United States Department of Agriculture

Lassen National Forest Over-snow Vehicle Use Designation

Draft Environmental Impact Statement

Forest Service

Lassen National Forest

January 2016

Over-snow Vehicle Use Designation

Draft Environmental Impact Statement

Lassen National Forest

Lead Agency: USDA Forest Service

Responsible Official: **David Hays, Forest Supervisor**
Lassen 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 Lassen National Forest. These designations would occur on National Forest System roads, National Forest System trails, and areas on National Forest System lands within the Lassen National Forest. The Forest Service would also identify snow trails where grooming would occur within the Lassen National Forest.

This proposal addresses the need to provide a manageable, designated system of public OSV trails and areas within the Lassen National Forest that is consistent with and achieves the purposes of the Forest Service Travel Management Regulations at 36 CFR Part 212. This action responds to general direction provided by the Forest Service's Travel Management Regulations at 36 CFR part 212, Subparts A and B, and Subpart C which provides specific direction for public OSV travel on the national forests.

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

Consistent with travel planning regulations at 36 CFR part 212 Subpart C, designated public over-snow vehicle trails and areas would 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 four alternatives, including (1) no action—continuation of current management; (2) the proposed action, as modified; and two other action alternatives.

A Notice of Intent to prepare an environmental impact statement (EIS) was published in the Federal Register on January 12, 2015. We prepared this draft EIS using public comments received during the scoping period, multiple interdisciplinary team discussions, 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 USDA 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 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 predecisional 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 §218.5(a). Issues raised in objections must be based on previously submitted, timely, specifically written comments regarding this proposed project unless based on new information arising after the designated comment opportunities.

Send Comments to: Chris O'Brien, on behalf of Dave Hays, Forest Supervisor, Lassen National Forest, 2550 Riverside Drive, Susanville, CA 96130; 530-257-2151. Comments may also be sent via facsimile to 530-252-6463. And, comments may be submitted on the Lassen National Forest OSV Designation web page: http://data.ecosystem-management.org/nepaweb/fs-usda-pop.php?project=45832

Date Comments Must Be Received By:

Summary of the Draft Environmental Impact Statement

Proposed Action

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

1. To designate 406 miles of National Forest System snow trails on National Forest System lands within the Lassen National Forest for OSV use when snowfall depth is adequate for that use to occur.
2. To designate 947,120 acres of National Forest System lands within the Lassen National Forest as areas where cross-country OSV use is allowed when snowfall depth is adequate for that use to occur.
3. To prohibit public OSV use on 29,130 acres of National Forest System land below 3,500 feet in elevation on the Lassen National Forest.
4. To prohibit public OSV use in the 520-acre Black Mountain Research Natural Area.
5. To identify approximately 324 miles of designated public OSV trails that would be groomed by the Forest Service on the Lassen National Forest for OSV use.
6. To groom OSV trails consistent with historical grooming practices, when there are 12 inches of uncompacted snow or more, and formally adopt California State Parks' snow grooming standards requiring a minimum of 12 inches of snow depth before grooming can occur.
7. To implement a forest-wide snow depth requirement for OSV use that would provide for public safety and natural and cultural resource protection by allowing OSV use in designated areas when there is a minimum of 12 inches of snow covering the landscape; and allow OSV use on designated National Forest System snow trails when there is a minimum of 6 inches of snow covering the trail.
8. To designate OSV crossings on the Pacific Crest Trail to be consistent with the crossings identified for summer motorized use under the Subpart B designations.

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. List of significant issues

Issue Topic	Cause and Effect
Quality Recreational Experience	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 Designating trails and areas 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.

Issue Topic	Cause and Effect
Noise	Designating trails and areas for OSV use and grooming trails for OSV use have the potential to generate anthropogenic noise and have the potential to 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.
Air Quality	Designating trails and areas for OSV use and grooming trails for OSV use have the potential to generate exhaust and emit pollutants into the air. This potential degradation of air quality can impact recreational users, wildlife, and sensitive areas.
Water and Soil Resources	Designating trails and areas for OSV use has the potential to result in ground disturbance and snow compaction and this can directly, indirectly and/or cumulatively adversely impact soil and water resources through soil compaction, erosion, and displacement.

Alternatives Considered in Detail

The Lassen National Forest developed four alternatives: No Action, the Proposed Action, and two additional action alternatives generated in response to the significant issues listed above. The four alternatives considered in detail for this analysis are listed in table S-2. Complete details of the alternatives, including project design criteria, are found in chapter 2 of this document.

Table S-2. Alternatives considered in detail

Alternative	Description of Alternative
1	No-action alternative. There would be no change to the way the Forest Service currently manages OSV use on the Lassen National Forest. • 976,760 acres would be open to OSV use. • 406 miles of snow trail would be open to OSV use. • 12 inches would be the minimum uncompacted snow depth for OSV use on snow trails. • 12 inches would be the minimum uncompacted snow depth for OSV use cross-country. • 324 miles of snow trail would be groomed for OSV use. • 18 inches would be the minimum uncompacted snow depth for snow trail grooming to occur.
2	Proposed action as scoped, with modifications based on public concerns expressed in the scoping process. • 947,120 acres would be designated for OSV use. • 406 miles of snow trail would be designated for OSV use. • 6 inches would be the minimum uncompacted snow depth for OSV use on snow trails. • 12 inches would be the minimum uncompacted snow depth for OSV use cross-country. • 324 miles of designated snow trail would be groomed for OSV use. • 12 inches would be the minimum uncompacted snow depth for snow trail grooming to occur.
3	• 878,690 acres would be designated for OSV use. • 406 miles of snow trail would be designated for OSV use. • 6 inches would be the minimum uncompacted snow depth for OSV use on snow trails. • 12 inches would be the minimum uncompacted snow depth for OSV use cross-country. • 324 miles of designated snow trail would be groomed for OSV use. • 18 inches would be the minimum uncompacted snow depth for snow trail grooming to occur.

Alternative	Description of Alternative
4	• 966,270 acres would be designated for OSV use. • 408 miles of snow trail would be designated for OSV use. • No minimum snow depth for OSV use on snow trails as long as damage to the underlying resource is avoided. • 12 inches would be the minimum uncompacted snow depth for OSV use cross-country. • 324 miles of designated snow trail would be groomed for OSV use. • 12 inches would be the minimum uncompacted snow depth for snow trail grooming to occur.

Summary of Environmental Impacts

The Forest Service analyzed the impacts of the alternatives on the following resource conditions:

- Transportation and Engineering
- Hydrology
- Heritage Resources
- Recreation
- Terrestrial Wildlife
- Fisheries and Aquatic Resources
- Botanical Resources
- Soils
- Socioeconomic Conditions
- Noise
- Air Quality

The analyses of those impacts are summarized in table S-3 and detailed in Chapter 3 of this document.

Table S-3 Summary of environmental impacts

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Transportation and Engineering	Safety: Public Safety & Traffic	The current Lassen 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.	Same as Alternative 2	Same as Alternative 2
	Cost: Affordability	Minor effects due to over-snow vehicle use for access roads to popular parking and staging areas.	Minor effects due to over-snow vehicle use for access roads to popular parking and staging areas.	Minor effects due to over-snow vehicle use for access roads to popular parking and staging areas.	Minor effects due to over-snow vehicle use for access roads to popular parking and staging areas.
	Transportation Property: Effects to Underlying NFS Roads and Trails	18” (grooming) and 12” (OSV use) snow depth requirement provides more than adequate protection of underlying roads.	12” (grooming) and 6” (OSV use) snow depth requirement provides adequate protection of underlying roads.	18” (grooming), 12” (general OSV use) and 6” (OSV use on underlying routes) snow depth requirements provide adequate protection of underlying roads.	12” (grooming, general OSV use) and 6” snow depth requirements and no visible damage on underlying routes provide adequate protection of underlying roads.
Hydrology	Effects to Water Quality	Negligible effects on water quality	Negligible effects on water quality	Negligible effects on water quality	Negligible effects on water quality
Heritage	Effects to Cultural Resources	No adverse effect	No adverse effect	No adverse effect	No adverse effect
Recreation					
Recreation Settings and Opportunities	Recreation Opportunity Spectrum/Consistency with ROS class	Consistent	Consistent	Consistent – with enhanced opportunities for non-motorized recreation experiences	Consistent – with enhanced opportunities for motorized recreation experiences
	Opportunities for Motorized Winter Uses/Acres and Percent Change	976,760 acres open to OSV use	947,120 acres open to OSV use, a 3 percent reduction from existing conditions.	878,690 acres open to OSV use, a 10 percent reduction from existing conditions.	966,270 acres open to OSV use, a 1 percent reduction from existing conditions.

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	Opportunities for Non-motorized Winter Uses/Acres and Percent Change	173,260 acres closed to OSV use/ 148 miles of trail closed to OSV use	202,900 acres closed to OSV use, a 15 percent increase from existing conditions	271,330 acres closed to OSV use, a 36 percent increase from existing conditions.	183,750 acres closed to OSV use, a 5 percent increase from existing conditions.
	OSV Designations/ Miles and Percent Change	406 miles designated/ 324 miles groomed	406 miles designated / 324 miles groomed No change from existing conditions.	406 miles designated/ 324 miles groomed No change from existing conditions.	406 miles designated/ 324 miles groomed No change from existing conditions.
Conflicts between motorized and non-motorized winter experiences	Noise	976,760 acres open to OSV use and potentially affected by noise/ 173,260 acres closed to OSV use and available for quiet recreation	947,120 acres open to OSV use and potentially affected by noise/ 202,900 acres closed to OSV use and available for quiet recreation	878,690 acres open to OSV use and potentially affected by noise/ 271,330 acres closed to OSV use and available for quiet recreation	966,270 acres open to OSV use and potentially affected by noise/ 183,750 acres closed to OSV use and available for quiet recreation
	Access to Desired Motorized and Non-Motorized Recreation Settings and Opportunities	Six plowed trailheads provide access for motorized and non-motorized winter use, including 324 miles of groomed OSV trails for motorized use and six non-motorized trails with a total of 148 miles for non-motorized use. 12-18 inches of snow required for OSV trail grooming	Six plowed trailheads provide access for motorized and non-motorized winter use, including 324 miles of groomed OSV trails for motorized use and six non-motorized trails with a total of 148 miles for non-motorized use. 12 inches of snow required for OSV trail grooming and cross-country travel. 6 inches for OSV use on trails with underlying roads and trails.	Six plowed trailheads provide access for motorized and non-motorized winter use, including 324 miles of groomed OSV trails for motorized use and six non-motorized trails with a total of 148 miles for non-motorized use. 18 inches of snow required for OSV trail grooming. 12 inches of snow required for cross-country travel. 6 inches on a limited basis for OSV use on specific trails with underlying roads and trails,	Six plowed trailheads provide access for motorized and non-motorized winter use, including 324 miles of groomed OSV trails for motorized use and six non-motorized trails with a total of 148 miles for non-motorized use. 12 inches of snow required for OSV trail grooming. 12 inches of snow required for cross-country travel. 12 inches with exceptions on OSV trails with underlying roads and trails with less than 12 inches to reach higher terrain and legal snow depths as long as no resource damage.

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Conflicts between motorized and non-motorized winter experiences (continued)	Potential Conflict with other Resource Values	Groomed OSV trails in close proximity to the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries, and to the boundary of Lassen Volcanic National Park. No known conflicts with tribal/spiritual areas, historic areas or populated areas.	Groomed OSV trails in close proximity to the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries, and to the boundary of Lassen Volcanic National Park. No known conflicts with tribal/spiritual areas, historic areas or populated areas.	Groomed OSV trails in close proximity to the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries, and to the boundary of Lassen Volcanic National Park. No known conflicts with tribal/spiritual areas, historic areas or populated areas.	Groomed OSV trails in close proximity to the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries, and to the boundary of Lassen Volcanic National Park. No known conflicts with tribal/spiritual areas, historic areas or populated areas.
	Public Safety	Non-motorized and motorized users share trailheads for access.	Non-motorized and motorized users share trailheads for access.	Non-motorized and motorized users share trailheads for access. Additional areas provided for non-motorized use that is separated from motorized use	Non-motorized and motorized users share trailheads for access. One additional area provided for non-motorized use that is separated from motorized use will enhance safety for non-motorized users.

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Designated Areas	Proximity and Frequency of OSV Designations in Relation to Designated Areas	Groomed OSV trails within ¼ mile of Wilderness and proposed Wilderness boundaries. Groomed OSV trails cross PCT in 3 locations, PCT crossings in open areas not designated.	Groomed OSV trails within ¼ mile of Wilderness and proposed Wilderness boundaries. Groomed OSV trails cross PCT in 3 locations, designated PCT crossings consistent with the PCT Comprehensive Plan and project design features	Groomed OSV trails within ¼ mile of Wilderness and proposed Wilderness boundaries. Designation of the McGowan Frontcountry non-motorized area minimizes motorized impact on the Heart Lake and Wild Cattle Mountains Proposed Wilderness Areas. Designation of the Butte Lake Backcountry Solitude Area minimizes motorized impact on the Caribou Wilderness and Caribou extension proposed wilderness and Lassen Volcanic National Park. Groomed OSV trails cross PCT in 3 locations, designated PCT crossings consistent with the PCT Comprehensive Plan and project design features.	Groomed OSV trails within ¼ mile of Wilderness and proposed Wilderness boundaries. Designation of the McGowan Frontcountry non-motorized area with OSVs restricted to one designated trail minimizes motorized impact on the Heart Lake and Wild Cattle Mountains Proposed Wilderness Areas. Groomed OSV trails cross PCT in 3 locations, designated PCT crossings consistent with the PCT Comprehensive Plan and project design features.

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Terrestrial Wildlife					
Threatened, Endangered, and Proposed Species, and Critical Habitat	Northern Spotted Owl	May affect, but is not likely to adversely affect	May affect, but is not likely to adversely affect	May affect, but is not likely to adversely affect	May affect, but is not likely to adversely affect
	Northern Spotted Owl Critical Habitat	No Effect	No Effect	No Effect	No Effect
	Pacific Fisher	May affect individuals, but will not jeopardize	May affect individuals, but will not jeopardize	May affect individuals, but will not jeopardize	May affect individuals, but will not jeopardize
	Gray Wolf	May affect, but is not likely to adversely affect	May affect, but is not likely to adversely affect	May affect, but is not likely to adversely affect	May affect, but is not likely to adversely affect
	Valley Elderberry Longhorn Beetle	No effect	No effect	No effect	No effect
	Western Yellow-billed Cuckoo	No effect	No effect	No effect	No effect
	Western Yellow-billed Cuckoo Critical Habitat	No effect	No effect	No effect	No effect
Sensitive Species	Pacific Marten	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing
	California Spotted Owl	Would impact individuals, but are not likely to lead to a trend toward federal listing or a loss of viability	Would impact individuals, but are not likely to lead to a trend toward federal listing or a loss of viability	Would impact individuals, but are not likely to lead to a trend toward federal listing or a loss of viability	Would impact individuals, but are not likely to lead to a trend toward federal listing or a loss of viability
	Northern Goshawk	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing
	Sierra Nevada Red Fox	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Sensitive Species (continued)	North American Wolverine	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing
	Fringed Myotis	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing
	Pallid Bat	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing
	Townsend's Big-eared Bat	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing
	Bald Eagle	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing
	Great Gray Owl	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing
	Willow Flycatcher	No impact	No impact	No impact	No impact
	Greater Sandhill Crane	No impact	No impact	No impact	No impact
	Yellow Rail	No impact	No impact	No impact	No impact
	Western Pond Turtle	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing
	Shasta Hesperian Snail	No impact	No impact	No impact	No impact
	Western Bumble Bee	No impact	No impact	No impact	No impact

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Subnivean Species: Shrews, Vole, Deer Mouse	Percentage of habitat affected and percentage of habitat within high and moderate OSV use categories	98/31	98/31	90/24	98/30
Management Indicator Species	Mule Deer	Minimal change in mule deer populations, trends, or the montane hardwood/conifer habitat associated with mule deer	Minimal change in mule deer populations, trends, or the montane hardwood/conifer habitat associated with mule deer	Minimal change in mule deer populations, trends, or the montane hardwood/conifer habitat associated with mule deer	Minimal change in mule deer populations, trends, or the montane hardwood/conifer habitat associated with mule deer
	Mountain Quail	Minimal expected change in trends for mountain quail or the early seral and mid-seral conifer habitat	Minimal expected change in trends for mountain quail or the early seral and mid-seral conifer habitat	Minimal expected change in trends for mountain quail or the early seral and mid-seral conifer habitat	Minimal expected change in trends for mountain quail or the early seral and mid-seral conifer habitat
	Sooty (Blue) Grouse	Minimal expected change in populations or population trends for sooty grouse, nor to the late-seral open canopy ecosystem component with which they are associated	Minimal expected change in populations or population trends for sooty grouse, nor to the late-seral open canopy ecosystem component with which they are associated	Minimal expected change in populations or population trends for sooty grouse, nor to the late-seral open canopy ecosystem component with which they are associated	Minimal expected change in populations or population trends for sooty grouse, nor to the late-seral open canopy ecosystem component with which they are associated
	Late Seral Closed Canopy Coniferous Forest (California spotted owl, Pacific marten, northern flying squirrel)	Minimal expected change in populations or population trends for California spotted owls, Pacific marten, or northern flying squirrels, nor to the late-seral closed canopy habitat component with which they are associated	Minimal expected change in populations or population trends for California spotted owls, Pacific marten, or northern flying squirrels, nor to the late-seral closed canopy habitat component with which they are associated	Minimal expected change in populations or population trends for California spotted owls, Pacific marten, or northern flying squirrels, nor to the late-seral closed canopy habitat component with which they are associated	Minimal expected change in populations or population trends for California spotted owls, Pacific marten, or northern flying squirrels, nor to the late-seral closed canopy habitat component with which they are associated
Migratory Landbirds		Minimal impacts to individual migratory birds and would not adversely affect migratory landbird conservation.	Minimal impacts to individual migratory birds and would not adversely affect migratory landbird conservation.	Minimal impacts to individual migratory birds and would not adversely affect migratory landbird conservation.	Minimal impacts to individual migratory birds and would not adversely affect migratory landbird conservation.

