the population because occurrences are located in areas with inadequate snow depth or areas exposed to bare ground that are prohibited from OSV use if they cause resource damage (all alternatives). For alternatives 2, 3, 4, and 5, OSV use on the respective required minimum snow depths is not expected to result in any changes to soils, vegetation, or hydrology of their aquatic habitats. Therefore, the Tahoe National Forest OSV Designation project **may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area**.

### Lahontan Lake Tui Chub (*Siphatales bicolor pectinifer*)

Although occurrences for *S. bicolor pectinifer* are located within the project area, proposed activities are not expected to adversely affect the population because occurrences are located in snow-free areas with inadequate snow depths that are prohibited from OSV use if they cause resource damage (all alternatives). For alternatives 2, 3, 4, and 5, OSV use on the respective required minimum snow depths is not expected to result in any changes to soils, vegetation, or hydrology of their aquatic habitats. Therefore, the Tahoe National Forest OSV Designation project **may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area**.

### Great Basin Rams-horn Snail (*Helisoma newberryi*)

Because *H. newberryi* are not active and/or present during the period of OSV use, the species would not be directly affected. Potential indirect effects are expected to be minor, and all effects would be minimized by prohibition of OSV use in areas with inadequate snow depth that would cause resource damage (all alternatives) and the required minimum snow depths proposed in alternatives 2, 3, 4, and 5. OSV use is not expected to result in a trend toward Federal listing or loss of viability for *H. newberryi*. Therefore, the Tahoe National Forest OSV Designation project **may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area**.

### California Floater (*Anodonta californiensis*)

Because *A. californiensis* are not active and/or present during the period of OSV use, *the species* would not be directly affected. Potential indirect effects are expected to be minor, and all effects would be minimized by prohibition of OSV use in areas with inadequate snow depth that would cause resource damage (all alternatives) and the required minimum snow depths proposed in alternatives 2, 3, 4, and 5. OSV use is not expected to result in a trend toward Federal listing or loss of viability for *A. californiensis*. Therefore, the Tahoe National Forest OSV Designation project **may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area**.

### Black Juga (*Juga nigrina*)

Direct impacts to *J. nigrina* would be extremely rare as OSVs would have to travel through water to harm *J. nigrina*. Due to the rarity of this occurring, the direct impacts to *J. nigrina* are considered discountable. Potential indirect effects are undetectable and unlikely to affect the species or alter its habitat, as described above. With no direct or indirect effects expected, there would be no cumulative effects to this species. Therefore, the Tahoe National Forest OSV Use Designation project **may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area.**

## Compliance with Relevant Laws, Regulations, Policies and Plans

The proposed project effects on threatened, endangered, proposed, and sensitive aquatic species have been evaluated and measures taken to ensure that sensitive species do not become threatened or endangered because of Forest Service actions.

All alternatives would maintain viable populations of all native and desired nonnative species and would be compliant with Forest Service Manual direction. All alternatives would also comply with the Tahoe National Forest Land and Resource Management Plan and the Sierra Nevada Forest Plan Amendment because sensitive aquatic species populations would remain viable and their habitats would be maintained.

# Botany – Listed and Sensitive Species

Effects to special interest plants, research natural areas, special interest areas, and noxious weeds are addressed in the Other Botanical Resources section.

## Consultation to Date

No previous consultation with the Fish and Wildlife Service has taken place for the proposed OSV designation.

The Fish and Wildlife Service is contacted on a regular basis to obtain a current list of threatened, endangered, and proposed species and critical habitats that may be present on the Tahoe National Forest. The most recent lists, from May 15, 2017, are maintained at the Supervisors Office. The following plant species are included:

- *Calystegia stebbinsii* (Stebbins' morning-glory) – from the Sacramento office
- *Fremontodendron californicum* ssp. *decumbens* (Pine Hill flannelbush) – from the Sacramento office
- *Orcuttia tenuis* (slender Orcutt grass) – from the Reno office
- *Packera layneae* (Layne's butterweed) – from the Sacramento office

The threatened plant, *Packera layneae,* is known from two occurrences on serpentine/gabbro soils on the American River Ranger District.

Three plants, *Calystegia stebbinsii* (endangered), *Fremontodendron californicum* ssp. *decumbens* (endangered), and *Orcuttia tenuis* (threatened) are not present and are not suspected to occur on the Tahoe National Forest. Therefore, they are not carried further into the effects analysis.

An additional threatened species, *Ivesia webberi*, has been considered as potentially present during previous Tahoe National Forest project planning, but all known populations and its designated critical habitat units are outside the Tahoe National Forest. Therefore, *Ivesia webberi* and its critical habitat would not be affected and are not analyzed in detail.

The candidate species, *Pinus albicaulis,* exists on the Tahoe National Forest at high elevations, and is addressed as a Forest Service Sensitive Species.

## Relevant Laws, Regulations, and Policy

### Federal Law and Policy

**Endangered Species Act.** The Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.) requires that any action authorized by a Federal agency not be likely to jeopardize the continued existence of a threatened or endangered species, or result in the destruction or adverse modification of critical habitat for these species. Section 7 of the Endangered Species Act, as amended, requires the responsible Federal agency to consult the Fish and Wildlife Service and the National Marine Fisheries Service concerning threatened or endangered species under their jurisdiction. It is Forest Service policy to analyze impacts to threatened or endangered species to ensure management activities are not likely to jeopardize the continued existence of a threatened or endangered species, or result in the destruction or adverse modification of critical habitat for these species. This assessment is documented in a biological assessment.

**Forest Service Manual and Handbooks (FSM/H 2670).** Forest Service Sensitive species are plant species identified by the Regional Forester for which population viability is a concern. The Forest Service develops and implements management practices to ensure that rare plants and animals do not become threatened or endangered and ensure their continued viability on national forests. It is Forest Service policy to analyze impacts to sensitive species to ensure management activities do not create a significant trend toward Federal listing or loss of viability. This assessment is documented in a biological evaluation.

**Forest Service Manual 2670.32** (USDA Forest Service 2005) directs the forest to avoid or minimize impacts to species whose viability has been identified as a concern, and therefore, listed as sensitive by the Regional Forester. If impacts cannot be avoided, then the forest must analyze the significance of the potential adverse effects on the population or its habitat within the area of concern and on the species as a whole. Impacts may be allowed, but the decision must not result in a trend toward Federal listing.

## Land and Resource Management Plan

**Tahoe National Forest Land and Resource Management Plan as amended by the Sierra Nevada Forest Plan Amendment (USDA Forest Service 2001) and Sierra Nevada Forest Plan Amendment, Final Supplemental Environmental Impact Statement and Record of Decision (USDA Forest Service 2004).** The LRMP states that all necessary steps will be taken to ensure that agency actions do not jeopardize the continued existence of these species, and that viable populations of sensitive plants will be maintained. Therefore, the forest has developed a sensitive plant program that provides an operational framework with an objective of maintaining a viable population of sensitive plant species by assuring that they receive full consideration in all forest planning and project efforts. There are no specific standards or guidelines for threatened, endangered, proposed, or sensitive (TEPS) plants.

**Sierra Nevada Forest Plan Amendment.** The January 2004 Record of Decision (ROD) for the Sierra Nevada Forest Plan Amendment (USDA Forest Service 2004) replaces the January 2001 Record of Decision for the Sierra Nevada Forest Plan Amendment in its entirety. Detailed information including specific standards and guidelines for species management can be found in the Sierra Nevada Forest Plan Amendment Record of Decision and Final Supplemental Environmental Impact Statement. The standards and guidelines in the January 2004 Sierra Nevada Forest Plan Amendment ROD are incorporated by reference.

General Forest Service direction for sensitive species is summarized below:

1. Assist states in achieving their goals for conservation of endemic species.
2. As part of the NEPA process, review programs and activities, through a biological evaluation, to determine their potential effect on sensitive species.
3. Avoid or minimize impacts to species whose viability has been identified as a concern.
4. If impacts cannot be avoided, analyze the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole.
5. Establish management objectives in cooperation with the states when a project on National Forest System (NFS) lands may have a significant effect on sensitive species population numbers or distribution. Establish objectives for Federal candidate species, in cooperation with the Fish and Wildlife Service and the states.

## Resource Indicators and Measures

Resource indicators and measures shown in table 19 will be used to measure and disclose effects to botanical resources of of threatened, endangered, and proposed species and critical habitats related to OSV use designations and grooming trails for OSV use.

**Table 94. Botanical resources indicators and measures for assessing effects**

| Resource Element | Resource Indicator | Measure |
|---|---|---|
| Threatened, endangered and sensitive plants | Species presence | Total acres on Tahoe National Forest |
| | | Acres in designated OSV areas |
| | | Acres in high-use OSV designated areas |

## Methodology

This analysis uses ArcMap and relevant GIS data layers from the Tahoe National Forest. The GIS layers of proposed OSV designations and groomed trails were overlain with the TEPS plant data layers to identify areas where effects could occur.

Table 95 lists Fish and Wildlife Service threatened, endangered or proposed plants and their critical habitats that may be present or are known within the planning area. The potential effects to each species were evaluated based on growth form, timing of important life cycle elements (i.e., emergence, flowering, seed production, germination, etc.), identified threats, important habitat components, and the expected interaction with disturbances associated with OSV use and snow trail grooming.

This biological evaluation/biological assessment reviews the modified proposed action and alternatives in sufficient detail to determine the level of effect that would occur to federally listed plants and Region 5 sensitive plant species. For sensitive species, one of four possible determinations is chosen based on the available literature, a thorough analysis of the potential effects of the project, and the professional judgment of the botanist who completed the evaluation. The three possible determinations are:

- No effect
- May affect individuals, but not likely to trend toward Federal listing or result in the loss of viability in the planning area of the Tahoe National Forest
- May affect individuals, and likely to trend toward Federal listing or result in the loss of viability in the planning area of Tahoe National Forest

Similar categories for federally listed threatened and endangered species and critical habitats are:

- No effect
- May affect, but is not likely to adversely affect
- May affect, and is likely to adversely affect

Information used in this analysis includes pertinent scientific literature, project-specific botanical data, results of surveys and site revisits, and GIS layers of the following data: project boundary, actions by alternative, Tahoe National Forest TEPS plant occurrences, and critical habitat information from the Fish and Wildlife Service.

## Assumptions Specific to the TEPS Plant Analysis

- Plants are unlikely to be directly affected by authorized OSV use (with the specified requirements of specific snow depths or adequate snow depth to avoid damage to resources – typically 12 inches) when their living tissues are not present above ground. Therefore, only shrub or tree species are likely to be directly affected by OSV use.
- Indirect effects, such as those possibly resulting from snow compaction and vehicle emissions, are likely to be concentrated in high-use areas. Therefore, an area within one-half mile of designated OSV trails is assumed to be affected by snow compaction and vehicle emissions. Because OSV use is expected to be concentrated in designated OSV trail corridors, and grooming activities are restricted to identified trails, plants in areas designated for OSV use outside these concentrated use corridors are much less likely to experience measurable indirect effects.
- Only authorized OSV uses will be analyzed. Concerns arising from unauthorized uses will be addressed as law enforcement issues and may prompt corrective actions.

## Spatial and Temporal Context for Effects Analysis

### Direct/Indirect Effects Boundaries

The spatial boundary for analyzing the direct and indirect effects to TEPS plants is the project area boundary, because all expected effects relevant to these resources would occur and remain within this area. Effects to vegetation would be expected to have occurred or become evident within one or two years of disturbance and this constitutes the short term. Effects that linger beyond 2 years are considered long-term effects, and may extend to decades or centuries. Such long-term effects beyond 20 years become increasingly difficult to predict due to unknown interactions and the many environmental variables with numerous possible outcomes.

### Cumulative Effects Boundaries

Because effects from the proposed activities would interact with effects from other ongoing or future projects only within the project area boundary, the cumulative effects boundary is also the project area boundary. Cumulative effects are considered for a time period within 20 years of project implementation.

## Affected Environment

### Species Considered in the Analysis

**Table 95. Threatened, endangered or proposed plant species considered**

| ***Scientific Name*** **Common Name** | **Habitat** | **Species present?** | **Habitat present?** | **Effects analysis needed?** |
|---|---|---|---|---|
| Threatened Plants | | | | |
| *Calystegia stebbinsii* Stebbin's morning-glory Endangered | 600-3,600 feet; chaparral or cismontane woodland on gabbroic or serpentinite substrates. Perennial herb. | No | No | No. No Effect. Species is not suspected to occur in project area. |

| ***Scientific Name*** **Common Name** | **Habitat** | **Species present?** | **Habitat present?** | **Effects analysis needed?** |
|---|---|---|---|---|
| *Fremontodendron californicum* ssp. *decumbens* Pine Hill flannelbush Endangered | 1,400-2,500 feet; chaparral or cismontane woodland on gabbroic or serpentinite, rocky substrates. Shrub. | No | No | No. No Effect. Species is not suspected to occur in project area. |
| *Ivesia webberi* Webber's ivesia | 4,500-6,500 feet; shallow clay soils in Lassen, Plumas, Sierra, Washoe, and Douglas Counties in CA and NV. | No | No | No. No Effect. Species is not suspected to occur in project area. |
| *Orcuttia tenuis* Slender Orcutt grass Threatened | Vernal pools, in oak and/or pine woodlands. Below 5,800 feet. Critical habitat is designated, but is not present on the forest. | No | No | No. No Effect. Species is not suspected to occur in project area. |
| *Packera layneae* Layne's butterweed Threatened | 650-3,600 feet; Tuolumne - Nevada counties; ultramafic soils (gabbro & serpentine); chaparral, conifer forest or woodland edges/openings. | Yes | Yes | Yes |
| **Sensitive Plants** | | | | |
| *Astragalus lemmonii* Lemmon's milkvetch | 4,000-7,000 feet in California; east of Sierra crest; lakeshores, meadows & seeps among Great Basin scrub. | No | Potential | Yes |
| *Astragalus pulsiferae* var. *coronensis* Modoc Plateau milk-vetch | 4,400-6,200 feet; Modoc – Plumas and Sierra Counties; Sandy or gravelly soils, often with juniper, pine or sagebrush. | No | Potential | Yes |
| *Astragalus webberi* Webber's milkvetch | 2,400-4,100 feet; known only from Plumas County; dry forest openings/edges & semi-disturbed areas. Perennial herb. | No | Potential | Yes |
| *Boechera rigidissima (Arabis rigidissima* var. *demota)* Galena Creek rockcress | Above 7,500 feet; known only in Placer County, California and Washoe County, Nevada; mesic areas (sometimes rocky) at red fir forest to aspen/meadow transitions. | No | Potential | Yes |
| *Botrychium ascendens* upswept moonwort | Above 4,000 feet (generally 5,000-7,500 feet on TNF); wet habitats (riparian, seeps, meadows, etc.). | Yes | Yes | Yes |
| *Botrychium crenulatum* scalloped moonwort | Above 4,000 feet (generally 5,000-7,500 feet on TNF); wet habitats (riparian, seeps, meadows, etc.). | Yes | Yes | Yes |
| *Botrychium lunaria* common moonwort | Above 6,000 feet; wet habitats (riparian, seeps, meadows, etc.). | No | Potential | Yes |
| *Botrychium minganense* Mingan moonwort | Above 4,000 feet (generally 5,000-7,500 feet on TNF); wet habitats (riparian, seeps, meadows, etc.). | Yes | Yes | Yes |
| *Botrychium montanum* western goblin | Above 4,000 feet; wet habitats (riparian, seeps, meadows, etc.). | No | Potential | Yes |

| ***Scientific Name*** **Common Name** | **Habitat** | **Species present?** | **Habitat present?** | **Effects analysis needed?** |
|---|---|---|---|---|
| *Bruchia bolanderi* Bolander's bruchia | Above 5,000 feet; montane meadows, stream banks, drying lake beds; on bare, semi-disturbed wet soils where competition is minimal. Bryophyte, Moss (perennial). | Yes | Yes | Yes |
| *Cudonia monticola* large cudonia | No elevation restriction, in duff; usually within old-growth conifer forests. Fungi (perennial). | No | Potential | Yes |
| *Cypripedium fasciculatum* clustered lady's-slipper | Below 6,000 feet; mesic, mid-to late-succession conifer or conifer-hardwood forests; north aspects; sometimes found with yew. | Yes | Yes | Yes |
| *Cypripedium montanum* mountain lady's-slipper | 1,500-6,500 feet; mesic to wet, mid- to late- succession conifer or conifer-hardwood forests; north aspects; often found under montane dogwood. | No | Potential | Yes |
| *Dendrocollybia racemosa* branched collybia | No elevation restriction; on decayed fungi or occasionally in duff; usually within old growth conifer or conifer-hardwood forests. Fungi (perennial) | No | Potential | Yes |
| *Erigeron miser* starved daisy | 6,200-8,500 feet; known only from Placer and Nevada counties; gravelly soils in crevices of near-vertical granite cliffs/faces. | Yes | Yes | Yes |
| *Eriogonum umbellatum* var. *torreyanum* Donner Pass buckwheat | Above 6,800 feet; dry, unstable, gravelly or stony soils; often on harsh exposures (e.g., ridge tops, steep slopes). | Yes | Yes | Yes |
| *Fritillaria eastwoodiae* Butte County fritillary | Below 4,900 feet; full to partial sun; chaparral, woodland and conifer forest. | Yes | Yes | Yes |
| *Helodium blandowii* Blandow's bog moss | Above 6,100 feet in California; usually found in bogs and fens, but sometimes seeps, wet meadows and under willows in riparian. Bryophyte, Moss. | No | Potential | Yes |
| *Ivesia aperta* var. *aperta* Sierra Velley ivesia | 5,000-6,000 feet; east of Sierra crest; known only from Sierra and Dog Valleys; meadow edges, ephemeral stream channels, vernally wet flats & gentle, rocky slopes near springs. | No | Potential | Yes |
| *Ivesia aperta* var. *canina* Dog Valley ivesia | 5,000-6,000 feet; east of Sierra crest; known only from Dog Valley; meadow edges, ephemeral stream channels, vernally wet flats and gentle, rocky slopes near springs. | No | Potential | Yes |
| *Ivesia sericoleuca* Plumas ivesia | 5,000-6,500 feet; east of Sierra Crest; Plumas and Placer counties; vernally wet meadows and alkali flats. | Yes | Yes | Yes |

| ***Scientific Name*** **Common Name** | **Habitat** | **Species present?** | **Habitat present?** | **Effects analysis needed?** |
|---|---|---|---|---|
| *Juncus luciensis* Santa Lucia dwarf rush | 4,500-6,300 feet; known only from southern California coast, Modoc Plateau and eastern Nevada County; wet, sandy soils of seeps, meadows, vernal pools, streams, & roadsides. | No | Potential | Yes |
| *Lewisia cantelovii* Cantelow's lewisia | 1,000-4,500 feet; known only from Yuba River drainage; wet rock cliffs and outcrops; usually with moss or club moss. | Yes | Yes | Yes |
| *Lewisia kelloggii* ssp. *hutchisonii* Hutchison's lewisia | 4,800-7,000 feet; ridgetops or relatively flat open areas; generally full sun; gravelly soils. | Yes | Yes | Yes |
| *Lewisia kelloggii* ssp. *kelloggii* Kellogg's lewisia | Above 6,500 feet; ridgetops or relatively flat open areas; generally full sun; gravelly or sandy soils. | Yes | Yes | Yes |
| *Lewisia longipetala* long-petaled lewisia | Above 8,300 feet; El Dorado – Nevada counties; north-facing slopes and ridge tops often found in wet soils near margins of persistent snow banks. | Yes | Yes | Yes |
| *Lewisia serrata* saw-toothed lewisia | 3,000-5,000 feet; known only from American River drainage; wet rock cliffs and outcrops; usually with moss. | Yes | Yes | Yes |
| *Meesia uliginosa* broad-nerved hump moss | Above 6,000 feet; usually found in bogs or fens, but also very wet meadows. Bryophyte, Moss | Yes | Yes | Yes |
| *Mielichhoferia elongata* elongate copper-moss | Below 3,500 feet; soils with copper or heavy metals; moist to wet rock cliffs/outcrops. Bryophyte, Moss | No | Potential | Yes |
| *Monardella follettii* Follett's monardella | 2,500-5,600 feet; known only from Plumas County; serpentine soils; partial to full sun; conifer forest edges/openings. | No | Potential | Yes |
| *Peltigera gowardii* Goward's waterfan | 1,150-7,000 feet, cold, clear, unpolluted streams; often found on rocks in cascades. Aquatic jelly lichen | No | Potential | Yes |
| *Penstemon personatus* closed-throated beardtongue | 4,500-6,500 feet; Plumas – north Nevada County; partial sun; north aspects; conifer forest edges and openings. | Yes | Yes | Yes |
| *Phacelia stebbinsii* Stebbins' phacelia | 2,000-6,700 feet; known only in Rubicon and American River drainages partial to full sun; generally in rocky openings/outcrops, but also woodland or conifer forest edges/openings. | Yes | Yes | Yes |
| *Phaeocollybia olivacea* olive phaeocollybia | No elevation restriction; Yuba County and north; on roots of Pinaceae and Fagaceae; usually within old growth conifer or conifer-hardwood forests. Fungi | No | Potential | Yes |

| *Scientific Name* Common Name | Habitat | Species present? | Habitat present? | Effects analysis needed? |
|---|---|---|---|---|
| *Pinus albicaulis* whitebark pine | Above 6,500 feet on TNF; subalpine and at timberline on rocky, well-drained soils. Coniferous tree. | Yes | Yes | Yes |
| *Poa sierra* Sierra bluegrass | 1,000-5,500 feet; shady moist slopes; conifer forest edges/openings. | Yes | Yes | Yes |
| *Pyrrocoma lucida* sticky pyrrocoma | 4,500-6,000 feet on TNF; east of Sierra crest; known only from Plumas and Sierra Counties; vernally wet meadows and alkali flats. | Yes | Yes | Yes |
| *Sowerbyella rhenana* stalked orange-peel fungus | No elevation restriction; in duff; wet mossy areas; usually within old-growth conifer forests. Fungi | No | Potential | Yes |
| *Tauschia howellii* Howell's tauschia | 5,500-8,500 feet in California; xeric ridge summits and slopes; decomposed granite gravel or sand; red fir and subalpine forest edges/openings. | Yes | Yes | Yes |

## Threatened Species Information

### *Packera layneae (Layne's butterweed)*

#### Status and Distribution

Layne's butterweed, a perennial herb, is listed by the Fish and Wildlife Service as a threatened species (USFWS 1996). It is known from several localities within the foothills of El Dorado, Tuolumne, and Yuba Counties (USFWS 2002) and in Placer County near Foresthill, California. The latter occurrence in Placer County is located just west of Sage Hill, on the Tahoe National Forest. This occurrence covers approximately 11 acres on open, gabbro soils at approximately 3,600 feet elevation, and includes about 100 plants in widely scattered clumps.

This early seral species occurs in temporary openings in chaparral plant communities on gabbro and serpentine soils and "is eliminated as vegetation grows up around it" (USFWS 2002). Based on the associated plant community and management history of the local population of this species near Sage Hill, Layne's butterweed appears adapted to a slight to moderate degree of disturbance (i.e., processes such as wildland fire that result in early seral vegetation).

Habitat loss, habitat fragmentation, alteration of natural fire regime, and suppression of disturbance (all mainly due to urbanization) are the major threats facing this species (USFWS 2002). In this project area, because of its relatively low elevation, Layne's butterweed occurrence does not consistently receive enough snowfall to allow OSV use on a regular basis.

## Sensitive Species Information

### *Aggregating Species for Analysis of Effects*

Due to the large number of sensitive plant species to address, and because OSV effects to various plant species are expected to be most similar according to their life form and growth habits, the 39 sensitive species considered in this analysis are grouped into the following categories:

- **Trees, shrubs, or sub-shrub species**, whose living tissues may be present above or within the snow column, and thus, may experience direct effects from OSV uses (physical damage or immediate exposure to exhaust). On the Tahoe National Forest, *Eriogonum umbellatum* var. *torreyanum*, *Monardella follettii*, and *Pinus albicaulis* are the sensitive plants in this category.
- **Perennial herbaceous species**, including grasses, mosses, and in this case, fungi, whose living tissues are at or below the soil surface in winter, and thus, are unlikely to experience direct effects, but they will be evaluated for impacts by exhaust contaminants trapped by the snow cover or by possible effects from snow compaction. On the Tahoe National Forest, there are 34 sensitive plants in this category.
- **Annual plant species** are generally not growing during the period of authorized OSV use, and thus would not experience direct effects. This group is the least likely to be impacted by the indirect effects of exhaust contaminants and snow compaction. *Phacelia stebbinsii* is the only annual sensitive plant on the Tahoe National Forest.
- **Aquatic plant species** grow under water and would not be directly affected by OSV use. If an occurrence is located in high-use areas, it is possible that snowpack contaminants could reach the occupied aquatic habitat when the snow melts. Snow compaction is not expected to affect aquatic habitats in any meaningful or predictable manner. Although many sensitive plants may be found in wet habitats, *Peltigera gowardii* is the only aquatic species.

## Environmental Consequences

### Effects common to all alternatives

Because the alternatives are very similar, with the same activities proposed, and the differences are mainly the spatial extent of OSV use, most of the effects are described in this section. The varying areas of authorized OSV use would result in mostly small differences in degree of possible effects. Therefore, each alternative's effects will mainly summarize the extent of TEPS plants affected, and provide the basis for determinations. A summary comparison of alternatives will follow, providing the decision-maker a quick reference for evaluating the alternatives along with the other resources that need to be considered.

Effects analyses for TEPS plants are presented in categories of plant life forms because the greatest possible impacts from OSV activities are dependent upon the presence of their living tissues within the snow or above the snow surface and whether each species is biologically active during the times that direct and indirect effects may occur. Effects to each life form category are presented after an introduction of direct and indirect effects.

#### *Direct Effects*

Direct effects are caused by the action and occur at the same time and place. A key difference between OSV use and other types of motor vehicle use is that, when properly operated and managed, OSVs do not make direct contact with soil, water, and ground vegetation, whereas most other types of motor vehicles operate directly on the ground (USDA Forest Service 2014). OSV use and grooming of OSV trails can damage vegetation through direct contact with plant tissues that are present above the snow or within the snow column that is compacted by the vehicles. Because woody species (trees, shrubs, and sub-shrubs) are the only plants present within the snow, they are the only plants that may be directly damaged. All other plant life forms are not expected to be directly affected by OSV use because adequate snow requirements and minimum snow depths are expected to prevent direct effects to vegetation at ground level.

It is generally recognized that disturbance to soil and vegetation by OSV use is reduced as snowpack depths increase. Damage to soil and low-growing vegetation is much more likely when OSV use occurs under low-snow conditions (Greller et al. 1974, Fahey and Wardle 1998). Thus, the requirement of adequate snow to avoid damage to resources for alternative 2, and the specific minimum snow depths for alternatives 3, 4, and 5 are expected to prevent or minimize damage to soil and vegetation.

In a study on Niwot Ridge in the Front Range of the Colorado Rocky Mountains, repeated snowmobile use occurred on snow-covered and snow-free areas between two weather stations, and the effects of this use were evaluated (Greller et al. 1974). General conclusions included: (1) in communities that are snow-free in winter, damage by snowmobiles was severe to lichens, *Selaginella*, and to relatively prominent, rigid cushion-plants. Part of the damage to these communities may have been due to the manual removal of rocks, necessary for the operation of snowmobiles in snow-free areas. (2) *Kobresia*, present in isolated tussocks in a cushion-plant community, absorbed the major portion of snowmobile impact. As *Kobresia* is thought to form the climatic climax community in this ecosystem, differential damage to it could seriously retard succession. (3) Snowmobile travel in uniform, closed *Kobresia* meadows inflicted much less damage to most plants, including *Kobresia* itself, than did similar travel on a sparsely vegetated community. (4) Plants best able to survive the heaviest snowmobile impact were those with small stature and little woodiness, or with buds well-protected at or below the soil surface. (5) Snowmobile traffic should be carefully restricted to snow-covered areas. Whenever this is not feasible, the least destructive and easiest alternative is travel on mature, well-vegetated *Kobresia* meadows or similar well-drained plant communities.

On the Tahoe National Forest, OSV travel on snow-free areas is prohibited in the current and proposed scenarios. By not allowing OSV use when and where there is less than adequate snow to avoid damage to resources (typically 12 inches for cross-country use) or designating specific snow depth requirements, the Tahoe National Forest minimizes the possibility of direct damage to soils and ground vegetation.

### *Indirect Effects*

Three specific topics of indirect effects were identified: snow compaction, pollutants, and invasive plant species. For areas designated for cross-country OSV use, these indirect effects are expected to be more dispersed and repeated less often than along trail corridors. There may be some meadows and other open areas where OSV use is more attractive to riders, and these may experience more concentrated use. However, OSV use has not been identified as a threat and is unlikely to cause damage to any non-woody TEPS plants in areas of dispersed use on the Tahoe National Forest.

#### Snow Compaction

Snow is compacted by any of the allowed OSVs, including snowmobiles, snowcats, and snow grooming equipment. Snow compaction mechanically alters snow grains and redistributes them. This mechanical disturbance breaks off the small points of new snow crystals, destroying the weak existing bonds between them, and bringing the new grains into much closer contact than occurs naturally. Snow metamorphism is artificially accelerated, and snow density and hardness are increased. In addition, the layered structure of the snowpack is changed (Fahey and Wardle 1998). All this has both thermal and hydrological implications, resulting in lower soil temperatures (Fahey and Wardle 1998, Eagleston and Rubin 2013) and delayed snowmelt (Keddy et al. 1979, Fahey and Wardle 1998, Davenport and Switalski 2006, Gage and Cooper 2013). The thermal conductivity of compacted snow is greater than undisturbed snow, and can reduce the buffering effect against temperature extremes and fluctuations. Thermal conductivity of compacted snow was 11.7 times greater than non-compacted snow (Neumann and Merriam 1972).

Keddy et al. (1979) studied the effects of snowmobile use on snow compaction, vegetation composition, and soil temperatures on an abandoned farm in Nova Scotia. They found that snow melted later in areas with compacted snow and that some species showed differences in cover between treatments. Considering the multitude of possible effects and the variety of plant structures and life histories, they were not surprised to find no overall trend for species composition changes. They also noted that the first pass by a snowmobile caused the greatest increase in snow compaction—roughly 75 percent of that observed after 5 sequential passes. While some species composition changes were observed in old field vegetation, they found no changes in species composition in a marsh area, possibly because of solid ice cover during the winter.

In a study of the impact of snowshoe/cross-country ski compaction and snowmelt erosion on groomed trails, Eagleston and Rubin (2013) reported that these non-motorized uses caused snow to remain on the compacted areas an average of 5 days longer than non-compacted areas. They also found that the compacted snow caused increased erosion. Soil temperatures under compacted snow stayed frozen for 3 days longer, and, averaged over the entire winter season, remained 0.1 degree Celsius colder than soil under non-compacted snow.

Fahey and Wardle (1998) examined the effects of snow grooming for downhill ski areas in subalpine and alpine environments. They found that the compacted snow increased frost penetration and delayed snowmelt.

However, research does not always support the generalization of lower soil temperatures and delayed snowmelt due to snow compaction. In a study of snow compaction effects from snowmobiles on fens on the Routt National Forest, Gage and Cooper (2009) found no statistically significant differences in the temperature of peat soils between compacted and non-compacted areas. They also found no differences in timing of snowmelt, biomass production, or plant phenology. From additional, unpublished data from the Telluride Ski Area, where intense compaction occurred daily, they observed a delayed snowmelt and thawing of the soil of about one month in compacted areas. They noted that the continuous influx of groundwater in fens may limit freezing and maintain more constant soil thermal conditions. They found no evidence conclusively linking snowmobile compaction to impairment of fen function.

Different plants have different levels of vulnerability and ability to recover from the effects of snow compaction. The characteristics that determine their vulnerability are the timing of flowering, and growth form and size (Fahey and Wardle 1998). Prolonged snow may adversely affect early spring flowering plants because they could have a shorter growing season and thus possibly reduced seed production due to delayed phenology and perhaps a misalignment of timing with their preferred pollinators. Due to snow compaction, early spring growth of some plant species may be retarded or may not occur under an OSV trail; however, the current and proposed OSV trails are underlain by existing roads and trails which are already compacted and/or disturbed and little, if any, additional impacts are expected to the vegetation.

Trail grooming on the Tahoe National Forest occurs almost entirely over an existing road and trail network and does not alter landforms or result in significant soil disturbance that would change water flow patterns or quantities of surface water runoff. Trail grooming is not expected to cause substantial impacts to water quality, perennial, intermittent or ephemeral streams, wetlands or other bodies of water.

In summary, the available research supports the assumption that more intensive snow compaction occurring along groomed or heavily used trails would have considerably greater effect on soil temperatures and delayed snowmelt than the compaction caused by dispersed uses in areas open to cross-country OSV use. Due to the intensive, repetitive, and predictable compaction of snow along designated OSV trails (groomed or not), these areas are much more likely to have a degree of compaction that could adversely influence vegetation. Therefore, in this analysis, areas within a half mile of designated OSV trails are assumed to be at risk from the effects of snow compaction. Outside the designated OSV trail corridors, dispersed OSV travel is much less likely to compact snow with enough intensity and repetition to measurably or predictably affect ground vegetation, and therefore, is not considered in this analysis as an expected source of indirect effects.

### Pollutants

Emissions from OSVs release pollutants including ammonium, sulfate, benzene, nitrogen oxides, ozone, carbon dioxide, carbon monoxide, aldehydes, polycyclic aromatic hydrocarbons and other toxic compounds into the air. A portion of these compounds may become trapped and stored in the snowpack, to be released during spring runoff. Four-stroke snowmobile engines produce considerably lower amounts of pollutants.

Pollutants emitted from exhaust can cause a variety of impacts on vegetation. Carbon dioxide may function as a fertilizer and cause changes in plant species composition (Bazzaz and Garbutt 1998); nitrogen oxides also may function as fertilizers, producing similar effects along roadsides (Falkengren-Grerup 1986). Sulfur dioxide, which can be taken up by vegetation, may result in altered photosynthetic processes (Winner and Atkison 1986, Mooney et al. 1988). Other toxic compounds may result in reduced metabolism or retarded growth.

Although a large portion of OSV exhaust is expected to be dissipated into the air, some of the airborne pollutants would enter the snowpack and be released during snowmelt. Similar responses can be assumed to occur in plants that ingest these compounds from snowmelt, although the compounds may undergo chemical changes while in the snowpack, confounding the predictability of effects.

Airborne pollutants can enter the snowpack from both local and regional sources, including, but not limited to, vehicle emissions, dust storms, and smog. The concentrations of basic cations and acidic anions in the snowpack can be altered and, when released quickly during snowmelt, can temporarily lower the pH of surface waters in a process known as “episodic acidification” (Blanchard et al. 1988). Soil acidification and vegetation changes were examined in southern Sweden, where Falkengren-Grerup (1986) found that increased nitrogen deposition and the increased acidity in the humus layer may have caused changes in plant cover, with some species increasing and some species decreasing.

Demonstrating that snowpack chemistry can be used as a quantifiable indicator of airborne pollutants from vehicular traffic, a correlation was shown between pollutant levels and vehicle traffic in Yellowstone National Park (Ingersoll et al. 1997). Ammonium and sulfate levels were consistently higher for the in-road snow compared to off-road snow, but nitrate concentrations did not decrease within a distance of 100 meters from the emission source; thus, the nitrate ion may be used to distinguish between local and regional emission sources (Ingersoll et al. 1997). Studying snow chemistry in Yellowstone National Park, Ingersoll (1998) found that concentrations of ammonium, nitrate, sulfate, benzene, and toluene were positively correlated with snowmobile use. Concentrations of ammonium were up to three times higher for the in-road snow compared to off-road snow. Concentrations decreased rapidly with distance from roadways.

Arnold and Koel (2006) also examined volatile organic compounds in Yellowstone National Park, and found that the snow in heavily used areas contained higher levels of benzene, ethylbenzene, m- and p-xylene, o-xylene, and toluene compared with a control site only 100 meters from the traveled roadways. Even at the most heavily used area (Old Faithful) they found that the concentrations of volatile organic compounds were considerably below U.S. Environmental Protection Agency's water quality criteria for these compounds. In situ water quality measurements (temperature, dissolved oxygen, pH, specific conductance, and turbidity) were collected; all were found within acceptable limits. Five volatile organic compounds were detected (benzene, ethylbenzene, m- and p-xylene, o-xylene, and toluene). The concentrations found were below EPA criteria and guidelines for the volatile organic compounds analyzed and were below levels that would adversely impact aquatic ecosystems (Arnold and Koel 2006).

Studying air quality and snow chemistry effects from snowmobiles in the Snowy Range, Wyoming, Musselman and Korfmacher (2007) found that heavier snowmobile use resulted in higher levels of nitrogen oxides and carbon monoxide, but ozone and particulate matter were not significantly different. When compared with air quality during the summer, they found that carbon monoxide levels were higher in the winter, but nitrogen oxides and particulate matter were higher in the summer. Air pollutants were well-dispersed and diluted by winds, and air quality was not perceived as being significantly affected by snowmobile emissions. Pollutant concentrations were generally low in both winter and summer. These results differ from those studies examining air pollution from snowmobiles in Yellowstone National Park. However, snow chemistry observations did agree with studies from Yellowstone National Park. Compared with off-trail snow, the snow sampled from snowmobile trails was more acidic with higher amounts of sodium, ammonium, calcium, magnesium, fluoride, and sulfate. Snowmobile activity apparently had no effect on nitrate levels in the snow.

In the winter, plant metabolic rates are drastically reduced. Airborne compounds would only be taken up by respiring woody plants. Airborne pollutants normally disperse quickly in mountain environments that are prone to windy conditions, such as the Sierra Nevada. Different plants may have different responses to the different pollutants in the snowpack, including damage from toxic, volatile compounds and possibly some benefits from additional nutrients and trace minerals. The levels of OSV exhaust contaminants on the Tahoe National Forest (considerably less than those observed in Yellowstone National Park) are not expected to impair water quality (McNamara 2016).

In a natural plant community with many species competing for resources, and very little research done on each species' responses to OSV emissions or the competitive interactions that may be affected, it is nearly impossible to predict what changes, if any, would occur. It can only be reasonably assumed that there may be some changes in plant species cover and composition. The uptake of harmful pollutants is not expected to result in the death of any individual plants. On the Tahoe National Forest, mortality of roadside TEPS plants due to vehicle pollutants has not been observed, even considering year-round vehicle uses. Therefore, the level of effect to TEPS plants from OSV pollutants is expected to be minimal, and would not result in loss of individuals.

The available research on OSV pollutants (both airborne and in the snowpack) indicate that some effects to vegetation may occur in the immediate vicinity of heavy use areas. Pollutants that become trapped in the snowpack are also expected to be concentrated in areas of heavy OSV use. Therefore, in this analysis, areas within a half mile of designated OSV trails (groomed or not) are assumed to be reasonably at risk from the effects of OSV pollutants. Outside the designated OSV trail corridors, dispersed OSV travel is much less likely to contribute harmful contaminants with high enough levels and repetition to measurably or predictably affect ground vegetation, and therefore is not considered in this analysis as an expected source of indirect effects.

#### *Relative Potential Effects to Plant Life Forms*

Considering the combination of direct and indirect effects described above, and the requirement of adequate snow to avoid resource damage or minimum snow depths of the alternatives, the effects of proposed OSV uses can be broken down into relative categories of potential damage to the major plant life forms. From the most likely to least likely to experience measurable effects:

- Evergreen trees and shrubs – most likely to be directly affected, due to mechanical damage; indirect effects are expected if the species occurs near designated OSV trails. Effects may occur in all areas designated for OSV use.
- Deciduous trees and shrubs – somewhat less likely, due to winter dormancy; indirect effects are expected if the species occurs near designated OSV trails. Effects may occur in all areas designated for OSV use.
- Sub-shrubs (low-growing woody species) – less likely due to less exposure to direct effects (but still expected); indirect effects may be expected if the species occurs near designated OSV trails. Effects may occur in all areas designated for OSV use.
- Perennial herbaceous species – direct effects are not expected to occur due to the requirement of adequate snow to avoid resource damage or minimum snow depths; indirect effects may be expected if the species occurs near designated OSV trails. Effects may occur along designated OSV trails, but are not likely in areas designated for OSV use.
- Annual species – direct effects are highly unlikely due to the requirement of adequate snow to avoid resource damage or minimum snow depths; indirect effects might be expected if the species occurs near designated OSV trails and spring flowering could be altered by persistent compacted snow. Effects may occur along designated OSV trails, but are not likely in areas designated for OSV use.
- Aquatic species – direct effects would not occur because OSV use is not allowed over open water; indirect effects from pollutants might be expected if the species occurs near designated OSV trails. Effects may occur along designated OSV trails, but are not likely in areas designated for OSV use.

## Threatened and Endangered Plants

### *Packera layneae (Layne's butterweed)*

#### **Direct Effects**

Layne's butterweed is an herbaceous perennial that dies back to the ground each year. Because of the plant's dormancy during the winter OSV use period and the requirement of adequate snow to avoid resource damage or minimum snow depths preventing OSV contact with soil and ground vegetation, Layne's butterweed would not be directly affected by OSV use or snow trail grooming activities.

The two occurrences on the Tahoe National Forest are present in an area that is designated for OSV use only in alternatives 1 and 4, and public OSV use would only occur only when these areas accumulate adequate snow and soil and vegetation resources would likely be protected from damage.

### Indirect Effects

The Layne's butterweed occurrences do not exist in high-use areas, where snow compaction and pollutants would be concentrated. There would be no indirect effects to Layne's butterweed because dispersed OSV use as described for all alternatives would not likely cause any noticeable changes from compaction of snow or pollutants. In alternatives 1 and 4, the area where Layne's butterweed is located would be open to dispersed OSV use, whereas in alternatives 2, 3, and 5, this area is not designated for public OSV use.

## Trees, shrubs, or sub-shrub species

### Direct Effects

Snowmobile activities may damage vegetation on and along trails and in areas open to cross-country OSV use. The most commonly observed effect from snowmobiles has been the physical damage to shrubs, saplings, and other vegetation (Neumann and Merriam 1972, Wanek 1971). Winter Wildland Alliance (WWA) analyzed the Gallatin National Forest regeneration survey data collected between 1983 and 1996 in areas that were harvested and replanted. That survey data indicated snowmobiles had damaged between 12 and 720 trees per acre (WWA 2009). Damage to vegetation has been observed in the Greater Yellowstone Area that is caused by winter recreational activities that occur off trail. For example, branches of willows (*Salix* spp.) and sagebrush (*Artemisia* spp.) have been broken, and leaders have been removed from conifers (Stangl 1999). Neumann and Merriam (1972) found that rigid woody stems up to 1 inch in diameter were very susceptible to damage. Stems were snapped off in surface packed or crusted snow. Neumann and Merriam (1972) also observed that compacted snow conditions caused twigs and branches to bend sharply and break. Stems that were more pliable bent and sprang back although the snowmobile track often removed bark from the stems' upper surfaces. Sub-zero temperatures make stems more prone to snapping rather than bending. Direct mechanical effects by snowmobiles on vegetation at and above snow surface can be severe. After only a single pass by a snowmobile, more than 78 percent of the saplings on a trail were damaged, and nearly 27 percent of them were damaged seriously enough to cause a high probability of death (Neumann and Merriam 1972). Young conifers were found to be extremely susceptible to damage from snowmobiles. Broken stems of any woody species would provide places for pathogens to enter the plant tissues and would reduce the integrity of developing stems or trunks, both of which could lead to additional damage or death of individuals.

Direct damage to woody plants may occur with OSV use on any snow depth. When OSVs are operated on low snow depths, shorter woody plants (including sub-shrubs, shrubs, and young trees) are more prone to damage because their living stems are present in the snow column that could be churned by OSV tracks and paddles or disrupted by OSV skis as they are ridden across the landscape. During the middle portion of the OSV season, snowpack is typically several feet deep and the shorter woody plants would not be directly affected. There would still be considerable possibility for damage to taller shrubs and tree species (most notably *Pinus albicaulis*, whitebark pine) with deeper snowpack, with potential for unintentional breakage and abrasion of branches and leader growth. These direct effects are expected to be localized, would affect only individuals due to the dispersed nature of open area OSV use, and would not result in loss of entire occurrences.

On the Tahoe National Forest, OSV use may directly damage individuals of the Region 5 sensitive species *Eriogonum umbellatum* var. *torreyanum* and *Pinus albicaulis*, due to their presence in areas designated for OSV use.

For *Pinus albicaulis*, because many occurrences are not yet tracked spatially, it is worth mentioning that over 13,000 acres of subalpine conifer forest on the Tahoe National Forest likely provide considerably more suitable habitat and additional occurrences beyond the few acres specifically mapped as a special status species. Each of the alternatives proposes to allow OSV use on approximately 2,300 to 5,200 of these acres. Additional habitat is also present but not mapped or tallied for the other sensitive plant species.

#### Indirect Effects

Airborne pollutants from OSVs would be concentrated along OSV trails. Because deciduous trees and shrubs lose their leaves in the winter months, they cannot photosynthesize during fall and winter; thus respiration is dramatically reduced for deciduous trees and shrubs. Although evergreen trees and shrubs retain their leaves and are thus capable of photosynthesis and respiration during winter, these processes are also considerably reduced during the cold season. Reduced respiration during the winter means that smaller amounts of the airborne pollutants would be ingested through gas exchange. For low-growing woody species that are generally covered by snow when OSV use would occur (*Eriogonum umbellatum var. torreyanum*), the exposure to airborne pollutants would be negligible.

Pollutants which are trapped and then released during snowmelt may (or may not) have some adverse and some beneficial effects, however the extent and direction of specific effects is unknown. It is expected that pollutant concentrations would be low enough that water quality would not be impaired, and thus it is likely that plant responses, if any, would not be noticeable.

### Perennial herbaceous species (including bryophytes and fungi)

#### Direct Effects

With the requirement of adequate snow to avoid resource damage or minimum snow depths providing protection of the soil surface and ground vegetation, perennial herbaceous species (which die back each year to buds at or below the soil surface) would not be directly affected by current or proposed OSV uses.

#### Indirect Effects

Snow compaction from dispersed OSV use is not expected to affect perennial herbaceous species because the possible delayed snowmelt (usually a week or two) and small degree of colder soil temperatures in the compacted snow areas would be within the normal range of variation that they experience on the Tahoe National Forest. Where it occurs each year, compacted snow may alter the timing of new foliage emergence in the spring due to delayed snowmelt and colder soil temperatures, but perennial herbaceous plants in the Sierra Nevada are assumed to be adapted to a wide variety of natural snowmelt times and the effects of compacted snow would likely be masked by the annual variation in snowpack.

Pollutants from dispersed OSV use (both airborne and those small amounts that become entrapped in the snow) would also not likely affect perennial herbaceous species because living plant tissues are not present above ground during the winter and pollutants are not expected to accumulate within the snow column or in run-off at high enough concentrations to cause noticeable changes.

Where occurrences exist in high-use areas, compaction and pollutants may be concentrated enough to cause some small magnitude changes to plant growth and community interactions. No populations are expected to decline with any of the proposed OSV uses.

## Annual plant species

### Direct Effects

Plant species that complete their life cycle within one growing season would not be directly affected by current or proposed OSV uses because they are normally not growing during the authorized period of OSV use.

### Indirect Effects

Snow compaction from dispersed OSV use is not expected to affect annual species because the possible delayed snowmelt (usually a week or two) and small degree of colder soil temperatures in the compacted snow areas would be within the normal range of variation. Compacted snow may slightly alter the timing of seed germination and plant growth in the spring, due to delayed snowmelt and colder soil temperatures in the compacted areas. This is not expected to noticeably affect annual plants because they are assumed to be adapted to a wide variety of natural snowmelt times within their ranges of distribution. The annual variation in snowpack and temperatures would likely mask any differences in phenology due to OSV uses.

Pollutants from dispersed OSV use (both airborne and those small amounts that become entrapped in the snow) would also not likely affect annual species because living plant tissues are not present above ground during the winter and pollutants are not expected to accumulate within the snow column or in run-off at high enough concentrations to cause any noticeable changes.

Where occurrences exist in high-use areas, compaction and pollutants may be concentrated enough to cause some small magnitude changes to plant community interactions. *Phacelia stebbinsii* is the only annual sensitive plant species on the Tahoe National Forest. Some occupied areas are within high-use areas, but no populations are expected to decline with any of the proposed OSV uses.

## Aquatic Species

### Direct Effects

Aquatic plant species would not be directly affected by current or proposed OSV uses, because OSVs are not authorized to operate over or within aquatic habitats.

### Indirect Effects

Delayed snowmelt and transfer of sub-freezing temperatures from snow compaction is not expected to affect aquatic plant species.

Airborne pollutants would not affect aquatic species because the plants grow underwater. In dispersed open areas, pollutants are not expected to accumulate within the snow column or in run-off at high enough concentrations to cause any noticeable changes to vegetation.

*Peltigera gowardii* is the only aquatic sensitive plant species suspected, but it has not yet been found on the Tahoe National Forest, and thus would not be affected.

## Cumulative Effects

Past activities are considered part of the existing condition and are discussed within the Affected Environment section. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed to those effects. Sensitive plant occurrences that exist today on the Tahoe National Forest are the result of these species' interactions with past environmental conditions and natural and human disturbances. In terms of sensitive plant habitats, past actions have resulted in an increase in densely forested stands, an increase in decadent shrubs, a decrease in key early-seral habitat components such as aspen stands, meadows, grasses and forbs, and young brush fields, and changed historic flow regimes in meadows/riparian habitats.

Snow plowing at the established OSV trailheads is an ancillary activity associated with the Tahoe National Forest OSV Use Designation project, and is not analyzed as a part of the proposal. Snow plowing is not expected to affect TEPS plants.

Other ongoing and foreseeable future activities include livestock grazing, recreation, timber harvest, fuel reduction, woodcutting activities, wildfire suppression, and other activities. These activities may affect some sensitive plants individually, but no trends toward Federal listing or loss of species viability are expected due to protective measures deemed necessary during environmental analysis and implemented as required. Impacts related to hikers and OHV activities (trampling, soil disturbance, dust accumulation on plants, etc.) are ongoing and are expected to increase as the numbers of national forest visitors rise. Timber harvest, fuel reduction, fire suppression, emergency responses, and other actions carried out by Federal workers or contractors are typically able to provide adequate protection for sensitive plant occurrences using flag and avoid methods or other specific measures designed for species protection. See appendix C for details on specific activities.

#### *Threatened and Endangered Plants*

Ongoing activities and natural growth and succession would contribute to some changes to *Packera layneae* habitat as they have in the past. Future actions are also not expected to adversely affect this species because avoidance measures would be incorporated into the planning and implementation of the projects. Since there would be no direct or indirect effects to *Packera layneae* or their associated critical habitat, there are no cumulative effects to consider for this species.

#### *Sensitive Plants*

It is expected that all current and future projects include mitigations, such as avoidance measures or other project design features to minimize adverse impacts to Region 5 sensitive plant species.

These sensitive plants are currently experiencing the everyday stresses of life in the wild, with drought likely impacting their growth and seed production in recent years. Besides the threat of physical damage from many of the contributing actions, these species are also threatened by invasive plant encroachments. Continuing pressures on sensitive plant habitats include wildfire, early or late freezing, severe wind or winter storms, flooding, insect population fluxes, and other natural events. These events may also cause damage or death to sensitive plant individuals or cause habitat changes.

Effects may include damage to or death of individuals, through project actions and possible effects from introduced invasive species, increased soil erosion, and other changes to habitat characteristics. It is expected that all of these projects would include reasonable mitigations to minimize or reduce impacts and monitor for concerns to help manage impacts to sensitive plant species habitat and occurrences. Through project design features, the potential for these impacts to occur is small. If impacts still occur, only low intensity, localized effects are expected for the sensitive plant species.

The annual, seasonal timing of OSV effects does not eliminate the chance of direct and indirect effects accumulating. Broken branches of woody plants and any deceased individual plants would require one to several years to recover, and additional actions would be taking place during this recovery time.

Individually and collectively, the magnitude of effects from these actions would remain relatively low. Natural disturbances, such as fire, wind and ice storms, and drought are much more likely to impact sensitive plant species, and their effects would be considerably greater. With cumulative effects considered, sensitive plant species viability in the OSV project area would be maintained and no trend toward Federal listing would occur. When effects from other projects are combined and if they overlap with the effects from the Tahoe OSV Use project, there would still be no loss of viability for any plant species and none would trend toward Federal listing, for all alternatives.

## Alternative 1 – No Action

### Alternative 1 Effects to TEPS plants

The following table summarizes the measures by the major analysis topics.

**Table 96. TEPS plant indicators and measures for alternative 1**

| Analysis Topic | Total acres on Tahoe National Forest | Acres in high-use areas | Acres in designated OSV areas |
|---|---|---|---|
| Threatened and Endangered plants | 57 | 0 | 57 |
| Sensitive plants | 2,496 | 308 | 2,051 |

There are no additional types of effects to TEPS plants beyond those described in Effects Common to All Alternatives that are specific to alternative 1. Under this alternative, direct effects to these botanical resources would be more likely due to larger areas open to OSV use.

Alternative 1 has no minimum snow depth requirement for OSV use, but riders still must not damage the underlying soil and vegetation resources because causing resource damage is illegal. It is assumed that a minimum of 12 inches of snow is typically needed to avoid damaging resources, and on trails with underlying roads, a minimum of 6 inches is typically needed to avoid damage to the underlying road surface. These are essentially the same requirements for snow depth as alternative 2, and would provide a reasonable protection for non-woody TEPS and special interest plants.

#### *Threatened and Endangered Plants*

As described above in Effects Common to All Alternatives, there would be no direct effects to *Packera layneae.*

#### *Sensitive Plants*

Sensitive plant species in the various plant life form categories would be affected differently, as described above in Effects Common to All Alternatives. Trees, shrubs, and sub-shrubs (woody plants) may be directly damaged by OSVs where they occur in areas designated for OSV use, and they may also experience indirect effects from snow compaction and pollutants, most likely to be noticeable where they occur near designated OSV trails. Perennial herbaceous species, annual species and aquatic species would not be directly affected, but they too may also experience noticeable indirect effects if they occur near designated OSV trails.

Indirect effects from snow compaction are expected to be greater with alternatives 1, 2, and 4 because only a minimal protection is afforded to ground vegetation. Alternative 1 also provides a minimal protection for woody sensitive plants because, although a minimum snow depth is not identified, enforcement of a reasonable avoidance of resource damage is the management tool used to keep OSV use from occurring when snow depths are too low.

**Sensitive Plant Determinations for Alternative 1:**

For two of the three sensitive woody plant species, *Eriogonum umbellatum* var. *torreyanum* and *Pinus albicaulis*, due to the possibility of direct damage to individuals and minor indirect effects from snow compaction and OSV pollutants where they occur in areas designated for OSV use, alternative 1 of the Tahoe OSV Use Designation project **may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability** in the planning area. The third sensitive woody plant species considered, *Monardella follettii*, is not known to occur on the Tahoe National Forest, and would not be affected.

After evaluating the specific habitat requirements of each species and likely interactions with OSV use, minor indirect effects from snow compaction and OSV pollutants would be possible for any of the sensitive plant species present in areas of high OSV use. Therefore, alternative 1 of the Tahoe OSV Use Designation project **may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability** in the planning area for *Botrychium crenulatum, Botrychium minganense*, *Bruchia bolanderi*, *Erigeron miser, Ivesia sericoleuca, Lewisia kelloggii* ssp. *hutchisonii*, *Meesia uliginosa*, *Phacelia stebbinsii,* and *Poa sierrae*.

Because the following species are not known to exist in areas of high OSV use, alternative 1 of the Tahoe OSV Use Designation project would have **no effect** on *Botrychium ascendens, Cypripedium fasciculatum, Fritillaria eastwoodiae, Ivesia aperta* var*. aperta, Lewisia cantelovii, Lewisia kelloggii* ssp. *kelloggii, Lewisia longipetala, Lewisia serrata, Peltigera gowardii, Penstemon personatus, Phaeocollybia olivaceae, Pyrrocoma lucida,* and *Tauschia howellii*.

Because the following species are not known to exist at all on the Tahoe National Forest, alternative 1 of the Tahoe OSV Use Designation project would have **no effect** on *Astragalus lemmonii, Astragalus pulsiferae* var*. coronensis, Astragalus webberi*, *Boechera rigidissima*, *Botrychium lunaria*, *Botrychium montanum, Cudonia monticola, Cypripedium montanum, Dendrocollybia racemosa*, *Helodium blandowii, Ivesia aperta* var*. canina, Juncus luciensis, Mielichhoferia elongata, Monardella follettii, Peltigera gowardii, and Sowerbyella rhenana.*

## Alternative 2 – Modified Proposed Action

### Alternative 2 Effects to TEPS Plants

The following table summarizes these measures by the major analysis topics.

**Table 97. TEPS plant indicators and measures for alternative 2**

| Analysis Topic | Total acres on Tahoe National Forest | Acres in high-use areas | Acres in designated OSV areas |
|---|---|---|---|
| Threatened and Endangered plants | 57 | 0 | 0 |
| Sensitive plants | 2,496 | 253 | 1,294 |

No additional types of effects to TEPS plants and other botanical resources beyond those described in Effects Common to All Alternatives are specific to alternative 2.

In comparison with other alternatives, alternative 2 would be relatively equal with alternatives 1 and 4 in providing the minimum snow depth needed to prevent damage to resources (assumed to be 12 inches). In contrast, alternatives 3 and 5 would increase minimum snow depths to 18 inches and 24 inches, respectively, and would provide additional degrees of protection and assurance that soil and vegetation resources are not damaged.

### *Threatened and Endangered Plants*

As described above in Effects Common to All Alternatives, there would be no direct effects to *Packera layneae*. The two occurrences on Tahoe National Forest are not near any OSV trail. Indirect effects are not likely to occur from the small amounts of snow compaction and pollutants associated with dispersed OSV use. Because no direct, indirect, or cumulative effects to this species are expected, alternative 2 of the Tahoe OSV Use Designation project would have **no effect** on *Packera layneae*.

### *Sensitive Plants*

Sensitive plant species in the various plant life form categories would be affected differently, as described above in Effects Common to All Alternatives. Trees, shrubs, and sub-shrubs (woody plants) may be directly damaged by OSVs where they occur in areas designated for OSV use, and they may also experience indirect effects where they occur near designated OSV trails. Perennial herbaceous species, annual species and aquatic species would not be directly affected, but they may also experience indirect effects if they occur near designated OSV trails.

With alternative 2, a 12-inch minimum snow depth is expected to prevent direct effects to non-woody sensitive plants.

Indirect effects from snow compaction are expected to be greater with alternatives 1, 2, and 4 because 12 inches is considered a minimal protection afforded to ground vegetation. Alternative 2 provides a minimal protection for non-woody sensitive plants because cross-country travel is allowed when there is adequate snow depth to avoid damage to (soil and ground vegetation) resources. However, there could still be considerable direct damage to woody species throughout the OSV season, with possible unintentional breakage and abrasion of branches and leader growth.

Because the amount of area designated for OSV use is relatively moderate at 406,895 acres, alternative 2 would have less impacts to sensitive plant occurrences than alternatives 1 and 4, but more than alternatives 3 and 5.

#### Sensitive Plant Determinations for Alternative 2:

For two of the three sensitive woody plant species, *Eriogonum umbellatum* var. *torreyanum* and *Pinus albicaulis,* due to the possibility of direct damage to individuals and minor indirect effects from snow compaction and OSV pollutants where they occur in areas designated for OSV use, alternative 2 of the Tahoe OSV Use Designation project **may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area**.

After evaluating the specific habitat requirements of each species and potential interactions with OSV use, minor indirect effects from snow compaction and OSV pollutants would be possible for any of the sensitive plant species present in areas of high OSV use. Therefore, alternative 2 of the Tahoe OSV Use Designation project **may affect individuals, but is not likely to result in a trend**

**toward Federal listing or loss of viability in the planning area** for *Botrychium crenulatum*, *Botrychium minganense*, *Bruchia bolanderi*, *Erigeron miser*, *Ivesia sericoleuca*, *Lewisia kelloggii* ssp. *hutchisonii*, *Lewisia serrata*, *Phacelia stebbinsii*, and *Poa sierrae*.

Because the following species are not known to exist in areas of high OSV use, alternative 2 of the Tahoe OSV Use Designation project would have **no effect** on *Botrychium ascendens*, *Cypripedium fasciculatum*, *Fritillaria eastwoodiae*, *Ivesia aperta* var. *aperta*, *Lewisia cantelovii*, *Lewisia kelloggii* ssp. *kelloggii*, *Lewisia longipetala*, *Meesia uliginosa*, *Peltigera gowardii*, *Penstemon personatus*, *Phaeocollybia olivaceae*, *Pyrrocoma lucida*, and *Tauschia howellii*.

Because the following species are not known to exist at all on the Tahoe National Forest, alternative 2 of the Tahoe National Forest OSV Designation Use project would have **no effect** on *Astragalus lemmonii*, *Astragalus pulsiferae* var. *coronensis*, *Astragalus webberi*, *Boechera rigidissima*, *Botrychium lunaria*, *Botrychium montanum*, *Cudonia monticola*, *Cypripedium montanum*, *Dendrocollybia racemosa*, *Helodium blandowii*, *Ivesia aperta* var. *canina*, *Juncus luciensis*, *Mielichhoferia elongata*, *Monardella follettii*, *Peltigera gowardii, and Sowerbyella rhenana.*

## Alternative 3

### Alternative 3 Effects to TEPS Plants

The following table summarizes these same measures by the major analysis topics.

**Table 98. TEPS plant indicators and measures for alternative 3**

| Analysis Topic | Total acres on Tahoe National Forest | Acres in high-use areas | Acres in designated OSV areas |
|---|---|---|---|
| Threatened and Endangered plants | 57 | 0 | 0 |
| Sensitive plants | 2,496 | 102 | 902 |

No additional types of effects to TEPS plants and other botanical resources beyond those described in Effects Common to All Alternatives are specific to alternative 3.

In comparison with alternatives 1, 2, and 4, because of its 18-inch minimum snow depth, alternative 3 would provide a low to moderate degree of additional protection and assurance that soil and vegetation resources are not damaged. However, alternative 5 would increase minimum snow depths to 24 inches and would provide further protection of resources.

#### *Threatened and Endangered Plants*

As described above in Effects Common to All Alternatives, there would be no direct effects to *Packera layneae*. The two occurrences on Tahoe National Forest are not near any OSV trail. Indirect effects are not likely to occur from the small amounts of snow compaction and pollutants associated with dispersed OSV use. Because no direct, indirect, or cumulative effects to this species are expected, alternative 3 of the Tahoe OSV Use Designation project would have **no effect** on *Packera layneae*.