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Fisheries and Aquatic Resources	Central Valley spring-run Chinook and Central Valley steelhead	May affect, not likely to adversely affect	May affect, not likely to adversely affect	May affect, not likely to adversely affect	May affect, not likely to adversely affect
	Sierra Nevada Yellow Legged Frog	May affect, likely to adversely affect	May affect, likely to adversely affect	May affect, likely to adversely affect	May affect, likely to adversely affect
	Cascades Frog (Sensitive)	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area	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	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area
Botany	*Orcuttia tenuis*	No effect	No effect	No effect	No effect
	Orcuttia tenuis Critical Habitat	No effect	No effect	No effect	No effect
	Tuctoria greenei	No effect	No effect	No effect	No effect
	Tuctoria greenei Critical Habitat	No effect	No effect	No effect	No effect
	Sensitive Species	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area
	Survey and Manage Species	No negative effects	No negative effects	No negative effects	No negative effects

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Soils	Soil Productivity and Soil Stability: OSV acres open to cross-country travel on sensitive soils (including wet meadows, areas with potential low stability, and areas with potential erosion hazards).	There would be no change in acreage of area currently open to cross-country OSV travel on sensitive soils. Approximately 87,292 acres with mapped sensitive soil types are open to cross-country travel.	Approximately 87,292 acres of sensitive soils would be open to cross-country OSV travel within the Forest. This is no different from the no-action alternative, and these two alternatives have the greatest acreage of sensitive soils open to OSV cross-country travel.	Approximately 73,622 acres of sensitive soils will be open to cross-country OSV travel. Under this alternative, the least amount of sensitive soils will be open to OSV cross-country travel.	Approximately 84,529 acres of sensitive soils will be open to cross-country OSV travel. Under this alternative, there would be less sensitive soils open to cross-country OSV travel than the proposed action, but slightly more than under alternative 3.
	Soil Stability: Minimum snow depths on trails (inches)	Minimum snow depth is 12 inches of unpacked snow prior to any OSV travel over existing roads and trails. This minimum snow depth has been observed to be sufficient to prevent contact of OSVs with the bare soil surface.	Minimum snow depth is 6 inches of unpacked snow prior to any OSV travel over existing roads and trails. This minimum snow depth may potentially create conditions in which the road surface is exposed to OSVs and there is potential for some soil erosion or rutting of the road surface. Monitoring of this snow depth is recommended to further evaluate the potential effects to soils.	Minimum snow depth is 6 inches of unpacked snow prior to any OSV travel over existing roads and trails. This minimum snow depth may potentially create conditions in which the road surface is exposed to OSVs and there is potential for some soil erosion or rutting of the road surface. Monitoring of this snow depth is recommended to further evaluate the potential effects to soils.	Minimum snow depth is 6 inches of unpacked snow prior to any OSV travel over existing roads and trails. This minimum snow depth may potentially create conditions in which the road surface is exposed to OSVs and there is potential for some soil erosion or rutting of the road surface. Monitoring of this snow depth is recommended to further evaluate the potential effects to soils.
	Soil Productivity: Minimum snow depths for cross-country travel (inches)	Minimum snow depth for cross-country OSV travel is currently 12 inches of unpacked snow. Potential effects to the soil are unlikely to occur with at least 12 inches of snow covering the soil surface.	Minimum snow depth of 12 inches of unpacked snow for cross-country OSV travel would not change. Potential effects to the soil are unlikely to occur with at least 12 inches of snow covering the soil surface.	Minimum snow depth of 12 inches of unpacked snow for cross-country OSV travel would not change. Potential effects to the soil are unlikely to occur with at least 12 inches of snow covering the soil surface.	Minimum snow depth of 12 inches of unpacked snow for cross-country OSV travel would not change. Potential effects to the soil are unlikely to occur with at least 12 inches of snow covering the soil surface.

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Soils (continued)	Soil Productivity: Total acres open to OSV use	Approximately 976,760 acres of the Forest are open to OSV use. Under the no-action alternative, the most acreage is open to OSV use; therefore, the most potential for soil damage exists under this alternative.	Approximately 947,120 acres of the Forest would be open to OSV use. This is less area open to OSV use compared to the no-action alternative, but it is the greatest amount of acres open to OSV use when compared to the other action alternatives. The proposed action has the potential for the most impacts to the soil resource when compared with alternatives 3 and 4.	Approximately 876,690 acres of the Forest would be open to OSV use, which is the least amount of land open to OSV use out of all four alternatives.	Approximately 879,690 acres of the Forest would be open to OSV use, which is a greater area than under alternative 3, but less area than the no-action and proposed action alternatives.
Socioeconomics	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	No change due to management; increased visitor use over time would increase number of jobs, labor income, and tax revenue	No change due to management; increased visitor use over time would increase number of jobs, labor income, and 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	No change due to management; visitor use expected to increase over time	No change due to management; visitor use expected to increase over time	No change due to management; visitor use expected to increase over time	No change due to management; visitor use expected to increase over time
	Quality of life: Values, beliefs, and attitudes	No net change in quality of life relative to current conditions; user conflict may increase due to population growth and increased visitor use	15% increase in acres closed to OSV use would benefit quality of life of non-motorized winter recreation users; potential for continued user conflict due to trails in proximity to wilderness, national park, and shared trailheads	36% increase in acres closed to OSV use would benefit quality of life of non-motorized winter recreation users; potential for continued user conflict due to trails in proximity to wilderness, national park, and shared trailheads	No net change in quality of life relative to current conditions; user conflict may increase due to population growth and increased visitor use

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Socioeconomics (continued)	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	Minor change due to prohibition on OSV use below 3,500 feet in elevation; climate change may increase distances winter recreation users must travel for adequate snow depth	Minor change due to prohibition on OSV use below 3,500 feet in elevation; climate change may increase distances winter recreation users must travel for adequate snow depth	No change due to management; climate change may increase distances winter recreation users must travel for adequate snow depth
Noise	Opportunities for motorized winter uses/Acres	976,760 acres open to OSV use and potentially affected by noise/173,260 acres closed to OSV use and available for quiet recreation	947,120 acres open to OSV use and potentially affected by noise/202,900 acres closed to OSV use and available for quiet recreation	878,690 acres open to OSV use and potentially affected by noise/271,330 acres closed to OSV use and available for quiet recreation	966,270 acres open to OSV use and potentially affected by noise/183,750 acres closed to OSV use and available for quiet recreation
	OSV designations / Miles	406 miles designated /324 miles groomed	406 miles designated /324 miles groomed No change from existing conditions.	406 miles designated /324 miles groomed No change from existing conditions.	406 miles designated /324 miles groomed No change from existing conditions.
Air Quality	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	976,760 acres open to OSV use. No known violations of the CAA as a result of OSV use under the existing condition.	947,120 acres open to OSV use, a 3 percent reduction from existing conditions. . No violations of the CAA are anticipated.	878,690 acres open to OSV use, a 10 percent reduction from existing conditions. No violations of the CAA are anticipated.	966,270 acres open to OSV use, a 1 percent reduction from existing conditions. No violations of the CAA are anticipated.
	Estimate of change (increase/decrease) in emissions and the potential to create adverse impacts to air quality. Acres open to OSV visitor use	406 miles designated for OSV use. No known violations of the CAA as a result of OSV use under the existing condition.	406 miles designated for OSV use. No change from existing conditions. No violations of the CAA are anticipated.	406 miles designated for OSV use. No change from existing conditions. No violations of the CAA are anticipated.	406 miles designated for OSV use. No change from existing conditions. No violations of the CAA are anticipated.

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Air quality (continued)	Potential effects of OSV emissions to create adverse impacts to air quality/ Shifts in OSV use in relation to sensitive areas (Class 1 and II areas).	Groomed OSV trails are in close proximity to the Caribou Wilderness, Thousand Lakes Wilderness, and the boundary of Lassen Volcanic National Park. No known violations of the CAA or impact to Class 1 areas as a result of OSV use under the existing condition.	Groomed OSV trails are in close proximity to the Caribou Wilderness, Thousand Lakes Wilderness, and the boundary of Lassen Volcanic National Park. No violations of the CAA or impact to Class 1 areas are anticipated under this alternative.	Groomed OSV trails are in close proximity to the Caribou Wilderness, Thousand Lakes Wilderness, and the boundary of Lassen Volcanic National Park. Designation of Butte Lake Backcountry Solitude area minimizes OSV impacts and reduces emissions near Caribou wilderness and Lassen Volcanic National Park. No violations of the CAA or impact to Class 1 areas are anticipated under this alternative.	Groomed OSV trails are in close proximity to the Caribou Wilderness, Thousand Lakes Wilderness and the boundary of Lassen Volcanic National Park. No violations of the CAA are anticipated or impacts to Class 1 areas.

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Chapter 1. Purpose of 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 environmental impact statement 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 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 Proposed Action**: This chapter provides a detailed description of the agency's 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 proposed action and alternatives with respect to their environmental impacts.
- **Chapter 3. Affected Environment and Environmental Consequences**: This chapter describes the environmental impacts of the 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.
- **Index**: The index provides page numbers by document topic.

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

Types of Routes and Other 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 total 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 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 District.
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).

Background

Travel Management Regulations – Subpart C

Subpart C of the Forest Service's Travel Management Regulations became effective on February 27, 2015 (80 FR 4500, Feb. 27, 2015). The regulations state, in part: "Over-snow vehicle use on NFS roads, on NFS trails, and in areas on NFS lands shall be designated by the Responsible Official on administrative units or Ranger Districts, or parts of administrative units or Ranger Districts, of the NFS 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)). Over-snow vehicle designations made as a result of the analysis in this EIS would conform to Subpart C of the Travel Management Regulations.

Once issued, these designations are 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.

Snow Trail Grooming Program

For more than 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 NFS trails (snow trails) by grooming snow for snowmobile use. Most groomed snow trails on the national forests in California are co-located on underlying National Forest System roads. Some grooming occurs on county roads and closed snow-covered highways. Grooming activities are funded by the state off-highway vehicle trust fund.

The following summarizes how the Forest Service currently manages public OSV use on the approximately 1,150,020-acre Lassen National Forest:

- Approximately 406 miles of National Forest System OSV trails;
- Of the approximately 406 miles of National Forest System OSV trails, approximately 324 miles are groomed OSV trails;
- Approximately 148 miles of National Forest System trail closed to OSV use;
- Approximately 976,760 acres of National Forest System land open to off-trail cross-country OSV use; and
- Approximately 173,260 acres of National Forest System land closed to OSV use.

In 2013, the Forest Service entered into a Settlement Agreement with Snowlands Network et al., to "complete appropriate NEPA analysis(es) to identify snow trails for grooming" on the Lassen National Forest and four other national forests in California. The Forest Service will comply with the terms of the Settlement Agreement for the Lassen National Forest by completing this analysis.

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

1. Analyze ancillary activities such as the plowing of related parking lots and trailheads as part of the effects analysis;
2. Consider a range of alternative actions that would result in varying levels of snowmobile use; and
3. 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.

Scope of this Action

The Lassen National Forest Over-snow Vehicle Use Designation is not intended to be a comprehensive, holistic winter recreation planning effort. The designations resulting from this analysis would only apply to the public use of OSVs on National Forest System lands within the Lassen National Forest. An OSV is defined in the Forest Service's Travel Management Regulations 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).

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.

These designations will only apply to public OSV use. Limited administrative use by the Forest Service; use of any fire, military, emergency, or law enforcement vehicle for emergency purposes; authorized use of any combat or combat support vehicle for national defense purposes; law enforcement response to violations of law, including pursuit; and OSV 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, would be exempt from these designations (36 CFR 212.81(a)).

No new designation of non-motorized trails or areas would result from this analysis. All existing non-motorized trails and areas on the Lassen National Forest would remain non-motorized in all alternatives analyzed in detail. Some existing non-motorized trails will be identified in this analysis to provide context. Non-motorized winter recreational opportunities and uses will be considered in the analysis in terms of the effects that designating snow trails and areas for OSV use may have on non-motorized recreational opportunities.

Further, with respect to the grooming action, there are financial limitations on the miles and frequency of snow trail grooming within the forest's snow trail grooming program. This is because the forest's current snow trail grooming program is funded by California State Parks. These funds are not likely to substantially increase in future years.

These designations would be effective immediately upon the issuance of the record of decision, which is expected in October 2016. The Forest Service would produce an OSV use map (OSVUM) that would look like the existing motor vehicle use map (MVUM) for the Lassen National Forest. Such a map would allow OSV enthusiasts to identify the routes and areas where OSV use would be allowed on the Lassen National Forest.

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 NFS snow trails and areas for OSV use (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).

Project Location

This proposal would be implemented on all of the National Forest System lands within the Lassen National Forest in Northeastern California (
figure 1).

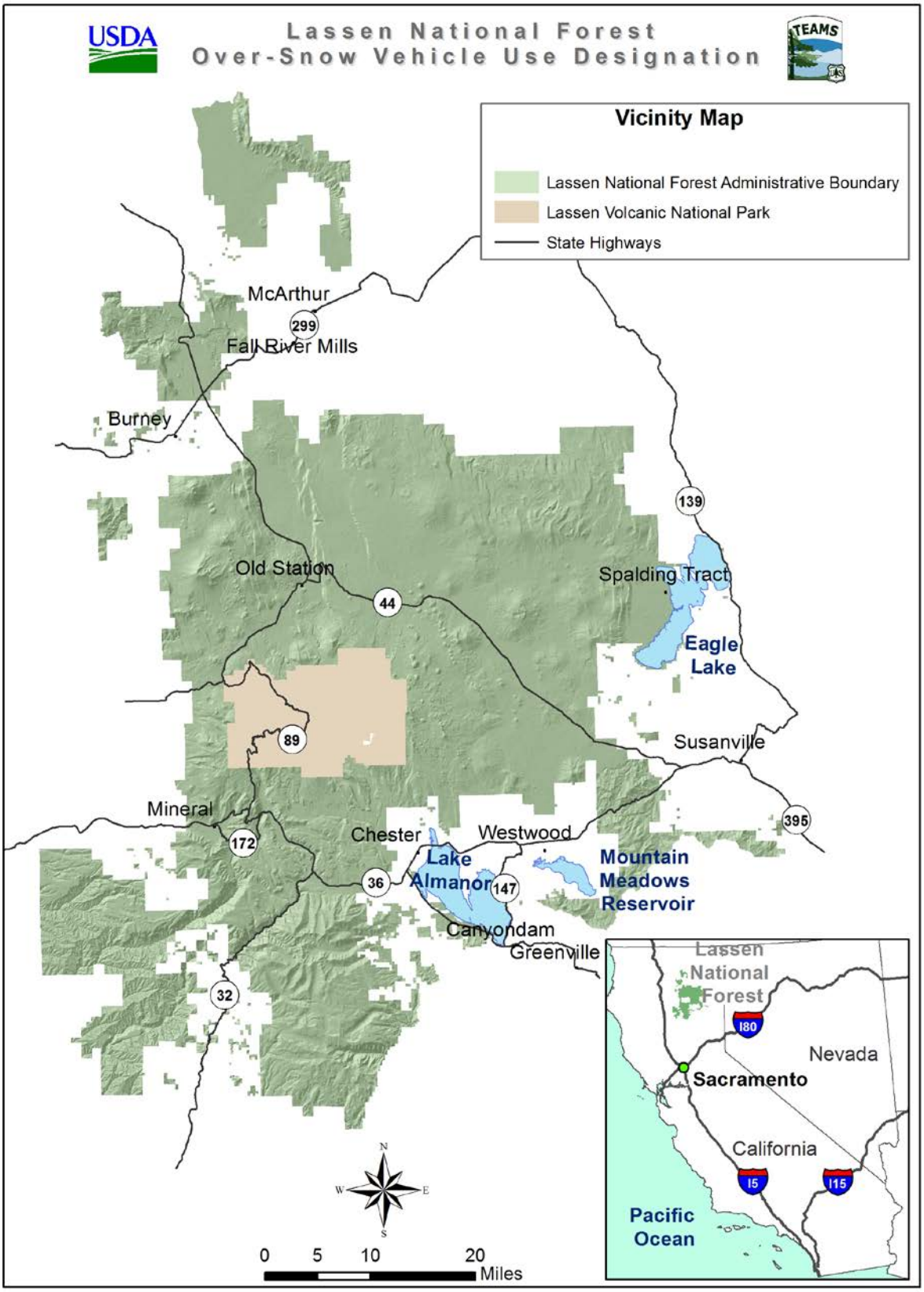

Figure 1. Vicinity map

Purpose and Need

One purpose of this project is to effectively manage OSV use on the Lassen National Forest to provide access, ensure that 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.