### *Sensitive Plants*

Sensitive plant species in the various plant life form categories would be affected differently, as described above in Effects Common to All Alternatives. Trees, shrubs, and sub-shrubs (woody plants) may be directly damaged by OSVs where they occur in areas designated for OSV use, and they may also experience indirect effects where they occur near designated OSV trails. Perennial herbaceous species, annual species and aquatic species would not be directly affected, but they also may experience indirect effects if they occur near designated OSV trails.

In comparison with alternatives 1, 2, and 4, increasing minimum snow depths to 18 inches for cross-country travel would add an extra measure of protection for TEPS plants and their habitats, but effects already described would still be possible.

Alternative 3 provides a moderate level of protection for all sensitive plants because an additional 6 inches of snow is required for OSV use, providing a deeper cushion to absorb snow compaction and further protection from direct effects to the shortest woody plant species. Non-woody sensitive plants are not expected to be directly affected. However, there could still be damage to woody species throughout the OSV season, with possible unintentional breakage and abrasion of branches and leader growth.

Because alternative 3 would allow cross-country OSV travel in the least area (275,972 acres), it would impact the fewest sensitive plant occurrences.

**Sensitive Plant Determinations for Alternative 3:**

For two of the three sensitive woody plant species, *Eriogonum umbellatum* var. *torreyanum* and *Pinus albicaulis,* due to possible direct damage to individuals and minor indirect effects from snow compaction and OSV pollutants where they occur in areas designated for OSV use, alternative 3 of the Tahoe OSV Use Designation project **may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area**.

After evaluating the specific habitat requirements of each species and potential interactions with OSV use, minor indirect effects from snow compaction and OSV pollutants would be possible for any of the sensitive plant species present in areas of high OSV use. Therefore, alternative 3 of the Tahoe OSV Use Designation project **may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area** for *Botrychium crenulatum, Botrychium minganense, Bruchia bolanderi, Erigeron miser, Ivesia sericoleuca, Lewisia kelloggii* ssp. *hutchisonii*, *Meesia uliginosa, Phacelia stebbinsii,* and *Poa sierrae.*

Because the following species are not known to exist in areas of high OSV use, alternative 3 of the Tahoe OSV Use Designation project would have **no effect** on *Botrychium ascendens, Cypripedium fasciculatum, Fritillaria eastwoodiae, Ivesia aperta* var. *aperta*, *Lewisia cantelovii, Lewisia kelloggii* ssp. *kelloggii*, *Lewisia longipetala, Lewisia serrata, Peltigera gowardii, Penstemon personatus, Phaeocollybia olivaceae, Pyrrocoma lucida,* and *Tauschia howellii*.

Because the following species are not known to exist at all on the Tahoe National Forest, alternative 3 of the Tahoe OSV Use Designation project would have **no effect** on *Astragalus lemmonii*, *Astragalus pulsiferae* var. *coronensis*, *Astragalus webberi*, *Boechera rigidissima*, *Botrychium lunaria*, *Botrychium montanum*, *Cudonia monticola*, *Cypripedium montanum*, *Dendrocollybia racemosa*, *Helodium blandowii*, *Ivesia aperta* var. *canina*, *Juncus luciensis, Mielichhoferia elongata, Monardella follettii*, *Peltigera gowardii, and Sowerbyella rhenana.*

## Alternative 4

### Alternative 4 Effects to TEPS Plants

The following table summarizes the measures by the major analysis topics.

**Table 99. TEPS plant indicators and measures for alternative 4**

| Analysis Topic | Total acres on Tahoe National Forest | Acres in high-use areas | Acres in designated OSV areas |
|---|---|---|---|
| Threatened and endangered plants | 57 | 0 | 57 |
| Sensitive plants | 2,496 | 354 | 2,062 |

No additional types of effects to TEPS plants and other botanical resources beyond those described in Effects Common to All Alternatives are specific to alternative 4.

With a 12-inch minimum snow depth, alternative 4 is similar to alternatives 1 and 2, providing the minimum snow depth needed to prevent damage to resources (assumed to be 12 inches). However, alternatives 3 and 5 would increase minimum snow depths to 18 inches and 24 inches, respectively, and would provide additional degrees of protection and assurance that soil and vegetation resources are not damaged.

#### *Threatened and Endangered Plants*

As described above in Effects Common to All Alternatives, there would be no direct effects to *Packera layneae.* The two occurrences on Tahoe National Forest are not near any OSV trail. Indirect effects are not likely to occur from the small amounts of snow compaction and pollutants associated with dispersed OSV use. Because no direct, indirect, or cumulative effects to this species are expected, alternative 4 of the Tahoe OSV Use Designation project would have **no effect** on *Packera layneae*.

#### *Sensitive Plants*

Sensitive plant species in the various plant life form categories would be affected differently, as described above in Effects Common to All Alternatives. Trees, shrubs, and sub-shrubs (woody plants) may be directly damaged by OSVs where they occur in areas designated for OSV use, and they may also experience indirect effects where they occur near designated OSV trails. Perennial herbaceous species, annual species and aquatic species would not be directly affected, but they too may also experience indirect effects if they occur near designated OSV trails.

Alternative 4 requires a minimum of 12 inches of snow for cross-country OSV use. This is considered to be a minimum reasonable protection for soil and ground vegetation. A 12-inch minimum snow depth is expected to prevent direct effects to non-woody sensitive plants.

Indirect effects from snow compaction are expected to be greater with alternatives 1, 2, and 4 because only a minimal protection is afforded to ground vegetation. Alternative 4 provides minimal protection for woody sensitive plants because cross-country travel is allowed when there is just adequate snow depth to avoid damage to (soil and ground vegetation) resources, but there could still be damage to woody species throughout the OSV season, with unintentional breakage and abrasion of branches and leader growth.

Because alternative 4 would allow cross-country OSV use on the greatest area (641,105 acres), it would have the potential to impact the most area of sensitive plant occurrences.

**Sensitive Plant Determinations for Alternative 4:**

For two of the three sensitive woody plant species, *Eriogonum umbellatum* var. *torreyanum* and *Pinus albicaulis*, due to possible direct damage to individuals and minor indirect effects from snow compaction and OSV pollutants where they occur in areas designated for OSV use, alternative 4 of the Tahoe OSV Use Designation project **may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area**.

After evaluating the specific habitat requirements of each species and potential interactions with OSV use, minor indirect effects from snow compaction and OSV pollutants would be possible for any of the sensitive plant species present in areas of high OSV use. Therefore, alternative 4 of the Tahoe OSV Use Designation project **may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area** for *Botrychium crenulatum*, *Botrychium minganense*, *Bruchia bolanderi*, *Erigeron miser*, *Ivesia sericoleuca*, *Lewisia kelloggii* ssp. *hutchisonii*, *Meesia uliginosa*, *Phacelia stebbinsii*, and *Poa sierrae*.

Because the following species are not known to exist in areas of high OSV use, alternative 4 of the Tahoe OSV Use Designation project would have **no effect** on *Botrychium ascendens*, *Cypripedium fasciculatum*, *Fritillaria eastwoodiae*, *Ivesia aperta* var. *aperta*, *Lewisia cantelovii*, *Lewisia kelloggii* ssp. *kelloggii*, *Lewisia longipetala*, *Lewisia serrata*, *Peltigera gowardii*, *Penstemon personatus*, *Phaeocollybia olivaceae*, *Pyrrocoma lucida*, and *Tauschia howellii*.

Because the following species are not known to exist at all on the Tahoe National Forest, alternative 4 of the Tahoe OSV Use Designation project would have **no effect** on *Astragalus lemmonii*, *Astragalus pulsiferae* var. *coronensis*, *Astragalus webberi*, *Boechera rigidissima*, *Botrychium lunaria*, *Botrychium montanum*, *Cudonia monticola*, *Cypripedium montanum*, *Dendrocollybia racemosa*, *Helodium blandowii*, *Ivesia aperta* var. *canina*, *Juncus luciensis*, *Mielichhoferia elongata*, *Monardella follettii*, *Peltigera gowardii*, *and Sowerbyella rhenana*..

## Alternative 5

### Alternative 5 Effects to TEPS Plants

The following table summarizes the measures by the major analysis topics.

**Table 100. TEPS plant indicators and measures for alternative 5**

| Analysis Topic | Total acres on Tahoe National Forest | Acres in high-use areas | Acres in designated OSV areas |
|---|---|---|---|
| Threatened and endangered plants | 57 | 0 | 0 |
| Sensitive plants | 2,496 | 237 | 986 |

No additional types of effects to TEPS plants and other botanical species beyond those described in Effects Common to All Alternatives are specific to alternative 5. Increasing the minimum snow depth requirement to 24 inches would add a moderate extra measure of protection for TEPS plants and their habitats, but effects already described would still be possible.

### *Threatened and Endangered Plants*

As described above in Effects Common to All Alternatives, there would be no direct effects to *Packera layneae*. The two occurrences on Tahoe National Forest are not near any OSV trail. Indirect effects are not likely to occur from the small amounts of snow compaction and pollutants associated with dispersed OSV use. Because no direct, indirect, or cumulative effects to this species are expected, alternative 5 of the Tahoe OSV Use Designation project would have **no effect** on *Packera layneae*.

### *Sensitive Plants*

Sensitive plant species in the various plant life form categories would be affected differently, as described above in Effects Common to All Alternatives. Trees, shrubs, and sub-shrubs (woody plants) may be directly damaged by OSVs where they occur in areas designated for OSV use, and they may also experience indirect effects where they occur near designated OSV trails. Perennial herbaceous species, annual species and aquatic species would not be directly affected, but they too may also experience indirect effects if they occur near designated OSV trails.

Alternative 5 provides the highest level of protection for sensitive plants in areas designated for OSV use because an additional 12 inches of snow is required, providing a deeper cushion to absorb snow compaction and further protection from direct effects to the shorter woody plant species. Non-woody sensitive plants are not expected to be directly affected. However, there could still be considerable damage to woody species throughout the OSV season, with unintentional breakage and abrasion of branches and leader growth.

Because there would be a smaller area open to cross-country OSV use (300,146 acres), alternative 5 would have a smaller potential for impacts to sensitive plant occurrences than other alternatives, except alternative 3.

#### Sensitive Plant Determinations for Alternative 5:

For two of the three sensitive woody plant species, *Eriogonum umbellatum* var. *torreyanum* and *Pinus albicaulis,* due to the possibility of direct damage to individuals and minor indirect effects from snow compaction and OSV pollutants where they occur in areas designated for OSV use, alternative 5 of the Tahoe OSV Use Designation project **may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area**.

After evaluating the specific habitat requirements of each species and potential interactions with OSV use, minor indirect effects from snow compaction and OSV pollutants would be possible for any of the sensitive plant species present in areas of high OSV use. Therefore, alternative 5 of the Tahoe OSV Use Designation project **may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area** for *Botrychium crenulatum, Botrychium minganense, Bruchia bolanderi, Erigeron miser, Ivesia sericoleuca, Lewisia kelloggii* ssp. *hutchisonii*, *Phacelia stebbinsii*, and *Poa sierrae*.

Because the following species are not known to exist in areas of high OSV use, alternative 5 of the Tahoe OSV Use Designation project would have **no effect** on *Botrychium ascendens, Cypripedium fasciculatum, Fritillaria eastwoodiae*, *Ivesia aperta* var. *aperta*, *Lewisia cantelovii, Lewisia kelloggii* ssp. *kelloggii*, *Lewisia longipetala, Lewisia serrata, Meesia uliginosa, Peltigera gowardii, Penstemon personatus, Phaeocollybia olivaceae, Pyrrocoma lucida,* and *Tauschia howellii*.

Because the following species are not known to exist at all on the Tahoe National Forest, alternative 5 of the Tahoe OSV Use Designation project would have **no effect** on *Astragalus lemmonii*, *Astragalus pulsiferae* var. *coronensis*, *Astragalus webberi*, *Boechera rigidissima*, *Botrychium lunaria*, *Botrychium montanum*, *Cudonia monticola*, *Cypripedium montanum*, *Dendrocollybia racemosa*, *Helodium blandowii*, *Ivesia aperta* var. *canina*, *Juncus luciensis*, *Mielichhoferia elongata*, *Monardella follettii, Peltigera gowardii, and Sowerbyella rhenana.*

## Summary of TEPS Plant Effects

### Summary of TEPS Plant Measures and Determinations

**Table 101. TEPS plant summary of measures for all alternatives**

| Analysis Topic | Total acres on Tahoe National Forest | Acres in high-use areas | Acres in designated OSV areas |
|---|---|---|---|
| Threatened and endangered plants | 57 | 0 all alternatives | 57 Alt.1<br>0 Alt. 2<br>0 Alt. 3<br>57 Alt. 4<br>0 Alt. 5 |
| Sensitive plants | 2,496 | 308 Alt. 1<br>253 Alt. 2<br>102 Alt. 3<br>354 Alt. 4<br>237 Alt. 5 | 2,051 Alt. 1<br>1,294 Alt. 2<br>902 Alt. 3<br>2,062 Alt. 4<br>986 Alt. 5 |

#### *Threatened and Endangered Plants*

There would be no direct effects to *Packera layneae* from the proposed OSV uses. The two occurrences on Tahoe National Forest are not within 0.5 mile of any OSV trail, in any alternative, and thus, are not in the assumed high-use areas. Indirect effects from snow compaction and pollutants associated with dispersed OSV use are not expected to affect this perennial herbaceous species.

Therefore, for all alternatives, there would be **no effect** to *Packera layneae* from the Tahoe OSV Use Designation project.

#### *Sensitive Plants*

Sensitive woody plant species may be directly affected by crushing, breaking, or abrasion of stems and evergreen foliage where they occur in any areas designated for OSV use. Plants of other life form categories would not be directly affected because their living tissues are not present above ground, and would not be directly damaged by OSVs. Any of the sensitive plants may be indirectly affected by snow compaction and/or OSV emissions containing pollutants where they occur in areas of high-use (open areas within 0.5 mile of designated OSV trails). Thus, these plant species are reasonably at risk to some level of effects, dependent on their life forms, timing of growth, and proximity to heavy OSV use. Indirect effects are expected to be minor, and all effects would be minimized by the required minimum snow depths or conditional requirements proposed. Although some individuals may be severely damaged and may eventually die from intensive OSV damage (*Pinus albicaulis* is the most likely species to be damaged to this extent), OSV use is not expected to result in a trend toward Federal listing or loss of viability for any sensitive plants.

Minimum snow depths or conditional requirements vary among the alternatives, with alternatives 1, 2, and 4 having similar, minimal requirements that are expected to prevent direct effects to non-woody sensitive plants. Alternative 3 requires a moderate snow depth of 18 inches for OSV use, and this adds a degree of protection for the shorter woody sensitive plants. Alternative 5 proposes the deepest snow depth of 24 inches for OSV use, and this adds an extra degree of protection for the shorter woody sensitive plants. Indirect effects for all species would be less in alternatives 3 and 5 due to deeper snow requirements.

**Sensitive Plant Determinations:**

For two of the three sensitive woody plant species, *Eriogonum umbellatum* var. *torreyanum* and *Pinus albicaulis*, due to the possibility of direct damage to individuals and minor indirect effects from snow compaction and OSV pollutants where they occur in areas designated for OSV use, all alternatives of the Tahoe OSV Use Designation project **may affect individuals, but are not likely to result in a trend toward Federal listing or loss of viability in the planning area**.

After evaluating the specific habitat requirements of each species and potential interactions with OSV use, minor indirect effects from snow compaction and OSV pollutants would be possible for any of the Sensitive plant species present in areas of high OSV use. Therefore, all alternatives of the Tahoe OSV Use Designation project **may affect individuals, but are not likely to result in a trend toward Federal listing or loss of viability in the planning area** for *Botrychium crenulatum, Botrychium minganense, Bruchia bolanderi, Erigeron miser, Ivesia sericoleuca, Lewisia kelloggii* ssp. *hutchisonii*, *Phacelia stebbinsii*, and *Poa sierrae*.

For *Lewisia serrata*, alternatives 1, 3, 4, and 5 would have **no effect** because the species is not known to be present in areas of high OSV use. Because it is present in areas of high OSV use in alternative 2, this alternative **may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area** for *Lewisia serrata.*

For *Meesia uliginosa*, alternatives 2 and 5 would have **no effect** because the species is not known to be present in areas of high OSV use. Because it is present in areas of high OSV use in alternatives 1, 3, and 4, these alternatives **may affect individuals, but are not likely to result in a trend toward Federal listing or loss of viability in the planning area** for *Meesia uliginosa.*

Because the following species are not known to exist in areas of high OSV use, all alternatives of the Tahoe OSV Use Designation project would have **no effect** on *Botrychium ascendens, Cypripedium fasciculatum, Fritillaria eastwoodiae, Ivesia aperta* var. *aperta, Lewisia cantelovii, Lewisia kelloggii* ssp. *kelloggii, Lewisia longipetala, Meesia uliginosa, Peltigera gowardii, Penstemon personatus, Phaeocollybia olivaceae, Pyrrocoma lucida,* and *Tauschia howellii*.

Because the following species are not known to exist at all on the Tahoe National Forest, all alternatives of the Tahoe OSV Use Designation project would have **no effect** on *Astragalus lemmonii, Astragalus pulsiferae* var. *coronensis, Astragalus webberi, Boechera rigidissima, Botrychium lunaria, Botrychium montanum, Cudonia monticola, Cypripedium montanum, Dendrocollybia racemosa, Helodium blandowii, Ivesia aperta* var. *canina, Juncus luciensis, Mielichhoferia elongata, Monardella follettii, Peltigera gowardii, and Sowerbyella rhenana.*

## Compliance with Relevant Laws, Regulations, Policies and Plans

All alternatives would comply with the Endangered Species Act because no federally listed or proposed species would be affected. With the Biological Evaluation and Biological Assessment, the proposed project effects on TEPS plants have been evaluated and measures taken to ensure that sensitive plants do not become threatened or endangered because of Forest Service actions. All alternatives would maintain viable populations of all native and desired nonnative plants, and the proposed activities were reviewed for potential effects on rare species, and thus would be compliant with Forest Service Manual direction. All alternatives would also comply with the Tahoe National Forest Land and Resource Management Plan and the Sierra Nevada Forest Plan Amendment because Sensitive plant populations would remain viable and their habitats would be maintained.

### Other Relevant Mandatory Disclosures

#### Unavoidable Adverse Effects

As described in Effects Common to All Alternatives, listed plants would not be affected. Some adverse effects may occur to some sensitive plants, but are not likely to cause a trend toward Federal listing or a loss of viability.

#### Irreversible and Irretrievable Commitments of Resources

Although some adverse effects to sensitive plants may occur, these plants are a renewable resource and thus there would be no irreversible commitments of the resource. Excessive damage to individuals could cause mortality, and thus, may constitute an irretrievable commitment.

## Other Botanical Species

### Special Interest Plants

Because OSV use and snow trail grooming may harm special interest plants and other botanical resources, this analysis will evaluate the direct, indirect, and cumulative effects of the alternatives on these botanical resources that could result from the following proposed actions:

- Designating roads, trails and areas for over-snow vehicle use
- Identification of snow trails for grooming for OSV use
- Ancillary activities such as the plowing of related parking lots and trailheads (analyzed as cumulative impacts)

An assessment of effects to Special Aquatic Features (Fens) is included as a subtopic within Special Interest Plants.

### Special Interest Areas

Special interest areas (SIAs) that are designated with a botanical emphasis will be evaluated for consistency with maintaining the vegetation and habitat characteristics for which the SIAs were created.

### Noxious Weeds

A Noxious Weed Risk Assessment (Botany Report, Appendix B) presents the weed species that exist in the project area and contains an analysis of effects from weeds and a determination of each alternative’s risk of introducing and/or spreading weed species in the project area.

## Relevant Laws, Regulations, and Policy

### Federal Law and Policy

**Forest Service Manual 2670.22** (USDA Forest Service 2005) directs national forests to "maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands." To comply with this direction, Forests are encouraged to track and evaluate effects to additional species that may be of concern even though they are not currently listed as sensitive. Such plant species are referred to as special interest or watch list species.

**Forest Service Manual 2900** (USDA Forest Service 2011) contains national direction for noxious weed management. Specific policies included in FSM 2900 include:

- Determine the risk of introducing, establishing, or spreading invasive species associated with any proposed action, as an integral component of project planning and analysis, and where necessary provide for alternatives or mitigation measures to reduce or eliminate that risk prior to project approval.
- Ensure that all Forest Service management activities are designed to minimize or eliminate the possibility of establishment or spread of invasive species on the National Forest System, or to adjacent areas. Integrate visitor use strategies with invasive species management activities on aquatic and terrestrial areas of the National Forest System. At no time are invasive species to be promoted or used in site restoration or re-vegetation work, watershed rehabilitation projects, planted for bio-fuels production, or other management activities on national forests and grasslands.
- Use contract and permit clauses to require that the activities of contractors and permittees are conducted to prevent and control the introduction, establishment, and spread of aquatic and terrestrial invasive species. For example, where determined to be appropriate, use agreement clauses to require contractors or permittees to meet Forest Service-approved vehicle and equipment cleaning requirements/standards prior to using the vehicle or equipment in the National Forest System.

**Executive Order 13112** (USDA Forest Service 1999) was originally signed on Feb 3, 1999, and amended by **Executive Order 13751** (USDA Forest Service 2016) on December 5, 2016, establishing the National Invasive Species Council to ensure that Federal programs and activities to prevent and control invasive species are coordinated, effective and efficient. EO 13112 defines an invasive species as "…an alien (or non-native) species whose introduction does, or is likely to cause economic or environmental harm or harm to human health". The Executive Orders direct Federal agencies to prevent the introduction of invasive species, detect and respond rapidly to and control such species, not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species unless the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.

### Land and Resource Management Plan

Noxious weeds are identified in the Tahoe National Forest LRMP as one of five problem areas to be addressed with management goals and strategies. Goals for noxious weed management are to manage weeds using an integrated weed management approach according to the priority set forth in FSM 2081.2:

- Priority 1. Prevent the introduction of new invaders.
- Priority 2. Conduct early treatment of new infestations.
- Priority 3. Contain and control established infestations.

Provisions for implementing these goals are embodied in the following applicable noxious weeds management standards and guidelines in the Forest Plan:

- As part of project planning, conduct a noxious weed risk assessment to determine risks for weed spread (high, moderate, or low) associated with different types of proposed management activities. Refer to weed prevention practices in the Regional Noxious Weed Management Strategy to develop mitigation measures for high and moderate risk activities.
- When recommended in project-level noxious weed risk assessments, consider requiring off-road equipment and vehicles (both Forest Service and contracted) used for project implementation to be weed free. Refer to weed prevention practices in the Regional Noxious Weed Management Strategy.
- Minimize weed spread by incorporating weed prevention and control measures into ongoing management or maintenance activities that involve ground disturbance or the possibility of spreading weeds. Refer to weed prevention practices in the Regional Noxious Weed Management Strategy.
- Routinely monitor noxious weed control projects to determine success and to evaluate the need for follow-up treatments or different control methods. Monitor known weed infestations, as appropriate, to determine changes in weed population density and rate of spread.

**Sierra Nevada Forest Plan Amendment (SNFPA).** The Record of Decision (ROD) for the 2004 Sierra Nevada Forest Plan Amendment includes the following direction applicable to motorized travel management and noxious weeds:

- Goals for noxious weed management are to manage weeds using an integrated weed management approach. Priority 1 is to prevent the introduction of new invaders. Priority 2 is to conduct early treatment of new infestations. Priority 3 is to contain and control established infestations (SNFPA ROD page 36). Applicable Standards and Guidelines for noxious weed management (SNFPA ROD pages 54-55, #36-41, 47-49) are listed below.
  36. Inform forest users, local agencies, special use permittees, groups, and organizations in communities near national forests about noxious weed prevention and management.
  37. Work cooperatively with California and Nevada State agencies and individual counties (for example, Cooperative Weed Management Areas) to: (1) prevent the introduction and establishment of noxious weed infestations and (2) control existing infestations.
  38. As part of project planning, conduct a noxious weed risk assessment to determine risks for weed spread (high, moderate, or low) associated with different types of proposed management activities. Refer to weed prevention practices in the Regional Noxious Weed Management.
  39. When recommended in project-level noxious weed risk assessments, consider requiring off-road equipment and vehicles (both Forest Service and contracted) used for project

implementation to be weed free. Refer to weed prevention practices in the Regional Noxious Weed Management Strategy.

40. Minimize weed spread by incorporating weed prevention and control measures into ongoing management or maintenance activities that involve ground disturbance or the possibility of spreading weeds. Refer to weed prevention practices in the Regional Noxious Weed Management Strategy.
41. Conduct follow-up inspections of ground disturbing activities to ensure adherence to the Regional Noxious Weed Management Strategy.
47. Complete noxious weed inventories, based on regional protocol. Review and update these inventories on an annual basis.
48. As outlined in the Regional Noxious Weed Management Strategy, when new, small weed infestations are detected, emphasize eradication of these infestations while providing for the safety of field personnel.
49. Routinely monitor noxious weed control projects to determine success and to evaluate the need for follow-up treatments or different control methods. Monitor known weed infestations, as appropriate, to determine changes in weed population density and rate of spread.

#### *Special Area Designations*

SIAs may have specific management objectives for unique botanical features or other features of interest. Botanical SIAs have been specifically designated to conserve and manage unique botanical communities, rare species, or other elements of biological diversity, and to provide for public enjoyment of these areas in a manner that is consistent with the values for which the areas were established. On the Tahoe National Forest, no management plans are available for established Botanical SIAs. The Placer County Big Tree Grove is a proposed Botanical Special Interest Area assumed to be reserved for the protection and public enjoyment of the most northerly grove of giant sequoias.

### Desired Condition

One stated goal in the Tahoe National Forest LRMP is to manage National Forest System lands so that management activities do not introduce or spread noxious or invasive exotic weeds.

Maintaining viable populations of all native and desired nonnative plant species is the underlying goal of Forest Service Manual 2670.

## Topics and Issues Addressed in This Analysis

### Purpose and Need

Botanical resources are not directly related to the purpose and need for action, but several public comments raised concerns about OSV damage to vegetation. Concerns for botanical resources are not among the key issues that drove development of additional action alternatives.

### Issues

OSV uses may cause direct and indirect effects to survey and manage plants, special interest plants, and invasive plants, but are most likely to affect those that have living tissues present within the snow column each season (such as trees or shrubs). Several public comments have been received that raise concerns about the effects of OSV use on general vegetation and rare species. Effects may be either direct by damage or death to individual plants from OSV (stem breaking, crushing, etc.), or indirect by increasing the opportunity for pathogens to attack damaged plant tissues or by altering habitat. Possible effects include but are not limited to: physical damage to plants and habitats; reduced seed production; decreased plant vigor; changes in hydrology; changes to soils, especially erosion and sedimentation; changes in physiological responses; and increases in risk of weed introduction and spread. These effects become much more likely if OSV use occurs where or when there is inadequate snow depth.

Some plant species emerge from the ground very early in the growing season and subsequent snowfall may accumulate enough afterward to allow authorized OSV use. In these cases, living plant tissues may also be impacted by OSV use. Compaction of snow may lead to changes in plant composition and habitat suitability. Weed seeds may be transported into areas designated for OSV use. When snow cover is not adequate, OSV use on and off established routes can affect some survey and manage plants, special interest plants, and their habitats. The proposed minimum snow depth requirements are presumed to be sufficient to protect the majority of plant species from damage.

## Resource Indicators and Measures

Resource indicators and measures shown in table 19 will be used to measure and disclose effects to botanical resources related to OSV use designations and grooming trails for OSV use.

**Table 102. Botanical resources indicators and measures for assessing effects**

| Resource Element | Resource Indicator | Measure |
|---|---|---|
| Vegetation | Species presence | Acres of special interest plant occurrences within open OSV use areas.<br>Acres of special interest plant occurrences within high-use areas. |
| | Qualitative discussion of species' responses to proposed activities | Special interest plants effects determination. |
| | Noxious/invasive weed presence | Acres of weed infestations within open OSV use areas.<br>Acres of weed infestations within high-use areas. |
| | Noxious/invasive weed response to proposed activities | Level of risk (high, moderate, low) for the project introducing or spreading weeds. |
| | Presence of designated botanical resource areas | Acres of botanical resource areas within open OSV use areas.<br>Acres of botanical resource areas within high-use areas. |

## Methodology

This analysis used ArcMap and relevant Geographic Information System (GIS) data layers from the Tahoe National Forest. The GIS layers of proposed OSV designations and groomed trails were overlain with the botanical resource layers to identify areas of potential effects.

Special interest plants that are known to occur within the planning area are presented in table 103. Effects to each special interest species were evaluated based on growth form, timing of important life cycle elements (i.e. emergence, flowering, seed production, germination, etc.), identified threats, important habitat components, and the expected interaction with disturbances associated with OSV use and snow trail grooming.

## Information Sources

Information used in this analysis includes pertinent scientific literature, project-specific botanical data, results of surveys and site revisits, and GIS layers of the following data: project boundary, actions by alternative, and Tahoe National Forest TEPS/special interest plant occurrences. Because some special interest plant occurrence data is lacking in the Tahoe National Forest data (specifically for *Carex davyi*, *Corallorhiza trifida*, *Rhamnus alnifolia*, *Schoenoplectus subterminalis*, *Stachys pilosa*, and *Stuckenia filiformis)*, supplemental data is provided by the California Natural Diversity Database (October 2017 Monthly Update).

## Incomplete and Unavailable Information

There is little research and information available regarding the responses of each plant species or whole plant communities to OSV uses, including indirect effects from snow compaction and vehicle emissions during the winter.

## Assumptions specific to the botanical resources analysis:

- High-use areas are defined in this analysis as open areas within 0.5 mile of designated OSV trails. The trails themselves are considered high-use regardless of designation of adjacent areas.
- Plants are unlikely to be directly affected by authorized OSV use (with the specified requirements of specific snow depths or adequate snow depth to avoid damage to resources – typically 12 inches) when their living tissues are not present above ground. Therefore, typically, only shrub or tree species are likely to be directly affected by OSV use.
- Indirect effects, such as those possibly resulting from snow compaction and vehicle emissions, are likely to be concentrated in the corridors along designated OSV trails (groomed or ungroomed). Therefore, an area within 0.5 mile of designated OSV trails is reasonably assumed to be affected by snow compaction, emissions, or other contamination. Because OSV use is expected to be concentrated in the designated OSV trail corridor, and grooming activities are restricted to identified trails, areas designated for OSV use outside these concentrated use corridors are much less likely to experience measurable indirect effects.
- Over-snow vehicles, towing vehicles, or trailers may carry mud or other debris containing weed seeds from infested areas to trailheads and possibly indirectly into any areas designated for OSV use.
- Only authorized OSV uses will be analyzed. Concerns arising from unauthorized uses will be addressed as law enforcement issues and may prompt corrective actions.
- Resource monitoring will identify unexpected types or levels of impacts to botanical resources, and may also prompt corrective actions as warranted.

## Spatial and Temporal Context for Effects Analysis

### *Direct and Indirect Effects Boundaries*

The spatial boundary for analyzing the direct and indirect effects to these botanical resources is the project area boundary, because all expected effects relevant to these resources would occur and remain within this area. Effects to vegetation would be expected to have occurred or become evident within one or two years of disturbance and this constitutes the short term. Effects that linger beyond

2 years are considered long-term effects, and may extend to decades or centuries. Such long-term effects beyond 20 years become increasingly difficult to predict due to unknown interactions and the many environmental variables with numerous possible outcomes.

#### *Cumulative Effects Boundaries*

Because effects from the proposed activities would interact with effects from other ongoing or future projects only within the project area boundary, the cumulative effects boundary is also the project area boundary. Cumulative effects are considered for a time period within 20 years of project implementation.