There is a need to provide a manageable, designated OSV system of trails and areas within the Lassen National Forest, that is consistent with and achieves the purposes of the Forest Service Travel Management Regulations at 36 CFR part 212. This action responds to direction provided by the Forest Service's Travel Management Regulations at 36 CFR part 212 and Subpart C of the Travel Management Regulations.

The existing system of available OSV trails and areas on the Lassen National Forest is the culmination of multiple agency decisions over recent decades. Public OSV use of the majority of this available system continues to be manageable and consistent with current travel management regulations.

Exceptions have been identified, based on internal and public input and the criteria listed at 36 CFR 212.55. These include needs to provide improved access for OSV users and to formalize prohibitions required by Forest Plan and other management direction. These exceptions represent additional needs for change, and in these cases, changes are proposed to meet the overall objectives.

Currently, the Forest Service requires 12 or more inches of snow on the ground to operate an OSV on the Lassen National Forest. Although 12 inches of snow may exist at a given time in many higher elevation areas, there may be less than 12 inches of snow at trailheads, which under current regulations, would leave areas with 12 or more inches of snow inaccessible to OSV use. To improve OSV access to areas open to OSV use, the proposed action would allow OSV use on designated snow trails, as long as there are at least 6 inches of snow on the ground.

The Forest Service has also identified two areas in which OSV use should be prohibited, but there are no existing orders or directives that have formally prohibited OSV use within them. One area is located in the southwest corner of the Lassen National Forest, below 3,500 feet in elevation. Snowfall is typically not adequate in this area for OSV use to occur. This area is approximately 29,130 acres in size. The proposed action would prohibit OSV use in this area.

The second area in which OSV use should be prohibited is the Black Mountain Research Natural Area (RNA). The Lassen National Forest Land and Resource Management Plan (Forest Plan) prohibits motorized vehicles within research natural areas, but no formal directive prohibiting such use has been issued for the Black Mountain RNA. This area is approximately 520 acres in size. The proposed action would prohibit OSV use in the Black Mountain RNA.

A second purpose of this project is to identify those designated NFS snow trails where grooming for OSV use would occur as required by the Settlement Agreement between the Forest Service and Snowlands Network, et al. Under the terms of the Settlement Agreement, the Forest Service is required to complete the appropriate NEPA analysis to identify snow trails for grooming on the Lassen National Forest. This action would identify snow trails for grooming.

The snow trail grooming analysis would also address the need to provide a high quality OSV trail system on the Lassen National Forest that is smooth and stable for the rider. Groomed trails are designed so that the novice rider can use them without difficulty.

Proposed Action

The Forest Service proposes several actions on the Lassen National Forest to be analyzed as required by the National Environmental Policy Act (NEPA). The actions proposed are as follows:

1. To designate 406 miles of National Forest System snow trails on National Forest System lands within the Lassen National Forest for OSV use during specified periods and when snowfall depth is adequate for that use to occur. All existing OSV prohibitions applying to trails would continue. OSV use that is inconsistent with the designations made under this decision would be prohibited under 36 CFR part 261.
2. To designate 947,120 acres of National Forest System lands within the Lassen National Forest as areas where cross-country OSV use is allowed during specified periods and when snowfall depth is adequate for that use to occur. All existing OSV prohibitions applying to areas would continue. OSV use that is inconsistent with the designations made under this decision would be prohibited under 36 CFR part 261.
3. To prohibit OSV use in any area below 3,500 feet in elevation on the Lassen National Forest. On the Lassen National Forest, an adequate amount of snowfall for OSV use typically occurs in most areas of the forest, except for areas below 3,500 feet in the southwest corner of the forest. This prohibition would cover 29,130 acres of NFS land where OSV use currently takes place when there is sufficient snow cover.
4. To prohibit OSV use in the 520-acre Black Mountain Research Natural Area.
5. To identify approximately 324 miles of designated OSV trails that would be groomed by the Forest Service on the Lassen National Forest for OSV use. Our trail mileages are estimates only and we are currently reviewing groomed trails where there is uncertainty regarding Forest Service jurisdiction.
6. To require a minimum of 12 inches of uncompacted snow in order for grooming to occur.
7. To implement a Forest-wide snow depth requirement for OSV use that would provide for public safety and natural and cultural resource protection by allowing OSV use in designated areas when there is a minimum of 12 inches of snow covering the landscape; and allow OSV use on designated National Forest System snow trails when there is a minimum of 6 inches of snow covering the trail. When the snow-depth requirement is not met, OSV use would be prohibited. All snow trails to be designated in all alternatives would overlay an existing paved, gravel, or native surface travel route. These travel routes are trails and roads used in the summer for highway, OHV, and non-motorized recreation.
8. To designate OSV crossings on the Pacific Crest Trail to be consistent with the crossings identified for summer motorized use.

Decision Framework

This decision will designate National Forest System snow trails and areas on National Forest System lands for OSV use on the Lassen National Forest where snowfall is adequate for that use to occur. It will also identify the National Forest System trails where grooming would occur. The decision would only apply to the use of over-snow vehicles as defined in the Forest Service’s Travel Management Regulations (36 CFR 212.1). The Forest Supervisor will consider all reasonable alternatives and decide whether to continue current management of OSV uses on the Lassen National Forest, implement the proposed action, or select an alternative for the management of OSV uses.

Responsible Official

The Lassen National Forest Supervisor is the deciding official who will issue the decision.

Public Involvement

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

A pre-scoping meeting was held on November 5, 2014, which was attended by interested and affected stakeholders. The meeting's objectives were to share information about the project and the NEPA process, gather input on public engagement and confirm and collect public input on a preliminary purpose and need for action through shared concerns and solutions with current OSV management on each forest. The meeting was attended by 28 people. A more detailed description of this meeting and outcomes are included in the December 2014 Pre-NEPA meeting summary report, available on the web and in the project record. The project first appeared on the Lassen National Forest's Schedule of Proposed Actions in January 2015.

A scoping letter describing the proposed action and seeking public comments was sent via regular mail or email to approximately 138 interested groups, individuals, and agencies on January 14, 2015, with comments requested to be returned by February 15, 2015. A press release was sent to local news media outlets on January 14, 2015. A notice of intent to prepare an environmental impact statement was published in the Federal Register on January 20, 2015. All notices included a web address for the project's website where comments could also be submitted. The project's website could also be accessed from the home page of the Lassen National Forest's public website.

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 66 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.

We analyzed all of the comment letters using a process called content analysis, which has several discrete steps. See page 427 for a list of respondents; a list of the subject categories represented by all of the comments; and a description of classification codes used for identifying preliminary issues.

Future Administrative Review Opportunities

The Lassen National Forest Over-Snow Vehicle Use Designation is an activity implementing a land management plan. 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.

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. Not all comments are issues.

We assigned each individual comment/concern to a classification code in order to assist with identifying issues and possible alternatives to the proposed action.

Significant issues generally concern resources that may be 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)…." A list of non-significant issues and reasons why they were found non-significant may be found in the project record located at the Lassen National Forest Supervisor's Office in Susanville, California.

Significant Issues

Based on the content analysis process described above and in appendix A, we have identified six significant issues for the Lassen National Forest Over-snow Vehicle Use Designation Analysis.

Quality Recreational Experience

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 estimate triples the OSV use on trails to the detriment of non-motorized users.

Designating roads, trails and areas 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. In the same way, OSV designations have the potential to enhance opportunities for non-motorized winter users in some areas while limiting or displacing those users in other areas. Conflict between motorized and non-motorized winter users 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 through illegal encroachment, noise, and increased human presence (i.e., Pacific Crest Trail, Wilderness).

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, along with the importance of motorized and non-motorized winter recreation opportunities as described in the Recreation Facility Analysis Niche Statements.

The component of this issue regarding a quality non-motorized experience is addressed by modifying the proposed action and developing alternative 3.

The proposed action was modified after scoping to prohibit OSVs from crossing the Pacific Crest Trail except at designated crossing points. These crossing points would be the same as those designated for wheeled vehicles.

Alternative 3 would prohibit OSV use on 68,430 more acres than the proposed action. Alternative 3 would also require a minimum of 18 inches of snow on trails before they would be groomed for OSV use, which is 6 inches more than the proposed action.

The component of this issue regarding a quality motorized experience is addressed by the proposed action and the development of alternative 4. The proposed action would reduce the minimum snow depth for OSV use on designated snow trails. Current management requires a minimum of 12 inches of snow before OSV could use designated snow trails. The proposed action reduces this minimum snow depth to 6 inches.

Alternative 4 would designate areas below an elevation of 3,500 feet for OSV use. This would increase the area available for OSV use by 19,150 acres more than the proposed action. Alternative 4 would also add 2 miles of OSV trail to the proposed action's trail system. Finally, alternative 4 would allow OSV use on designated snow trails with as few as 6 inches of snow without restriction, and with less than 6 inches of snow as long as such use would not cause visible damage to the underlying surface.

Noise

Designating roads, trails, and areas for OSV use and grooming trails for OSV use have the potential to generate anthropogenic 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.

Potential effects from noise are analyzed in Chapter 3 using the following indicator measures:

- Opportunities for motorized winter uses – Acres open to OSV use; percentage change
- OSV designations – Miles of designated OSV trails and miles of groomed OSV trails

Air Quality

Designating roads, trails, and areas for OSV use and grooming trails for OSV use have the potential to generate exhaust and emit pollutants into the air. This has the potential to degrade air quality, which can impact recreational users, wildlife, and sensitive areas.

Potential effects from exhaust and pollutants are analyzed in Chapter 3 using the following indicator measures:

- Estimate of change (increase/decrease) in emissions and the potential to create adverse impacts to air quality – Miles and acres of trail open to OSV visitor use
- Potential effects of OSV emissions to create adverse impacts to air quality – Shifts in OSV use in relation to sensitive areas (Class I and II areas)

Water and Soil Resources

Designating roads, trails, and areas for OSV use has the potential to result in ground disturbance and snow compaction, and this can directly, indirectly, and/or cumulatively adversely impact soil and water resources through soil compaction, erosion, displacement, and alteration of surface runoff and ground water flow. OSV use also has the potential for releasing 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. Changes in snowmelt patterns could affect hydrologic regimes in localized areas.

OSVs when operated cross-country instead of on designated trails have the potential for more widespread impacts from ground disturbance (similar in nature to summer motorized use if there is inadequate snow cover). These potential effects are highly dependent on location, particularly areas of thin snow cover, and the amount and timing of use.

OSVs when operated on designated National Forest System roads and designated National Forest System Trails without adequate snow cover have the potential to also result in soil compaction, erosion, and displacement and decreased water quality, as described above.

This issue is addressed by development of an alternative to the proposed action that includes establishing a uniform 12-inch minimum snow depth for all uses, with some exceptions. Project design criteria and monitoring measures have been added to all of the action alternatives regarding how snow depths would be measured, enforced, and used as guidelines to ensure resource impacts are minimized.

Aquatic Wildlife

OSV use and grooming for OSV use have the potential to 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.

OSVs, when operated cross-country instead of on designated trails, have the potential for more widespread impacts from ground disturbance (similar in nature to summer motorized use if there is inadequate snow cover). These potential effects are highly dependent on location, particularly areas of thin snow cover, and the amount and timing of use.

OSVs, when operated on designated National Forest System roads and trails without adequate snow cover, have the potential to 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 sensitive aquatic habitats, if in close proximity to these trails.

Terrestrial Wildlife

Designating roads, trails, and areas for OSV use and grooming trails for OSV use has the potential to impact terrestrial wildlife through direct/indirect or cumulative injury, mortality, or disturbance to individuals (e.g., increased noise and human presence resulting in a loss of breeding and/or feeding) and direct/indirect or cumulative disturbance or impacts to wildlife habitats (e.g., snow compaction in or near denning sites).

OSVs, when operated cross-country instead of on designated trails, have the potential to impact wildlife species from snow compaction in areas of inadequate snow cover and impacts on 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 thin snow cover, and the amount and timing of use.

Chapter 2. Alternatives

Introduction

This chapter describes and compares the no-action alternative and three action alternatives for the **Lassen National Forest Over-snow Vehicle Use Designation.** It includes a detailed description and maps of each alternative, how they were developed, 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.

How Alternatives were Developed

Information gathered by the Forest Service in their consultation and discussions with local counties, and Forest Service employees contributed to the development of alternatives. After the scoping period concluded, the Forest Service reviewed and considered all public comments.

Once issues were identified, we carefully considered alternatives to the proposed action or clarification to the proposed action. There were multiple comments regarding the proposed action. There were also many comments that suggested new alternatives or new alternative components to consider. The IDT reviewed these proposed alternatives to determine whether any modifications should be made to the proposed action and to make a recommendation to the line officer about which alternatives should be analyzed in detail in the EIS.

Alternatives Considered in Detail

The Lassen National Forest explored and evaluated the following alternatives (summarized in Table 16 at the end of this chapter)

Alternative 1: No Action

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 alternative 1, there would be no changes to the existing system of OSV use on roads, trails, and areas within the Lassen National Forest except as prohibited by Forest Order. In addition, only those seasonal restrictions as specified in the Lassen Forest Plan and contained in existing Forest Orders would be continued. The 2005 Travel Management Regulations, Subpart C, would not be implemented, and no OSV use map would be produced.

Current management requires a minimum snow depth of 12 inches for OSV use. Tables 2, 3, 4, 6, and 7, below, display the existing condition (current OSV management).

Alternative 2: Modified Proposed Action

The Forest Service proposes several actions on the Lassen National Forest to be analyzed as required by the National Environmental Policy Act (NEPA). The actions proposed are as follows:

1. To designate OSV use on National Forest System roads, National Forest System trails, and areas on National Forest System lands within the Lassen National Forest where snowfall depth is adequate for that use to occur. The responsible official would designate OSV use as allowed, restricted, or prohibited on administrative units or Ranger Districts, or parts of administrative

units or Ranger Districts of the Lassen National Forest. Areas where off-trail cross-country OSV use would be allowed would cover 947,120 acres. Trails where OSV use would be allowed would total 406 miles. All existing OSV prohibitions applying to Areas or trails would continue.

2. Of the 406 miles of designated OSV trails, 324 miles would be groomed by the Forest Service on the Lassen National Forest. Our trail mileages are estimates only and we are currently reviewing groomed trails where there is uncertainty regarding Forest Service jurisdiction.

3. Require a minimum of 12 inches of uncompacted snow in order for grooming to occur. The January 2015 proposed action description and NOI incorrectly stated that the California state standard for grooming utilizing state funds was 18 inches. It is in fact 12 to 18 inches and we were able to verify this after the initiation of scoping. Therefore, this change has been made to the proposed action to be consistent with on-going management and current agreements with the state.

4. To implement a forest-wide snow depth requirement for OSV use that would provide for public safety and natural and cultural resource protection by allowing OSV use in designated Areas when there is a minimum of 12 inches of snow covering the landscape; and allow OSV use on designated National Forest System roads and designated National Forest System Trails when there is a minimum of 6 inches of snow covering the road or trail. When the snow-depth requirement is not met, OSV use would be prohibited. All snow trails would be located on existing dirt, gravel, or paved trails or roads. These trails and roads are used in the summer for highway, OHV, and non-motorized recreation.

5. Designate OSV crossings on the Pacific Crest Trail to be consistent with the crossings identified for summer motorized use.

6. Area Prohibitions. Over-snow vehicle use is currently prohibited on 173,260 acres of the Lassen National Forest. The proposed action would continue OSV prohibitions in currently prohibited areas and include the following additional prohibitions:

   i. Prohibit OSV use in areas below 3,500 feet in elevation in the southwestern corner of the Lassen National Forest (approximately 29,130 acres).

   ii. Prohibit OSV use in the Black Mountain Research Natural Area to be consistent with management area direction in the Forest Plan (approximately 520 acres).

As a result, OSV use would be prohibited on a total of approximately 202,900 acres of the 1,150,020-acre Lassen National Forest.

Trail Prohibitions. The proposed action would continue OSV prohibitions on the following trails on the Lassen National Forest:

a. Pacific Crest Trail (approximately 106 miles).

b. Colby Mountain Cross-country Ski Trails (approximately 6 miles).

c. McGowan Lake Cross-country Ski Trails (approximately 5 miles).

d. Biz Johnson Trail from Susanville to Westwood Junction (approximately 17 miles).

e. Lake Almanor Recreation Trail (approximately 9 miles).

f. Eagle Lake Trail (approximately 5 miles).

The proposed actions are summarized in table 2 through table 7 and on maps displayed on pages 20 and 21 of this document.

Table 2. Summary comparing current OSV management with the proposed action for the management of OSV use on the Lassen National Forest

OSV Management	Current OSV Management	Proposed Action Designations
National Forest System (NFS) Lands within the Lassen National Forest	1,150,020 Acres	1,150,020 Acres
NFS Lands within the Lassen National Forest where OSV Use Designations would Apply	1,150,020 Acres	1,150,020 Acres
OSV Use Allowed: • Areas for OSV Use • Snow Trails for OSV Use	 976,760 Acres 406 Miles	 947,120 Acres 406 Miles
OSV Use Prohibited: • Areas (table 6) o Below 3,500 Feet in Elevation Included in Above Total o Black Mountain RNA Included in Above Total • Trails (table 7)	 173,260 Acres 0 Acres 0 Acres 148 Miles	 202,900 Acres 29,130 Acres 520 Acres 148 Miles
Minimum Snow Depth for OSV Use on Snow Trails	12 inches	6 inches on a limited basis
Minimum Snow Depth for Off-trail, Cross-country OSV Use	12 inches	12 inches

All area size and trail distance estimates are approximate and are rounded to the nearest 10 acres or nearest mile.