## Affected Environment

### Existing Condition

#### *Special Interest Plants*

Often referred to as “watch list” species, Special interest plants are species that do not meet all of the criteria to be included on the Regional Forester’s sensitive plant list, but are of sufficient concern to consider them in the planning process. The Tahoe National Forest watch list includes species that are newly described; locally rare; range extensions or disjunct populations; species of specific public interest; or species with too little information to determine their appropriate status. Watch lists are dynamic and updated as the need arises to reflect changing conditions and new information. Such species make an important contribution to forest biodiversity and are addressed as appropriate through the NEPA process. Sixty-one special interest plants are known or suspected to occur on the Tahoe National Forest. Special aquatic features (fens) are also included in this topic. See table 103 below.

**Table 103. Special Interest plant species and communities considered**

| *Scientific Name*<br>Common Name | Habitat | Life Form |
|---|---|---|
| *Allium jepsonii*<br>Jepson’s onion | Foothill woodland, lower montane coniferous forest, serpentine or volcanic soils. 900-4,400 feet. Flowers April-August. | Perennial herb |
| *Allium sanbornii* var. *congdonii*<br>Congdon’s onion | Serpentinite or volcanic substrates in chaparral or cismontane woodland.1,000-5,000 feet. Flowers April-July. | Perennial herb |
| *Allium sanbornii* var. *sanbornii*<br>Sanborn's onion | Usually serpentinite, gravelly areas in chaparral, cismontane woodland, or lower montane coniferous forest.1,000-5,000 feet. Flowers May-September. | Perennial herb |
| *Arctostaphylos mewukka* ssp. *truei*<br>True’s manzanita | Sometimes roadside, in chaparral or lower montane coniferous forest. 1,400-4,560 feet. Flowers February-July. | Evergreen shrub |
| *Arctostaphylos nissenana*<br>Nissenan manzanita | Chaparral/closed-cone pine forest. 1,500-3,500 feet. Flowers February-March. | Evergreen shrub |
| *Calochortus clavatus* ssp. *avius*<br>Clubhair mariposa lily | Forest edges, lava caps, 3,000-5,800 feet. Flowers May-July. | Perennial herb |
| *Calystegia vanzuukiae*<br>Van Zuuk’s morning-glory | Serpentine/gabbro soils, 1,640-3,875 feet. | Perennial herb |

| *Scientific Name* Common Name | Habitat | Life Form |
|---|---|---|
| *Cardamine pachystigma* var. *dissectifolia* serpentine bittercress | Openings, usually serpentinite, rocky, in chaparral or lower montane coniferous forest. Below 6,900 feet. Flowers February-May. | Perennial herb |
| *Carex davyi* Davy's sedge | Dry, often sparse meadows and slopes, subalpine/red fir forest, 4,800-10,600 feet. Flowers May-Aug. | Perennial herb |
| *Carex lasiocarpa* woolly fruit sedge | Fens, wet areas, 1,900-6,900 feet. Flowers June-July. | Perennial herb |
| *Carex limosa* Mud sedge | Fens, wet areas, 4,000-8,700 feet. Flowers June-August. | Perennial herb |
| *Carex praticola* Meadow sedge | Meadows/wet areas, 1,600-10,500 feet. Flowers May-July. | Perennial herb |
| *Carex sheldonii* Sheldon's sedge | Wet areas, 4,000-5,000 feet. Flowers May-Aug. | Perennial herb |
| *Ceanothus arcuatus* Arching ceanothus | Serpentine soils, 1,900-7,025 feet. Flowers April-June. | Shrub |
| *Chlorogalum grandiflorum* Red hills soaproot | Serpentine, gabbroic soils, 800-4,100 feet. Flowers May-June. | Perennial herb |
| *Clarkia biloba* ssp. *brandegeae* Brandegee's clarkia | Forest edges/openings, less than 3,100 feet. Flowers May-July. | Annual herb |
| *Clarkia mildrediae* ssp. *lutescens* Mildred's clarkia | Woodland/forest edges, less than 5,750 feet. Flowers June-August. | Annual herb |
| *Clarkia mildrediae ssp. mildrediae* Mildred's clarkia | Woodland/forest edges, 800-5,650 feet. Flowers May-August. | Annual herb |
| *Claytonia megarhiza* Alpine springbeauty | Talus/rock crevices, above 8,000 feet. Flowers July-September. | Perennial herb |
| *Corallorhiza trifida* Yellow coralroot | Wet areas. 4,450-5,750 feet. Flowers June-July. | Perennial herb |
| *Darlingtonia californica* California pitcherplant | Wetlands/riparian, 0-8,500 feet. Flowers April-July. | Perennial herb |
| *Drosera anglica* English sundew | Bogs, fens, wetland/riparian, less than 8,500 feet. Flowers June-September. | Perennial herb |
| *Epilobium howellii* Yuba Pass willowherb | Meadows and seeps, wetland/riparian. 6,000-9,000 feet. Flowers July-August. | Perennial herb |
| *Epilobium luteum* Yellow willowherb | Wetland areas, 4,900-5,600 feet. Flowers July-September. | Perennial herb |
| *Eremogone cliftonii* Clifton's eremogone | Openings, usually granitic, in chaparral and montane coniferous forests. 1,490-5,850 feet. Flowers April-September. | Perennial herb |
| *Erigeron petrophyllus* var. *sierrensis* northern Sierra daisy | Serpentinite soils, 900-5,700 feet. Flowers June-October. | Perennial herb |

| *Scientific Name*<br>Common Name | Habitat | Life Form |
|---|---|---|
| *Eriogonum umbellatum* var. *ahartii*<br>Ahart's buckwheat | Serpentinite, slopes, openings in chaparral or cismontane woodlands, less than 5,600 feet. Flowers June-September. | Perennial herb/subshrub |
| *Glyceria grandis*<br>American mannagrass | Riparian/wetland areas, below 6,890 feet. Flowers June-August. | Perennial herb |
| *Hemieva ranunculifolia*<br>Buttercup-leaf suksdorfia | Riparian/wetland/mesic, rocky, granitic areas, 4,900-8,200 feet. Flowers June-August. | Perennial herb |
| *Horkelia parryi*<br>Parry's horkelia | Grows in openings and edges, on Ione formation and other soils, in chaparral or cismontane woodland, below 3,400 feet. Flowers April-September. | Perennial herb |
| *Lilium humboldtii* ssp. *humboldtii*<br>Humboldt lily | Openings in chaparral, cismontane woodland, or lower montane conifer forests. Flowers May-August. | Perennial herb |
| *Lycopus uniflorus*<br>Northern bugleweed | Fens, marshes, swamps, below 6,600 feet. Flowers July-September. | Perennial herb |
| *Meesia longiseta*<br>Meesia moss | Carbonate substrates, on soil in fens, meadows, and seeps in upper montane coniferous forest, all elevations. | Bryophyte, moss (perennial herb) |
| *Meesia triquetra*<br>Meesia moss | Fens, meadows, and seeps in upper montane coniferous forest or subalpine areas, 4,200-9,700 feet. | Bryophyte, moss (perennial herb) |
| *Micranthes howellii*<br>Howell's saxifrage | Wetland/riparian areas, sometimes serpentinite, in cismontane woodland, below 3,000 feet. Flowers March-May. | Perennial herb |
| *Mimulus glaucescens*<br>Shieldbract monkeyflower | Serpentinite seeps, sometimes streambanks, in chaparral, cismontane woodland, lower montane coniferous forest, or valley and foothill grassland habitats, below 4,100 feet. Flowers February-September. | Annual herb |
| *Mimulus laciniatus*<br>Cutleaf monkeyflower | Granitic seeps in chaparral or montane coniferous forest, 3,300-8,700 feet. Flowers April-July. | Annual herb |
| *Oreostemma elatum*<br>Plumas alpine aster | Fens, meadows, and seeps in upper montane coniferous forest, 3,200-6,700 feet. Flowers June-August. | Perennial herb |
| *Packera eurycephala* var. *lewisrosei*<br>Lewis' groundsel | Serpentine soils in chaparral, cismontane woodland, or lower montane coniferous forest, 900-6,200 feet. Flowers March-September. | Perennial herb |
| *Penstemon sudans*<br>Susanville beardtongue | Volcanic, rocky places, sometimes roadsides, in Great Basin scrub, lower montane coniferous forest, or pinyon and juniper woodland, 3,900-8,000 feet. Flowers June-September. | Perennial herb |
| *Perideridia bacigalupi*<br>Mother lode yampah | Serpentine soils, in chaparral and pine woodlands, 1,400-3,400 feet. Flowers June-August. | Perennial herb |
| *Piperia colemanii*<br>Coleman's piperia | Chaparral, duff in lower montane coniferous forest, often shaded. 3,900-7,600 feet. Flowers June-August. | Perennial herb |
| *Potamogeton praelongus*<br>whitestem pondweed | Deep water, lakes. 5,900-9,850 feet. Flowers July-August. | Aquatic perennial herb |

| *Scientific Name*<br>Common Name | Habitat | Life Form |
|---|---|---|
| *Pseudostellaria sierrae*<br>pseudostellaria | Forest edges/openings, 4,000-7,200 feet. Flowers May-August. | Perennial herb |
| *Rhamnus alnifolia*<br>Alderleaf buckthorn | Wetland/riparian areas, 4,500-7,000 feet. Flowers May-July. | Deciduous shrub |
| *Rhynchospora alba*<br>white beaksedge | Wetland/riparian areas, 150-6,700 feet. Flowers July-August. | Perennial herb |
| *Rhynchospora capitellata*<br>Brownish beaksedge | Wetland/riparian areas, 150-6,600 feet. Flowers July-August. | Perennial herb |
| *Sanicula tracyi*<br>Tracy's blacksnakeroot | Openings/edges in cismontane woodland or montane coniferous forest. 300-5,200 feet. Flowers April-July. | Perennial herb |
| *Schoenoplectus subterminalis*<br>Swaying bulrush | Fens, montane lake margins. 2,400-7,400 feet. Flowers June-September. | Aquatic perennial herb |
| *Scutellaria galericulata*<br>marsh skullcap | Streambanks, marshes, swamps, meadows, seeps. 4,000-7,000 feet. Flowers June-September. | Perennial herb |
| *Sidalcea gigantea*<br>Giant checkerbloom | Wetland/riparian areas, meadows and seeps in montane coniferous forest. 2,100-6,400 feet. Flowers January-October. | Perennial herb |
| *Sedum albomarginatum*<br>Feather River stonecrop | Steep cliffs and mountain slopes in rocky serpentine substrates, riparian/river canyons, 850-6,400 feet. Flowers May-June. | Perennial herb |
| *Silene occidentalis* ssp. *longistipitata*<br>Western catchfly | Forest edges/openings in chaparral or montane coniferous forest, 3,200-6,600 feet. Flowers June-August. | Perennial herb |
| *Silene occidentalis* ssp. *occidentalis*<br>Western catchfly | Forest edges/openings in chaparral or montane coniferous forest, 4,000-6,900 feet. Flowers June-August. | Perennial herb |
| *Sphagum* species<br>Peat moss | Fens/ peatlands, all elevations. | Perennial herb |
| *Stachys pilosa*<br>Hairy hedgenettle | Wetland/riparian areas in Great Basin scrub. 3,900-5,850 feet. Flowers June-August. | Perennial herb |
| *Stellaria obtusa*<br>Rocky Mountain chickweed | Forest edges/openings, 5,200-6,600 feet. Flowers June-August. | Perennial herb |
| *Stuckenia filiformis*<br>Fineleaf pondweed | Marshes and swamps (assorted shallow freshwater), 980-7,055 feet. Flowers May-July. | Aquatic perennial herb |
| *Tonestus eximius*<br>Lake Tahoe serpentweed | Granitic, subalpine forest, 8,000-10,000 feet. Flowers July-August. | Perennial herb |
| *Utricularia minor*<br>lesser bladderwort | Shallow water, above 1,500 feet. Flowers in May-August. | Aquatic perennial herb |
| *Veronica cusickii*<br>Cuskick's speedwell | Moist soils, alpine boulder and rock fields, meadows, and seeps, above 6,500 feet. Flowers July-August. | Perennial herb |
| Special Aquatic Features - Fens | Wet areas, all elevations. Approximately 52 acres of fen habitats are mapped on the Tahoe National Forest. | - |

### *Special Interest Species Information*

#### Aggregating Species for Analysis of Effects

Because OSV effects to various plant species are expected to be most similar according to their life form and growth habits, the species considered in this analysis are grouped into the following categories:

- **Trees, shrubs, or sub-shrub species**, (woody plants) whose living tissues may be present above or within the snow column, and thus could experience direct effects from OSV uses (physical damage or immediate exposure to exhaust). On the Tahoe National Forest, five special interest plants are in this category.
- **Perennial herbaceous species**, including grasses, fungi, and mosses, whose living tissues are at or below the soil surface, and thus are unlikely to experience direct effects, but they will be evaluated for impacts by exhaust contaminants trapped by the snow cover or by possible effects from snow compaction. Forty-seven special interest plant species in this category are considered.
- **Annual plant species** are generally not growing during the period of authorized OSV use, and thus would not experience direct effects. This group is the least likely to be impacted by the indirect effects of exhaust contaminants and snow compaction. Five annual special interest plant species are considered in this analysis.
- **Aquatic plant species** grow underwater and would not be directly affected by OSV use. If an occurrence is located within high-use areas, it is possible that snowpack contaminants could reach the occupied aquatic habitat when the snow melts. Snow compaction is not expected to affect aquatic habitats in any meaningful or predictable manner. In this analysis, four aquatic special interest plant species are considered.

### *Special Aquatic Features – Fens*

Fens are peat-forming wetlands, supported by nearly constant groundwater inflow. Their permanent saturation creates oxygen-deprived soils with very low rates of decomposition, allowing the accumulation of organic matter produced by wetland plants. Fens also are hotspots of biological diversity. In California, the perennial supply of water provides refugia for plant and animal species that persist only in fens. Fens were determined to be particularly important for their biological diversity and as habitat for species of *Sphagnum*, *Meesia*, and other bryophytes.

### *Special Interest Areas*

One special interest area is designated as a Botanical Area, and it is not deignated for OSV use.

Placer County Big Trees Grove is the most northerly stand of naturally occurring Giant Sequoias, *Sequoiadendron giganteum*, and is 357 acres in size and is located 22 miles east of Foresthill overlooking the Middle Fork American River. The northern end of this SIA is bordered by a designated OSV trail. This area has been designated as a Botanical Special Interest Area. The trees have been a popular tourist attraction since the 1800s, and each bears the name of a prominent American. A nature trail and picnic area offer visitors a nice lunch or rest stop.

## Environmental Consequences

### Effects common to all alternatives

Because the alternatives are very similar, with the same activities proposed, and the differences are mainly the spatial extent of OSV use, most of the effects are described in this section. The varying areas of authorized OSV use would result in mostly small differences in degree of potential effects. Therefore, each alternative's effects will mainly summarize the extent of botanical resources affected, and provide the basis for determinations. A summary comparison of alternatives will follow, providing the decision-maker a quick reference for evaluating the alternatives along with the other resources that need to be considered. Detailed results of botanical resource measures for each alternative, by species, is presented in table 109.

#### *Special Interest Plants*

Effects analyses for special interest plants are presented in categories of plant life forms because the greatest possible impacts from OSV activities are dependent upon the presence of their living tissues within the snow or above the snow surface and whether each species is biologically active during the times that direct and indirect effects may occur. Effects to each life form category are presented after an introduction of direct and indirect effects.

### Direct Effects

A key difference between OSV use and other types of motor vehicle use is that, when properly operated and managed, OSVs do not make direct contact with soil, water, and ground vegetation, whereas most other types of motor vehicles operate directly on the ground (USDA Forest Service 2014). OSV use and grooming of OSV trails can damage vegetation through direct contact with plant tissues that are present above the snow or within the snow column that is compacted by the vehicles. Because woody species (trees, shrubs, and sub-shrubs) are the only plants present within the snow, they are the only plants that are likely to be directly damaged. All other plant life forms are not expected to be directly affected by OSV use because adequate snow requirements and minimum snow depths are expected to prevent direct effects to vegetation at ground level.

It is generally recognized that disturbance to soil and vegetation by OSV use is reduced as snowpack depths increase. Damage to soil and low-growing vegetation is much more likely when OSV use occurs under low-snow conditions (Greller et al. 1974, Fahey and Wardle 1998). Thus, the requirement of adequate snow to avoid damage to resources for alternative 2, and the specific minimum snow depths for alternatives 3, 4, and 5 are expected to prevent or minimize damage to soil and ground vegetation.

In a study on Niwot Ridge in the Front Range of the Colorado Rocky Mountains, repeated snowmobile use occurred on snow-covered and snow-free areas between two weather stations, and the effects of this use were evaluated (Greller et al. 1974). General conclusions included: (1) in communities that are snow-free in winter, damage by snowmobiles was severe to lichens, *Selaginella*, and to relatively prominent, rigid cushion-plants. Part of the damage to these communities may have been due to the manual removal of rocks, necessary for the operation of snowmobiles in snow-free areas; (2) *Kobresia*, present in isolated tussocks in a cushion-plant community, absorbed the major portion of snowmobile impact. As *Kobresia* is thought to form the climatic climax community in this ecosystem, differential damage to it could seriously retard succession; (3) Snowmobile travel in uniform, closed *Kobresia* meadows inflicted much less damage to most plants, including *Kobresia* itself, than did similar travel on a sparsely vegetated community;

(4) Plants best able to survive the heaviest snowmobile impact were those with small stature and little woodiness, or with buds well-protected at or below the soil surface; (5) Snowmobile traffic should be carefully restricted to snow-covered areas. Whenever this is not feasible, the least destructive and easiest alternative is travel on mature, well-vegetated *Kobresia* meadows or similar well-drained plant communities.

On the Tahoe National Forest, OSV travel on snow-free areas is prohibited in the current and proposed scenarios. By not allowing OSV use when and where there is less than adequate snow to avoid damage to resources (typically 12 inches for cross-country use) or designating specific snow depth requirements, the Tahoe National Forest minimizes the possibility of direct damage to soils and ground vegetation.

## Indirect Effects

Indirect effects are caused by the action and occur later in time or are farther removed in distance, but are still reasonably foreseeable. Three specific topics of indirect effects were identified: snow compaction, pollutants, and invasive plant species. Potential effects from snow compaction and pollutants are described below, and a discussion of potential invasive plant effects will follow in its own section because it is a required analysis topic itself.

### Snow Compaction

Snow is compacted by any of the allowed OSVs, including snowmobiles, snow cats, and snow grooming equipment. Snow compaction mechanically alters snow grains and redistributes them. This mechanical disturbance breaks off the small points of new snow crystals, destroying the weak existing bonds between them, and bringing the new grains into much closer contact than occurs naturally. Snow metamorphism is artificially accelerated, and snow density and hardness are increased. In addition, the layered structure of the snowpack is changed (Fahey and Wardle 1998). All this has both thermal and hydrological implications, resulting in lower soil temperatures (Fahey and Wardle 1998, Eagleston and Rubin 2012) and delayed snowmelt (Keddy et al. 1979, Fahey and Wardle 1998, Davenport and Switalski 2006, Gage and Cooper 2013). The thermal conductivity of compacted snow is greater than undisturbed snow, and can reduce the buffering effect against temperature extremes and fluctuations. Thermal conductivity of compacted snow was 11.7 times greater than non-compacted snow (Neumann and Merriam 1972).

Keddy and others (1979) studied the effects of snowmobile use on snow compaction, vegetation composition, and soil temperatures on an abandoned farm in Nova Scotia. They found that snow melted later in areas with compacted snow and that some species showed differences in cover between treatments. Considering the multitude of possible effects and the variety of plant structures and life histories, they were not surprised to find no overall trend for species composition changes. They also noted that the first pass by a snowmobile caused the greatest increase in snow compaction – roughly 75 percent of that observed after 5 sequential passes. While some species composition changes were observed in old field vegetation, they found no changes in species composition in a marsh area, possibly because of solid ice cover during the winter.

In a study of the impact of snowshoe/cross-country ski compaction and snowmelt erosion on groomed trails, Eagleston and Rubin (2012) reported that these non-motorized uses caused snow to remain on the compacted areas an average of 5 days longer than non-compacted areas. They also found that the compacted snow caused increased erosion. Soil temperatures under compacted snow stayed frozen for 3 days longer, and, averaged over the entire winter season, remained 0.1 degree Celsius colder than soil under non-compacted snow.

Fahey and Wardle (1998) examined the effects of snow grooming for downhill ski areas in subalpine and alpine environments. They found that the compacted snow increased frost penetration and delayed snowmelt.

However, research does not always support the generalization of lower soil temperatures and delayed snowmelt due to snow compaction. In a study of snow compaction effects from snowmobiles on fens on the Routt National Forest, Gage and Cooper (2013) found no statistically significant differences in the temperature of peat soils between compacted and non-compacted areas. They also found no differences in timing of snowmelt, biomass production, or plant phenology. From additional, unpublished data from the Telluride Ski Area, where intense compaction occurred daily, they observed a delayed snowmelt and thawing of the soil of about one month in compacted areas. They noted that the continuous influx of groundwater in fens may limit freezing and maintain more constant soil thermal conditions. They found no evidence conclusively linking snowmobile compaction to impairment of fen function.

Different plants have different levels of vulnerability and ability to recover from the effects of snow compaction. The characteristics which determine their vulnerability are the timing of flowering, and growth form and size (Fahey and Wardle 1998). Prolonged snow lie may adversely affect early spring flowering plants because they could have a shorter growing season and thus possibly reduced seed production due to delayed phenology and perhaps a misalignment of timing with their preferred pollinators. Due to snow compaction, early spring growth of some plant species may be retarded or may not occur under an OSV trail; however, the current and proposed OSV trails are underlain by existing roads and trails which are already compacted and/or disturbed and little, if any, additional impacts are expected to the vegetation.

Trail grooming on the Tahoe National Forest occurs mostly over an existing road and trail network. The grooming does not alter landforms or result in significant soil disturbance that would change water flow patterns or quantities of surface water runoff.

In summary, the available research supports the assumption that more intensive snow compaction occurring along groomed or heavily used trails would have considerably greater effect on soil temperatures and delayed snowmelt than the compaction caused by dispersed uses in areas open to cross-country OSV use. Due to the intensive, repetitive, and predictable compaction of snow along designated OSV trails (groomed or not), these areas are much more likely to have a degree of compaction that could adversely influence vegetation. **Therefore, in this analysis, areas within one-half mile of designated OSV trails are assumed to be at risk from the effects of snow compaction.** Outside the designated OSV trail corridors, dispersed OSV travel is much less likely to compact snow with enough intensity and repetition to measurably or predictably affect ground vegetation, and therefore is not considered in this analysis as an expected source of indirect effects.

### Pollutants

Emissions from over-snow vehicles, particularly two-stroke engines on snowmobiles, release pollutants including ammonium, sulfate, benzene, nitrogen oxides, ozone, carbon dioxide, carbon monoxide, aldehydes, polycyclic aromatic hydrocarbons and other toxic compounds into the air. A portion of these compounds may become trapped and stored in the snowpack, to be released during spring runoff. Four-stroke snowmobile engines produce considerably lower amounts of pollutants.

Pollutants emitted from exhaust can cause a variety of impacts on vegetation. Carbon dioxide may function as a fertilizer and cause changes in plant species composition (Bazzaz and Garbutt 1998);

nitrogen oxides also may function as fertilizers, producing similar effects along roadsides (Falkengren-Grerup 1986). Sulfur dioxide, which can be taken up by vegetation, may result in altered photosynthetic processes (Winner and Atkison 1986, Mooney et al. 1988). Other toxic compounds may result in reduced metabolism or retarded growth.

Although a large portion of OSV exhaust is expected to be dissipated into the air, some of the airborne pollutants would enter the snowpack and be released during snowmelt. Similar responses can be assumed to occur in plants that ingest these compounds from snowmelt, although the compounds may undergo chemical changes while in the snowpack, confounding the predictability of effects.

Airborne pollutants can enter the snowpack from both local and regional sources, including but not limited to vehicle emissions, dust storms, and smog. The concentrations of basic cations and acidic anions in the snowpack can be altered and, when released quickly during snowmelt, can temporarily lower the pH of surface waters in a process known as “episodic acidification” (Blanchard et al. 1988). Soil acidification and vegetation changes were examined in southern Sweden, where Falkengren-Grerup (1986) found that increased nitrogen deposition and the increased acidity in the humus layer may have caused changes in plant cover, with some species increasing and some species decreasing.

Demonstrating that snowpack chemistry can be used as a quantifiable indicator of airborne pollutants from vehicular traffic, a correlation was shown between pollutant levels and vehicle traffic in Yellowstone National Park (Ingersoll et al. 1997). Ammonium and sulfate levels were consistently higher for the in-road snow compared to off-road snow, but nitrate concentrations did not decrease within a distance of 100 meters from the emission source; thus, the nitrate ion may be used to distinguish between local and regional emission sources (Ingersoll et al. 1997). Studying snow chemistry in Yellowstone National Park, Ingersoll (1998) found that concentrations of ammonium, nitrate, sulfate, benzene, and toluene were positively correlated with snowmobile use. Concentrations of ammonium were up to three times higher for the in-road snow compared to off-road snow. Concentrations decreased rapidly with distance from roadways.

Arnold and Koel (2006) also examined volatile organic compounds in Yellowstone National Park, and found that the snow in heavily used areas contained higher levels of benzene, ethylbenzene, m- and p-xylene, o-xylene, and toluene compared with a control site only 100 meters from the traveled roadways. Even at the most heavily used area (Old Faithful) they found that the concentrations of volatile organic compounds were considerably below the EPA’s water quality criteria for these compounds. In situ water quality measurements (temperature, dissolved oxygen, pH, specific conductance, and turbidity) were collected; all were found within acceptable limits. Five volatile organic compounds were detected (benzene, ethylbenzene, m- and p-xylene, o-xylene, and toluene). The concentrations were found below EPA criteria and guidelines for the volatile organic compounds analyzed and were below levels that would adversely impact aquatic ecosystems (Arnold and Koel 2006).

Studying air quality and snow chemistry effects from snowmobiles in the Snowy Range, Wyoming, Musselman and Korfmacher (2007) found that heavier snowmobile use resulted in higher levels of nitrogen oxides and carbon monoxide, but ozone and particulate matter were not significantly different. When compared with air quality during the summer, they found that carbon monoxide levels were higher in the winter, but nitrogen oxides and particulate matter were higher in the summer. Air pollutants were well-dispersed and diluted by winds, and air quality was not perceived as being significantly affected by snowmobile emissions. Pollutant concentrations were generally low in both winter and summer. These results differ from those studies examining air pollution from snowmobiles in Yellowstone National Park. However, snow chemistry observations did agree with studies from Yellowstone National Park. Compared with off-trail snow, the snow sampled from snowmobile trails was more acidic with higher amounts of sodium, ammonium, calcium, magnesium, fluoride, and sulfate. Snowmobile activity apparently had no effect on nitrate levels in the snow.

In the winter, plant metabolic rates are drastically reduced. Airborne compounds would only be taken up by respiring woody plants. Airborne pollutants normally disperse quickly in mountain environments that are prone to windy conditions, such as the Sierra Nevada. Different plants may have different responses to the different pollutants in the snowpack, including damage from toxic, volatile compounds and possibly some benefits from additional nutrients and trace minerals. The levels of OSV exhaust contaminants on the Tahoe National Forest (considerably less than those observed in Yellowstone National Park) are not expected to impair water quality (McNamara 2016).

In a natural plant community with many species competing for resources, and very little research done on each species' responses to OSV emissions or the competitive interactions that may be affected, it is nearly impossible to predict what changes, if any, would occur. It can only be reasonably assumed that there may be some changes in plant species cover and composition. The uptake of harmful pollutants is not expected to result in the death of any individual plants. On the Tahoe National Forest, no mortality of roadside TES plants due to vehicle pollutants has been observed, even considering year-round vehicle uses. Therefore, the level of effect to TES plants from OSV pollutants is expected to be minimal, and would not result in loss of individuals.

The available research on OSV pollutants (both airborne and in the snowpack) indicate that some effects to vegetation may occur in the immediate vicinity of heavy use areas. Pollutants that become trapped in the snowpack are also expected to be concentrated in areas of heavy OSV use. **Therefore, in this analysis, areas within one-half mile of designated OSV trails (groomed or not) are assumed to be reasonably at risk from the effects of OSV pollutants.** Outside the designated OSV trail corridors, dispersed OSV travel is much less likely to contribute harmful contaminants with high enough levels and repetition to measurably or predictably affect ground vegetation, and therefore is not considered in this analysis as an expected source of indirect effects.

### *Relative Potential Effects to Plant Life Forms*

Considering the combination of direct and indirect effects described above, and the requirement of adequate snow to avoid resources or minimum snow depth requirements of the alternatives, the effects of proposed OSV uses can be broken down into relative categories of potential damage to the major plant life forms. From the most likely to least likely to experience measurable effects:

- Evergreen trees and shrubs – most likely to be directly affected, due to mechanical damage; indirect effects are expected if the species occurs in high-use areas. Direct effects may occur in all areas designated for OSV use.
- Deciduous trees and shrubs – somewhat less likely, due to winter dormancy; indirect effects are expected if the species occurs near designated OSV trails. Effects may occur in all areas designated for OSV use.
- Sub-shrubs (low-growing woody species) – less likely due to less exposure to direct effects (but still expected); indirect effects may be expected if the species occurs in high-use areas. Direct effects may occur in all areas designated for OSV use.

- Perennial herbaceous species – direct effects are not expected to occur due to the requirement of adequate snow to avoid resource damage or minimum snow depths; indirect effects may be expected if the species occurs in high-use areas. Indirect effects may occur along designated OSV trails, but are not likely in areas open to cross-country OSV use.
- Annual species – direct effects are not expected to occur due to the requirement of adequate snow to avoid resource damage or minimum snow depths; indirect effects might be expected if the species occurs in high-use areas and if spring flowering were to be altered by persistent compacted snow. Effects may occur along designated OSV trails, but are not likely in areas open to cross-country OSV use. Depending on their specific habitats, annual plants may or may not be indirectly affected by delayed snowmelt or pollutants.
- Aquatic species – direct effects would not occur because OSV use is not allowed over open water; indirect effects from pollutants might be expected if the species occurs in high-use areas. No effects are expected to aquatic species from delayed snowmelt. Indirect effects from pollutants may occur in high-use areas, but are not likely in other areas open to cross-country OSV use.

### *Trees, shrubs, or sub-shrub species*

#### Direct Effects

Snowmobile activities may damage vegetation on and along trails and in area open to cross-country OSV use. The most commonly observed effect from snowmobiles was the physical damage to shrubs, saplings, and other vegetation (Neumann and Merriam 1972, Wanek 1971). Winter Wildland Alliance (WWA) analyzed the Gallatin National Forest regeneration survey data collected between 1983 and 1996 in areas that were harvested and replanted. That survey data indicated snowmobiles had damaged between 12 and 720 trees per acre (WWA 2009). Damage to vegetation has been observed in the Greater Yellowstone Area that is caused by winter recreational activities that occur off trail. For example, branches of willows (*Salix* spp.) and sagebrush (*Artemisia* spp.) have been broken, and leaders have been removed from conifers (Stangl 1999). Neumann and Merriam (1972) found that rigid woody stems up to 1 inch in diameter were very susceptible to damage. Stems were snapped off in surface packed or crusted snow. Neumann and Merriam (1972) also observed that compacted snow conditions caused twigs and branches to bend sharply and break. Stems that were more pliable bent and sprang back although the snowmobile track often removed bark from the stems’ upper surfaces. Sub-zero temperatures make stems more prone to snapping rather than bending. Direct mechanical effects by snowmobiles on vegetation at and above snow surface can be severe. After only a single pass by a snowmobile, more than 78 percent of the saplings on a trail were damaged, and nearly 27 percent of them were damaged seriously enough to cause a high probability of death (Neumann and Merriam 1972). Young conifers were found to be extremely susceptible to damage from snowmobiles. Broken stems of any woody species would provide places for pathogens to enter the plant tissues and would reduce the integrity of developing stems or trunks, both of which could lead to additional damage or death of individuals. These direct effects are expected to be localized and not result in loss of entire occurrences.