Table 3. Summary comparing current groomed OSV trails with proposed action for the grooming of OSV trails on the Lassen National Forest

OSV Management	Current OSV Management	Proposed Action
Total Groomed Trail System*	324 Miles	324 Miles
Minimum Snow Depth for Snow Trail Grooming to Occur	18 inches	12 inches
Grooming Season	12/26 – 3/31	12/26 – 3/31

*Included in the miles of trail over which OSV use is allowed in table 1.
Distance estimates are approximate and are rounded to the nearest mile.

The designations resulting from this analysis would only apply to the use of OSVs. An OSV is defined in the Forest Service's Travel Management Regulations 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).

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.

Limited administrative use by the Forest Service; use of any fire, military, emergency, or law enforcement vehicle for emergency purposes; authorized use of any combat or combat support vehicle for national defense purposes; law enforcement response to violations of law, including pursuit; and OSV use that is specifically authorized under a written authorization issued under Federal law or regulations would be exempt from these designations (36 CFR 212.81(a)).

National Forest System roads, National Forest System trails, and areas on National Forest System lands where OSV use is designated as allowed, restricted, or prohibited would be shown on an OSV use map (OSVUM). This map would show the roads, trails and areas where OSV use is allowed. It also would show trailheads and other ancillary recreational facilities.

Allowed OSV Use

OSV use would be designated as currently allowed on 406 miles of trails on the Lassen National Forest. Off-trail cross-country OSV use would also be designated as allowed on 947,120 acres. All designated OSV use would be subject to snow-depth restrictions. All OSV use would be prohibited on the Lassen National Forest unless there is adequate snow depth that meets the following conditions:

Allowed OSV Use	**Minimum Snow Depth**
OSV use on designated snow trails with underlying roads and trails:	6 inches
Cross-country off-trail OSV use:	12 inches

The minimum snow depth of 6 inches for OSV use on trails with underlying roads and trails represents a change from existing management. This change is to provide improved trail access for OSV users from trailheads to deeper snow areas.

OSV Use on Groomed Trails

The proposed action would identify 324 miles of National Forest System trails that would be groomed for OSV use on the Lassen National Forest (map, page 21). This would represent no change from current management.

Table 4 compares the number of miles of groomed snow trails that have historically been groomed and are currently managed with the miles of snow trails under the proposed action that are identified to be groomed. When there are 6 inches or more of snow covering these trails they would be open to OSV use. Snow trail grooming for OSV use would occur on all of these trails only when there are 18 or more inches of snow on the ground. Groomed trail systems would be located in the following areas: Ashpan, Bogard, Fredonyer, Jonesville, Morgan Summit, and Swain Mountain.

Table 4. Comparison of miles of groomed trail under current management and proposed action (miles)

OSV Area	Current OSV Management	Proposed Action
Ashpan*	41	41
Bogard	26	26
Fredonyer	44	44
Jonesville	62	62
Morgan Summit	60	60
Swain Mountain	91	91
Total	**324**	**324**

*Includes 3 miles of groomed snow trail within the Latour State Forest trail system that are located on National Forest System land and accessible from the Ashpan area.

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. Snow trails are prioritized for grooming based on visitor use. Grooming historically occurred several times per week. As part of this proposal, the grooming frequency on priority trails would occur several times per week and after major storms, typically between 4:00 p.m. and 6:00 a.m. The total hours of trail grooming that would occur at each site for an average season are shown in table 5.

Table 5. Summary of grooming operations on the Lassen National Forest

Grooming Location	Annual Groomed Miles	Annual Snowcat Hours	Max Day Hours
Ashpan	1,743	249	12
Bogard and Fredonyer	5,076	680	12
Jonesville	2,222	420	25
Morgan Summit	900	300	12
Swain Mountain	660	94	12

Trails would be groomed to a minimum width of 10 feet and typically up to 14 feet wide. Trails would be groomed up to 30 feet wide in the more heavily used areas such as near trailheads. Groomed trail width is determined by variety of factors such as width of the underlying road bed, width of grooming tractor, heavy two-way traffic on the trail, and trail corners. Trail width would not be groomed beyond width of underlying roadbed. Where the terrain allows, main ingress and egress trails that connect to the trailhead would be groomed to 18 feet wide or greater to facilitate the added traffic.

Snowcats are operated at speeds in the range of 3 to 7 miles per hour. The vehicle is operated with warning lights on at all times. The maximum hours of equipment operation is generally a 12-hour day during peak season (table 5).

Trail grooming would be conducted in accordance with the 1997 Snowmobile Trail Grooming Standards set by the California Off-Highway Motor Vehicle Recreation (OHMVR) Division, as follows:

- Operators shall be trained and directed by a grooming coordinator.
- Identify hazards in advance of grooming, preferably in autumn before snow falls.
- Typical grooming season is from December to March. Operate the snow tractor on approved designated trails only. Maintain a 10-foot vertical clearance from potential obstructions.
- Limit grooming speeds to between 3 to 7 miles per hour.
- Groom trails to a minimum of 10 feet wide with a typical width of 10 to 14 feet.

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.

Designation of Areas

Subpart C of the Travel Management Regulations defines an area as, “a discrete, specifically delineated space that is smaller, and, except for OSV use, in most cases much smaller, than a Ranger District.” The proposed action would designate areas on the Lassen National Forest where off-trail cross-country OSV uses would be allowed when there are 12 or more inches of snow on the ground. These areas total approximately 947,120 acres. These areas are located in any part of the Lassen National Forest where OSVs are not otherwise prohibited.

Prohibited OSV Use

The proposed action would continue existing prohibitions on OSV use on approximately 173,260 acres of NFS land and add new OSV use prohibitions on approximately 29,650 acres. These new prohibitions would apply to areas below 3,500 feet and in the Black Mountain RNA (table 6). Existing OSV prohibitions in Wilderness areas and in areas designated in the Forest Plan as Recommended Wilderness, Semi-primitive Non-motorized, and Research Natural Areas that currently have the force of law, regulation, or policy and would continue to exist. Combined with Areas where motorized vehicles are currently prohibited by law, regulation, or policy, OSV use would be prohibited on a total of approximately 202,900 acres.

Table 6. Areas where OSV use would be prohibited by the proposed action (acres*)

OSV-Prohibited Area	Current Management	Proposed Action
Below 3,500 feet Outside of Semi-primitive Non-motorized and Wilderness	0	29,130
Black Mountain Research Natural Area	0	520
Caribou Wilderness	20,830	20,830
Chips Creek Semi-primitive Non-motorized	18,320	18,320
Cinder Butte Semi-primitive Non-motorized	13,700	13,700
Cub Creek Research Natural Area	4,090	4,090
Eagle Lake Osprey Management Area	1,670	1,670
Heart Lake Recommended Wilderness	8,620	8,620
Ishi B Semi-primitive Non-motorized Outside of Ishi Wilderness	13,700	13,700
Ishi Wilderness	40,910	40,910
Keddie Ridge Semi-primitive Non-motorized	3,490	3,490
Mill Creek Recommended Wilderness	7,710	7,710
Onion Springs Semi-primitive Non-motorized	1,080	1,080
Prospect Semi-primitive Non-motorized	2,610	2,610
Snow Mountain Semi-primitive Non-motorized	700	700
Thousand Lakes Wilderness	16,570	16,570
Unnamed Minimal Management Area in the vicinity of Butt Mountain	1,660	1,660
Unnamed Minimal Management Area in the vicinity of Hat Creek Rim	12,740	12,740
Wild Cattle Mountain Recommended Wilderness	4,890	4,890
Total OSV-Prohibited Area	**173,260**	**202,900**

*All estimates are approximate and are rounded to the nearest 10 acres.

OSV use is currently prohibited on six trails and trail systems on the Lassen National Forest. The proposed action would continue these prohibitions (table 7).

Table 7. NFS trails where OSV use would be prohibited by the Proposed Action (miles on the Lassen National Forest)

Trail/Trail System	Current Management	Proposed Action
Pacific Crest Trail	106	106
Colby Mountain Cross-country Ski Trails	6	6
McGowan Lake Cross-country Ski Trails	5	5
Biz Johnson Trail from Susanville to Westwood Junction	17	17
Lake Almanor Recreation Trail	9	9
Eagle Lake Trail	5	5
Total	**148**	**148**

Distance estimates are approximate and are rounded to the nearest mile.

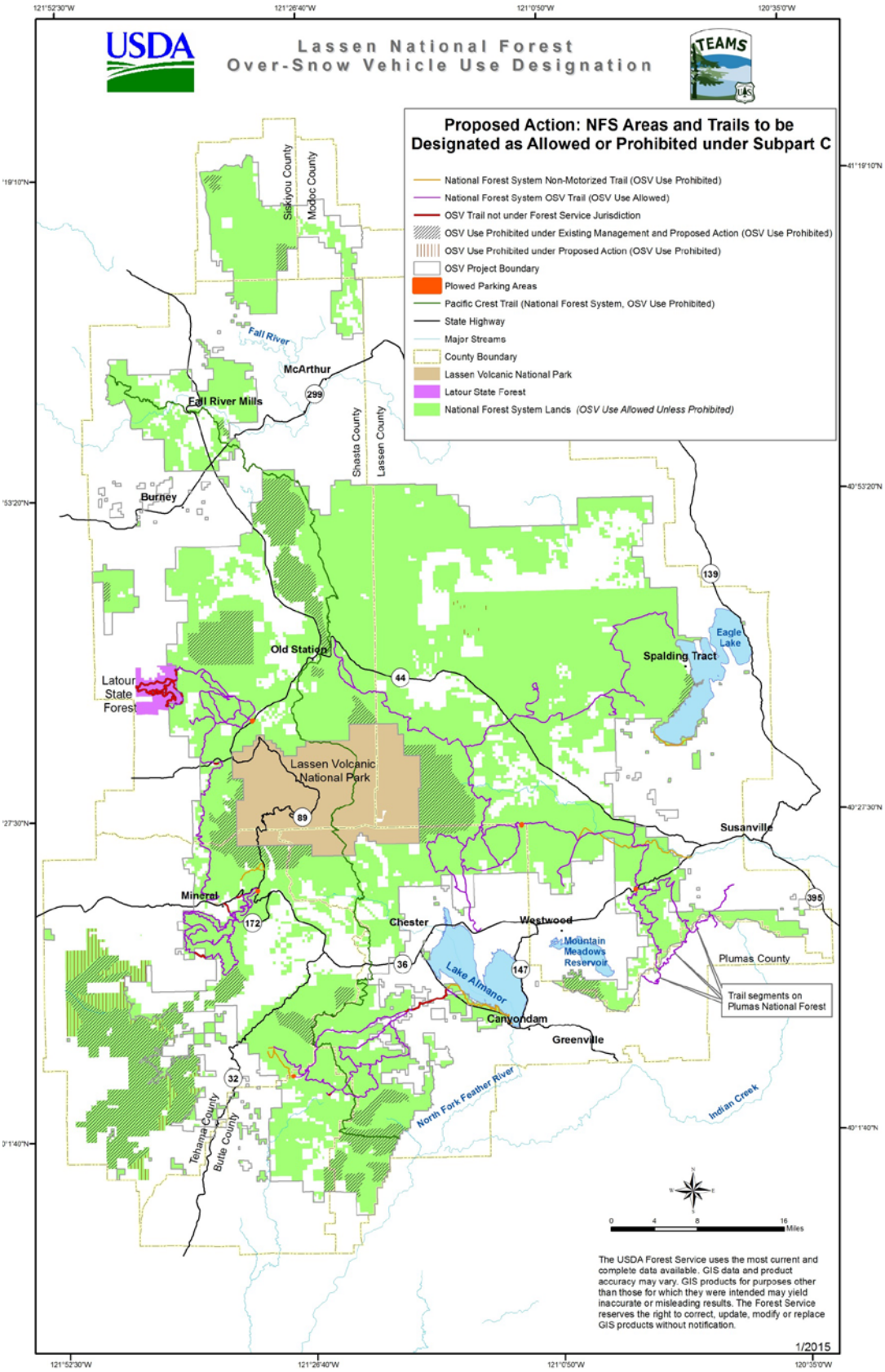

Figure 2. Map of proposed action – 36 CFR 212 Subpart C Designations

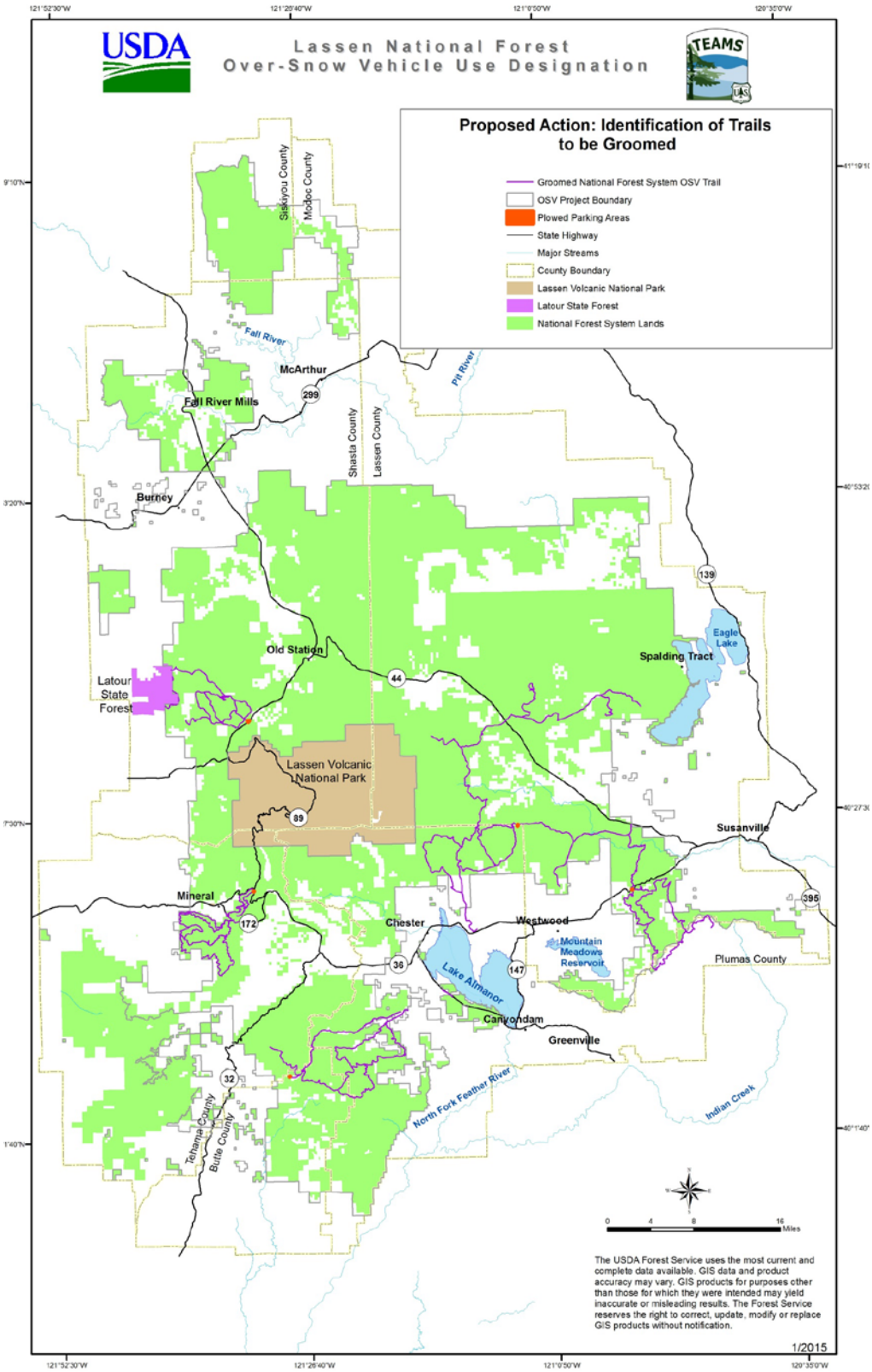

Figure 3. Map of proposed action – groomed OSV trails

Alternative 3

This alternative addresses the non-motorized recreational experience significant issue. It includes the components of the modified proposed action, as described above, but with the following additions.

Prohibit OSV use in the following areas:

- McGowen (9,940 acres)
    - OSV use would be allowed on designated OSV trail on the west boundary of this area.
- Colby Mountain (4,400 acres)
- Lake Almanor (1,980 acres)
- Eagle Lake Addition (1,640 acres)

Prohibit OSV use in two additional areas, but allow OSV use restricted to designated trails within these areas:

- Butte Lake Area (30,800 acres)
    - OSV use restricted to trail only on 22 miles of snow trail
- Fredonyer-Goumaz/Willard Hill Area (19,670 acres)
    - OSV Use restricted to trail only on 13 miles of snow trail

This alternative also includes a 12-inch minimum snow depth for cross-country OSV use, an 18-inch minimum snow depth for grooming and a 6-inch minimum snow depth for OSV use on underlying roads or trails. OSV use on roads with at least 6 inches of snow would be allowed on a limited basis on specific, identified routes in order for OSVs to access higher terrain and legal snow levels when snow depths are less than 12 inches, as long as this use does not cause visible damage to the underlying surface and can be readily enforced.

Project design features and monitoring listed in the next section would apply to this alternative. In addition, the following project design features would also be implemented:

- Education on responsible practices, trail restrictions, or separations to reduce conflicts.

This alternative would groom the same snow trails for OSV use as the modified proposed action. This alternative is summarized in table 8 through table 11 and shown on the map in figure 4.

Table 8. Summary comparing current OSV management with the modified proposed action and alternative 3 for the management of OSV use on the Lassen National Forest

OSV Management	Current OSV Management	Proposed Action Designations	Alternative 3 Designations
National Forest System (NFS) Lands within the Lassen National Forest (Acres)	1,150,020	1,150,020	1,150,020
OSV Use Allowed:			
• OSV Areas (Acres)	976,760	947,120	878,690
• Snow Trails (NFS Trail Miles)	406	406	406
o OSV Use Restricted to Designated Snow Trails Trails (Miles)*	0	0	35
▪ Butte Lake – Designated Snow Trails – OSV Use Allowed (Miles)	0	0	22
▪ Fredonyer-Goumaz/Willard Hill Designated Snow Trails – OSV Use Allowed (Miles)	0	0	13
OSV Use Prohibited:			
• Total Area (see table 10) (Acres)**	173,260	202,900	271,330
• Below 3,500 Feet in Elevation Included in Above Total (Acres)	0	29,130	29,130
• Black Mountain RNA Included in Above Total (Acres)	0	520	520
• McGowan – Cross-country OSV Use Prohibited (Acres)	0	0	9,940
• Colby Mountain – Cross-country OSV Use Prohibited (Acres)	0	0	4,400
• Lake Almanor – Cross-country OSV Use Prohibited (Acres)	0	0	1,980
• Eagle Lake Addition (Acres)	0	0	1,640
• Non-motorized Trails (see table 11) (Miles)	148	148	148
OSV Use Prohibited Except on Designated Snow Trails (Acres)**			
• Butte Lake – Cross-country OSV Use Prohibited (Acres)	0	0	30,800
• Fredonyer-Goumaz/Willard Hill – Cross-country OSV Use Prohibited (Acres)	0	0	19,670
Minimum Snow Depth for OSV Use on Snow Trails Designated for OSV Use (Inches)	12	6 on a limited basis	6 on a limited basis
Minimum Snow Depth for Off-trail, Cross-country OSV Use (Inches)	12	12	12

*Area estimates include acres in OSV restricted areas where cross-country OSV use would be prohibited and assume an average OSV trail width of 14 feet.

**Includes areas in which OSV use would be restricted to designated OSV trails.

All area size and trail distance estimates are approximate and are rounded to the nearest 10 acres or nearest mile.

Table 9. Summary comparing current groomed OSV trails with the modified proposed action and alternative 3 for the grooming of OSV trails on the Lassen National Forest

OSV Management	Current OSV Management	Modified Proposed Action	Alternative 3
Total Groomed Trail System (Miles)*	324	324	324
Minimum Snow Depth for Snow Trail Grooming to Occur (Inches)	18	12**	18
Grooming Season	12/26 – 3/31	12/26 – 3/31	12/26 – 3/31

*Included in the miles of trail over which OSV use is allowed in table 1.

**The proposed action has been modified to be consistent with the state grooming standard which states, "Begin grooming when the snow depth is at least 12 to 18 inches" (OSV Program Draft EIR, Program Years 2010-2020 – October 2010, California Department of Parks and Recreation, Off-Highway Motor Vehicle Recreation Division, page 2-12).

Distance estimates are approximate and are rounded to the nearest mile.

Table 10. Summary comparing current management with areas where OSV use would be prohibited under the modified proposed action and alternative 3 (acres)

OSV Prohibited Area	Current OSV Management	Proposed Action Designations	Alternative 3 Designations
Below 3,500 feet Outside of Semi-primitive Non-motorized and Wilderness	0	29,130	29,130
Black Mountain Research Natural Area	0	520	520
McGowan	0	0	9,940
Colby Mountain	0	0	4,400
Lake Almanor	0	0	1,980
Eagle Lake Addition	0	0	1,640
Butte Lake*	0	0	30,800
Fredonyer-Goumaz/Willard Hill*	0	0	19,670
Caribou Wilderness	20,830	20,830	20,830
Chips Creek Semi-primitive Non-motorized	18,320	18,320	18,320
Cinder Butte Semi-primitive Non-motorized	13,700	13,700	13,700
Cub Creek Research Natural Area	4,090	4,090	4,090
Eagle Lake Osprey Management Area	1,670	1,670	1,670
Heart Lake Recommended Wilderness	8,620	8,620	8,620
Ishi B Semi-primitive Non-motorized Outside of Ishi Wilderness	13,700	13,700	13,700
Ishi Wilderness	40,910	40,910	40,910
Keddie Ridge Semi-primitive Non-motorized	3,490	3,490	3,490
Mill Creek Recommended Wilderness	7,710	7,710	7,710
Onion Springs Semi-primitive Non-motorized	1,080	1,080	1,080
Prospect Semi-primitive Non-motorized	2,610	2,610	2,610
Snow Mountain Semi-primitive Non-motorized	700	700	700
Thousand Lakes Wilderness	16,570	16,570	16,570

OSV Prohibited Area	Current OSV Management	Proposed Action Designations	Alternative 3 Designations
Unnamed Minimal Management Area in the vicinity of Butt Mountain	1,660	1,660	1,660
Unnamed Minimal Management Area in the vicinity of Hat Creek Rim	12,740	12,740	12,740
Wild Cattle Mountain Recommended Wilderness	4,890	4,890	4,890
Total OSV Prohibited Area	173,260	202,900	271,330

*Area estimates include acres in OSV restricted areas where OSV use would be prohibited and assume an OSV trail width of 14 feet.

All area estimates are approximate and are rounded to the nearest 10 acres.

Table 11. Summary comparing current management with NFS trails where OSV use would be prohibited under the modified proposed action and alternative 3 (miles on the Lassen National Forest)

Trail/Trail System	Current OSV Management	Proposed Action	Alternative 3
Pacific Crest Trail	106	106	106
Colby Mountain Cross-country Ski Trails	6	6	6
McGowan Lake Cross-country Ski Trails	5	5	5
Biz Johnson Trail from Susanville to Westwood Junction	17	17	17
Lake Almanor Recreation Trail	9	9	9
Eagle Lake Trail	5	5	5
Total	148	148	148

Distance estimates are approximate and are rounded to the nearest mile.

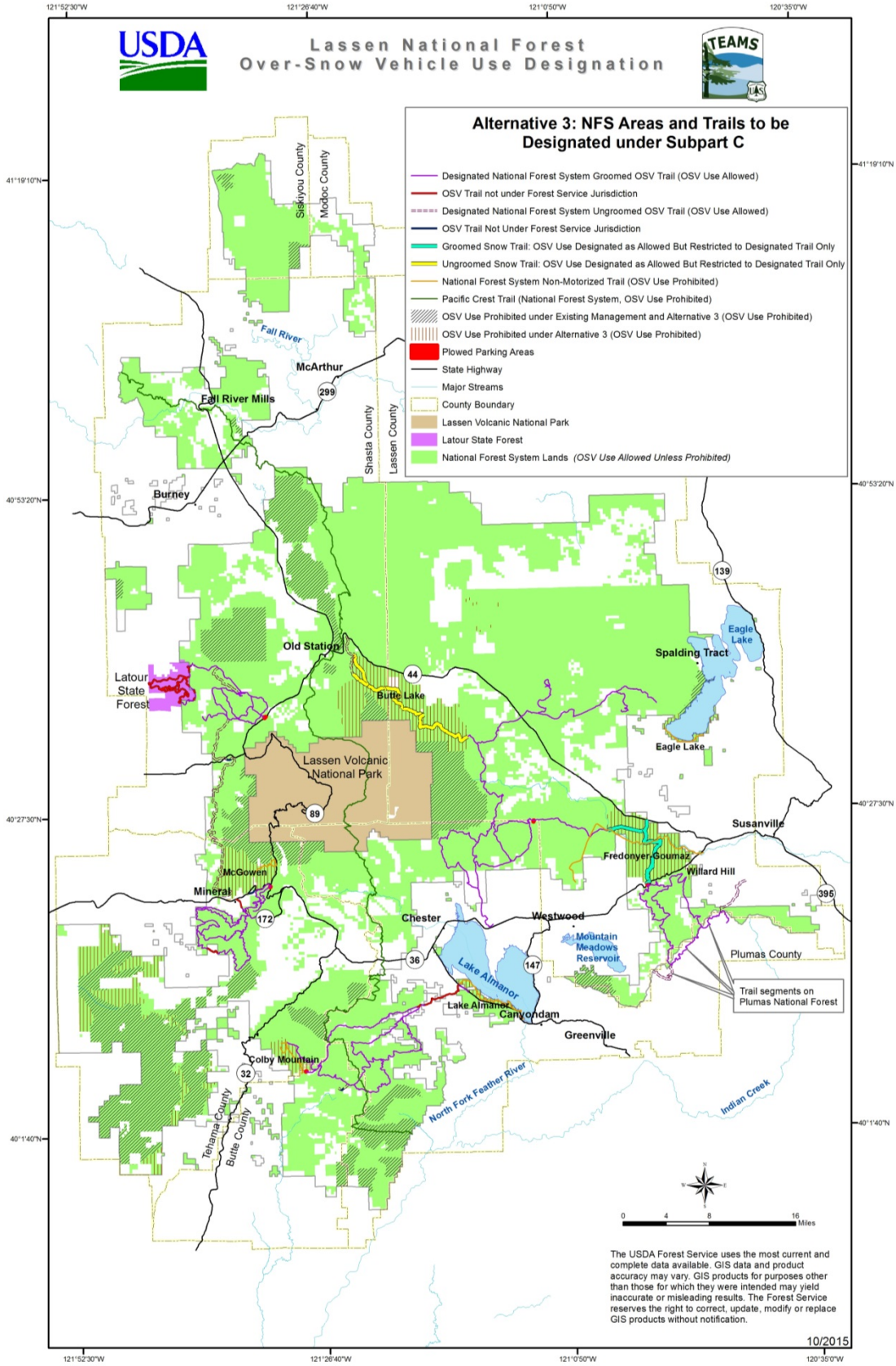

Figure 4. Map of alternative 3 – 36 CFR 212 Subpart C Designations

Alternative 4

This alternative addresses the motorized recreational experience significant issue. It is the same as the proposed action except for the following changes:

- Allow winter OSV motorized recreation use and trail grooming when uncompacted snow depths equal or exceed 12 inches. Exceptions are allowed on designated OSV trails overlaying existing paved, dirt, and gravel National Forest System roads and trails in order for OSVs to access higher terrain and legal snow levels when snow depths are less than 12 inches, as long as this use does not cause visible damage to the underlying surface. However, a 12-inch minimum snow depth of uncompacted snow will be required for OSV trail grooming activities and cross-country OSV use.
- Allow OSV use below 3,500 feet, when there is adequate snow depth, as described above.
- Prohibit cross-country OSV use in the entire area from SH36 up SR89 to Lassen Volcanic National Park and across McGowan Lake Road to NFS road 31N17 with one exception:
    - Within this OSV prohibited area, designate for OSV use the trail from the intersection of 30N16 (McGowan Lake Road) and 30N16C to allow OSV use from this intersection west out to the 31N17 road. Therefore, OSV use would be restricted to only this designated OSV trail within this area.

This alternative would groom the same snow trails for OSV use as the modified proposed action. This alternative is summarized on table 12 through table 15 and shown in figure 5.

Table 12. Summary comparing current OSV management with the proposed action and alternative 4 for the management of OSV use on the Lassen National Forest

OSV Management	Current OSV Management	Proposed Action Designations	Alternative 4 Designations
National Forest System (NFS) Lands within the Lassen National Forest (Acres)	1,150,020	1,150,020	1,150,020
OSV Use Allowed:			
• OSV Areas (Acres)	976,760	947,120	966,270
• Snow Trails (NFS Trail Miles)	406	406	408
o OSV Use Restricted to Designated Snow Trails (Miles)*	0	0	2
▪ McGowan Designated Snow Trails – OSV Use Allowed (Miles)	0	0	2
OSV Use Prohibited:			
• Total Area (see table 14) (Acres)**	173,260	202,900	183,750
• Below 3,500 Feet in Elevation Included in Above Total (Acres)	0	29,130	0
• Black Mountain RNA Included in Above Total (Acres)	0	520	520
• OSV Use Restricted to Designated OSV Trails (Acres)**	0	0	9,940
o McGowan – Cross-country OSV Use Prohibited (Acres)	0	0	9,940
Minimum Snow Depth for OSV Use on Snow Trails Designated for OSV Use (Inches)	12	6 on a limited basis	Dependent on snow conditions. No restrictions with 6 or more inches on trails identified for grooming.
Minimum Snow Depth for Off-trail, Cross-country OSV Use (Inches)	12	12	12

*Area estimates include acres in OSV restricted areas where cross-country OSV use would be prohibited and assume an average OSV trail width of 14 feet.

**Includes areas in which OSV use would be restricted to designated OSV trails.

All area size and trail distance estimates are approximate and are rounded to the nearest 10 acres or nearest mile.

Table 13. Summary comparing current groomed OSV trails with the modified proposed action and alternative 4 for the grooming of OSV trails on the Lassen National Forest

Note: Distance estimates are approximate and are rounded to the nearest mile.

OSV Management	Current OSV Management	Proposed Action	Alternative 4
Total Groomed Trail System (Miles)*	324	324	324
Minimum Snow Depth for Snow Trail Grooming to Occur (Inches)	18	12**	12
Grooming Season	12/26 – 3/31	12/26 – 3/31	Discretion of groomer

*Included in the miles of trail over which OSV use is allowed in table 1.

**The proposed action has been modified to be consistent with the state grooming standard which states, “Begin grooming when the snow depth is at least 12 to 18 inches” (OSV Program Draft EIR, Program Years 2010-2020 – October 2010, California Department of Parks and Recreation, Off-Highway Motor Vehicle Recreation Division, page 2-12).

Table 14. Summary comparing current management with areas where OSV use would be prohibited under the modified proposed action and alternative 4 (acres)

Note: All area estimates are approximate and are rounded to the nearest 10 acres.

OSV Prohibited Area	Current OSV Management	Proposed Action Designations	Alternative 4 Designations
Below 3,500 feet Outside of Semi-primitive Non-motorized and Wilderness	0	29,130	0
Black Mountain Research Natural Area	0	520	520
McGowan*	0	0	9,940
Caribou Wilderness	20,830	20,830	20,830
Chips Creek Semi-primitive Non-motorized	18,320	18,320	18,320
Cinder Butte Semi-primitive Non-motorized	13,700	13,700	13,700
Cub Creek Research Natural Area	4,090	4,090	4,090
Eagle Lake Osprey Management Area	1,670	1,670	1,670
Heart Lake Recommended Wilderness	8,620	8,620	8,620
Ishi B Semi-primitive Non-motorized Outside of Ishi Wilderness	13,700	13,700	13,700
Ishi Wilderness	40,910	40,910	40,910
Keddie Ridge Semi-primitive Non-motorized	3,490	3,490	3,490
Mill Creek Recommended Wilderness	7,710	7,710	7,710
Onion Springs Semi-primitive Non-motorized	1,080	1,080	1,080
Prospect Semi-primitive Non-motorized	2,610	2,610	2,610
Snow Mountain Semi-primitive Non-motorized	700	700	700
Thousand Lakes Wilderness	16,570	16,570	16,570
Unnamed Minimal Management Area in the vicinity of Butt Mountain	1,660	1,660	1,660
Unnamed Minimal Management Area in the vicinity of Hat Creek Rim	12,740	12,740	12,740
Wild Cattle Mountain Recommended Wilderness	4,890	4,890	4,890
Total OSV Prohibited Area	173,260	202,900	183,750

*Area estimates include acres in OSV restricted areas where OSV use would be prohibited and assume an OSV trail width of 14 feet.

Table 15. Summary comparing current management with NFS trails where OSV use would be prohibited under the modified proposed action and alternative 4 (miles on the Lassen National Forest)

Note: Distance estimates are approximate and are rounded to the nearest mile.