On the Tahoe National Forest, OSV use may directly damage individuals of the Tahoe National Forest special interest plants *Arctostaphylos mewukka* ssp. *truei, and Arctostaphylos nissenana*.

#### Indirect Effects

Airborne pollutants from OSVs would be concentrated in high-use areas. Because deciduous trees and shrubs lose their leaves in the winter months, they cannot photosynthesize during fall and winter.

Thus, respiration is dramatically reduced for deciduous trees and shrubs. Although evergreen trees and shrubs retain their leaves and are thus capable of photosynthesis and respiration during winter, these processes are also considerably reduced during the cold season. Reduced respiration during the winter means that smaller amounts of the airborne pollutants would be ingested through gas exchange.

Pollutants which are trapped and then released during snowmelt may (or may not) have some adverse and some beneficial effects, however the extent and bearing of specific effects is unknown. It is expected that pollutant concentrations would be low enough that water quality would not be impaired (McNamara 2016), and thus it is likely that plant responses, if any, would not be noticeable.

### *Perennial herbaceous species (including bryophytes)*

#### Direct Effects

With the requirement of adequate snow to avoid resource damage or minimum snow depths providing protection of the soil surface and ground vegetation, perennial herbaceous species (which die back each year to buds at or below the soil surface) would not be directly affected by current or proposed OSV uses.

#### Indirect Effects

Snow compaction from dispersed OSV use is not expected to affect perennial herbaceous species because the possible delayed snowmelt (usually a week or two) and small degree of colder soil temperatures in the compacted snow areas would be within the normal range of variation that they experience on the Tahoe National Forest.. Where it occurs each year, compacted snow may alter the timing of new foliage emergence in the spring due to delayed snowmelt and colder soil temperatures, but perennial herbaceous plants in the Sierra Nevada are assumed to be adapted to a wide variety of natural snowmelt times and the effects of compacted snow would likely be masked by the annual variation in snowpack.

Pollutants from dispersed OSV use (both airborne and those small amounts that become entrapped in the snow) would also not likely affect perennial herbaceous species because living plant tissues are not present above ground during the winter and pollutants are not expected to accumulate within the snow column or in run-off at high enough concentrations to cause noticeable damage.

Where occurrences exist in high-use areas, compaction and pollutants may be concentrated enough to cause some small magnitude changes to plant growth and community interactions. No populations are expected to decline with any of the proposed OSV uses.

### *Annual plant species*

#### Direct Effects

Plant species that complete their life cycle within one growing season would not be directly affected by current or proposed OSV uses because they are not growing when authorized OSV uses may occur.

#### Indirect Effects

Snow compaction from dispersed OSV use is not expected to affect annual species because the possible delayed snowmelt (usually a week or two) and small degree of colder soil temperatures in the compacted snow areas would be within the normal range of variation. Compacted snow may slightly alter the timing of seed germination and plant growth in the spring, due to delayed snowmelt and colder soil temperatures in the compacted areas. This is not expected to noticeable affect annual plants because they are assumed to be adapted to a wide variety of natural snowmelt times within their ranges of distribution. The annual variation in snowpack and temperatures would likely mask any differences in phenology due to OSV uses.

Pollutants from dispersed OSV use (both airborne and those small amounts that become entrapped in the snow) would also not likely affect annual species because living plant tissues are not present above ground during the winter and pollutants are not expected to accumulate within the snow column or in run-off at high enough concentrations to cause any noticeable changes.

Where occurrences exist in high-use areas, compaction and pollutants may be concentrated enough to cause some small magnitude changes to plant community interactions. No populations are expected to decline with any of the proposed OSV uses.

#### *Aquatic Species*

##### Direct Effects

Aquatic plant species would not be directly affected by current or proposed OSV uses because OSVs are not authorized to operate over or within aquatic habitats.

##### Indirect Effects

Delayed snowmelt and transfer of sub-freezing temperatures from snow compaction is not expected to affect aquatic plant species.

Airborne pollutants would not affect aquatic species because the plants grow underwater. In dispersed open areas, pollutants are not expected to accumulate within the snow column or in run-off at high enough concentrations to cause any noticeable changes to vegetation. Where occurrences exist in high-use areas, pollutants may be concentrated enough to cause some small magnitude changes to plant community interactions. No populations are expected to decline with any of the proposed OSV uses.

#### *Special Aquatic Features – Fens*

Fens can be threatened by resource use affecting the watershed such as livestock grazing and trampling, timber harvest, road building, off-road vehicle use, water pumping, and water pollution. Any condition or activity that disturbs the hydrologic regime or soil temperature of a fen, causing drying or warming, may threaten the function of that fen (Sikes et al. 2013). 52 acres of fen habitats are mapped on the Tahoe National Forest.

##### Direct Effects

Because adequate snow to avoid resource damage or minimum snow depths would prevent direct disturbance of soils or ground vegetation, there would be no direct effects to fen habitats.

##### Indirect Effects

Snow compaction poses the greatest threat from the proposed OSV uses. Delayed snowmelt and colder temperatures under compacted snow may cause changes to fen communities. The effects vary with differing usage patterns. A single snowmobile pass is far less likely to significantly affect hydrologic or ecological processes in wetlands than a series of intensely-used snowmobile trails (Gage and Cooper 2009). Effects are much more likely to occur where fens are present near designated OSV trails, and would be more dispersed in areas open to cross-country travel. Possible changes to the fen communities could include shifts in species composition due to colder temperatures and disruption of the insulating space that naturally develops beneath the snow. In order for species composition to change as a result of snow compaction, the same specific areas would need to be compacted year after year, and the likelihood of this occurring is much greater where OSV use is concentrated, such as along the designated OSV trails. Because so many site-specific variables are involved, compositional changes due to snow compaction are not possible to predict. Where fen habitats exist within high-use areas, some compositional changes could result from snow compaction, but these are expected to be minor and not impair the function of the fen habitat.

Airborne pollutants would not affect fens because these communities would be under a blanket of snow when the emissions are produced. As with any of the plant groups, pollutants which are trapped and then later released during snowmelt may (or may not) have some adverse and some beneficial effects, however the extent and direction of specific effects is unknown. It is expected that pollutant concentrations would be low enough that water quality would not be impaired, and thus it is likely that fen responses, if any, would not be noticeable.

### Invasive Species

On the Tahoe National Forest, 19 invasive plant species are documented. The Botany Specialist Report, Appendix B, includes a list of each species and their acreage of mapped infestations in high-use areas and in areas designated for OSV use. Six additional invasive plant species are likely present (*Bromus tectorum, Berteroa incana, Hydrilla verticillata, Myriophyllum spicatum, Phalaris arundinacea*, and *Rubus armeniacus*), but mapped locations are not available.

Although seed dispersal by vehicles is a major vector for weed invasions (Ouren et al. 2007, Von der Lippe and Kowarik 2007, Taylor et al. 2011), no literature or observational evidence was found to support the idea that invasive plants are spread by OSV use or grooming activities. However, it is possible that some weed introduction or expansion could result from these uses. OSVs could bring weed seeds into the project area, especially if the OSVs and/or their trailers are stored outside near weed infestations. Throughout the seasons of non-use (spring, summer, and fall), weed species are actively growing and producing seed, which may get deposited on OSVs and trailers that are stored outside, particularly during windy conditions or if weeds are growing in close proximity. Weed introductions are most likely to occur at trailheads, where seeds may be brought into the area on trailers, towing vehicles, and OSVs. The movement and jarring of this equipment during unloading may dislodge soil and other debris containing weed seeds. Less likely, but still possible, is that weed seeds may be deposited by the OSVs as they travel along designated trails and through areas open to cross-country travel, although it is unknown whether weed seeds deposited on the snow surface would remain viable and germinate when spring arrives. It is possible that the majority of weed seeds that may be brought into the area would be eaten by birds, mice, or other animals before spring conditions arrive.

Weeds usually gain a foothold in natural communities where soil disturbance has provided suitable conditions for weed seed germination, where ground vegetation is disturbed and unable to outcompete the invaders, and (in forested areas) where tree canopy removal or thinning has allowed additional sunlight to reach the forest floor. Aside from the possible introduction of weed seeds described above, none of the other typical factors promoting weed infestations are expected with OSV use.

The most likely places for possible weed introductions is in areas of concentrated OSV use. OSV trailheads are also accessible by wheeled vehicles during the summer seasons, so the presence of weeds does not necessarily indicate that they were brought to the sites as a result of OSV activities. Although there are some differences in designated OSV trails in each alternative, the locations and uses of seven OSV trailheads would be the same for all alternatives. The following weed species have been found at the OSV trailheads:

- Bassetts – no weeds documented
- China Wall – yellow starthistle and spotted knapweed are present
- Cisco Grove – no weeds documented
- Little Truckee Summit - no weeds documented
- Prosser – no weeds documented
- Sand Shed/Bassetts – no weeds documented
- Yuba Pass – no weeds documented

Given the lack of evidence that OSV use contributes to weed infestations, and the low risk of the proposed activities, the overall risk of weed increases due to OSV use is expected to be **low** for all alternatives.

### Special Interest Areas

The purpose of this SIA analysis is to determine compliance with the intended focus of Botanical Special Interest Areas. There is no variation between alternatives regarding OSV uses in this SIA, so this section will apply for all alternatives.

No cross-country OSV use would be allowed in Placer County Big Tree Grove under any of the alternatives. No designated OSV trails are proposed within this SIA, but one trail (Mosquito Ridge Trail, SNO-12E16) is adjacent to the northern boundary of Placer County Big Tree Grove, and OSV use is expected to remain within the designated trail corridor. No damage to the giant sequoia resource is anticipated. With OSV access prohibited, no direct or indirect effects are expected to occur to the Placer County Big Tree Grove, and OSV use would not alter any of the vegetation and habitat characteristics for which the SIA was established.

## Cumulative Effects

Past activities are considered part of the existing condition and are discussed within the Affected Environment section. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed to those effects.

Snow plowing at the established OSV trailheads is an ancillary activity associated with the Tahoe National Forest OSV Use Designation project, and is not analyzed as a part of the proposal. Snow plowing is not expected to affect botanical resources, other than providing an additional vector for the possible transport of noxious/invasive weed species. The risk of weed invasion by this means is relatively low in comparison with total vehicle uses throughout the year.

#### *Special Interest Plants*

Because the current Tahoe OSV use analysis identifies likely potential effects to 13 special interest plants (A*rctostaphylos mewukka* ssp. *truei*, *Arctostaphylos nissenana*, *Allium sanbornii* var. *sanbornii*, *Carex davyi*, *Chlorogalum grandiflorum*, *Epilobium howellii*, *Meesia triquetra*, *Pseudostellaria sierrae, Schoenoplectus subterminalis, Sphagnum* species*, Stachys pilosa, Rhamnus alnifolia*, and *Stuckenia filiformis*), it would only be for these species that effects from other activities could accumulate.

For these 13 special interest plants that may experience overlapping effects, the extent, intensity, and type of contributing impacts must be considered. They are currently experiencing the everyday stresses of life in the wild, with drought likely impacting their growth and seed production in recent years. Besides the threat of physical damage from many of the contributing actions, these species are also threatened by invasive plant encroachments. Continuing pressures on special interest plant habitats include wildfire, early or late freezing, severe wind or winter storms, flooding, insect population fluxes, and other natural events. These events may also cause damage or death of special interest plant individuals or cause habitat changes.

As present and future activities take place, effects to the identified species may include damage to or death of individuals, through project actions and possible effects from introduced invasive species, increased soil erosion, and other changes to habitat characteristics. It is expected that all of these projects would include reasonable mitigations to minimize or reduce impacts and monitor for concerns to help manage impacts to Tahoe National Forest special interest plant species habitat and occurrences. Mitigations to reduce the risk of spreading weeds are required for all the contributing actions considered, thereby making these impacts less likely to occur. If impacts still occur, only low-intensity, localized effects are expected for the special interest plant species.

The annual, seasonal timing of OSV effects does not eliminate the chance of direct and indirect effects accumulating. Broken branches of woody plants and any deceased individual plants would require one to several years to recover, and additional actions would be taking place during this recovery time. Individually and collectively, the magnitude of effects from these actions would remain relatively low. Natural disturbances, such as fire, wind and ice storms, and drought are much more likely to impact sensitive plant species, and their effects would be considerably greater. With cumulative effects considered, special interest plant species viability in the OSV project area would be maintained and no trend toward Federal listing would occur. When the effects from other projects and activities are combined where and when they overlap with the effects from the Tahoe OSV Use Designation Project, there would still be no loss of viability for any plant species and none would trend toward Federal listing, for all alternatives.

#### *Invasive Plants*

Invasive plants are also analyzed for each project, and mitigations are typically incorporated into project plans where ground disturbance may occur. In addition, weeds are routinely treated each year as part of the Tahoe National Forest weeds program. The low weed risk of this project would add minimal risk to the ongoing and foreseeable actions in the planning area.

#### *Special Interest Areas*

Because OSV use would not have direct or indirect effects to botanical special interest areas, there would be no cumulative effects from OSV use.

## Alternative 1 Effects to Botanical Resources

Detailed indicators and measures for botanical resources are presented in table 104, which summarizes the measures by major analysis topics.

**Table 104. Botanical resources indicators and measures for alternative 1**

| Analysis Topic | Total acres on Tahoe National Forest | Acres within high-use areas | Acres in designated OSV areas |
|---|---|---|---|
| Special interest plants | 3,990 | 1,052 | 3,632 |
| Fens, bogs | 52 | 12 | 52 |
| Invasive plants | 1,440 | 14 | 759 |
| Special interest areas | 357 | 0 | 0 |

No additional types of effects to botanical resources beyond those described in Effects Common to All Alternatives are specific to alternative 1. This alternative would generally have greater potential for effects to these botanical resources due to larger areas of open OSV use.

Alternative 1 has no minimum snow depth requirement for OSV use, but riders still must not damage the underlying soil and vegetation resources because causing resource damage is illegal. It is assumed that a minimum of 12 inches of snow is typically needed to avoid damaging resources, and on trails with underlying roads, a minimum of 6 inches is typically needed to avoid damage to the underlying road surface. These are essentially the same requirements for snow depth as alternative 2, and would provide a reasonable protection for non-woody TEPS plants.

### *Special Interest Plants*

Special interest plant species in the various plant life form categories would be affected differently, as described above in Effects Common to All Alternatives. Trees, shrubs, and sub-shrubs (woody plants) may be directly damaged by OSVs where they occur in areas designated for OSV use, and they may also experience indirect effects from snow compaction and pollutants, most likely to be noticeable where they occur near designated OSV trails. Perennial herbaceous species, annual species and aquatic species would not be directly affected, but they too may also experience noticeable indirect effects if they occur near designated OSV trails.

Indirect effects from snow compaction are expected to be greater with alternatives 1, 2, and 4 because only a minimal protection is afforded to ground vegetation. Alternative 1 provides minimal protection for woody sensitive plants because, although a minimum snow depth is not identified, enforcement of a reasonable avoidance of resource damage is the management tool used to keep OSV use from occurring when snow depths are too low.

Because direct damage can happen where they occur in areas designated for OSV use and indirect effects to occurrences within high-use areas, three of the five special interest woody plant species considered, *Arctostaphylos mewukka* ssp. *truei*, *Arctostaphylos nissenana*, and *Rhamnus alnifolia*, **may be affected** by alternative 1 of the Tahoe OSV Use Designation project, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester's Sensitive Plant List.

Because there could be indirect effects to occurrences within high-use areas, seven of the special interest perennial herbaceous plant species (*Carex davyi*, *Epilobium howellii*, *Meesia triquetra*, *Pseudostellaria sierrae*, *Sphagnum* species, *Stachys pilosa,* and *Stellaria obtusa*) and one of the special interest aquatic plant species (*Stuckenia filiformis*) **may be affected** by alternative 1 of the Tahoe OSV Use Designation project, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester's Sensitive Plant List.

For all other special interest plants not specifically mentioned above, because they are not known to be present within high-use areas, alternative 1 of the Tahoe OSV Use Designation project **will not affect** these species.

### *Special Aquatic Features – Fens*

Because some fens are present within high-use areas, alternative 1 could result in some minor changes in plant community interactions due to indirect effects of snow compaction and/or OSV-generated pollutants. Twelve of the total 52 acres of mapped fen habitats may be affected, but the function of the fens is not expected to be impaired.

### *Invasive Species*

As described above in Effects Common to All Alternatives, the risk of weed introduction and/or spread due to OSV use is very low.

### *Special Interest Areas*

With OSV access prohibited, no direct or indirect effects are expected to occur to the Placer County Big Tree Grove, and OSV use would not alter any of the vegetation and habitat characteristics for which the SIA was established.

## Alternative 2 Effects to Botanical Resources

Detailed indicators and measures for botanical resources are presented in table 105, which summarizes the measures by major analysis topics.

**Table 105. Botanical resources indicators and measures for alternative 2**

| Analysis Topic | Total acres on Tahoe National Forest | Acres within high-use areas | Acres in designated OSV areas |
|---|---|---|---|
| Special interest plants | 3,990 | 1,121 | 3,015 |
| Fens, bogs | 52 | 12 | 51 |
| Invasive plants | 1,440 | 59 | 450 |
| Special interest areas | 357 | 0 | 0 |

No additional types of effects to botanical resources beyond those described in Effects Common to All Alternatives are specific to alternative 2.

In comparison with other alternatives, alternative 2 would be relatively equal with alternatives 1 and 4 in providing the minimum snow depth needed to prevent damage to resources (assumed to be 12 inches). In contrast, alternatives 3 and 5 would increase minimum snow depths to 18 inches and 24 inches, respectively, and would provide additional degrees of protection and assurance that soil and vegetation resources are not damaged.

### *Special Interest Plants*

Direct effects to special interest plant species in the various plant life form categories would be affected differently, as described above in Effects Common to All Alternatives. Trees, shrubs, and sub-shrubs (woody plants) may be directly damaged by OSVs where they occur in areas designated for OSV use, and they may also experience indirect effects from snow compaction and pollutants, most likely to be noticeable where they occur near designated OSV trails. Perennial herbaceous species, annual species and aquatic species would not be directly affected, but they too may also experience noticeable indirect effects if they occur near designated OSV trails.

With alternative 2, OSV use would not be allowed when resource damage (including damage to soil and ground vegetation) is likely to occur. The proposed action states that a minimum of 12 inches of snow is typically needed to avoid damaging resources, and on trails with underlying roads, a minimum of 6 inches is typically needed to avoid damage to the underlying road surface. Enforcement in low-snow conditions would be at the discretion of the law enforcement officer on site, and the interpretation of resource damage is expected to consider mainly damage to soil and ground vegetation. This level of resource protection is expected to prevent direct effects to non-woody special interest plants.

Indirect effects from snow compaction are expected to be greater with alternatives 1, 2, and 4 because only a minimal protection is afforded to ground vegetation. Alternative 2 provides minimal protection for woody special interest plants because cross-country travel is allowed when there is adequate snow depth to avoid damage to (soil and ground vegetation) resources. However, there could still be considerable damage to woody species throughout the OSV season, with unintentional breakage and abrasion of branches and leader growth.

Because there could be direct damage where they occur in areas designated for OSV use and indirect effects to occurrences within high-use areas, three of the five special interest woody plant species considered, *Arctostaphylos mewukka* ssp. *truei*, *Arctostaphylos nissenana*, and *Rhamnus alnifolia*, **may be affected** by alternative 2 of the Tahoe OSV Use Designation project, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester’s Sensitive Plant List.

Because there could be indirect effects to occurrences within high-use areas, 10 of the special interest perennial herbaceous plant species (*Allium sanbornii* var. *sanbornii*, *Carex davyi*, *Chlorogalum grandiflorum*, *Epilobium howellii*, *Meesia triquetra*, *Pseudostellaria sierrae*, *Schoenoplectus subterminalis*, *Sphagnum* species, *Stachys pilosa*, and *Stellaria obtusa*) and one of the special interest aquatic plant species (*Stuckenia filiformis*) **may be affected** by alternative 2 of the Tahoe OSV Use Designation project, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester’s Sensitive Plant List.

For all other special interest plants not specifically mentioned above, because they are not present within high-use areas, alternative 2 of the Tahoe OSV Use Designation project would **not affect** these species.

#### *Special Aquatic Features – Fens*

Same as alternative 1.

#### *Invasive Species*

As described above in Effects Common to All Alternatives, the risk of weed introduction and/or spread due to OSV use is very low.

#### *Special Interest Areas*

Same as alternative 1.

## Alternative 3 Effects to Botanical Resources

Detailed indicators and measures for botanical resources are presented in table 106, which summarizes the measures by major analysis topics.

**Table 106. Botanical resources indicators and measures for alternative 3**

| Analysis Topic | Total acres on Tahoe National Forest | Acres within high-use areas | Acres in designated OSV areas |
|---|---|---|---|
| Special interest plants | 3,990 | 757 | 2,382 |
| Fens, bogs | 52 | 12 | 41 |
| Invasive plants | 1,440 | 107 | 180 |
| Special interest areas | 357 | 0 | 0 |

There are no additional types of effects to botanical resources beyond those described in Effects Common to All Alternatives that are specific to alternative 3.

In comparison with alternatives 1, 2, and 4, because of its 18 inch minimum snow depth, alternative 3 would provide a low to moderate degree of additional protection and assurance that soil and vegetation resources are not damaged. However, alternative 5 would increase minimum snow depths to 24 inches and would provide further protection of resources.

### *Special Interest Plants*

Special Interest plant species in the various plant life form categories would be affected differently, as described above in Effects Common to All Alternatives. Trees, shrubs, and sub-shrubs (woody plants) may be directly damaged by OSVs where they occur in areas designated for OSV use, and they may also experience indirect effects from snow compaction and pollutants, most likely to be noticeable where they occur near designated OSV trails. Perennial herbaceous species, annual species and aquatic species would not be directly affected, but they too may also experience noticeable indirect effects if they occur near designated OSV trails.

In comparison with alternatives 1, 2, and 4, increasing minimum snow depths to 18 inches for cross-country travel would add an extra measure of protection for Special Interest plants, but effects already described would still be possible.

Alternative 3 provides a moderate level of protection for all Special Interest plants because an additional 6 inches of snow is required for OSV use, providing a deeper cushion to absorb snow compaction and further protection from direct effects to the shortest woody plant species. Non-woody Sensitive plants are not expected to be directly affected. However, there could still be damage to woody species throughout the OSV season, with unintentional breakage and abrasion of branches and leader growth.

Because alternative 3 would allow cross-country OSV travel in the least area (275,972 acres), it would impact the fewest special interest plant occurrences.

Because there could be direct damage where they occur in areas designated for OSV use and indirect effects to occurrences within high-use areas, three of the five special interest woody plant species considered (*Arctostaphylos mewukka* ssp. *truei*, *Arctostaphylos nissenana*, and *Rhamnus alnifolia)* **may be affected** by alternative 3 of the Tahoe OSV Use Designation project, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester's Sensitive Plant List.

Because there could beindirect effects to occurrences within high-use areas, seven of the special interest perennial herbaceous plant species (*Carex davyi*, *Epilobium howellii*, *Meesia triquetra*, *Pseudostellaria sierrae*, *Sphagnum* species, *Stachys pilosa*, and *Stellaria obtusa*) and one of the Special Interest aquatic plant species (*Stuckenia filiformis*) **may be affected** by alternative 3 of the Tahoe OSV Use Designation project, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester's Sensitive Plant List.

For all other special interest plants not specifically mentioned above, because they are not known to be present within high-use areas, alternative 3 of the Tahoe OSV Use Designation project **will not affect** these species.

### *Special Aquatic Features – Fens*

Because some fens are present within high-use areas, alternative 3 could result in some minor changes in plant community interactions due to indirect effects of snow compaction and/or OSV-generated pollutants. Twelve of the total 52 acres of mapped fen habitats may be affected, but the function of the fens is not expected to be impaired.

### *Invasive Species*

As described above in Effects Common to All Alternatives, the risk of weed introduction and/or spread due to OSV use is very low.

### *Special Interest Areas*

With OSV access prohibited, no direct or indirect effects are expected to occur to the Placer County Big Tree Grove, and OSV use would not alter any of the vegetation and habitat characteristics for which the SIA was established.

## Alternative 4 Effects to Botanical Resources

Detailed indicators and measures for botanical resources are presented in table 107, which summarizes the measures by major analysis topics.

**Table 107. Botanical resources indicators and measures for alternative 4**

| Analysis Topic | Total acres on Tahoe National Forest | Acres within high-use areas | Acres in designated OSV areas |
|---|---|---|---|
| Special interest plants | 3,990 | 1,052 | 3,632 |
| Fens, bogs | 52 | 12 | 52 |
| Invasive plants | 1,440 | 195 | 759 |
| Special interest areas | 357 | 0 | 0 |

No additional types of effects to botanical resources beyond those described in Effects Common to All Alternatives are specific to alternative 4.

With a 12-inch minimum snow depth, alternative 4 is similar to alternatives 1 and 2, providing the minimum snow depth needed to prevent damage to resources (assumed to be 12 inches). However, alternatives 3 and 5 would increase minimum snow depths to 18 inches and 24 inches, respectively, and would provide additional degrees of protection and assurance that soil and vegetation resources are not damaged.

### *Special Interest Plants*

Special interest plant species in the various plant life form categories would be affected differently, as described above in Effects Common to All Alternatives. Trees, shrubs, and sub-shrubs (woody plants) may be directly damaged by OSVs where they occur in areas designated for OSV use, and they may also experience indirect effects from snow compaction and pollutants, most likely to be noticeable where they occur near designated OSV trails. Perennial herbaceous species, annual species and aquatic species would not be directly affected, but they too may also experience noticeable indirect effects if they occur near designated OSV trails.

Alternative 4 requires a minimum of 12 inches of snow for cross-country OSV use. This is considered to be a minimum reasonable protection for soil and ground vegetation. A 12-inch minimum snow depth is expected to prevent direct effects to non-woody special interest plants.

Indirect effects from snow compaction are expected to be greater with alternatives 1, 2, and 4 because only a minimal protection is afforded to ground vegetation. Alternative 4 provides a minimal protection for woody sensitive plants because cross-country travel is allowed when there is just adequate snow depth to avoid damage to (soil and ground vegetation) resources, but there could still be damage to woody species throughout the OSV season, with unintentional breakage and abrasion of branches and leader growth.

Because alternative 4 would allow cross-country OSV use on the greatest area (641,105 acres), it could impact the most area of special interest plant occurrences.

Because there could be direct damage where they occur in areas designated for OSV use and indirect effects to occurrences within high-use areas, three of the five special interest woody plant species considered (*Arctostaphylos mewukka* ssp. *truei*, *Arctostaphylos nissenana*, and *Rhamnus alnifolia)* **may be affected** by alternative 4 of the Tahoe OSV Use Designation project, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester’s Sensitive Plant List.

Because there could be indirect effects to occurrences within high-use areas, seven of the special interest perennial herbaceous plant species (*Carex davyi*, *Epilobium howellii*, *Meesia triquetra*, *Pseudostellaria sierrae*, *Sphagnum* species, *Stachys pilosa,* and *Stellaria obtusa*) and one of the special interest aquatic plant species (*Stuckenia filiformis*) **may be affected** by alternative 4 of the Tahoe OSV Use Designation project, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester’s Sensitive Plant List.

For all other special interest plants not specifically mentioned above, because they are not known to be present within high-use areas, alternative 4 of the Tahoe OSV Use Designation project **will not affect** these species.

### *Special Aquatic Features – Fens*

Same as alternative 1.

### *Invasive Species*

As described above in Effects Common to All Alternatives, the risk of weed introduction and/or spread due to OSV use is very low.

### *Special Interest Areas*

Same as alternative 1.

## Alternative 5 Effects to Botanical Resources

Detailed indicators and measures for botanical resources are presented in table 108, which summarizes the measures by major analysis topics.

**Table 108. Botanical resources indicators and measures for alternative 5**

| Analysis Topic | Total acres on Tahoe National Forest | Acres within high-use areas | Acres in designated OSV areas |
|---|---|---|---|
| Special interest plants | 3,990 | 976 | 2,678 |
| Fens, bogs | 52 | 16 | 39 |
| Invasive plants | 1,440 | 9 | 365 |
| Special interest areas | 357 | 0 | 0 |

No additional types of effects to botanical resources beyond those described in Effects Common to All Alternatives are specific to alternative 5.

### *Special Interest Plants*

Special interest plant species in the various plant life form categories would be affected differently, as described above in Effects Common to All Alternatives. Trees, shrubs, and sub-shrubs (woody plants) may be directly damaged by OSVs where they occur in areas designated for OSV use, and they may also experience indirect effects from snow compaction and pollutants, most likely to be noticeable where they occur near designated OSV trails. Perennial herbaceous species, annual species and aquatic species would not be directly affected, but they too may also experience noticeable indirect effects if they occur near designated OSV trails.

Alternative 5 provides the highest level of protection for sensitive plants in areas designated for OSV use because an additional 12 inches of snow is required, providing a deeper cushion to absorb snow compaction and further protection from direct effects to the shorter woody plant species. Non-woody sensitive plants are not expected to be directly affected. However, there could still be damage to woody species throughout the OSV season, with unintentional breakage and abrasion of branches and leader growth.

Because a smaller area would be open to cross-country OSV use (300,146 acres), alternative 5 would have less possibility for impacts to sensitive plant occurrences than other alternatives, except alternative 3.

Because there could be direct damage where they occur in areas designated for OSV use and indirect effects to occurrences within high-use areas, three of the five special interest woody plant species considered (*Arctostaphylos mewukka* ssp. *truei*, *Arctostaphylos nissenana*, and *Rhamnus alnifolia)* **may be affected** by alternative 5 of the Tahoe OSV Use Designation project, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester's Sensitive Plant List.

Because there could be indirect effects to occurrences within high-use areas, seven of the special interest perennial herbaceous plant species (*Carex davyi*, *Epilobium howellii*, *Meesia triquetra*, *Pseudostellaria sierrae*, *Sphagnum* species, *Stachys pilosa,* and *Stellaria obtusa*) and one of the special interest aquatic plant species (*Stuckenia filiformis*) **may be affected** by alternative 5 of the Tahoe OSV Use Designation project, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester's Sensitive Plant List.

For all other special interest plants not specifically mentioned above, because they are not known to be present within high-use areas, alternative 5 of the Tahoe OSV Use Designation project **will not affect** these species.

#### *Special Aquatic Features – Fens*

Because some fens are present within high-use areas, alternative 5 could result in some minor changes in plant community interactions due to indirect effects of snow compaction and/or OSV-generated pollutants. Sixteen of the total fifty-two acres of mapped fen habitats may be affected, but the function of the fens is not expected to be impaired.

#### *Invasive Species*

As described above in Effects Common to All Alternatives, the risk of weed introduction and/or spread due to OSV use is very low.

#### *Special Interest Areas*

Same as alternative 1.