Trail/Trail System	Current OSV Management	Proposed Action	Alternative 4
Pacific Crest Trail	106	106	106
Colby Mountain Cross-country Ski Trails	6	6	6
McGowan Lake Cross-country Ski Trails	5	5	3
Biz Johnson Trail from Susanville to Westwood Junction	17	17	17
Lake Almanor Recreation Trail	9	9	9
Eagle Lake Trail	5	5	5
Total	148	148	146

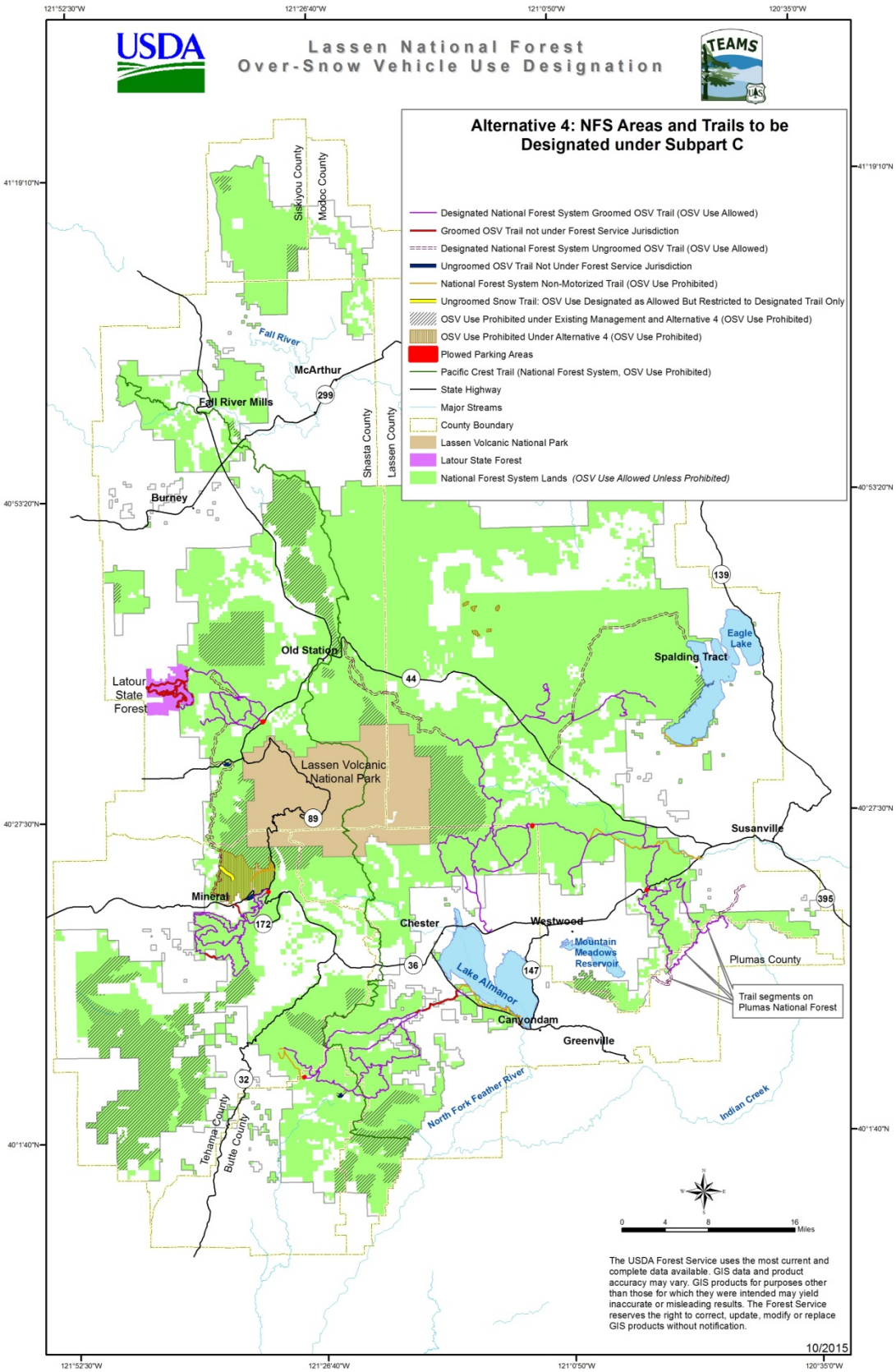

Figure 5. Map of alternative 4 – 36 CFR 212 Subpart C Designations

Project Design Features

We have developed the following project design features and mitigation measures to be used as part of the implementation of all of the action alternatives. These features were developed to reduce or eliminate adverse impacts from project activities and are incorporated as an integrated part of each alternative. Project design features are based upon standard practices and operating procedures that have been employed and proved effective in similar circumstances and conditions. Project design features do not apply to the No Action alternative because no project activities are proposed under this alternative; no changes would be made to the existing system of OSV trails or areas in the planning area under the No Action alternative. However, continuing current management under the No Action alternative would include the use of standard operating procedures and best management practices for routine OSV trail grooming and maintenance of the current OSV trail and area system.

Forest Service National Best Management Practices for Water Quality Management on National Forest System Lands, Volume 1 National Core BMP Technical Guide (BMPs, USDA Forest Service 2012) applicable to OSV use would be implemented under any of the action alternatives.

Recreation

- Coordinate timing of trail grooming to minimize impact on recreation experiences
- Configure OSV system to minimize impact on other resource values.
- As staffing and funding allows, consider areas where additional signage along the Pacific Crest Trail may be needed to enhance wayfinding for winter users. Agency signage procedures would be followed. As a guideline, ensure trail markers are at eye level (approximately 40” above average maximum snow depth).
- All action alternatives would include identification of the Pacific Crest Trail on the Over-snow Vehicle Use Map.
- Consider areas where antler shed gathering is popular and/or concentrated and if there is a need to implement seasonal OSV use restrictions or changes in management to provide for this recreational opportunity.

Soil and Water Resources

- Spill containment equipment shall be available at the facilities where grooming equipment is re-fueled.
- Designate specified equipment maintenance and refueling sites and ensure that they are located on gentle slopes, on uplands, and outside of Riparian Conservation Areas (RCAs) and sensitive terrestrial wildlife habitats.
- Grooming shall not occur when the ground surface is exposed and soil damage or rutting could occur. The operator shall consider recent, current, and forecasted weather and snow conditions to ensure these conditions are met.
- Design and maintain all stream crossings and other instream structures to provide for passage of flow and sediment, withstand expected flood flows, and allow free movement of resident aquatic life.
- Prohibit OSV use and grooming in wetlands unless protected by at least 1 foot of packed snow or 2 inches of frozen soil, unless there is no other practicable alternative. If OSV trails must enter wetlands, use bridges or raised prisms with diffuse drainage to sustain

flow patterns. Set crossing bottoms at natural levels of channel beds and wet meadow surfaces. Avoid actions that may dewater or reduce water budgets in wetlands.
- Adhere to Best Management Practices related to Over Snow Vehicle Use from the 2012 USFS National Core BMP Technical Guide and the 2011 Region 5 Soil and Water Conservation Handbook

Aquatic Species and Habitat

- Prohibit OSV use on unfrozen lakes, reservoirs, ponds and any other open surface water.

Terrestrial Wildlife

- Use the results of annual inventory and monitoring efforts for threatened, endangered and sensitive species (northern spotted owl, California spotted owl, northern goshawk, bald eagle) to determine proximity of known nesting or roosting sites to designated OSV trails.
- As time and funds allow, develop a public outreach program as part of this project to raise public awareness of winter wildlife habitat, wildlife behavior, and ways to minimize user impacts.

Botany

- Provide public education for invasive species and encourage cleaning of over-snow vehicles, towing vehicles, and trailers prior to entering public lands to remove dirt, debris, plant parts, and material that may carry weed seeds.

Administration, Enforcement and Public Safety

- Designated OSV use areas or OSV trails may be temporarily closed by the Forest for other types of management activities such as contracted timber or vegetation management or other resource concerns.
- Designated OSV use areas or OSV trails may be temporarily closed by the Forest if unacceptable adverse impacts are occurring; a public safety hazard is revealed or other site-specific need by authorization of the Forest Supervisor.
- Groomed trails are closed to wheeled vehicle use from December 26 through March 31.
- Encourage public awareness and education regarding locations of non-motorized trails or areas where OSV use is prohibited; consider additional signage or other methods to minimize OSV encroachment in these areas.

Monitoring

Once a decision is made on OSV use designation via the record of decision, the implementation phase would begin. We anticipate that an implementation plan, with a monitoring component, would be developed at that time.

The Forest Service has an obligation to monitor the effects of OSV use as required by Subpart C of the Travel Management Rule. Furthermore, as an ongoing part of our State-funded OSV program, California State Parks provides funding to the Forest Service to monitor our trail systems for evidence of OSV trespass into closed areas, OSV use near or damage of sensitive plant and wildlife sites, and low snow areas subject to erosion concerns.

Monitoring that will occur during implementation of any alternative includes effectiveness monitoring, based on available resources. The highest priority for monitoring will ensure that:

1. Resource damage is not occurring when there is less than the prescribed minimum snow depth (depending on alternative) with certain exceptions as described in the alternative descriptions above. Snow depths measurement locations and techniques would be developed using an interdisciplinary team approach and would consider terrain, season, proximity to sensitive areas, and resource damage criteria.
2. Where resource damage is suspected due to OSV use in less than the prescribed minimum snow depth, monitoring would occur to help inform the line officer if damage is occurring, the extent of the damage, and what steps need to be taken to address the issue.
3. OSV use is not damaging sensitive resource locations, in consultation with forest biologists. In particular:
   - Monitor OSV use in the white bark pine stand on Burney Mountain to determine if damage is occurring. If adverse impacts are observed, changes in management of OSV use would be considered, or other appropriate protective measures taken, in consultation with a forest botanist. Considerations will include prohibiting cross-country OSV use in this area.
   - Monitor OSV use in designated Forest Plan botanical Special Areas to determine if damage is occurring. If adverse impacts are observed and it is determined that OSV use in these areas is not compatible with the intended focus of these areas, per each special area's management plan, changes in management of OSV use would be considered, or other appropriate protective measures taken, in consultation with a forest botanist. Considerations will include prohibiting cross-country OSV use in these SIAs or restricting OSV use to designated routes only.
   - Monitor OSV use in sensitive wildlife habitats, in consultation with the forest biologist, to determine if adverse impacts are occurring. If adverse impacts are observed, changes in management would be considered in consultation with the forest biologist.
   - Monitor water quality in spring snowmelt periodically at specified locations, in consultation with the forest hydrologist and aquatic biologist, to determine potential impacts of OSV exhaust on water quality. If adverse impacts are observed, changes in management of OSV use would be considered, or other appropriate protective measures taken, in consultation with a forest botanist.
4. OSV use is not occurring in prohibited areas.
5. OSV use restricted to designated routes is not encroaching outside the trail corridor.

Alternatives Considered but Eliminated from Detailed Analysis

1. Consider providing more flexibility in the beginning and ending dates for grooming

The proposed action states that grooming “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. Snow Trails are prioritized for grooming based on visitor use.” These dates are consistent with the previous summer travel management decision (Travel Management Rule

Subpart B) on the Lassen National Forest and allow for passenger vehicle access through mid- to late-December for visitors with Christmas tree permits. There is a safety concern with allowing grooming activities on roads with passenger vehicles. This suggestion would increase conflicts between classes of vehicles, would increase the overall cost of the grooming program and would conflict with the existing summer travel decision. For these reasons, this suggestion was dismissed from further detailed analysis.

2. Ensure OSV use designations avoid municipal watersheds

There are no designated municipal watersheds in the project area.

3. Ensure size of areas designated for OSV use are consistent with the definition of areas as described in the Travel Management Rule; they should be smaller than Ranger Districts and they should be established using the minimization criteria

We considered this suggestion and have modified the proposed action to address it (Alternative 2, Modified Proposed Action).

4. Prohibit OSV use in a 2.5 mile radius around the SW Visitor's Center of Lassen Volcanic National Park

Currently, there is no OSV use allowed within a 2.5-mile radius of the SW Visitors' Center. A review of the map of Lassen Volcanic National Park shows the SW Visitors' Center approximately 1 mile inside the park boundary. No OSV use is allowed within the park boundary. Outside the park boundary, OSV use is prohibited by the Forest Service for at least 1.5 additional miles from the SW visitors' center. For these reasons, this suggestion was dismissed from further detailed analysis.

5. Use a universal minimal snow depth for the proposal and/or modify the proposed 6-inch minimum snow depth for OSV use on Forest Service roads. The identification of varying snow depths for different uses or areas, as described in the proposed action can be confusing to the public and difficult to enforce, particularly the 6-inch depth for OSV trails overlaying roads, and could lead to increased probability of OSV use off-trail in these areas

We considered this suggestion and have modified the proposed action to include a 12-inch minimum snow depth for cross-country OSV use and for grooming, as described in the next section (page 23).

6. Remove any minimum snow depth requirement on existing roads; OSVs do not impact roads and the operator should be allowed to decide whether he or she can safely travel on minimal snow to access the backcountry where deeper snow exists

We recognize that flexibility is important for OSV use on roads in order to provide the ability for users to access deeper snow areas in times of less than 12 inches of snow; this is a component of the Modified Proposed Action. It is also perhaps better addressed by the greater flexibility provided by the minimum snow depth component of Alternative 4, as described in the next section (page 23).

7. Modify the minimum snow depth for cross-country OSV use to 10 inches instead of 12 inches. Also consider that 6 or 8 inches of snow is adequate when there is a good crust of snow or if the area is flat

Based on input from the resource specialists on our interdisciplinary team, their review of available literature, professional judgment and consultation with other agency professionals, 12 inches of snow was deemed to be the minimum depth of snow necessary to ensure adverse resource impacts from cross-country OSV use do not occur. We consider 12 inches of uncompacted snow to be the minimum necessary and the level that is adequate for OSV use to occur, per Subpart C of the travel management rule. For this reason, a snow depth less than 12 inches for cross-country OSV use was not considered further.

8. Ensure flexibility in the requirement for minimum snow depths and consider them guidelines instead. Flexibility is needed to account for snow depths that are affected by variables such as elevation, temperature, aspect, and snow melt

We considered this suggestion and have modified the proposed action to include a 12-inch minimum snow depth for cross-country OSV use and the retention of some flexibility in the application of snow depths on underlying roads. The minimum snow depth component of Alternative 4 provides greater flexibility and addresses this concern, as described in the next section (page 23).

9. Ensure that the process used to measure snow depth and enforce minimum snow depths are equitable and that entire areas are not closed to OSV use based on a snow depth measurement taken at just one trailhead, for instance

We considered this suggestion and have developed monitoring measures to determine snow depth measurement criteria and locations, using an interdisciplinary approach, which would apply to any of the action alternatives.

10. Ensure monitoring and enforcement are part of the proposal

We agree that monitoring and enforcement are critical to the success of implementation. Overall enforceability and administration of the alternatives will be considered as part of the engineering analysis and documented, in a general sense, in chapter 3 of the EIS. Any alternatives considered

in detail will be based on the assumption that they will be enforced. We have developed several monitoring measures that would apply to implementation of all alternatives.

11. Modify the 18-inch minimum snow depth for grooming; it is too restrictive. This depth is not mandated by the State's grooming program

We considered this suggestion and have modified the proposed action to include a 12-inch minimum snow depth for cross-country OSV use, and for grooming, as described in the next section.

We also considered the suggestion to remove any snow depth restriction on grooming activities and to instead rely on the groomer operator to determine the necessary depth. Based on input from the resource specialists on our interdisciplinary team, their review of available literature, professional judgment and consultation with other agency professionals, 12 inches of snow was deemed to be the minimum depth of snow necessary to ensure adverse resource impacts from grooming and then subsequent use by OSVs does not occur. We consider 12 inches of uncompacted snow to be the minimum necessary and the level that is adequate for OSV use and grooming to occur, per Subpart C of the travel management rule. For this reason, a snow depth less than 12 inches for cross-country OSV use and grooming was not considered further.

12. Increase the minimum snow depth requirement for off-trail OSV use to 18 inches or, better, 24 inches

We considered this suggestion but disagree that a snow depth greater than 12 inches is necessary to provide adequate snow cover for OSV use while still protecting forest resources. We have conducted preliminary analysis with our interdisciplinary team to ensure that this snow depth is adequate, based on the best available science, while still providing access for OSV use. For these reasons, this suggestion was dismissed from further detailed analysis. However, the minimum snow depth components of alternatives to the proposed action were developed to address certain resource impacts in certain areas. Project design features have also been developed to ensure resource impacts are minimized as well.

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

We considered this suggestion and agree this is a necessary project design feature to ensure adverse impacts from OSV use on open or flowing water are minimized. This has been added to the list of project design features that would apply to all action alternatives.

14. Eliminate the prohibition of OSV use in areas below 3,500 feet in elevation and use minimum snow depth to guide use instead

We considered this suggestion and recognize that the provision for ensuring 12 inches of snow are on the ground before OSV use will be allowed could be used in areas below 3,500 feet, like it would for the rest of the project area, as an alternative to prohibiting use based on this elevational band. This is addressed by Alternative 4.

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

We considered this suggestion and have developed Alternative 3 that will be included for detailed analysis in the EIS. However, not all aspects of this suggested alternative 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 would not address the purpose and need for action which is to provide a manageable, designated OSV system of trails and Areas for public use within the Lassen 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 trails and Areas for public use within the Lassen 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) forest-wide 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 trails and Areas for public use within the Lassen 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 trails and Areas for public use within the Lassen 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.
- 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 §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 trails and Areas for motorized over-snow vehicle use within the Lassen 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.
- Forest Plan amendments creating "Front-country Non-motorized," "Backcountry Solitude," and "Managed Shared Use" management areas. The objectives of these management areas are to "create a fair balance of recreational opportunity on the Lassen National Forest," and "protect opportunities for non-motorized recreation recognizing the experience non-motorized users seek, and minimize impacts from OSVs on wildlife, the environment, and other uses."
    - No OSV use would be allowed in "Front-country Non-motorized" areas. These areas would "protect non-motorized recreation opportunity in areas that are easily accessed from plowed trailheads and roads and have a high degree of non-motorized use. Restriction of OSVs is necessary to eliminate the noise, toxic exhaust, disproportionate consumption of powder snow, trail rutting, and other OSV impacts."
    - OSVs would be restricted to designated OSV trails in "Backcountry Solitude" areas. These areas would "protect large areas for a quiet and remote recreation experience in winter. These areas also protect sensitive species that thrive only in relatively large areas with minimal human activity."
    - OSVs would be restricted to designated OSV trails in "Managed Shared Use" areas. These areas would "restrict OSV usage so that there can be meaningful shared use of easily-accessible and popular areas. Meaningful shared use is made possible by restricting OSVs to designated routes, establishing separate trailheads, [gradually] restricting OSVs to cleaner and quieter machines, imposing speed limits on shared-use trails, and other management tools."
        - Forest Plan amendments are not necessary to address the concerns the commenter seeks to address, because implementation of Subpart C

will result in areas and trails that are clearly designated for OSV use and use inconsistent with those designations will be prohibited. The Forest Plan does not directly restrict uses, and an amendment establishing these management areas would have no immediate on-the-ground effect on public uses. In addition, no Forest Plan amendment is required to restrict or prohibit OSV use to achieve most of the objectives of the commenter's alternative in the identified areas. (As discussed above for features 1 and 3, the creation of separate, non-motorized trailheads and the transition to cleaner and quieter OSVs through the encouragement of best available technology (BAT) are outside the scope of the purpose and need and will not be included in Alternative 3. This feature will therefore not be included in Alternative 3 to be analyzed in detail. However, Alternative 3 will include the restrictions on OSV use sought by the commenter for the same geographic areas.

- Forest Plan amendment allowing the Forest Service to designate snow play areas. "Designation of snow play areas allows for concentration of use in areas that are appropriate for snow play and that have adequate parking, such as Willard Hill. Such areas and their primary access routes should be closed to snowmobile traffic for safety and other reasons."
    - A Forest Plan amendment allowing 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 trails and Areas for motorized over-snow vehicle use within the Lassen National Forest that is consistent with and achieves the purposes of the Forest Service Travel Management Rule at 36 CFR part 212, subpart C. A Forest Plan amendment would also not be necessary to address the concern the commenter seeks to address, for the reasons explained above in response to alternative component #6. Therefore this feature will not be included in Alternative 3 to be analyzed in detail. However Alternative 3 will include the restrictions on OSV use sought by the commenter for the Willard Hill area.

16. Create a non-motorized corridor along the Pacific Crest National Scenic Trail (PCT) of up to one-half mile on either side; this will promote user safety, reduce conflicts between motorized and non-motorized users, and ensure consistency with the Comprehensive Plan for the Pacific Crest National Scenic Trail and the National Trails System Act of 1968 (P.L. 90-543). The Pacific Crest Trail and its non-motorized corridor should be illustrated on Over-snow Vehicle Use Maps

We acknowledge the importance of appropriate management of the PCT. However, the creation of a non-motorized corridor along the PCT would not be within the scope of this project which is to provide a manageable, designated OSV system of trails and Areas for public use within the Lassen National Forest, that is consistent with and achieves the purposes of the Forest Service Travel Management Rule at 36 CFR part 212, subpart C. Consideration of a non-motorized corridor along the PCT is more appropriately addressed during the Forest Plan Revision process.

All action alternatives include identification of the PCT on the OSVUM.

17. 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 maximum frequency of OSV crossings is established in the Comprehensive Plan for the PCT management plan. No crossings are allowed in the Primitive or Semi-Primitive Non-motorized ROS classifications. However, on the Lassen, no OSV use is allowed in either of these ROS classes and the proposed action and all alternatives are consistent with this crossing standard.

- For the remainder of the trail corridor in other ROS classes, the standard is a minimum of 1 crossing per ½ mile, or more frequent, averaging over the entire length of PCT on the Forest. GIS data shows 106 miles of PCT on the Forest. This would allow 212 OSV crossings. The proposed action and alternatives would designate fewer than 212 OSV crossings of the PCT.

Therefore, current OSV management and the modified proposed action would be consistent with the Comprehensive Plan for the PCT.

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

We considered this suggestion and recognize that the motorized and non-motorized recreational experience is an important concern 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. 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 and have added a section to the EIS called “Recommendations for Future Management.” As the development of the alternatives for analysis continues, and the analysis is conducted, we will ensure that possible changes related to facilities or other management considerations, are listed so they can be considered by the decision maker for future management.

19. Ensure over-snow vehicle route density is below 1 mile per square mile, that wolverine and Canada lynx are considered and protected, that OSV use areas are discreet specified areas that consider visual and acoustic barriers to ensure wildlife habitat security

We considered this and several other suggestions and concerns related to terrestrial wildlife. We consider terrestrial wildlife a non-significant issue for this analysis and will analyze effects on wildlife in the EIS.

20. Create winter conservation plans for sensitive species

See the response above regarding the identification of terrestrial wildlife as a non-significant issue for this analysis. Development of specific conservation plans for individual species, however, is outside the scope of the analysis.

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

We considered this suggestion and have developed a project design feature to prohibit OSV use on open or flowing water. Minimum snow depth restrictions will also minimize OSV impacts in riparian areas, streams, and frozen lakes. We have also added a monitoring measure to the Modified Proposed Action to focus on monitoring OSV use on Eagle Lake and other priority streams.

This concern is also addressed by Alternative 3.

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

We considered this suggestion and have developed Alternative 4 with the components of this alternative included for detailed analysis in the EIS. However, not all aspects of this suggested alternative are within the scope of the analysis, as described below, and have been dismissed from further detailed analysis:

- 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. Since these 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 proposed action.
    - Many of these ungroomed trails pass through lands not under Forest Service jurisdiction or where Forest Service jurisdiction is uncertain (unknown if the Forest Service has easements to allow public access on non-NFS land). Establishment of Forest Service jurisdiction would be required for these trails to be designated for OSV use under subpart C.
- The suggested alternative recommends the use of a minimum snow depth less than 12 inches for cross-country use and grooming. This was considered and the rationale for dismissal from analysis is explained in more detail in other suggested alternatives listed above.
- The suggested alternative recommends that the Pacific Crest Trail be managed for non-motorized use only and to allow OSV use only in order to cross the trail. However, because the PCT is difficult to distinguish in the winter, specific crossings should not be designated when the trail is difficult to see and therefore OSVs should be allowed to cross without restriction. This was considered but because the Comprehensive Plan for the PCT requires that we identify and designate OSV crossings, we dismissed this suggestion from detailed analysis.

Comparison of Alternatives

Table 16. Summary comparison of alternatives

OSV Management	Alt. 1	Alt. 2	Alt. 3	Alt. 4
National Forest System (NFS) Lands within the Lassen National Forest (Acres)	1,150,020	1,150,020	1,150,020	1,150,020
OSV Use Allowed:				
• OSV Areas (Acres)	976,760	947,120	878,690	966,270
• Snow Trails (NFS Trail Miles)	406	406	406	408
• OSV Use Restricted to Designated Snow Trails (Miles)	0	0	35	2
o Butte Lake – Designated Snow Trails – OSV Use Allowed (Miles)	0	0	22	0
o McGowan Designated OSV Trails – OSV Use Allowed (Miles)	0	0	0	2
o Colby Mountain Designated OSV Trails – OSV Use Allowed (Miles)	0	0	0	0
o Lake Almanor Designated OSV Trails – OSV Use Allowed (Miles)	0	0	0	0
o Fredonyer-Goumaz/Willard Hill Designated OSV Trails – OSV Use Allowed (Miles)	0	0	13	0
OSV Use Prohibited:				
• Total Area (Acres)	173,260	202,900	271,330	183,750
• Below 3,500 Feet in Elevation Included in Above Total (Acres)	0	29,130	29,130	0
• Black Mountain RNA Included in Above Total (Acres)	0	520	520	520
• McGowan – Cross-country OSV Use Prohibited (Acres)	0	0	9,940	9,940
• Colby Mountain – Cross-country OSV Use Prohibited (Acres)	0	0	4,400	0
• Lake Almanor – Cross-country OSV Use Prohibited (Acres)	0	0	1,980	0
• Eagle Lake Addition (Acres)	0	0	1,640	0
• Trails (Miles)	148	148	148	0

OSV Management	Alt. 1	Alt. 2	Alt. 3	Alt. 4
• OSV Use Restricted to Designated OSV Trails (Acres)	0	0	66,790	0
o Butte Lake – Cross-country OSV Use Prohibited (Acres)	0	0	30,800	0
o Fredonyer-Goumaz/Willard Hill – Cross-country OSV Use Prohibited (Acres)	0	0	19,670	0
Minimum Snow Depth for OSV Use on Snow Trails Designated for OSV Use (Inches)	12	6 on a limited basis	6 on a limited basis	Dependent on snow conditions. No restrictions with 6 or more inches on trails identified for grooming
Minimum Snow Depth for Off-trail, Cross-country OSV Use (Inches)	12	12	12	12
Total Groomed Trail System (Miles)	324	324	324	324
Minimum Snow Depth for Snow Trail Grooming to Occur (Inches)	18	12	18	12
Grooming Season	12/26 – 3/31	12/26 – 3/31	12/26 – 3/31	Discretion of groomer

Table 17. Summary of comparison of alternatives by environmental effects (ranking alternatives averaged across indicators) (chapter 3)

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Transportation and Engineering	Safety: Public Safety & Traffic	The current Lassen 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.	Same as Alternative 2	Same as Alternative 2
	Cost: Affordability	Minor effects due to over-snow vehicle use for access roads to popular parking and staging areas.	Minor effects due to over-snow vehicle use for access roads to popular parking and staging areas.	Minor effects due to over-snow vehicle use for access roads to popular parking and staging areas.	Minor effects due to over-snow vehicle use for access roads to popular parking and staging areas.

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Tansportation and Engineering (continued)	Transportation Property: Effects to Underlying NFS Roads and Trails	18” (grooming) and 12” (OSV use) snow depth requirement provides more than adequate protection of underlying roads.	12” (grooming) and 6” (OSV use) snow depth requirement provides adequate protection of underlying roads.	18” (grooming), 12” (general OSV use) and 6” (OSV use on underlying routes) snow depth requirements provide adequate protection of underlying roads.	12” (grooming, general OSV use) and 6” snow depth requirements and no visible damage on underlying routes provide adequate protection of underlying roads.
Hydrology	Effects to Water Quality	Negligible effects on water quality	Negligible effects on water quality	Negligible effects on water quality	Negligible effects on water quality
Heritage	Effects to Cultural Resources	No adverse effect	No adverse effect	No adverse effect	No adverse effect
Recreation					
Recreation Settings and Opportunities	Recreation Opportunity Spectrum/Consistency with ROS class	Consistent	Consistent	Consistent – with enhanced opportunities for non-motorized recreation experiences	Consistent – with enhanced opportunities for motorized recreation experiences
	Opportunities for Motorized Winter Uses/Acres and Percent Change	976,760 acres open to OSV use	947,120 acres open to OSV use, a 3 percent reduction from existing conditions.	878,690 acres open to OSV use, a 10 percent reduction from existing conditions.	966,270 acres open to OSV use, a 1 percent reduction from existing conditions.
	Opportunities for Non-motorized Winter Uses/Acres and Percent Change	173,260 acres closed to OSV use/ 148 miles of trail closed to OSV use	202,900 acres closed to OSV use, a 15 percent increase from existing conditions	271,330 acres closed to OSV use, a 36 percent increase from existing conditions.	183,750 acres closed to OSV use, a 5 percent increase from existing conditions.
	OSV Designations/ Miles and Percent Change	406 miles designated/ 324 miles groomed	406 miles designated / 324 miles groomed No change from existing conditions.	406 miles designated/ 324 miles groomed No change from existing conditions.	406 miles designated/ 324 miles groomed No change from existing conditions.
Conflicts between motorized and non-motorized winter experiences	Noise	976,760 acres open to OSV use and potentially affected by noise/ 173,260 acres closed to OSV use and available for quiet recreation	947,120 acres open to OSV use and potentially affected by noise/ 202,900 acres closed to OSV use and available for quiet recreation	878,690 acres open to OSV use and potentially affected by noise/ 271,330 acres closed to OSV use and available for quiet recreation	966,270 acres open to OSV use and potentially affected by noise/ 183,750 acres closed to OSV use and available for quiet recreation

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Conflicts between motorized and non-motorized winter experiences (continued)	Access to Desired Motorized and Non-Motorized Recreation Settings and Opportunities	Six plowed trailheads provide access for motorized and non-motorized winter use, including 324 miles of groomed OSV trails for motorized use and six non-motorized trails with a total of 148 miles for non-motorized use. 12-18 inches of snow required for OSV trail grooming	Six plowed trailheads provide access for motorized and non-motorized winter use, including 324 miles of groomed OSV trails for motorized use and six non-motorized trails with a total of 148 miles for non-motorized use. 12 inches of snow required for OSV trail grooming and cross-country travel. 6 inches for OSV use on trails with underlying roads and trails.	Six plowed trailheads provide access for motorized and non-motorized winter use, including 324 miles of groomed OSV trails for motorized use and six non-motorized trails with a total of 148 miles for non-motorized use. 18 inches of snow required for OSV trail grooming. 12 inches of snow required for cross-country travel. 6 inches on a limited basis for OSV use on specific trails with underlying roads and trails,	Six plowed trailheads provide access for motorized and non-motorized winter use, including 324 miles of groomed OSV trails for motorized use and six non-motorized trails with a total of 148 miles for non-motorized use. 12 inches of snow required for OSV trail grooming. 12 inches of snow required for cross-country travel. 12 inches with exceptions on OSV trails with underlying roads and trails with less than 12 inches to reach higher terrain and legal snow depths as long as no resource damage.
	Potential Conflict with other Resource Values	Groomed OSV trails in close proximity to the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries, and to the boundary of Lassen Volcanic National Park. No known conflicts with tribal/spiritual areas, historic areas or populated areas.	Groomed OSV trails in close proximity to the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries, and to the boundary of Lassen Volcanic National Park. No known conflicts with tribal/spiritual areas, historic areas or populated areas.	Groomed OSV trails in close proximity to the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries, and to the boundary of Lassen Volcanic National Park. No known conflicts with tribal/spiritual areas, historic areas or populated areas.	Groomed OSV trails in close proximity to the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries, and to the boundary of Lassen Volcanic National Park. No known conflicts with tribal/spiritual areas, historic areas or populated areas.

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Conflicts between motorized and non-motorized winter experiences (continued)	Public Safety	Non-motorized and motorized users share trailheads for access.	Non-motorized and motorized users share trailheads for access.	Non-motorized and motorized users share trailheads for access. Additional areas provided for non-motorized use that is separated from motorized use	Non-motorized and motorized users share trailheads for access. One additional area provided for non-motorized use that is separated from motorized use will enhance safety for non-motorized users.
Designated Areas	Proximity and Frequency of OSV Designations in Relation to Designated Areas	Groomed OSV trails within ¼ mile of Wilderness and proposed Wilderness boundaries. Groomed OSV trails cross PCT in 3 locations, PCT crossings in open areas not designated.	Groomed OSV trails within ¼ mile of Wilderness and proposed Wilderness boundaries. Groomed OSV trails cross PCT in 3 locations, designated PCT crossings consistent with the PCT Comprehensive Plan and project design features	Groomed OSV trails within ¼ mile of Wilderness and proposed Wilderness boundaries. Designation of the McGowan Frontcountry non-motorized area minimizes motorized impact on the Heart Lake and Wild Cattle Mountains Proposed Wilderness Areas. Designation of the Butte Lake Backcountry Solitude Area minimizes motorized impact on the Caribou Wilderness and Caribou extension proposed wilderness and Lassen Volcanic National Park. Groomed OSV trails cross PCT in 3 locations, designated PCT crossings consistent with the PCT Comprehensive Plan and project design features.	Groomed OSV trails within ¼ mile of Wilderness and proposed Wilderness boundaries. Designation of the McGowan Frontcountry non-motorized area with OSVs restricted to one designated trail minimizes motorized impact on the Heart Lake and Wild Cattle Mountains Proposed Wilderness Areas. Groomed OSV trails cross PCT in 3 locations, designated PCT crossings consistent with the PCT Comprehensive Plan and project design features.