## Summary of Effects

### Summary of Botanical Resource Measures and Determinations

**Table 109. Botanical resources summary of measures for all alternatives**

| Analysis Topic | Total acres on Tahoe National Forest | Acres within high-use areas | Acres in designated OSV areas |
|---|---|---|---|
| Special interest plants | 3,990 | 1,052 Alt. 1<br>1,121 Alt. 2<br>757 Alt. 3<br>1,052 Alt. 4<br>976 Alt. 5 | 3,632 Alt. 1<br>3,015 Alt. 2<br>2,382 Alt. 3<br>3,632 Alt. 4<br>2,678 Alt. 5 |
| Special aquatic features - fens | 52 | 12 Alt. 1<br>12 Alt. 2<br>12 Alt. 3<br>12 Alt. 4<br>16 Alt. 5 | 52 Alt. 1<br>51 Alt. 2<br>41 Alt. 3<br>52 Alt. 4<br>39 Alt. 5 |
| Invasive plants | 1,440 | 14 Alt. 1<br>59 Alt. 2<br>107 Alt. 3<br>195 Alt. 4<br>9 Alt. 5 | 759 Alt. 1<br>450 Alt. 2<br>180 Alt. 3<br>759 Alt. 4<br>365 Alt. 5 |
| Special interest areas | 357 | 0 all alternatives | 0 all alternatives |

#### *Special Interest Plants*

Special interest woody plant species may be directly affected by crushing, breaking, or abrasion of stems and evergreen foliage where they occur in any areas designated for OSV use. Plants of other life form categories would not be directly affected because their living tissues are not present above ground, and would not be directly damaged by OSVs. Any of the special interest plants may be indirectly affected by snow compaction and/or OSV emissions containing pollutants where they occur in close proximity to areas of high-use (within one-half mile of designated OSV trails). Thus, these plant species are reasonably at risk to some level of effects, dependent on their life forms, timing of growth, and proximity to heavy OSV use. Potential indirect effects are expected to be minor, and all effects would be minimized by the required minimum snow depths proposed. Although some individuals may be damaged or lost, OSV use is not expected to result in a trend toward Federal listing or loss of viability for any Special Interest plants.

**Special Interest Plant Determinations:**

Because there could be direct damage where they occur in areas designated for OSV use and indirect effects to occurrences within high-use areas, three of the five special interest woody plant species considered (*Arctostaphylos mewukka* ssp. *truei*, *Arctostaphylos nissenana*, and *Rhamnus alnifolia)* **may be affected** by all alternatives of the Tahoe OSV Use Designation project, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester’s Sensitive Plant List.

Because there could be indirect effects to occurrences within high-use areas, seven of the special interest perennial herbaceous plant species (*Carex davyi*, *Epilobium howellii*, *Meesia triquetra*, *Pseudostellaria sierrae, Sphagnum* species, *Stachys pilosa*, and *Stellaria obtusa*) and one of the special interest aquatic plant species (*Stuckenia filiformis*) **may be affected** by alternatives 1, 3, 4, and 5 of the Tahoe OSV Use Designation project, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester's Sensitive Plant List.

Because there could be indirect effects to occurrences within high-use areas, 10 of the special interest perennial herbaceous plant species (*Allium sanbornii* var. *sanbornii*, *Carex davyi*, *Chlorogalum grandiflorum*, *Epilobium howellii*, *Meesia triquetra*, *Pseudostellaria sierrae*, *Schoenoplectus subterminalis*, *Sphagnum* species, *Stachys pilosa*, and *Stellaria obtusa*) and one of the Special Interest aquatic plant species (*Stuckenia filiformis*) **may be affected** by alternative 2 of the Tahoe OSV Use Designation project, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester's Sensitive Plant List.

For all other special interest plants not specifically mentioned above, because they are not known to be present within high-use areas, all alternatives of the Tahoe OSV Use Designation project **will not affect** these species.

### *Special Aquatic Features – Fens*

Direct effects to fens are unlikely to occur due to authorized public OSV use as proposed in any of the alternatives. Minor indirect effects are possible from snow compaction and/or OSV-generated pollutants, but fen function would not be altered.

### *Invasive Plants*

Nineteen invasive plant species are documented in the project area, and many infestations along roadsides are treated each year. Weeds may be introduced to OSV trailheads and into areas designated for OSV use (possibly transported on trailers, towing vehicles, or OSVs), but the other typical factors promoting the spread and establishment of weeds (soil disturbance and vegetation cover reductions) are not expected to occur with the proposed OSV uses. There have been no observations or literature found that point to OSV use causing introduction or spread of invasive plants, but it may be possible, especially at trailheads, where vehicle use is concentrated. Given this uncertainty and the overall lack of evidence of OSV use contributing to weed infestations, the risk of weed increases due to OSV use is expected to be **low** for all alternatives.

### *Special Interest Areas*

For all alternatives, the vegetation and habitat characteristics for which the Placer County Big Tree Grove was established would be maintained. The required minimum snow depths for OSV use, and a prohibition of OSV use within this SIA would prevent damaging effects from occurring to the giant sequoia resource.

## Compliance with LRMP and Other Relevant Laws, Regulations, Policies and Plans

All alternatives would maintain viable populations of all native and desired nonnative plants, and the proposed activities were reviewed for possible effects on special interest species, and thus, would be compliant with Forest Service Manual direction. In addition, noxious/invasive weeds were evaluated for effects from the proposed actions and suitable prevention measures taken, thus complying with the Tahoe National Forest LRMP and Forest Service Manual direction, as well as Executive Orders 13112 and 13751.

Special interest areas with a botanical focus would be managed to preserve the characteristics for which the areas were established, and thus, would comply with the Tahoe National Forest LRMP.

## Other Relevant Mandatory Disclosures

### Unavoidable Adverse Effects

As described in Effects Common to All Alternatives, special interest woody plants and other special interest plants in high-use areas may be affected by OSV use. Without placing restrictions in areas where these species occur, there could be unavoidable adverse effects to some individuals.

### Irreversible and Irretrievable Commitments of Resources

Although some adverse effects to special interest plants may occur, these plants are a renewable resource, and thus, there would be no irreversible commitments of the resource. To a small extent, excessive unauthorized damage to individuals could cause mortality, and thus, may constitute an irretrievable commitment for special interest plant species.

# Socioeconomic Conditions

## Relevant Laws, Regulations, and Policy

### Regulatory Framework

#### *Land and Resource Management Plan*

The Tahoe LRMP identifies goals for recreation as well as the economic and social environment. In particular, the following goals help to frame the social and economic analysis in this report:

- "The Forest will provide a variety of opportunities for developed and dispersed recreation experiences."
- "Make programs and activities of the Tahoe National Forest available to all persons regardless of race, color, sex, religion, or National origin."

Additionally, the LRMP identifies standard and guidelines related to address recreation user conflict, which are relevant for the social analysis:

- "Separation of the users is preferable, offering both types of users a satisfying recreational experience."
- Consider "safety of the users."

#### *Travel Management Rule Subpart C*

The Forest Service's 2005 Travel Management Rule requires the designation of roads, trails, and areas on national forests and grasslands that are open to motor vehicle use. Subpart C mandates the designation of routes and areas for over-snow vehicle use.

#### *Federal Law*

**Multiple Use and Sustained Yield Act**

The Multiple Use and Sustained Yield Act requires that economic impacts are considered when establishing management plans or decisions that may affect the management of renewable forest and rangeland resources. This report meets the requirements of this law by addressing the economic impacts of OSV use designation on the local economy.

### National Environmental Policy Act

The National Environmental Policy Act (NEPA) requires that economic and social impacts of Federal actions be considered as part of the environmental analysis. This section includes analysis on social and economic issues identified during the scoping process to meet the terms of NEPA and regulations.

### National Forest Management Act

The National Forest Management Act and regulations require that the economic impacts of decisions or plans affecting the management of renewable resources are analyzed and that the economic stability of communities whose economies are dependent on national forest lands is considered. This analysis meets the requirements of the National Forest Management Act by specifically considering the economic impacts of the implementation of the OSV use designation project and its impacts on local communities and minority populations.

*Executive Orders*

### Environmental Justice, EO 12898 of February 11, 1994

Executive Order 12898 directs Federal agencies to identify and address any adverse human health and environmental effects of agency programs that disproportionately impact minority and low-income populations. This ssection identifies minority and low-income populations in the analysis area and addresses the potential for disproportionate and adverse effects to these populations.

## Resource Indicators and Measures

Resource indicators and measures shown in table 19 will be used to measure and disclose effects to socioeconomic resources related to OSV use designations and grooming trails for OSV use.

**Table 110. Socioeconomic resource indicators and measures for assessing effects**

| Resource Element | Resource Indicator | Measure (Quantify if possible) |
|---|---|---|
| Economic activity | Employment | Number of jobs and amount of labor income |
| Quality of life | Recreation visitation | Number of recreation visits |
| Quality of life | Values, beliefs, and attitudes | Qualitative evaluation of public values, beliefs, and attitudes |
| Environmental Justice | Effects to low-income and minority populations | Qualitative evaluation of disproportionate effects to low-income and minority populations |

## Methodology

### Economic Analysis

Economic impacts were modeled using IMPLAN Professional Version 3.0 with 2014 data. IMPLAN is an input-output model, which estimates the economic impacts of projects, programs, policies, and economic changes on a region. IMPLAN analyzes the direct, indirect, and induced economic impacts. Direct economic impacts are generated by the activity itself, such as visitor spending associated with OSV use on the Tahoe National Forest. Indirect employment and labor income contributions occur when a sector purchases supplies and services from other industries to produce their product. Induced contributions are the employment and labor income generated as a result of spending new household income generated by direct and indirect employment. The employment estimated is defined as any part-time, seasonal, or full-time job. In the economic impact tables, direct, indirect and induced contributions are included in the estimated impacts. The IMPLAN database describes the economy in 536 sectors using Federal data from 2014.

Data on use levels under each alternative were collected from Forest Service resource specialists. In most instances, the precise change is unknown. Therefore, the changes are based on the professional expertise of Forest Service resource specialists. Regional economic impacts are estimated based on the assumption of full implementation of each alternative. The actual changes in the economy would depend on individuals taking advantage of the resource-related opportunities that would be supported by each alternative. If market conditions or trends in resource use were not conducive to developing some opportunities, the economic impact would be different from what is estimated in this analysis.

### Social Analysis

Social effects analysis uses the baseline social conditions presented in the Affected Environment section, National Visitor Use Monitoring (NVUM) profiles (USDA Forest Service 2016b), and public comments to discern the primary values that the Tahoe National Forest provides to area residents and visitors. Social effects are based on the interaction of the identified values with estimated changes to resource availability and uses. Key determinants of quality of life that may be affected by OSV route and area designation were identified through the scoping process.

### Information Sources

Key data sources for the social and economic analysis include:

- Economic Profile System (EPS), Headwaters Economics
- U.S. Census Bureau, American Community Survey
- U.S. Forest Service, Ecosystem Management Coordination, National Forest Recreation Economic Contributions website
- National Visitor Use Monitoring program data for the Tahoe National Forest, last collected in FY2010
- Public scoping comments

### Spatial and Temporal Context for Effects Analysis

Most of the Tahoe National Forest lands are located within Nevada, Placer, Sierra, and Yuba Counties. However, the geographic footprint of national forests does not always correspond with functional economic areas affected by forest management. Forest Service economists have defined economic analysis areas for all national forests and grasslands using a protocol that identifies interactions between Forest Service resource management and local economic activity. Based on this protocol, the Tahoe National Forest's economic area of influence encompasses Butte, El Dorado, Lassen, Nevada, Placer, Plumas, Sacramento, Shasta, Sierra, Sutter, Trinity, and Yuba Counties. These 12 counties form the social and economic analysis area for this report.

The temporal boundaries for analyzing effects to the social and economic environment extend 10 years into the future (2026). This is the period for which social and economic consequences are foreseeable. Social and economic change, including changes in recreation preferences, cannot plausibly be predicted outside this temporal frame.

# Affected Environment

## Existing Condition

**Table 111. Resource indicators and measures for socioeconomic resources, existing condition**

| Resource Element | Resource Indicator (Quantify if possible) | Measure (Quantify if possible) |
|---|---|---|
| Economic activity | Employment | Number of jobs and amount of labor income |
| Quality of life | Recreation visitation | Number of recreation visits |
| Quality of life | Values, beliefs, and attitudes | Qualitative evaluation of public values, beliefs, and attitudes |
| Environmental Justice | Low-income and minority populations | Identification of low-income and minority populations in the analysis area |

### Demographic and Economic Characteristics

The area around the Tahoe National Forest is a mixture of metropolitan and non-metropolitan areas. The forest is located between two major metropolitan areas – Sacramento, California, and Reno, Nevada. However, much of the area immediately around the forest is rural.

The analysis area has higher shares of older residents than the state. Nevada, Plumas, Sierra, and Trinity Counties have about double the share of residents over the age of 65, compared to the entire state of California. Older populations may have different recreational preferences. For instance, mobility limitations associated with age may increase the importance of easy access to recreational sites.

**Table 112. Demographic characteristics by county**

| Location | Population (ACS 2014 5-year Estimate) | Rural-Urban Continuum Code (ERS 2013) | Share of Population Over 65 (ACS 2014 5-year Estimate) |
|---|---|---|---|
| Butte County | 221,578 | 3 (Metro, less than 250,000) | 16.1% |
| El Dorado County | 181,465 | 1 (Metro, more than 1 million) | 16.3% |
| Lassen County | 33,356 | 7 (Nonmetro, not adjacent to metro) | 10.9% |
| Nevada County | 98,606 | 4 (Nonmetro, adjacent to metro) | 21.4% |
| Placer County | 361,518 | 1 (Metro, more than 1 million) | 16.6% |
| Plumas County | 19,286 | 7 (Nonmetro, not adjacent to metro) | 23.2% |
| Sacramento County | 1,450,277 | 1 (Metro, more than 1 million) | 12.0% |
| Shasta County | 178,520 | 3 (Metro, less than 250,000) | 18.1% |
| Sierra County | 3,019 | 8 (Nonmetro, completely rural) | 23.1% |
| Sutter County | 95,067 | 3 (Metro, less than 250,000) | 13.7% |
| Trinity County | 13,515 | 8 (Nonmetro, completely rural) | 22.1% |
| Yuba County | 73,059 | 3 (Metro, less than 250,000) | 10.9% |
| California | 38,066,920 | -- | 10.7% |

Source: U.S. Census Bureau 2016a and USDA ERS 2013

The 12 counties in the analysis area experience a greater degree of economic insecurity than the state overall. Median household incomes are lower and unemployment rates are higher in most of the counties within the planning area compared to the state. These economic characteristics suggest that changes in local employment and income may be felt acutely. Tahoe National Forest recreation visitors spend money on lodging, food, fuel, and other goods and services in the economic analysis area. The designation of OSV routes and areas may affect recreation visitation and spending. As a result, local employment and income may change. Additionally, visitor spending contributes to county and municipal revenue from lodging and sales taxes. Tax revenues are used to fund essential public services, such as emergency management. The environmental consequences analysis addresses possible changes in employment, income, and public finances in the context of local economic characteristics.

**Table 113. Economic characteristics by county**

| Location | **Median Household Income** (ACS 2014 5-year Estimate) | **Unemployment Rate** (ACS 2014 5-year Estimate) | **Share of Tourism-related Employment** (County Business Patterns 2013, accessed via EPS) |
|---|---|---|---|
| Butte County | $43,165 | 13.1% | 18.6% |
| El Dorado County | $68,507 | 11.3% | 27.8% |
| Lassen County | $53,351 | 13.4% | 20.4% |
| Nevada County | $56,949 | 10.7% | 26.9% |
| Placer County | $73,747 | 9.3% | 23.0% |
| Plumas County | $48,032 | 16.7% | 15.4% |
| Sacramento County | $55,615 | 13.1% | 16.0% |
| Shasta County | $44,556 | 12.2% | 17.8% |
| Sierra County | $43,107 | 7.0% | 31.8% |
| Sutter County | $51,527 | 14.0% | 17.6% |
| Trinity County | $36,862 | 13.0% | 19.8% |
| Yuba County | $45,470 | 17.3% | 16.0% |
| California | $61,489 | 11.0% | 16.3% |

Source: U.S. Census Bureau 2016a and U.S. Census Bureau 2016b

Much of the Tahoe National Forest recreation visitor spending contributes to economic activity in travel and tourism-related sectors. These sectors include retail trade, passenger transportation, accommodation and food, and arts, entertainment, and recreation. Travel and tourism sectors account for a larger share of employment in the analysis area counties than in California overall. This suggests that the analysis area economy is reliant on tourism (including outdoor recreation).

## Recreation Visitors

National Visitor Use Monitoring (NVUM) data was last collected on the Tahoe National Forest in fiscal year 2010. Approximately 1.8 million visits to the Tahoe National Forest occur each year (USDA Forest Service 2016b). Approximately 2 percent of survey respondents indicate that they participate in snowmobiling during their trip, with 1.7 percent reporting that snowmobiling is the primary purpose of their trip (USDA Forest Service 2016b). The majority of forest visitors (70.8 percent) traveled fewer than 100 miles to reach the site. Nearly 40 percent of visits originated from a single zip code (96161), which covers the city of Truckee, California (USDA Forest Service 2016b). The NVUM data does not break out visitor origin by activity type. Therefore, the analysis assumes that OSV and non-motorized winter recreation visitors reside in the same areas as forest visitors overall.

### Economic Contributions

National forest recreation visitor spending support employment and income in communities that surround National Forest System lands. Visitor spending is influenced by both the type of trip (local or non-local; day or overnight) and the type of recreation activities. Snowmobilers spend more than most other recreation visitors (White and Stynes 2010). The NVUM survey collects data on "previous and planned spending of the entire recreation party within 50 miles of the interview site during the trip to the area" (White and Stynes 2010). This data indicates that a snowmobiler spends an average of $642 on a non-local overnight trip and $74 on a local day trip, compared to $366 and $34 for the same types of trips among participants of all recreation activities (White and Stynes 2010). Therefore, snowmobilers spend nearly twice what an average recreation user spends on their trip.

Recreation visitation (all activities and trip types) on the Tahoe National Forest supports approximately 807 jobs[38] and $28.6 million in labor income on an average annual basis (USDA Forest Service 2016a). The largest contributions are to the retail trade and accommodation and food services sectors (USDA Forest Service 2016a). Due to the high spending of snowmobilers, changes to over-snow vehicle opportunities on the Tahoe National Forest could measurably affect economic contributions associated with national forest recreation. The environmental consequences analysis addresses the economic impact of over-snow vehicle route and area designations.

### Values, Beliefs, and Attitudes

**Values** are "relatively general, yet enduring, conceptions of what is good or bad, right or wrong, desirable or undesirable."

**Beliefs** are "judgments about what is true or false – judgments about what attributes are linked to a given object. Beliefs can also link actions to effects."

**Attitudes** are "tendencies to react favorably or unfavorably to a situation, individual, object, or concept. They arise in part from a person's values and beliefs regarding the attitude object" (Allen et al. 2009).

OSV designation may affect nearby residents and visitors to the Tahoe National Forest. Public comments received during the scoping process provide insight into the values, beliefs, and attitudes of stakeholders in the OSV designation process. These comments reflect diverse opinions on the costs and benefits of various types of winter recreation on the Tahoe National Forest.

The contribution of OSV use to local economic activity and the possibility of restrictions tdecreasing these economic contributions was noted during the scoping period: "Tourism and OSV recreation is the main source of income for the local economy in Sierra County. This income provides jobs and tax revenues for the County. Many in the OSV community purchase their snowmobiles, parts, supplies, and fuel from Tom's Snowmobile & Service in Sierra City. The OSV community supports

[38] The economic modeling software (IMPLAN) reports jobs as average annual full-time and part-time jobs. No distinction is made between full-time and part-time employment, so the job calculations in this report are not full-time equivalents (FTEs). However, the duration of employment is used to calculate the number of jobs. Therefore, 1 full-time or part-time job lasting 1 year is equivalent to 2 full-time or part-time jobs lasting 6 months each. Both of these examples will be reported as 1 job in this analysis.

the local restaurants and places to stay in Sierra City and Bassetts Station. Fuel is purchased at Bassetts. Without this winter revenue, these fragile businesses may collapse, thus causing a hardship on the summer visitors and the local economy" (letter 174, comment 10). However, other commenters noted that OSV use may crowd out visitor spending by non-motorized winter recreation users: "If there is too much noise from snowmobiles, I will look for other recreational destinations, taking my vacation money used to support many small businesses near Tahoe National Forest elsewhere" (letter 176, comment 2).

Another commenter noted the importance of motorized recreation opportunities to individuals with limited mobility: "I am a retired law enforcement officer who enjoys being able to access wilderness areas in the winter. However, I am also disabled, which prevents me from doing so unless I have motorized access. I can no longer ski or snowshoe into these areas to enjoy them. Please don't lock me out of these wilderness areas to satisfy anti-motorized sports groups with an agenda. I have just as much right to access these public lands as they do" (letter 17, comment 1).

Some commenters noted that motorized and non-motorized recreationists face asymmetrical user conflict: "The newer snowmobiles of today are capable of high-speed travel, and encourage riders to "high mark. The snowmobilers' very goal is to get to a pristine bowl and leave their machines' tracks as high up in the bowl as possible. I have personally been on the north bowl of Castle Peak and watched two machines high mark the bowl repeatedly, and in less than one hour, completely obliterate the bowl for skiers. After a fresh snowfall, these bowls normally provide weeks of backcountry recreation for skiers and boarders, but a couple of machines can ruin it in the first hour of the day, leaving behind a slope obliterated by two-foot trenches that are difficult or impossible to ski through" (letter 149, comment 1).

In contrast, many OSV users believe that "the groomed trails that the skiers and other Nordic sport enthusiasts use are groomed exclusively by OSV users. They also provide faster and easier access for local search and rescue" (letter 197, comment 4). Furthermore, one commenter argues that "the 'conflict of uses' issue has generally been created and emphasized by anti-OSV advocates who are looking for any opportunity to restrict or eliminate OSV use. Despite their aggressive litigation efforts, there are few, if any, court decisions that have forced an agency to restrict any motorized recreation based on alleged 'conflict.' There are many strategies that can be employed to manage the ever-growing human population that desires to recreate in the National Forest System. We generally support the concept of 'shared use.' As long as overall visitation numbers are appropriate for the affected resources, motorized and non-motorized users can be compatible with one another so long as individual users understand designations and plan their activities accordingly" (letter 150, comment 14).

Additionally, some commenters believe that motorized and non-motorized winter recreation users have unbalanced opportunities on the Tahoe National Forest. For example, one comment noted that "From Yuba Pass south plus from the Little Truckee Summit west, there is again vast lands that are open to motorized winter use. This includes many miles of groomed snowmobile trails. In contract, between Highway 80 and Highway 49, the only non-motorized winter area is the Castle Valley and Round Valley area north of Donner Summit. On a fair-weather Saturday or Sunday, 300 skiers and snowshoers venture into this area. That is a huge number of users for such a small area. It is also an unwarranted situation given that expansion of this non-motorized area to the west side of Andesite Peak would not significantly reduce snowmobile opportunities given the lands from Yuba Pass south plus from Little Truckee Summit west" (letter 212, comment 5).

In contrast, some OSV users believe that "there is an immense amount of terrain west, south and east of the lake that is easily accessible for skiers that want to get away from the noise or smell. I have been to many of these without the sled. Once areas are closed, they are never re-opened to sleds. So we lose more and more terrain as these proposals come through. The area proposed by a commenter online of Castle Peak is a prime example. There has already been a designated no sled area in this area due to prior agreements. That is a great sled skiing area and we see plenty of skiers that enjoy it simultaneously when we are out there. The argument of being close to the trail head goes for us too. If I want to get a few runs in before work on my sled, I can't head 20 miles back into the wilderness, I need something close by" (letter 158, comment 3).

Snow depth restrictions were controversial among some commenters with one noting that "setting a specific depth is dangerous and will lead to area closure based on a single measurement, more negative interactions between snowmobiles and skiers and a level of mistrust between the FS and recreation groups" (letter 222, comment 4) and that restrictions are unnecessary because "snowmobile riders won't ruin their OSVs on bare ground" (letter 60, comment 2). Another commenter was concerned that proposed snow depth restrictions were inadequate, arguing that "Limiting off trail OSV use to areas covered by at least 12" of snow does little to protect the natural environment. A minimum of 30" of snow depth would be a more reasonable standard. Many times, 12" of snow is not sufficient to prevent a 130 pound skier from disturbing buried vegetation. OSVs obviously penetrate much more deeply through the snow surface" (letter 72, comment 2).

Some commenters are also concerned about the environmental implications of OSV use on the Tahoe National Forest, arguing that pollution and noise due to OSV use can harm drinking water quality (letter 183, comment 55) and affect wildlife habitat (letter 147, comment 32).

The relationship between OSV users and Pacific Crest Trail users was highlighted in several comments. For some, OSV use near the Pacific Crest Trail disturbs skiers and other non-motorized winter recreation users (letter 39, comment 1). Other commenters, however, argued that "The Pacific Crest Trail Association's request for 1/2 mile wide corridor on the PCT is ludicrous and should be disregarded by the Forest Service" (letter 172, comment 3) and that limiting PCT crossing is "impractical and senseless" (letter 95, comment 6).

## Environmental Justice

In 1994, President Clinton issued Executive Order 12898. This order directs Federal agencies to focus attention on the human health and environmental conditions in minority and low-income communities. The purpose of EO 12898 is to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on minority and low-income populations.

Environmental justice is the fair treatment and meaningful involvement of people of all races, cultures, and incomes, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. The goal of environmental justice is for Federal agency decision-makers to identify impacts that are disproportionately high and adverse with respect to minority and low-income populations and identify alternatives that will avoid or mitigate those impacts. According to USDA DR5600-002 (USDA Forest Service 1997), environmental justice, minority, minority population, low-income, and human health and environmental effects, are defined as follows:

> **Environmental Justice** means that, to the greatest extent practicable and permitted by law, all populations are provided the opportunity to comment before decisions are rendered on, are allowed to share in the benefits of, are not excluded from, and are not affected in a disproportionately high and adverse manner by, government programs and activities affecting human health or the environment.

**Minority** means a person who is a member of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic.

**Minority Population** means any readily identifiable group of minority persons who live in geographic proximity to, and, if circumstances warrant, migrant farm workers and other geographically dispersed/transient persons who will be similarly affected by USDA programs or activities.

**Low-income Population** means any readily identifiable group of low-income persons who live in geographic proximity to, and, if circumstances warrant, migrant farm workers and other geographically dispersed/transient persons who will be similarly affected by USDA programs or activities. Low-income populations may be identified using data collected, maintained and analyzed by an agency or from analytical tools such as the annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty.

**Human Health and/or Environmental Effects** as used in this Departmental Regulation include interrelated social and economic effects.

The emphasis of environmental justice is on health effects and/or the benefits of a healthy environment. The Council on Environmental Quality (CEQ) has interpreted health effects with a broad definition: “Such effects may include ecological, cultural, human health, economic or social impacts on minority communities, low-income communities or Indian Tribes…when those impacts are interrelated to impacts on the natural or physical environment” (CEQ 1997).

As noted above, residents of the analysis area counties typically have lower median household incomes and higher rates of unemployment than California residents overall. Poverty rates vary substantially within the planning area. Some counties, such as El Dorado, Nevada, and Placer have much lower rates of poverty than the state overall. In contrast, more than one-fifth of Butte and Yuba County residents live in poverty. These data suggest that the planning area contains an environmental justice population based on poverty status.

However, the analysis area counties have lower shares of minority residents than the state. In California, about 60 percent of the population identifies as a racial or ethnic minority (other than white, non-Hispanic). In the analysis area counties, the shares of minority residents are considerably lower, except in Sacramento and Sutter counties, where approximately half of the residents identify as racial or ethnic minorities. These data indicate that the planning area does not contain environmental justice populations based on race and ethnicity.

**Table 114. Environmental justice characteristics by county**

| Location | Poverty Rate[39] (ACS 2014 5-year Estimate) | Share Other than White Alone, Non-Hispanic (ACS 2014 5-year Estimate) |
|---|---|---|
| Butte County | 21.5% | 25.8% |
| El Dorado County | 10.3% | 20.7% |
| Lassen County | 17.1% | 34.0% |

[39] “Following the Office of Management and Budget's (OMB) Statistical Policy Directive 14, the Census Bureau uses a set of money income thresholds that vary by family size and composition to determine who is in poverty. If a family's total income is less than the family's threshold, then that family and every individual in it is considered in poverty. The official poverty thresholds do not vary geographically, but they are updated for inflation using Consumer Price Index (CPI-U). The official poverty definition uses money income before taxes and does not include capital gains or noncash benefits (such as public housing, Medicaid, and food stamps)” (U.S. Census Bureau 2016a).

| Location | Poverty Rate[39] (ACS 2014 5-year Estimate) | Share Other than White Alone, Non-Hispanic (ACS 2014 5-year Estimate) |
|---|---|---|
| Nevada County | 12.4% | 14.0% |
| Placer County | 8.9% | 25.0% |
| Plumas County | 15.9% | 15.5% |
| Sacramento County | 18.1% | 52.7% |
| Shasta County | 18.0% | 19.5% |
| Sierra County | 16.3% | 12.7% |
| Sutter County | 16.8% | 51.0% |
| Trinity County | 18.6% | 16.9% |
| Yuba County | 22.2% | 42.6% |
| California | 16.4% | 60.8% |

Source: U.S. Census Bureau 2016a

Given the high rates of poverty in the analysis area, the environmental consequences analysis will address the possibility that management actions could disproportionately and adversely affect low-income individuals. Low-income individuals may be less able to adapt to changes in employment, income, and recreation opportunities on the Tahoe National Forest.

## Environmental Consequences

### Alternative 1 – No Action

#### *Economic Activity*

Alternative 1 would not affect forest recreation use or visitor spending. Therefore, this alternative would not affect the number of jobs, amount of labor income, or tax revenue in the local economy. Visitor use is expected to increase over time due to factors outside the control of the Forest Service (e.g., population growth), which would increase employment, labor income, and tax revenue. However, these increases in visitor use would not be affected by the selection of any of the alternatives.

#### *Quality of Life*

The values, beliefs, and attitudes discussion above identified several key issues related to OSV use on the Tahoe National Forest and quality of life for visitors and area residents. In particular, commenters discussed recreation opportunities and user conflict. Alternative 1 would not implement management activities that affect recreation opportunities or user conflict. User conflict may increase as population and visitor use increase. As a number of commenters noted, user conflict is often asymmetrical (motorized use inhibit non-motorized use, but not the reverse). Therefore, the possibility of increased user conflict may affect quality of life for non-motorized winter recreation users.

#### *Environmental Justice*

Alternative 1 would not affect the cost of participating in recreation activities on the forest. Therefore, this alternative would not disproportionately and adversely affect the low-income individuals and households in the analysis area. However, climate change may reduce the areas on the forest that are suitable for winter recreation due to reduced precipitation and warmer winters. This could slightly increase the travel costs (i.e., in terms of time and fuel) for accessing winter recreation opportunities on the forest. Low-income individuals and households have fewer financial resources and, thus, may be disproportionately affected by increased recreational travel costs.

**Table 115. Socioeconomic resource indicators and measures for alternative 1**

| Resource Element | Resource Indicator (Quantify if possible) | Measure (Quantify if possible) | (Alternative 1) |
|---|---|---|---|
| **Economic activity** | Employment, income, tax revenue | Number of jobs, amount of labor income, tax revenue | No change due to management; increased visitor use over time would increase number of jobs, labor income, and tax revenue |
| **Quality of life** | Recreation visitation | Number of recreation visits | No change due to management; visitor use expected to increase over time |
| **Quality of life** | Values, beliefs, and attitudes | Qualitative evaluation of public values, beliefs, and attitudes | User conflict may increase due to population growth and increased visitor use |
| **Environmental Justice** | Low-income and minority populations | Change in cost of participating in recreation activities | No change due to management; climate change may increase distances winter recreation users must travel for adequate snow depth |

## Alternative 2 – Modified Proposed Action

### *Direct and Indirect Effects*

#### Economic Activity

Alternative 2 would decrease the acres designated for cross-country OSV use from 638,002 to 406,895, a 36 percent reduction from existing conditions. However, this alternative would increase the miles of trail available for grooming from 217 miles under alternative 1 to 237 miles, an increase of 20 miles or 9 percent. Based on observational evidence, OSV visitor use is driven by the miles of groomed trails. However, data do not exist to quantify the relationship between the additional 20 miles of trails available for grooming and OSV visitation. Nevertheless, alternative 2 is expected to increase OSV use on the Tahoe National Forest relative to the alternative 1. Current OSV users account for approximately 36,000 visits to the forest each year. Increased OSV visitation would support additional recreation-related employment, labor income, and tax revenue in the local area.

However, as discussed in the Values, Beliefs, and Attitudes section, non-motorized winter recreation users may be crowded out due to OSV use. Therefore, an increase in OSV use may be offset by a decline in non-motorized winter use. This would lower the gains in employment, labor income, and tax revenue associated with increased OSV use on the Tahoe National Forest.

#### Quality of Life

The values, beliefs, and attitudes discussion above identified several key issues related to public OSV use on the Tahoe National Forest and quality of life for visitors and area residents. In particular, commenters discussed recreation opportunities and user conflict. Alternative 2 would decrease the share of acres designated for cross-country OSV use relative to existing conditions. However, as mentioned above, this alternative would make 20 additional miles of trails available for grooming relative to current management. Trail grooming is expected to make the Tahoe National Forest more appealing for OSV recreation users. Increased OSV visitation would increase the likelihood of conflict between motorized and non-motorized winter recreation users. Since OSV use can make areas unappealing to non-motorized winter recreation users due to safety concerns and preferences for quiet, alternative 2 could adversely affect non-motorized winter recreation users' quality of life.

### Environmental Justice

Alternative 2 would not affect the cost of participating in recreation activities on the forest relative to current conditions. Therefore, this alternative would not disproportionately and adversely affect low-income individuals and households in the analysis area. However, climate change may reduce the areas on the forest that are suitable for winter recreation due to reduced precipitation and warmer winters. This could increase the travel costs (i.e., in terms of time and fuel) for accessing winter recreation opportunities on the forest. Low-income individuals and households have fewer financial resources and, thus, may be disproportionately affected by increased recreational travel costs.

**Table 116. Socioeconomic resource indicators and measures for alternative 2 direct and indirect effects**

| Resource Element | Resource Indicator (Quantify if possible) | Measure (Quantify if possible) | Alternative 2 Direct/Indirect Effects |
|---|---|---|---|
| **Economic activity** | Employment, income, tax revenue | Number of jobs, amount of labor income, tax revenue | Increased OSV visitation would support additional employment, labor income, and tax revenue in the local area; possibility that reduced non-motorized winter recreation visitation could offset increased economic activity |
| **Quality of life** | Recreation visitation | Number of recreation visits | OSV visitation expected to increase due to more miles of trail available for grooming; increased OSV visitation may crowd out some non-motorized winter recreation users |
| **Quality of life** | Values, beliefs, and attitudes | Qualitative evaluation of public values, beliefs, and attitudes | Increased OSV visitation may adversely affect non-motorized winter recreation users' quality of life |
| **Environmental Justice** | Low-income and minority populations | Change in cost of participating in recreation activities | No change in cost due to management; climate change may increase distances winter recreation users must travel for adequate snow depth |

### *Cumulative Effects – Alternative 2*

#### Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Past, present, and reasonably foreseeable projects in the planning area include vegetation management, livestock grazing allotment management, and recreation site improvements. These actions may temporarily restrict or displace recreation use. However, none of the actions are expected to measurably affect annual recreation use, visitor spending, and associated employment, labor income, and tax revenue. Therefore, no cumulative effects related to economic activity are anticipated. The temporary displacement of recreation use may affect quality of life if preferred sites are temporarily unavailable. However, such effects are expected to be infrequent and minor. Temporary displacement is not expected to increase conflict between motorized and non-motorized recreation users. Finally, these past, present, and reasonably foreseeable actions may affect travel costs if visitors must travel farther because preferred recreation sites are temporarily unavailable. However, since displacement would be infrequent and minor, effects to travel costs are not expected to meaningfully add to the potential environmental justice effects described in the direct and indirect effects analysis.

Long-term, a number of ongoing and reasonably foreseeable activities are expected to improve opportunities for recreation visitor use on the Tahoe National Forest. The Little Truckee Summit Parking Area improvement project would expand parking capacity and improve facilities to better satisfy demand for winter recreation opportunities on the Tahoe National Forest. The Sugarplum project is improving recreation site conditions for winter recreation users on the Tahoe National Forest. The effects of ongoing and reasonably foreseeable activities related to winter recreation may interact with OSV use designation to affect visitation beyond what is estimated here. Trailhead improvements are expected to increase participation in winter motorized and non-motorized activities on the Tahoe National Forest.

**Table 117. Socioeconomic resource indicators and measures for alternative 2 cumulative effects**

| Resource Element | Resource Indicator (Quantify if possible) | Measure (Quantify if possible) | Alternative 2 Cumulative Effects |
|---|---|---|---|
| **Economic activity** | Employment, income, tax revenue | Number of jobs, amount of labor income, tax revenue | No measurable effects to employment, labor income, and tax revenue are expected |
| **Quality of life** | Recreation visitation | Number of recreation visits | Short-term infrequent and minor displacement of recreation visitors. Long-term increase in recreation visitation due to recreation site improvements. |
| **Quality of life** | Values, beliefs, and attitudes | Qualitative evaluation of public values, beliefs, and attitudes | Infrequent and minor displacement not expected to change winter recreation users conflict or quality of life |
| **Environmental Justice** | Low-income and minority populations | Change in cost of participating in recreation activities | No measurable change in travel costs |

## Alternative 3

### *Direct and Indirect Effects*

#### Economic Activity

Alternative 3 would decrease the acres designated for OSV use from 638,002 to 275,972, a 57 percent reduction from existing conditions. However, Alternative 3 would not change the miles of OSV trails available for grooming relative to Alternative 1, current management (217 miles). Based on observational evidence, OSV visitor use is driven by the miles of groomed trails. Therefore, Alternative 3 is not expected to affect OSV use on the Tahoe National Forest relative to the Alternative 1. As a result, there would be no changes in local economic activity associated with recreational visitation to the Tahoe National Forest.

### Quality of Life

The values, beliefs, and attitudes discussion above identified several key issues related to public OSV use on the Tahoe National Forest and quality of life for visitors and area residents. In particular, commenters discussed recreation opportunities and user conflict. Alternative 3 would substantially reduce the share of acres designated for cross-country OSV use relative to alternative 1. However, alternative 3 would not change the miles of OSV trails available for grooming. Therefore, despite the decrease in acres designated for cross-country OSV use, overall recreation visitation is expected to be consistent with current conditions on the Tahoe National Forest. In terms of winter recreation visitors' quality of life, alternative 3 would have the same consequences as the alternative 1.

### Environmental Justice

Alternative 3 would not affect the cost of participating in recreation activities on the forest relative to current conditions. Therefore, this alternative would not disproportionately nor adversely affect the low-income individuals and households in the analysis area. However, climate change may reduce the areas on the forest that are suitable for winter recreation due to reduced precipitation and warmer winters. This could increase the travel costs (i.e., in terms of time and fuel) for accessing winter recreation opportunities on the forest. Low-income individuals and households have fewer financial resources and, thus, may be disproportionately affected by increased recreational travel costs.

**Table 118. Socioeconomic resource indicators and measures for alternative 3 direct and indirect effects**

| Resource Element | Resource Indicator (Quantify if possible) | Measure (Quantify if possible) | Alternative 3 Direct/Indirect Effects |
|---|---|---|---|
| Economic activity | Employment, income, tax revenue | Number of jobs, amount of labor income, tax revenue | Potential for minor changes in motorized and non-motorized winter recreation use are not expected to meaningfully affect recreation-related employment, labor income, or tax revenue in local area |
| Quality of life | Recreation visitation | Number of recreation visits | No change due to management |
| Quality of life | Values, beliefs, and attitudes | Qualitative evaluation of public values, beliefs, and attitudes | No expected effects to motorized or non-motorized winter recreation users' quality of life |
| Environmental Justice | Low-income and minority populations | Change in cost of participating in recreation activities | No change in cost due to management; climate change may increase distances winter recreation users must travel for adequate snow depth |

### *Cumulative Effects*

The cumulative effects under alternative 3 would be similar to the cumulative effects described under the alternative 2.

## Alternative 4

### *Direct and Indirect Effects*

#### Economic Activity

Relative to current conditions, alternative 4 would slightly increase the acres designated for cross-country OSV use from 638,002 to 641,105, or 0.5 percent. Additionally, alternative 4 would increase the total miles of trails available for grooming from 217 miles under the alternative 1 to 260 miles, an increase of 43 miles or 20 percent. Based on observational evidence, OSV visitor use is driven by the miles of groomed trails. Current OSV users account for approximately 36,000 visits, out of 1.8 million total recreation visits, to the Tahoe National Forest each year. Although OSV users account for a small share of total recreation visitation on the forest, Forest Service survey data indicate that OSV users typically spend more than other recreation users (White et al. 2013).

As discussed in the Values, Beliefs, and Attitudes section, non-motorized winter recreation users typically prefer to recreate at sites without OSV users. Therefore, an increase in OSV use lead to reductions in non-motorized winter use. This would moderate the gains in employment, labor income, and tax revenue associated with increased OSV use on the Tahoe National Forest. However, due to the relatively high spending of OSV visitors, overall, alternative 4 is expected to support higher levels of employment, labor income, and tax revenue in the local area compared to all other considered alternatives.

### Quality of Life

The effect on motorized and non-motorized winter recreation visitors' quality of life would be the same as described under alternative 2.

### Environmental Justice

The environmental justice consequences of alternative 4 would be the same as those described for alternative 2.

**Table 119. Socioeconomic resource indicators and measures for alternative 4 direct and indirect effects**

| Resource Element | Resource Indicator (Quantify if possible) | Measure (Quantify if possible) | Alternative 4 Direct/Indirect Effects |
|---|---|---|---|
| Economic activity | Employment, income, tax revenue | Number of jobs, amount of labor income, tax revenue | Increased OSV visitation would support additional employment, labor income, and tax revenue in the local area; possibiity that reduced non-motorized winter recreation visitation could offset increased economic activity |
| Quality of life | Recreation visitation | Number of recreation visits | OSV visitation expected to increase due to more miles of trail available for grooming; increased OSV visitation may crowd out some non-motorized winter recreation users |
| Quality of life | Values, beliefs, and attitudes | Qualitative evaluation of public values, beliefs, and attitudes | Increased OSV visitation may adversely affect non-motorized winter recreation users' quality of life |
| Environmental Justice | Low-income and minority populations | Change in cost of participating in recreation activities | No change in cost due to management; climate change may increase distances winter recreation users must travel for adequate snow depth |

*Cumulative Effects*

The cumulative effects under alternative 4 would be similar to the cumulative effects described under alternative 2.

## Alternative 5

*Direct and Indirect Effects*

### Economic Activity

Alternative 5 would decrease the acres designated for OSV use to 300,146 acres, a 53 percent reduction from alternative 1. However, alternative 5 would make 215 miles of trails available for grooming, which is only 2 miles fewer than alternative 1. This change in miles available for grooming is not expected to measurably affect recreation visitation to the Tahoe National Forest. Therefore, OSV visitation to the Tahoe National Forest is not expected to change and employment, labor income, and tax revenue relative to the alternative 1.

### Quality of Life

The values, beliefs, and attitudes discussion above identified several key issues related to OSV use on the Tahoe National Forest and quality of life for visitors and area residents. In particular, commenters discussed recreation opportunities and user conflict. Alternative 5 would make the fewest miles of trails available for grooming and would designate the second fewest acres for cross-country OSV use. Therefore, alternative 5 would improve quality of life for non-motorized winter recreation users relative to the Alternative 1 and other action alternatives. The decrease in acres designated for cross-country OSV use may alleviate concerns expressed by non-motorized winter recreation users related to vehicle exhaust fumes, disparities in speed, noise, and competition for fresh powder. The reduction in miles of trail available for grooming and acres designated for OSV use on the Tahoe National Forest may adversely affect OSV users' quality of life if they cannot access preferred sites, face more competition at existing sites, or need to travel further to recreate on the forest. However, the miles of trail available for grooming is only slightly below current conditions. Therefore, effects to OSV users' quality of life are expected to be minor.

### Environmental Justice

Alternative 5 would reduce opportunities for OSV recreation on the Tahoe National Forest relative to current conditions. Alternative 5 may require some OSV users to travel farther to recreate on the forest. Additionally, like all alternatives, climate change may affect travel costs due to reduced precipitation and warmer winters. Overall, alternative 5 is expected to increase the travel costs of OSV visitors to the Tahoe National Forest. Low-income individuals and families would be disproportionately affected by increased travel costs.

**Table 120. Socioeconomic resource indicators and measures for alternative 5 direct and indirect effects**

| Resource Element | Resource Indicator (Quantify if possible) | Measure (Quantify if possible) | Alternative 5 Direct/Indirect Effects |
|---|---|---|---|
| Economic activity | Employment, income, tax revenue | Number of jobs, amount of labor income, tax revenue | OSV visitation would not measurably change relative to current conditions, therefore, recreation-related employment, labor income, and tax revenue in the local area would not change |
| Quality of life | Recreation visitation | Number of recreation visits | OSV visitation is not expected to measurably change due to small change in miles of OSV trails available for grooming; non-motorized winter recreation may increase due to fewer acres designated for cross-country OSV use |
| Quality of life | Values, beliefs, and attitudes | Qualitative evaluation of public values, beliefs, and attitudes | OSV users' quality of life may decline if they travel farther or face site competition; non-motorized winter recreation users would benefit from decreased likelihood of user conflict |
| Environmental Justice | Low-income and minority populations | Change in cost of participating in recreation activities | OSV users would have to travel farther to access open areas or groomed trails; increased travel costs would disproportionately affect lower income individuals and families |

### *Cumulative Effects*

Past, present, and reasonably foreseeable projects may temporarily restrict or displace recreation use. However, none of the actions are expected to measurably affect annual recreation use, visitor spending, and associated employment, labor income, and tax revenue. Therefore, no cumulative effects related to economic activity are anticipated. The temporary displacement of recreation use may affect quality of life if preferred sites are temporarily unavailable. However, such effects are expected to be infrequent and minor. Temporary displacement is not expected to increase conflict between motorized and non-motorized recreation users. Finally, these past, present, and reasonably foreseeable actions may affect travel costs if visitors must travel farther because preferred recreation sites are temporarily unavailable. This effect would be the most pronounced for OSV users under alternative 5 because management actions would limit opportunities for OSV recreation on the Tahoe National Forest. Therefore, further displacement due to ongoing and reasonably foreseeable activities could cause further reduction in OSV opportunities and increased crowding at available sites.

Long-term, a number of ongoing and reasonably foreseeable activities are expected to improve opportunities for recreation visitor use on the forest. The Little Truckee Summit Parking Area improvement project would expand parking capacity and improve facilities to better satisfy demand for winter recreation opportunities. The Sugarplum project is improving recreation site conditions for winter recreation users on the forest. The interaction of these activities with the actions proposed under alternative 5 would affect winter recreation users' quality of life beyond what is estimated in the direct and indirect effects analysis. Expanded parking capacity would lessen the possibility of recreation site crowding adversely affecting visitors' quality of life.

**Table 121. Socioeconomic resource indicators and measures for alternative 5 cumulative effects**

| Resource Element | Resource Indicator (Quantify if possible) | Measure (Quantify if possible) | Alternative 5 Cumulative Effects |
|---|---|---|---|
| Economic activity | Employment, income, tax revenue | Number of jobs, amount of labor income, tax revenue | Visitor displacement is possible, but no measurable effects to employment, labor income, and tax revenue beyond what is described in direct and indirect effects analysis |
| Quality of life | Recreation visitation | Number of recreation visits | Possible displacement of recreation visitors in the short-term; long-term site improvements could lessen potential for site competition to reduce OSV visitation |
| Quality of life | Values, beliefs, and attitudes | Qualitative evaluation of public values, beliefs, and attitudes | Site improvements could improve quality of life for OSV users with fewer opportunities under Alternative 5 |
| Environmental Justice | Low-income and minority populations | Change in cost of participating in recreation activities | No measurable change in travel costs |

## Compliance with LRMP and Other Relevant Laws, Regulations, Policies and Plans

Alternative 1 would not be in compliance with Subpart C of the Travel Management rule, which requires designation of roads, trails, and areas on National Forest System lands to provide for OSV use.

Alternatives 2, 3, 4, and 5 would be in compliance with Subpart C of the Travel Management rule. These alternatives would also be in compliance with Forest Plan goals to provide a variety of recreation opportunities.

## Summary of Environmental Effects

**Table 122. Summary comparison of socioeconomic effects**

| Resource Element | Indicator/ Measure | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| Economic activity | Employment, income, tax revenue | No change due to management; increased visitor use over time would increase number of jobs, labor income, and tax revenue | Increased OSV visitation would support additional employment, labor income, and tax revenue in the local area; possible reduction in non-motorized winter recreation visitation could offset increased economic activity | Potential for minor changes in motorized and non-motorized winter recreation use are not expected to meaningfully affect recreation-related employment, labor income, or tax revenue in local area | Increased OSV visitation would support additional employment, labor income, and tax revenue in the local area; possible reduction in non-motorized winter recreation visitation could offset increased economic activity | OSV visitation would not measurably change relative to current conditions, therefore, recreation-related employment, labor income, and tax revenue in the local area would not change |
| Quality of life | Recreation visitation | No change due to management; visitor use expected to increase over time | OSV visitation expected to increase due to more miles of trail available for grooming; increased OSV visitation may crowd out some non-motorized winter recreation users | No change due to management visitor use expected to increase over time | OSV visitation expected to increase due to more miles of trail available for grooming; increased OSV visitation may crowd out some non-motorized winter recreation users | OSV visitation is not expected to change due to small change in miles of OSV trails available for grooming; non-motorized winter recreation may increase due to fewer acres designated for cross-country OSV use |
| Quality of life | Values, beliefs, and attitudes | User conflict may increase due to population growth and increased visitor use | Increased OSV visitation may adversely affect non-motorized winter recreation users' quality of life | No expected effects to motorized or non-motorized winter recreation users' quality of life | Increased OSV visitation may adversely affect non-motorized winter recreation users' quality of life | OSV users' quality of life may decline if they travel farther or face site competition; non-motorized winter recreation users would benefit from decreased likelihood of user conflict |

| Resource Element | Indicator/ Measure | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| Environmental justice | Low-income and minority populations | No change due to management; climate change may increase distances winter recreation users must travel for adequate snow depth | No change in cost due to management; climate change may increase distances winter recreation users must travel for adequate snow depth | No change in cost due to management; climate change may increase distances winter recreation users must travel for adequate snow depth | No change in cost due to management; climate change may increase distances winter recreation users must travel for adequate snow depth | OSV users would have to travel farther to access open areas or groomed trails; increased travel costs would disproportionately affect lower income individuals and families |

# Cultural Resources

## Relevant Laws, Regulations, and Policy

### Federal Law

#### *National Historic Preservation Act*

The National Historic Preservation Act of 1966, as amended, directs all Federal agencies to take into account the effects of their undertakings (actions, financial support, and authorizations) on properties included in or eligible for the National Register. Implementing regulations are found at 36 CFR 800.

### Land and Resource Management Plan

The Tahoe National Forest Land and Resource Management Plan (USDA Forest Service 1990) as amended by the Sierra Nevada Forest Plan Amendment Supplemental Final Environmental Impact Statement and Record of Decision (USDA Forest Service 2004a, 2004b), provides management direction and standards and guidelines for vegetation, watershed, and recreation management activities. Forest Plan guidance relevant to heritage resources are described in more detail below.

Section 106 of the National Historic Preservation Act of 1966 and implementing regulations requires the agency official to determine if the undertaking is a type of activity that could affect historic properties. If the nature of the undertaking has the potential to affect cultural resources, there must be identification efforts that may include survey. The undertaking's area of potential effects (APE) would be surveyed for cultural resources in order to comply with 36 CFR 800 – Protection of Historic Properties, and the National Environmental Policy Act. Compliance with National Historic Preservation Act of 1966 and 36 CFR 800 regulations includes all historic properties be evaluated for the National Register of Historic Places.

#### *Relevant Standards and Guidelines*

The Sierra Nevada Forest Plan Amendment described the following elements of managing cultural resources (Volume 2, Chapter 3, Part 5.8, p. 510):

- Conducting inventories of proposed undertakings within the area of potential effects to identify types and locations of historic properties.
- Determining which historic properties are eligible for the National Register of Historic Places.
- Assessing potential project effects on eligible historic properties.
- Avoiding or mitigating adverse effects on historic properties eligible for the National Register or other significant sites.
- Follow-up monitoring to assess the effectiveness of management procedures such as implementing site protection measures.

## Region 5 Programmatic Agreement

The Tahoe National Forest has consulted with the State Historic Prexervation Officer on the application of this undertaking with stipulations in the Region 5 Programmatic Agreement.[40] SHPO concurred that requiring at least 12 inches of snow or ice (based on weather, Forest Service personnel and public observations), be present in order to authorize cross-country OSV use in designated OSV use areas would sufficiently prevent surface and subsurface impacts to historic properties and constitutes a finding of No Historic Properties Affected, consistent with section 7.8(b) of the Regional Programmatic Agreement.

## Executive Orders

### *Protection and Enhancement of the Cultural Environment*

The Protection and Enhancement of the Cultural Environment, EO 11593 of May 13, 1971 directs Federal agencies to inventory cultural resources under their jurisdiction, nominate all federally owned properties that meet the criteria to the National Register of Historic Places, use due caution until the inventory and nomination processes are completed, and assure that Federal plans and programs contribute to preservation and enhancement of non-federally owned properties.

### *Indian Sacred Sites, EO of May 24, 1996*

The Indian Sacred Sites, EO of May 24, 1996, directs Federal land management agencies, to the extent permitted by law, and not clearly inconsistent with essential agency functions, to accommodate access to and use of Indian sacred sites, to avoid affecting the physical integrity of such sites wherever possible, and, where appropriate, to maintain the confidentiality of sacred sites. Federal agencies are required to establish a process to assure that the affected Indian tribes are provided reasonable notice of proposed Federal actions or policies that may affect Indian Sacred sites.

### *Executive Order 13175 of November 6, 2000*

In Executive Order 13175 of November 6, 2000, Section 5 states there should be a process to ensure meaningful and timely input in the development of regulatory policies that have tribal implications.

### *Executive Memorandum from April 29, 1994*

In Executive Memorandum from April 29, 1994, President Clinton discusses the unique legal relationship between Native American Tribal governments and the U.S. Government. He requires each executive department and agency to consult, to assess the impact of Federal Government plans, and to remove impediments from consultation with tribes.

### *Executive Memorandum from November 5, 2009*

Executive Memorandum from November 5, 2009, President Obama supports and reaffirms EO 13175 and gives specific directions on how plans should be developed and when they must be submitted to the Director of the Office of Management and Budget.

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[40] Programmatic Agreement Among U.S.D.A. Forest Service, Pacific Southwest Region (Region 5), California State Historic Preservation Officer, Nevada State Historic Preservation Officer, Advisory Council on Historic Preservation Regarding the Processes for Compliance with Section 106 of the National Historic Preservation Act for Management of Historic Properties by the National Forests of the Pacific Southwest Region, February 2013 (Region 5 PA)

## Analysis Assumptions

The assumptions used in this effects analysis include:

- Snowpack creates a protective barrier between vehicles and archaeological sites. Snow levels at 12 inches provide adequate protection.
- All trails are located on engineered roads or trails with gravel, pavement or other base material or an existing hardened surface. This material acts as a cap for archaeological sites that are bisected by the road, thus providing protection to historic properties when snow levels are less than 12 inches. [Regional PA stipulation 2.1(c)(1-6)]
- Use of maintained designated roads by OSVs with 6 inches of snow has similar effects to vehicles and OHV use on the same road.

## Affected Environment

With over 4,000 recorded sites on National Forest System land, the Tahoe National Forest contains a variety of pre-contact and historic archaeological sites and buildings. Research of cultural resources discovered within the boundaries of theTahoe National Forest indicate people have been using the forest for over 8,000 years with intensification occurring within the last 5,000 to 4,000 years. By 5,000 years ago on the western side of the forest, permanent villages were established at elevations generally below 3,500 feet (snow line). On the eastern side of the forest, winter villages were located in the lower-elevation valleys where Reno and Carson City, Nevada, are located. Prior to the crossing of the Sierra Nevada by emigrant parties, an extensive trail system was established by Native people for travel and trade. Many of these trails became major travel routes into California during the historic era. Two Native American ethnographic groups, the Nisenan Maidu and the Washoe, have direct ties to land now managed by the National Forest Service system under the administration of the by the Tahoe National Forest. To date, no traditional cultural properties or sites of religious or cultural importance have been identified within the Tahoe National Forest.

## Environmental Consequences

### Alternative 1 – No Action

#### *Direct and Indirect Effects*

Under no action, no new direct effects would occur. Cultural resources would continue to be vulnerable to the effects of unregulated over-snow recreation. Sites would continue to be impacted when OSVs are used when snow is less than 12 inches. In addition, cultural resources would continue to naturally deteriorate over time. Cultural resources would continue to be threatened by natural processes (wildfire, erosion, flooding) and from recreational activities that bring people in contact with cultural sites.

### Alternatives 2, 3, and 5

#### *Direct and Indirect Effects*

Direct effects to cultural resources are those that physically alter, damage, or destroy all or part of a resource; alter characteristics of the surrounding environment that contribute to the resource's significance; introduce visual or audible elements out of character with the property or that alters its setting; or resource neglect to the extent that it deteriorates or is destroyed.

Under alternatives 2, 3, and 5, direct effects would not likely occur because known sites would be covered by 12 inches or more of snow. In addition, all alternatives would not designate cross-country OSV use within a 1-acre area near Robinson Flat to protect historic structures. Therefore, these alternatives would not directly affect cultural resources within the proposed project area.

#### *Cumulative Effects*

Since alternatives 2, 3, and 5 would not have direct or indirect effects on cultural resources, no cumulative effects are anticipated.

### Alternative 4

#### *Direct and Indirect Effects*

This alternative allows for designated cross-country OSV areas only when there are 12 or more inches of snow or ice covering the landscape; however, on designated snow trails with underlying roads, a minimum of 6 or more inches of snow covering is typically needed to avoid damage to the underlying road surface. As long as trails with gravel or paved or hardened surface are used, there would be no effect.

This alternative could directly affect cultural resources along two trails that partially do not contain an underlying road surface: (1) the Howard Creek OSV Trail overlays Forest Service Road 28. The portion of the trail that creates a connection from the Gold Lake Highway (groomed) to Haskell Peak OSV Trail does not have a paved road, gravel or road with other base material; and (2) the Andesite West OSV Trail partially overlays the Forest Service 14E07. The portion of trail that does not overlay this road does not have a paved road, gravel or road with other base material.

Indirect effects can occur when site visitation increases due to identification of cultural resources during recreation activities. Site visitation increases the likelihood for direct effects from looting or physically altering the resource.

#### *Cumulative Effects*

The cumulative effects include increased site visitation which results in other sites being identified. These cumulative effects may result in overall heritage resource landscapes being affected.

## Compliance with LRMP and Other Relevant Laws, Regulations, Policies and Plans

Alternative 1 would not be in compliance with Subpart C of the Travel Management Rule, which requires designation of roads, trails, and areas on National Forest System lands to provide for OSV use. Alternative 1 would also not comply with the Region 5 Programmatic Agreement because it does not establish a minimum snow depth for trail or cross-country public OSV use.

Alternative 4 would not comply with the Region 5 Programmatic Agreement [Regional PA stipulation 2.1(c)(1-6)], which requires all trails be on paved roads, gravel or roads with other base material. This material acts as a cap for archaeological sites, thus, providing protection to historic properties when snow levels are less than 12 inches. Portions of two trails (Howard Creek and the Andesite West OSV Trail) do not have a paved road, gravel or road with other base material underneath.

Alternatives 2, 3, and 5 would be in compliance with Subpart C of the Travel Management Rule, the Region 5 Programmatic Agreement, and Forest Plan goals to provide a variety of recreation opportunities.

# Engineering and Roads

## Relevant Laws, Regulations, and Policy

#### *National Forest Roads and Trails Act of October 13, 1964, as amended (16 U.S.C.* 532-538)

This act authorizes road and trail systems for the national forests. It also authorizes granting of easements across National Forest System lands, construction and financing of maximum economy roads (FSM 7705), and imposition of requirements on road users for maintaining and reconstructing roads, including cooperative deposits for that work.

#### *Annual Department of the Interior, Environment, and Related Agencies Appropriations Act*

This act appropriates funds for the Forest Service's road and trail programs.

#### *Organic Administration Act of 1897 (16 U.S.C. 551).*

This act authorizes the regulation of national forests.

#### *National Trails System Act of October 2, 1968 (16 U.S.C. 1241-1249)*

This act established the National Trails System and authorizes planning, right-of-way acquisition, and construction of trails established by Congress or the Secretary of Agriculture.

### Federal Regulations

#### *Code of Federal Regulations*

- 36 CFR 212 (Forest Service travel management)
- 36 CFR 251 (Land Uses)
- 36 CFR 261 (Prohibitions)

### Forest Service Manual and Handbooks

- FSM 7700 Travel Management
- FSM 7730 Transportation System Operation and Maintenance
- FSH 7709.55 Chapter 10- Travel Planning for Designations
- FSH 7709.59 Chapter 20- Traffic Management

### State Direction

- California Snowmobile Trail Grooming (1997 Grooming Standards)
- Over Snow Vehicle Program Final Environmental Impact Report, Program Years 2010 – 2020 (State of California, Dept. of Parks and Recreation)
- California OSV laws

## Land and Resource Management Plan

### *Tahoe National Forest Plan*

Forestwide transportation system management standards and guidelines (Forest Plan page 40).

Restrict road, trail, and off-highway use to the extent necessary for protection of:

- Threatened, endangered, and sensitive plants or animals
- Essential wildlife functions
- Cultural resources
- Riparian zones and wetlands

Eliminate motorized vehicle use in riparian areas and wetlands except on system roads and designated routes and stream crossings

Maintain the transportation system to a standard that is commensurate with user types and amount of use. Closure of roads and trails will be appropriate if the cost for maintenance and resource protection exceeds the benefits received or the financial ability of the forest to pay for these services.

Seasonal road and trail restriction are preferred over permanent closure.

Before deciding to regulate by signing and public announcements as opposed to physical barriers, consider the risk to resource values and the magnitude of maintenance costs resulting from violations. If physical barriers are used, make sure that private land access needs or cooperative agreements requirements are met.

Regulating for single purpose use is not an acceptable objective lf only enacted to meet one group's desire. A need to regulate because of user conflict will be evaluated on a case by case bases.

Close roads and trails or regulate traffic when necessary to protect the safety of forest users. Candidates for regulation or closure include roads with hazards such as avalanche, landslides, forest fires, flooding, timber operations etc.

Conduct a separate analysis to correlate land capability, user needs, and user or landowner conflicts forestwide for all dispersed recreation travelways.

Consider the need to protect administrative or special-use facilities when deciding whether to close certain roads. Lookouts, guard stations, and transmission sites are examples of such facilities.

Consider the quality of dispersed recreation opportunities when deciding whether to close a road, It may be beneficial, for example, to separate four-wheeled motorized recreation use from other forms of motorized recreation, especially when simultaneous use diminishes the quality of the recreation experience for both users.

Based on the results of a transportation analysis, close and obliterate roads that are not necessary for resource management, private land uses, or public uses. Bring the roadbed into resource production. Prevent potential resource damage by the obliterated road.

Construct the minimum number of miles of road and meet the minimum design standard possible while still meeting safety, user, and resource needs with economic efficiency. Logging system design, timber sale design, and transportation planning must be emphasized on all timber sales to comply with this policy. No new roads will be constructed or reconstructed without an approved transportation plan and environmental assessment, or environmental impact dtatement, if required.

Proposal for subdivision access over existing National Forest System roads will be addressed.

When planning recreation development projects and resource management activities, coordinate with State and local road agencies to address potential traffic impacts and mitigation measures.

Cooperate with the State, other agencies, and user groups to identify, and where compatible with Forest Plan management objectives, develop segment of trail that would contribute to a statewide trail system. A statewide system would connect use areas and provide the opportunity for long-distance trail touring.

#### *Sierra Nevada Forest Plan Amendment*

- No applicable direction

### Methodology

The Forest Transportation Atlas was the primary data used, along with professional expertise. The atlas is primarily composed of roads and motorized trail information as contained in GIS spatial data and Forest Service Infrastructure (INFRA) tabular data. In addition, the proposed over-snow vehicle route network for designation, by alternative (GIS data) were included. Last of all, the existing National Forest System roads and OSV-related engineering facilities, including snow parks, warming huts, parking areas (GIS data) were considered.

All distance figures are approximate values based on the Forest Transportation Atlas (including spatial GIS data and tabular INFRA data) and are limited to the accuracy of those sources which includes measurements from GIS, GPS, field instruments and aerial photography. Mileages have been updated throughout the planning process as better information has been made available and may change slightly with additional field verification and project implementation.

### Assumptions

- All OSV users would follow applicable laws and designations as described under each alternative.
- All proposed and analyzed OSV trails would be located where the Forest Service has jurisdiction.

### Spatial and Temporal Context for Effects Analysis

The affected spatial area where direct, indirect, and cumulative transportation effects may be caused by proposed activities involves the project area (Tahoe National Forest).

The temporal boundaries for transportation effects from the proposed activities are indefinite, as long as snow conditions exist to provide for the designations as described under each alternative.

## Resource Indicators and Measures

Resource indicators and measures shown in table 19 will be used to measure and disclose effects to engineering and roads resources related to OSV use designations and grooming trails for OSV use.

**Table 123. Engineering and roads resource indicators and measures for alternative 1**

| Resource Element | Resource Indicator | Measure |
|---|---|---|
| Safety | Public Safety & Traffic | Qualitative effects to motor vehicle operators and other users of the trail system |
| Cost | Affordability | Qualitative effects to the total cost of maintaining the Forest transportation system (FTS) that will be open to motor vehicle use |
| Transportation property | Effects to underlying NFS roads and trails | Wear and tear that may affect wheeled motor vehicle use |

## Affected Environment

The Tahoe National Forest current management for snow trail grooming when using OHMVR Division funds and equipment is to follow OHMVR snow depth standards.

When grooming occurs using other funds and equipment there is currently no minimum snow depth.

The following summarizes how the Forest Service currently manages OSV use on the approximately 836,273-acre Forest Tahoe National Forest:

- Approximately 638,002 acres of National Forest System land are designated for off-trail cross-country OSV use;
- Approximately 1,218 acres of National Forest System lands designated for OSV use from January 1 through September 14;
- 265 miles of trails for OSV use:
    - Approximately 217 miles of designated National Forest System OSV trails available for grooming;
    - 41 miles of trails marked, ungroomed for OSV use within OSV Use Areas;
    - 7 miles of designated OSV trails are not available for grooming;
- OSV use on the PCT is prohibited. There are currently no designated crossings. There is currently no OSV prohibition on lands adjacent to the PCT.
- Forest Plan does not establish a minimum snow depth for public OSV cross-country or trail use.

## Desired Condition

The desired condition involves providing a stable and cost-efficient road system through appropriate construction, reconstruction, maintenance; providing a stable and cost-efficient trail system through appropriate construction, reconstruction, maintenance; and providing administrative sites and facilities that effectively and cost-efficiently serve the public and the Forest Service workforce.

## Environmental Consequences

### Alternative 1

#### *Direct and Indirect Effects*

The current Tahoe National Forest Winter Recreation Guide map provides adequate information to maintain a reasonable level of public safety and avoid traffic conflicts. There would be minor adverse effects (minor costs) due to over-snow vehicle use on access roads to popular parking and staging areas. Current snow trail grooming management using OHMVR Division funds and equipment follows OHMVR snow depth standards. Snow depth requirement provides adequate protection of roads under the snow. Table 124 displays alternative 1 effects on public safety and traffic, OSV use effects on the cost of maintaining the transportation system and effects on road and trail surfaces.

**Table 124. Engineering and roads resource indicators and measures for alternative 1**

| Resource Element | Resource Indicator | Measure | Alternative 1 |
|---|---|---|---|
| Safety | Public Safety & Traffic | Qualitative effects to motor vehicle operators and other users of the trail system | The current Tahoe National Forest Winter Recreation Guide map provides adequate information to maintain a reasonable level of public safety and avoid traffic conflicts |
| Cost | Affordability | Qualitative effects to the total cost of maintaining the Forest transportation system (FTS) that will be open to motor vehicle use | Minor effects (minor costs) due to over-snow vehicle use for access roads to popular parking and staging areas. |
| Transportation property | Effects to underlying NFS roads and trails | Wear and tear that may affect wheeled motor vehicle use | The Tahoe National Forest current management for snow trail grooming using OHMVR Division funds and equipment follows OHMVR snow depth standards. This snow depth requirement provides adequate protection of underlying roads. |

### Alternative 2

#### *Direct and Indirect Effects*

Effects under alternative 2 would be similar to alternative 1. The Tahoe National Forest Winter Recreation Guide map would provide adequate information to maintain a reasonable level of public safety and avoid traffic conflicts. There would be minor adverse effects (minor costs) due to over-snow vehicle use on access roads to popular parking and staging areas.

Minimum snow depth requirements would avoid damage to resources, typically a minimum of 6 inches (OSV use on underlying routes) would provide adequate protection of underlying roads. A standard of 12 to 18 inches of snow depth would be required for snow trail grooming when funds and equipment are used from sources other than the OHMVR Division. Snow depth requirement would provide adequate protection of roads under the snow.

Minor additional maintenance costs may occur from over-snow vehicle use of access roads, parking and staging areas due to:

- Freezing and thawing of road subgrade resulting in asphalt cracking
- Exposure of native surface or asphalt due to grooming, use or rain-on-snow events resulting in shortened life-cycle of the infrastructure
- Improvements or maintenance to the storm drainage system may be required due to increased runoff and/or earlier snowmelt

Table 125 displays effects on public safety and traffic, OSV use effects on the cost of maintaining the transportation system and wear and tear effects on road and trail surfaces.

**Table 125. Resource indicators and measures for alternative 2**

| Resource Element | Resource Indicator (Quantify if possible) | Measure (Quantify if possible) | Alternative 2 |
|---|---|---|---|
| Safety | Public Safety & Traffic | Qualitative effects to motor vehicle operators and other users of the trail system | The over-snow vehicle use map would provide adequate information to maintain a reasonable level of public safety and avoid traffic conflicts; this would also improve understanding of allowed uses and prohibitions. |
| Cost | Affordability | Qualitative effects to the total cost of maintaining the forest transportation system (FTS) that will be open to motor vehicle use | Minor effects (additional maintenance costs) due to over-snow vehicle use on access roads to popular parking and staging areas. |
| Transportation property | Effects to underlying NFS roads and trails | Wear and tear that may affect wheeled motor vehicle use | Adequate snow depth requirement, to avoid damage to resources, (OSV use on underlying routes) typically a minimum of 6 inches would provide adequate protection of underlying roads. A standard of 12 to 18 inches of snow depth would be required for snow trail grooming when funds and equipment are used from sources other than the OHMVR Division. |

### *Cumulative Effects*

There would be negligible cumulative effects under alternative 2. Effects on public safety, road maintenance costs and effects on underlying roads and trails would be negligible. Measurement indicators are shown in table 126.

**Table 126. Engineering and roads resource indicators and measures for alternative 2 cumulative effects**

| Resource Element | Resource Indicator (Quantify if possible) | Measure (Quantify if possible) | Alternative 2 |
|---|---|---|---|
| Safety | Public Safety & Traffic | Qualitative effects to motor vehicle operators and other users of the trail system | Negligible cumulative effects; temporary closures for logging and other forest operations activities would eliminate conflicts. |
| Cost | Affordability | Qualitative effects to the total cost of maintaining the forest transportation system (FTS) that will be open to motor vehicle use | Negligible cumulative effects. |
| Transportation property | Effects to underlying NFS roads and trails | Wear and tear that may affect wheeled motor vehicle use | Negligible cumulative effects; use of temporary closures and proper use of snow plowing requirements for harvest and other forest operations activities would minimize cumulative effects. |

## Alternative 3

### *Direct and Indirect Effects*

Effects under alternative 3 would be similar to alternative 1. The over-snow vehicle use map would provide adequate information to maintain a reasonable level of public safety and avoid traffic conflicts. There would be minor adverse effects (additional costs) due to over-snow vehicle use on access roads to popular parking and staging areas.

Adequate snow on roads, 18 inches minimum snow depth for trail grooming and cross-country OSV use (OSV use on underlying routes) would provide adequate protection of underlying roads and trails.

Minor additional maintenance costs may occur from over-snow vehicle use of access roads, parking and staging areas due to:

- Freezing and thawing of road subgrade resulting in asphalt cracking
- Exposure of native surface or asphalt due to grooming, use or rain-on-snow events would shortened life-cycle of the infrastructure
- Improvements to the storm drainage system may be required due to increased runoff and/or earlier snowmelt

Table 127 displays effects on safety, associated transportation costs and effects on road surfaces under alternative 3.

**Table 127. Engineering and roads resource indicators and measures for alternative 3**

| Resource Element | Resource Indicator (Quantify if possible) | Measure (Quantify if possible) | Alternative 3 |
|---|---|---|---|
| Safety | Public Safety & Traffic | Qualitative effects to motor vehicle operators and other users of the trail system | The over-snow vehicle use map would provide adequate information to maintain a reasonable level of public safety and avoid traffic conflicts; this would also improve understanding of allowed uses and prohibitions. |
| Cost | Affordability | Qualitative effects to the total cost of maintaining the forest transportation system (FTS) that will be open to motor vehicle use | Minor effects (additional maintenance costs) due to over-snow vehicle use for access roads to popular parking and staging areas. |
| Transportation property | Effects to underlying NFS roads and trails | Wear and tear that may affect wheeled motor vehicle use | Adequate snow on roads, 18 inches for grooming, trail use and cross-country travel snow depth requirements would provide adequate protection of underlying roads. |

### *Cumulative Effects*

Cumulative effects of related projects described under alternative 2 would apply to alternative 3. Table 128 displays cumulative effects under alternative 3.

**Table 128. Engineering and roads resource indicators and measures for alternative 3 cumulative effects**

| Resource Element | Resource Indicator (Quantify if possible) | Measure (Quantify if possible) | Alternative 3 |
|---|---|---|---|
| Safety | Public Safety & Traffic | Qualitative effects to motor vehicle operators and other users of the trail system | Negligible cumulative effects; use of temporary closures for logging and other forest operations activities would eliminate conflicts. |
| Cost | Affordability | Qualitative effects to the total cost of maintaining the forest transportation system (FTS) that will be open to motor vehicle use | Negligible cumulative effects. |
| Transportation property | Effects to underlying NFS roads and trails | Wear and tear that may affect wheeled motor vehicle use | Negligible cumulative effects; use of temporary closures and proper use of snow plowing requirements for harvest and other forest operations activities would minimize cumulative effects. |

## Alternative 4

### *Direct and Indirect Effects*

The over-snow vehicle use map would provide adequate information to maintain a reasonable level of public safety and avoid traffic conflicts. The map and information would also improve understanding of allowed OSV uses and prohibitions. Snow depth requirement, 12 inches for grooming and 6 inches for OSV use on designated trails would provide adequate protection of underlying roads and trails.

Minor additional maintenance costs may occur from over-snow vehicle use of access roads, parking and staging areas due to:

- Freezing and thawing of road subgrade resulting in asphalt cracking
- Exposure of native surface or asphalt due to grooming, use or rain-on-snow events would shortened life-cycle of the infrastructure
- Improvements to the storm drainage system may be required due to increased runoff and/or earlier snowmelt

Table 129 displays effects on safety, associated transportation costs and effects on road surfaces under alternative 4.

**Table 129. Engineering and roads resource indicators and measures for alternative 4**

| Resource Element | Resource Indicator (Quantify if possible) | Measure (Quantify if possible) | Alternative 4 |
|---|---|---|---|
| **Safety** | Public Safety & Traffic | Qualitative effects to motor vehicle operators and other users of the trail system | The over-snow vehicle use map would provide adequate information to maintain a reasonable level of public safety and avoid traffic conflicts; this would also improve understanding of allowed uses and prohibitions. |
| **Cost** | Affordability | Qualitative effects to the total cost of maintaining the forest transportation system (FTS) that will be open to motor vehicle use | Minor effects (additional maintenance costs) due to over-snow vehicle use for access roads to popular parking and staging areas. |
| **Transportation property** | Effects to underlying NFS roads and trails | Wear and tear that may affect wheeled motor vehicle use | 12 inches for grooming and general OSV use, and 6 inches for OSV use, on underlying routes, snow depth requirements would provide adequate protection of underlying roads. |

### *Cumulative Effects*

Cumulative effects of related projects described under alternative 2 would apply to alternative 4. Table 130 displays alternative 4 cumulative effects.

**Table 130. Engineering and roads resource indicators and measures for alternative 4 cumulative effects**

| Resource Element | Resource Indicator (Quantify if possible) | Measure (Quantify if possible) | Alternative 4 |
|---|---|---|---|
| Safety | Public Safety & Traffic | Qualitative effects to motor vehicle operators and other users of the trail system | Negligible cumulative effects; use of temporary closures for logging and other forest operations activities would eliminate conflicts. |
| Cost | Affordability | Qualitative effects to the total cost of maintaining the forest transportation system (FTS) that will be open to motor vehicle use | Negligible cumulative effects. |
| Transportation property | Effects to underlying NFS roads and trails | Wear and tear that may affect wheeled motor vehicle use | Negligible cumulative effects; use of temporary closures and proper use of snow plowing requirements for harvest and other forest operations activities would minimize cumulative effects. |

## Alternative 5

### *Direct and Indirect Effects*

The over-snow vehicle use map would provide adequate information to maintain a reasonable level of public safety and avoid traffic conflicts; this would also improve understanding of allowed uses and prohibitions. There would be minor costs on access roads to popular parking and staging areas due to over-snow vehicle use.

Minimum snow depth requirements would avoid damage to resources, a minimum of 24 inches (OSV use on underlying routes) would provide more than adequate protection of underlying roads. A minimum of 12 inches of snow depth would be required for snow trail grooming regardless of funding. Snow depth requirement would provide adequate protection of roads under the snow.

Minor additional maintenance costs may occur from over-snow vehicle use of access roads, parking and staging areas due to:

- Freezing and thawing of road subgrade resulting in asphalt cracking
- Exposure of native surface or asphalt due to grooming, use or rain-on-snow events would shortened life-cycle of the infrastructure
- Improvements to the storm drainage system may be required due to increased runoff and/or earlier snowmelt

Table 131 displays effects on safety, associated transportation costs and effects on road surfaces under alternative 5.

**Table 131. Engineering and roads resource indicators and measures for alternative 5**

| Resource Element | Resource Indicator (Quantify if possible) | Measure (Quantify if possible) | Alternative 5 |
|---|---|---|---|
| Safety | Public Safety & Traffic | Qualitative effects to motor vehicle operators and other users of the trail system | The over-snow vehicle use map would provide adequate information to maintain a reasonable level of public safety and avoid traffic conflicts; this would also improve understanding of allowed uses and prohibitions. |
| Cost | Affordability | Qualitative effects to the total cost of maintaining the forest transportation system (FTS) that will be open to motor vehicle use | Minor effects (additional maintenance costs) due to over-snow vehicle use for access roads to popular parking and staging areas. |
| Transportation property | Effects to underlying NFS roads and trails | Wear and tear that may affect wheeled motor vehicle use | 12 inches (grooming, general OSV use) and 24 inches of (OSV use on underlying routes) snow depth requirements would provide protection of underlying roads. |

### *Cumulative Effects*

Cumulative effects of projects described under alternative 2 would apply to alternative 5. Table 132 displays alternative 5 cumulative effects.

**Table 132. Engineering and roads resource indicators and measures for alternative 5 cumulative effects**

| Resource Element | Resource Indicator (Quantify if possible) | Measure (Quantify if possible) | Alternative 5 |
|---|---|---|---|
| Safety | Public Safety & Traffic | Qualitative effects to motor vehicle operators and other users of the trail system | Negligible cumulative effects; use of temporary closures for logging and other forest operations activities would eliminate conflicts. |
| Cost | Affordability | Qualitative effects to the total cost of maintaining the forest transportation system (FTS) that will be open to motor vehicle use | Negligible cumulative effects. |
| Transportation property | Effects to underlying NFS roads and trails | Wear and tear that may affect wheeled motor vehicle use | Negligible cumulative effects; use of temporary closures and proper use of snow plowing requirements for harvest and other forest operations activities would minimize cumulative effects. |

## Summary of Environmental Effects

A summary of transportation related environmental effects of alternatives 1 through 5 are shown in table 133.

**Table 133. Summary comparison of environmental effects to transportation and engineering resources**

| Resource Element | Indicator/ Measure | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| Safety | Public Safety & Traffic | The current Tahoe National Forest Winter Recreation Guide map provides adequate information to maintain a reasonable level of public safety and avoid traffic conflicts | The over-snow vehicle use map would provide adequate information to maintain a reasonable level of public safety and avoid traffic conflicts; this would also improve understanding of allowed uses and prohibitions. | The over-snow vehicle use map would provide adequate information to maintain a reasonable level of public safety and avoid traffic conflicts; this would also improve understanding of allowed uses and prohibitions. | The over-snow vehicle use map would provide adequate information to maintain a reasonable level of public safety and avoid traffic conflicts; this would also improve understanding of allowed uses and prohibitions. | The over-snow vehicle use map would provide adequate information to maintain a reasonable level of public safety and avoid traffic conflicts; this would also improve understanding of allowed uses and prohibitions. |
| Cost | Affordability | Minor effects (additional maintenance costs) due to over-snow vehicle use on access roads to popular parking and staging areas. | Minor effects (additional maintenance costs) due to OSV use on access roads to popular parking and staging areas. | Minor effects (additional maintenance costs) due to over-snow vehicle use on access roads to popular parking and staging areas. | Minor effects (additional maintenance costs) due to over-snow vehicle use on access roads to popular parking and staging areas. | Minor effects (additional maintenance costs) due to over-snow vehicle use on access roads to popular parking and staging areas. |

| Resource Element | Indicator/ Measure | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 |
|---|---|---|---|---|---|---|
| Transportation property | Effects to underlying NFS roads and trails | The Tahoe National Forest current management for snow trail grooming using OHMVR Division funds and equipment follows OHMVR snow depth standards. This snow depth requirement provides adequate protection of underlying roads. | Adequate snow depth to avoid damage to resources requirement, typically a minimum of 6 inches would provide adequate protection of underlying roads. To avoid damaging resources for cross-country travel, a minimum of 12 inches of un-compacted snow is typically needed. Twelve to 18 inches snow depth would be required for grooming when funds and equipment are used from sources other than the OHMVR Division. | Adequate snow on roads, 18 inches for grooming, trail use and cross-country travel snow depth requirements would provide adequate protection of underlying roads. | Twelve inches for grooming, general OSV use and 6 inches for OSV use on underlying routes, snow depth requirements would provide adequate protection of underlying roads. | Twelve inches for grooming, and 24 inches for cross-country travel and trail OSV use requirement would provide protection of underlying roads. |

## Compliance with LRMP and Other Relevant Laws, Regulations, Policies and Plans

Alternatives 2, 3, 4 and 5 are compliant with all applicable direction, since they all involve production of a motor vehicle use map as required in Subpart C of the travel management regulations (36 CFR 212).

Alternative 1 does not involve production of a motor vehicle use map as required in Subpart C of the travel management regulations. Alternative 1 is otherwise compliant with applicable direction.

# Chapter 4. List of Preparers and Contributors

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and other organization and individuals during the development of this environmental impact statement:

## List of Preparers

| Name | Title/Discipline | Relevant Experience | Education |
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| Ann Braun | Content Analyst, FS Enterprise Program | 3 years content analysis,12 years information and data analysis, and 10 years Acquisition Management with the U.S. Forest Service | Undergraduate Education in General Studies, and Communication |
| Tracie Buhl | Fire Management Specialist, FS Enterprise Program | 17 years in Fire Management/Natural Resources with the U.S. Forest Service. Seven years conducting air analyses. | Undergraduate education in Natural Resources, Fire Science. |
| Tricia Burgoyne | Soil Scientist, FS Enterprise Program | 8 years' experience working as a soil scientist for the U.S. Forest Service | BS, Forest Ecology and Management |
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| Craig Comstock | GIS Support Specialist, FS Enterprise Program | 11 years in GIS management with the U.S. Forest Service. | BA, Geography |
| Pat Goude | Writer-Editor, FS Enterprise Program | 8 years as a writer-editor with the U.S. Forest Service | BA, Technical Journalism |
| Delilah Jaworski | Social Scientist, FS Enterprise Program | 7 years conducting social and economic analyses for the U.S. Forest Service and other Federal land management agencies | MSc, Environment and Development |
| Janel McCurdy | Interdisciplinary Team Leader, FS Enterprise Program | 17 years leading NEPA interdisciplinary teams with the U.S. Forest Service | BS, Forest Resource Management |
| Mike McNamara | Hydrologist, FS Enterprise Program | 25 years' experience as a U.S. Forest Service Hydrologist | BS, Geology<br>MS, Forest Hydrology |
| Janet Moser | Wildlife Biologist, FS Enterprise Program | | |
| Anthony Olegario | Fisheries Biologist, FS Enterprise Program | 15 years as a U.S. Forest Service Fisheries Biologist | BS, Mechanical Engineering<br>MS, Fisheries Science |
| Kristi Eichner | Project Manager, FS Enterprise Program | 26 years as Project Manager, Environmental Specialist, and Wildlife Biologist for FS, FWS, BOR, and FHWA | BS, Zoology |

| Name | Title/Discipline | Relevant Experience | Education |
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| Stephanie Valentine | Outdoor Recreation Planner, FS Enterprise Program | 18 years serving as an Outdoor Recreation Planner for Federal agencies, 6 years with the U.S. Forest Service | BS, Outdoor Recreation Management |
| Beth Ann Waterston | Content Analyst, Project Record, FS Enterprise Program | 15 years' experience as a forester, with primary emphasis in planning and silviculture | BS, Natural Resource Sciences, Masters course work in Ecosystem Management |
| Frank Yurczyk | Logging Engineer, FS Enterprise Program | 50 plus years in transportation planning; NEPA (IDT lead); fuel reduction and community protection operation plans, economic efficiency analysis; timber sale - planning, design, layout, and fire suppression; Burn area rehabilitation | BS Forest Management |

## Interdisciplinary Team Consultants

| Name | Title | Affiliation |
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| Michael Woodbridge | Public Affairs Officer/Forest IDTlead | Tahoe National Forest |
| Temoc Rios | Public Services Staff Officer | Tahoe National Forest |
| Laura Hierholzer | Regional NEPA Coordinator | NFS Region 5 |
| Patti Krueger | Regional Threatened and Endangered Species Coordinator | NFS Region 5 |
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| Kathleen E. Mick | Program Manager, Trails Motorized Recreation Travel Management | NFS Region 5 |
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| Carol Purchase | Watershed Program Manager | Tahoe National Forest |
| Garrett Villanueva | Program Manager, Trails Motorized Recreation Travel Management | NFS Region 5 |
| Jeff Wiley | OHV Program Manager | Tahoe National Forest |

## Distribution of the Environmental Impact Statement to Federal agencies, Tribes, elected officials and State and local governments pursuant to 40 CFR 1502.19.

### Federal, State and Local Agencies

#### *Federal Agencies*

Advisory Council on Historic Preservation, Director, Planning and Review
U. S. Army Corp of Engineers
Chief of Naval Operations, Energy and Environmental Readiness Division
Environmental Protection Agency, Region 9, EIS Review Coordinator
Environmental Protection Agency, Office of Federal Activities, EIS Filing Section
Federal Aviation Administration, Regional Administrator, Western-Pacific Region
Federal Energy Regulatory Commission
Federal Highway Administration
National Marine Fisheries Service Habitat Conservationists Division, SW Region
Natural Resources Conservation Service, National Environmental Coordinator
Northwest Power Planning Council
Rural Utilities Service
Susquehanna River Basins Commission
USDA APHIS PPD/EAD
USDA National Agricultural Library Head Acquisitions and Serials Branch
USDA Natural Resources Conservation Service, National Environmental Coordinator
US Coast Guard, Environmental Management
US Department of Energy, Director, Office of NEPA Policy and Compliance
USDI Bureau of Land Management
USDI Fish and Wildlife Service
USDI Office of Environmental Policy and Compliance

#### *California State Agencies*

California Air Resources Board
California Department of Fish and Game
California Department of Parks and Recreation OHMVR
California Water Resources Control Board

#### *Local Agencies*

Foresthill Divide Chamber of Commerce
Placer County Air Pollution Control District
Placer County Public Works
Pacific Gas & Electric
Sierra Avalanche Center
Nevada Irrigation District

## Elected Officials

### *Federal Officials*

**U.S. Senators**

Diane Feinstein
Kamala Harris

**U.S. House of Representatives**

Tom McClintock
Doug LaMalfa

### *California State Officials*

Brian Dahle, California Assembly
Kristen Olsen, California Assembly
Tom Berryhill, California Assembly

### *Local Officials*

Nevada County Board of Supervisors
Placer County Board of Supervisors
Sierra County Board of Supervisors

## Tribes

Colfax-Todd Valley Consolidated Tribe
Nevada City Rancheria
Todd Valley Miwok-Maidu Cultural Foundation
United Auburn Indian Community of the Auburn Rancheria
Washoe Tribe of Nevada and California

# Distribution of the Environmental Impact Statement to Individuals and Organizations

The following individuals and organizations were either contacted directly in the scoping process, or made themselves known to the Forest Service by submitting comments during scoping for the Tahoe National Forest OSV Designation analysis. These individuals and organizations will be notified of the availability of the draft environmental impact statement and the 45-day comment period pursuant to 36 CFR 218.24 (a)(3)

## Individuals

| Last Name or Organization | First Name | Last Name or Organization | First Name |
|---|---|---|---|
| Amador | Don | Baringer | William |
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| Anderson | Christine | Bazar | Kevin |
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| Erdoes | Jeff | Holden | Barbara |
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| Hylton | Steve | Marsh | Glenda |
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| Jamsheed | Wania | Matlin | Thelma |
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| Johnson | Curtiss | McDermott | Helen |
| Johnson | Donna | McPherson | James |
| Johnson | Whit | McMartin | Betty |
| Jones | Donna | McMartin | Janet |
| Jones | Scott | McKay | Greg |
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| Kellogg | Mike | McVay | Jared |
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| Klim | Ed | Meyer | R. |
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| Langbein | John | Mills | Peter |
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| Leong | Robin | Morrow | Mary |
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| Lindsay | Keith | Muhlbach | Scott |
| Long | Kelly | Munson | James |
| Lyng | Hunter | Murphy | Michael |
| MacIntosh | Chris | Ondracek | Ronald |
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| Osborn | Julie | Sommers | Keane |
| Pfister | Cliff | Sordelli | Michael |
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| Pollock | Brice | Torres | JP |
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| Rostin | Peter | White | Charles |
| Rowen | Bob | Wiley | Fred |

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| Russell | Jake | Wood | Colin |
| Russell | Sarah | Wood | Leonard |
| Schauer | Jeffrey | Wyeth | Harry |
| Schmitz | Scott | Zanto | Aaron |
| Scott | Melanie | Zentner | Dave |
| Smith | Steven | Zuliani | Don |
| Jennings | Jim | | |

## Organizations

AAUW Outdoor Enthusiasts

American Council of Snowmobile Associations

Birch, Horton, Bittner & Cherot, P.C.

Blue Ribbon Coalition

CNSA/Off Road Business Association

California Wilderness Society

Clearstream Consulting

Cragmont Climbing Club

Disabled Sports USA

Friends of Independent Lake

High Camp Hut

International Snowmobile Manufacturers Association

Methoe Trails

Nordic Skiers of Nevada

North Fork American River Alliance

North Shore Adventures

Off Road Business Association

Pacific Crest Trail Association

Sierra Access Coalition

Sierra Foothills Audubon Society

Sierra Club, Bay Chapter

Sierra Club, Placer Group

Sierra Club Snowcamping

Sierra Pacific Industries

Snowlands Network

Tahoe Sierra Snowmobiling Club

The Trust for Public Land

Truckee Donner Land Trust

Upper American River Foundation

Winter Wildlands Alliance

Wilderness Society

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## Management Indicator Species

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# Glossary

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|---|---|
| **Administrative Use** | Motorized vehicle use vehicle use associated with management activities or projects on National Forest land administered by the Forest Service or under authorization of the Forest Service. Management activities include but are not limited to: law enforcement, timber harvest, reforestation, cultural treatments, prescribed fire, watershed restoration, wildlife and fish habitat improvement, private land access, allotment management activities, and mineral exploration and development that occur on National Forest land administered by the Forest Service or under authorization of the Forest Service. |
| **Area** | A discrete, specifically delineated space that is smaller, and, except for over-snow vehicle use, in most cases much smaller, than a ranger ristrict. |
| **Designated Road or Trail or Area** | A National Forest System road, National Forest system trail, or an area on National Forest System lands that is designated for over-snow vehicle use pursuant to 36 CFR 212.51 on an over-snow vehicle use map (36 CFR 212.1). |
| **Designation of over-snow vehicle use** | Designation of a National Forest System road, a National Forest System trail, or an area on National Forest System lands where over-snow vehicle use is allowed pursuant to 212.81. |
| **Forest road or trail** | A road or trail wholly or partially within or adjacent to and serving the [National Forest System (NFS)] that is determined to be necessary for the protection, administration, and utilization of the NFS and the use and development of its resources (36 CFR 212.1) |
| **Non-motorized use** | A term used in this document to refer to travel other than that defined as motorized. For example, hiking, riding horses, or mountain biking. |
| **Over-snow vehicle (OSV)** | A motor vehicle that is designed for use over snow and that runs on a track or tracks and/or a ski or skis, while in use over snow (36 CFR 212.1) |
| **Over-snow vehicle use map** | A map reflecting roads, trails, and areas designated for over-snow vehicle use on an administrative unit or a ranger district of the National Forest System. |
| **Trail** | A route 50 inches wide or less or a route over 50 inches wide that is identified and managed as a trail (36 CFR 212.1). |