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Terrestrial Wildlife					
Threatened, Endangered, and Proposed Species, and Critical Habitat	Northern Spotted Owl	May affect, but is not likely to adversely affect	May affect, but is not likely to adversely affect	May affect, but is not likely to adversely affect	May affect, but is not likely to adversely affect
	Northern Spotted Owl Critical Habitat	No Effect	No Effect	No Effect	No Effect
	Pacific Fisher	May affect individuals, but will not jeopardize	May affect individuals, but will not jeopardize	May affect individuals, but will not jeopardize	May affect individuals, but will not jeopardize
	Gray Wolf	May affect, but is not likely to adversely affect	May affect, but is not likely to adversely affect	May affect, but is not likely to adversely affect	May affect, but is not likely to adversely affect
	Valley Elderberry Longhorn Beetle	No effect	No effect	No effect	No effect
	Western Yellow-billed Cuckoo	No effect	No effect	No effect	No effect
	Western Yellow-billed Cuckoo Critical Habitat	No effect	No effect	No effect	No effect
Sensitive Species	Pacific Marten	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing
	California Spotted Owl	Would impact individuals, but are not likely to lead to a trend toward federal listing or a loss of viability	Would impact individuals, but are not likely to lead to a trend toward federal listing or a loss of viability	Would impact individuals, but are not likely to lead to a trend toward federal listing or a loss of viability	Would impact individuals, but are not likely to lead to a trend toward federal listing or a loss of viability
	Northern Goshawk	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing
	Sierra Nevada Red Fox	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Sensitive Species (continued)	North American Wolverine	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing
	Fringed Myotis	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing
	Pallid Bat	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing
	Townsend's Big-eared Bat	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing
	Bald Eagle	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing
	Great Gray Owl	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing
	Willow Flycatcher	No impact	No impact	No impact	No impact
	Greater Sandhill Crane	No impact	No impact	No impact	No impact
	Yellow Rail	No impact	No impact	No impact	No impact
	Western Pond Turtle	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing	May impact individuals, but are not likely to lead to a loss of viability or a trend toward federal listing
	Shasta Hesperian Snail	No impact	No impact	No impact	No impact
	Western Bumble Bee	No impact	No impact	No impact	No impact

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Subnivean Species: Shrews, Vole, Deer Mouse	Percentage of habitat affected and percentage of habitat within high and moderate OSV use categories	98/31	98/31	90/24	98/30
Management Indicator Species	Mule Deer	Minimal change in mule deer populations, trends, or the montane hardwood/conifer habitat associated with mule deer	Minimal change in mule deer populations, trends, or the montane hardwood/conifer habitat associated with mule deer	Minimal change in mule deer populations, trends, or the montane hardwood/conifer habitat associated with mule deer	Minimal change in mule deer populations, trends, or the montane hardwood/conifer habitat associated with mule deer
	Mountain Quail	Minimal expected change in trends for mountain quail or the early seral and mid-seral conifer habitat	Minimal expected change in trends for mountain quail or the early seral and mid-seral conifer habitat	Minimal expected change in trends for mountain quail or the early seral and mid-seral conifer habitat	Minimal expected change in trends for mountain quail or the early seral and mid-seral conifer habitat
	Sooty (Blue) Grouse	Minimal expected change in populations or population trends for sooty grouse, nor to the late-seral open canopy ecosystem component with which they are associated	Minimal expected change in populations or population trends for sooty grouse, nor to the late-seral open canopy ecosystem component with which they are associated	Minimal expected change in populations or population trends for sooty grouse, nor to the late-seral open canopy ecosystem component with which they are associated	Minimal expected change in populations or population trends for sooty grouse, nor to the late-seral open canopy ecosystem component with which they are associated
	Late Seral Closed Canopy Coniferous Forest (California spotted owl, Pacific marten, northern flying squirrel)	Minimal expected change in populations or population trends for California spotted owls, Pacific marten, or northern flying squirrels, nor to the late-seral closed canopy habitat component with which they are associated	Minimal expected change in populations or population trends for California spotted owls, Pacific marten, or northern flying squirrels, nor to the late-seral closed canopy habitat component with which they are associated	Minimal expected change in populations or population trends for California spotted owls, Pacific marten, or northern flying squirrels, nor to the late-seral closed canopy habitat component with which they are associated	Minimal expected change in populations or population trends for California spotted owls, Pacific marten, or northern flying squirrels, nor to the late-seral closed canopy habitat component with which they are associated
Migratory Landbirds		Minimal impacts to individual migratory birds and would not adversely affect migratory landbird conservation.	Minimal impacts to individual migratory birds and would not adversely affect migratory landbird conservation.	Minimal impacts to individual migratory birds and would not adversely affect migratory landbird conservation.	Minimal impacts to individual migratory birds and would not adversely affect migratory landbird conservation.

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Fisheries and Aquatic Resources	Central Valley spring-run Chinook and Central Valley steelhead	May affect, not likely to adversely affect	May affect, not likely to adversely affect	May affect, not likely to adversely affect	May affect, not likely to adversely affect
	Sierra Nevada Yellow Legged Frog	May affect, likely to adversely affect	May affect, likely to adversely affect	May affect, likely to adversely affect	May affect, likely to adversely affect
	Cascades Frog (Sensitive)	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area	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	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area
Botany	*Orcuttia tenuis*	No effect	No effect	No effect	No effect
	Orcuttia tenuis Critical Habitat	No effect	No effect	No effect	No effect
	Tuctoria greenei	No effect	No effect	No effect	No effect
	Tuctoria greenei Critical Habitat	No effect	No effect	No effect	No effect
	Sensitive Species	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area	May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability in the planning area
	Survey and Manage Species	No negative effects	No negative effects	No negative effects	No negative effects

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Soils	Soil Productivity and Soil Stability: OSV acres open to cross-country travel on sensitive soils (including wet meadows, areas with potential low stability, and areas with potential erosion hazards).	There would be no change in acreage of area currently open to cross-country OSV travel on sensitive soils. Approximately 87,292 acres with mapped sensitive soil types are open to cross-country travel.	Approximately 87,292 acres of sensitive soils would be open to cross-country OSV travel within the Forest. This is no different from the no-action alternative, and these two alternatives have the greatest acreage of sensitive soils open to OSV cross-country travel.	Approximately 73,622 acres of sensitive soils will be open to cross-country OSV travel. Under this alternative, the least amount of sensitive soils will be open to OSV cross-country travel.	Approximately 84,529 acres of sensitive soils will be open to cross-country OSV travel. Under this alternative, there would be less sensitive soils open to cross-country OSV travel than the proposed action, but slightly more than under alternative 3.
	Soil Stability: Minimum snow depths on trails (inches)	Minimum snow depth is 12 inches of unpacked snow prior to any OSV travel over existing roads and trails. This minimum snow depth has been observed to be sufficient to prevent contact of OSVs with the bare soil surface.	Minimum snow depth is 6 inches of unpacked snow prior to any OSV travel over existing roads and trails. This minimum snow depth may potentially create conditions in which the road surface is exposed to OSVs and there is potential for some soil erosion or rutting of the road surface. Monitoring of this snow depth is recommended to further evaluate the potential effects to soils.	Minimum snow depth is 6 inches of unpacked snow prior to any OSV travel over existing roads and trails. This minimum snow depth may potentially create conditions in which the road surface is exposed to OSVs and there is potential for some soil erosion or rutting of the road surface. Monitoring of this snow depth is recommended to further evaluate the potential effects to soils.	Minimum snow depth is 6 inches of unpacked snow prior to any OSV travel over existing roads and trails. This minimum snow depth may potentially create conditions in which the road surface is exposed to OSVs and there is potential for some soil erosion or rutting of the road surface. Monitoring of this snow depth is recommended to further evaluate the potential effects to soils.
	Soil Productivity: Minimum snow depths for cross-country travel (inches)	Minimum snow depth for cross-country OSV travel is currently 12 inches of unpacked snow. Potential effects to the soil are unlikely to occur with at least 12 inches of snow covering the soil surface.	Minimum snow depth of 12 inches of unpacked snow for cross-country OSV travel would not change. Potential effects to the soil are unlikely to occur with at least 12 inches of snow covering the soil surface.	Minimum snow depth of 12 inches of unpacked snow for cross-country OSV travel would not change. Potential effects to the soil are unlikely to occur with at least 12 inches of snow covering the soil surface.	Minimum snow depth of 12 inches of unpacked snow for cross-country OSV travel would not change. Potential effects to the soil are unlikely to occur with at least 12 inches of snow covering the soil surface.

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Soils (continued)	Soil Productivity: Total acres open to OSV use	Approximately 976,760 acres of the Forest are open to OSV use. Under the no-action alternative, the most acreage is open to OSV use; therefore, the most potential for soil damage exists under this alternative.	Approximately 947,120 acres of the Forest would be open to OSV use. This is less area open to OSV use compared to the no-action alternative, but it is the greatest amount of acres open to OSV use when compared to the other action alternatives. The proposed action has the potential for the most impacts to the soil resource when compared with alternatives 3 and 4.	Approximately 876,690 acres of the Forest would be open to OSV use, which is the least amount of land open to OSV use out of all four alternatives.	Approximately 879,690 acres of the Forest would be open to OSV use, which is a greater area than under alternative 3, but less area than the no-action and proposed action alternatives.
Socioeconomics	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	No change due to management; increased visitor use over time would increase number of jobs, labor income, and tax revenue	No change due to management; increased visitor use over time would increase number of jobs, labor income, and 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	No change due to management; visitor use expected to increase over time	No change due to management; visitor use expected to increase over time	No change due to management; visitor use expected to increase over time	No change due to management; visitor use expected to increase over time
	Quality of life: Values, beliefs, and attitudes	No net change in quality of life relative to current conditions; user conflict may increase due to population growth and increased visitor use	15% increase in acres closed to OSV use would benefit quality of life of non-motorized winter recreation users; potential for continued user conflict due to trails in proximity to wilderness, national park, and shared trailheads	36% increase in acres closed to OSV use would benefit quality of life of non-motorized winter recreation users; potential for continued user conflict due to trails in proximity to wilderness, national park, and shared trailheads	No net change in quality of life relative to current conditions; user conflict may increase due to population growth and increased visitor use

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Socioeconomics (continued)	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	Minor change due to prohibition on OSV use below 3,500 feet in elevation; climate change may increase distances winter recreation users must travel for adequate snow depth	Minor change due to prohibition on OSV use below 3,500 feet in elevation; climate change may increase distances winter recreation users must travel for adequate snow depth	No change due to management; climate change may increase distances winter recreation users must travel for adequate snow depth
Noise	Opportunities for motorized winter uses/Acres	976,760 acres open to OSV use and potentially affected by noise/173,260 acres closed to OSV use and available for quiet recreation	947,120 acres open to OSV use and potentially affected by noise/202,900 acres closed to OSV use and available for quiet recreation	878,690 acres open to OSV use and potentially affected by noise/271,330 acres closed to OSV use and available for quiet recreation	966,270 acres open to OSV use and potentially affected by noise/183,750 acres closed to OSV use and available for quiet recreation
	OSV designations / Miles	406 miles designated /324 miles groomed	406 miles designated /324 miles groomed No change from existing conditions.	406 miles designated /324 miles groomed No change from existing conditions.	406 miles designated /324 miles groomed No change from existing conditions.
Air Quality	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	976,760 acres open to OSV use. No known violations of the CAA as a result of OSV use under the existing condition.	947,120 acres open to OSV use, a 3 percent reduction from existing conditions. . No violations of the CAA are anticipated.	878,690 acres open to OSV use, a 10 percent reduction from existing conditions. No violations of the CAA are anticipated.	966,270 acres open to OSV use, a 1 percent reduction from existing conditions. No violations of the CAA are anticipated.
	Estimate of change (increase/decrease) in emissions and the potential to create adverse impacts to air quality. Acres open to OSV visitor use	406 miles designated for OSV use. No known violations of the CAA as a result of OSV use under the existing condition.	406 miles designated for OSV use. No change from existing conditions. No violations of the CAA are anticipated.	406 miles designated for OSV use. No change from existing conditions. No violations of the CAA are anticipated.	406 miles designated for OSV use. No change from existing conditions. No violations of the CAA are anticipated.

	Impacts	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Air quality (continued)	Potential effects of OSV emissions to create adverse impacts to air quality/ Shifts in OSV use in relation to sensitive areas (Class 1 and II areas).	Groomed OSV trails are in close proximity to the Caribou Wilderness, Thousand Lakes Wilderness, and the boundary of Lassen Volcanic National Park. No known violations of the CAA or impact to Class 1 areas as a result of OSV use under the existing condition.	Groomed OSV trails are in close proximity to the Caribou Wilderness, Thousand Lakes Wilderness, and the boundary of Lassen Volcanic National Park. No violations of the CAA or impact to Class 1 areas are anticipated under this alternative.	Groomed OSV trails are in close proximity to the Caribou Wilderness, Thousand Lakes Wilderness, and the boundary of Lassen Volcanic National Park. Designation of Butte Lake Backcountry Solitude area minimizes OSV impacts and reduces emissions near Caribou wilderness and Lassen Volcanic National Park. No violations of the CAA or impact to Class 1 areas are anticipated under this alternative.	Groomed OSV trails are in close proximity to the Caribou Wilderness, Thousand Lakes Wilderness and the boundary of Lassen Volcanic National Park. No violations of the CAA are anticipated or impacts to Class 1 areas.

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.

Chapter 3 explains the basic components of the analysis followed by a section on each resource. This should provide the reader a better understanding of the overall motorized routes and designations for wheeled motorized vehicles within the planning area. Acreage and mileage totals are approximate within tables and text due to rounding.

This DEIS looks at effects within the Lassen National Forest. The effects of the proposed actions in the Lassen National Forest 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 reducing or allowing places people could ride OSVs instead of listing every route and predicting the effects at a particular site.

Most specialists used Geographic Information System (GIS) to calculate the miles and areas affected, or to model habitats. If specialists used models other than GIS, it would be described in their report.

It was assumed that OSV use would occur where it is proposed. In doing so, the effects analysis describes the effects resulting from the change between where people are riding OSVs (alternative 1) and where people would ride OSVs (alternatives 2 and 3).

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 Lassen 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 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.

Specialist Reports

Relevant resource components from each resource specialist's report are highlighted in this chapter. Components include the existing environment which is the baseline environmental condition as described

under alternative 1,and the anticipated environmental effects of implementing the range of alternatives. Please see appendix B for Forest Plan consistency for each resource.

This draft environmental impact statement (DEIS) incorporates by reference the resource specialists' reports in the Project Record (40 CFR 1502.21). These reports contain the detailed data, executive summaries, regulatory framework, assumptions and methodologies, analyses, conclusions, maps, references, and technical documentation that the resource specialists relied upon to reach their conclusions.

Project Record

As also stated in chapter 1, the Lassen National Forest Project Record is referenced in an effort to keep this document brief and concise as per 40 CFR 1502.21. The Project Record contains a variety of documents, including, but not limited to: specialists' reports, literature, supporting documents, and other process-related documents.

Transportation and Engineering

This analysis will consider and disclose potential effects to engineering and roads (safety, traffic, affordability, jurisdiction, and the underlying forest transportation system) that could result from four unique alternatives pertaining to implementing Subpart C of the Travel Management Regulations (36 CFR 212). These regulations require designating roads, trails, and areas for OSV use.

Engineering and roads are not directly related to the purpose and need nor directly connected to issues identified during the scoping process. Issues identified include:

- Quality Recreational Experience
- Noise
- Air Quality
- Water and Soil Resources
- Aquatic Wildlife
- Terrestrial Wildlife

Relevant Laws, Regulations, and Policy

Laws

National Forest Roads and Trails Act of October 13, 1964, as amended (16 U.S.C. 532-538)
Authorizes road and trail systems for the national forests. Authorizes granting of easements across NFS 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
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)
Establishes 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 & 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

Forest Plan

Forest-wide Standards and Guidelines

FACILITIES

- Provide a stable and cost-efficient road system through appropriate construction, reconstruction, maintenance
  - Maintain all roads and related structures to protect resources of adjacent areas; meet contractual and legal obligations, and provide an efficient transportation system
- Provide a stable and cost-efficient trail system through appropriate construction, re- construction, maintenance
  - Meet current objectives for trail management and use of all designated hiking, equestrian, off-highway vehicle, and over-snow trails.
  - Maintain all trails and related structures to: protect the recreation amenities of adjacent areas, provide reasonable access, be an efficient transportation system; and provide various levels according to type and volume of use

- Modify parts of the Forest Development Trail System as needed to meet changing use demands
- Construct, reconstruct, and maintain each trail to satisfy reasonable environmental and economic criteria

- Provide administrative sites and facilities that effectively and cost-efficiently serve the public and the Forest Service workforce

Sierra Nevada Forest Plan Amendment

- No applicable direction

Resource Indicators and Measures

- Measurement Indicator 1: Public Safety and Traffic – For each alternative display/discuss the effects on public safety. Discuss the proposed changes to the trail system and effects it will have to motor vehicle operators and other users of the trail system. Note instances where the proposed designation would allow operation of motor vehicles in a manner inconsistent with state law.
- Measurement Indicator 2: Affordability –For each alternative display/discuss how over-snow uses and grooming will affect the total cost of maintaining the Forest transportation system (FTS) that will be open to motor vehicle use. Include the annual maintenance changes associated with making the changes to the system. This analysis will not involve standard (wheeled motor vehicle) road maintenance costs.
- Measurement Indicator 3: Effects to underlying NFS roads and trails, including wear and tear that may affect wheeled motor vehicle use.

This analysis uses qualitative indicators and measures, due to the nature of the resource and scope/scale of the alternatives.

Table 18. Transportation and engineering resource indicators and measures

Resource Element	Resource Indicator	Measure
Safety	Public Safety and 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

Methodology

Information Sources

The Forest transportation atlas will be the primary data used, along with professional expertise. The atlas is primarily composed of roads and motorized trail information as contained in geographic information system (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) will be included. Last of all, the existing National Forest System roads and OSV-related engineering facilities, including snow parks, warming huts, parking areas (GIS data) will be 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 will follow applicable laws and designations as described under each alternative.
- All proposed and analyzed OSV trails are 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 (Lassen 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.

Affected Environment

Existing Condition

The existing system of available OSV trails and areas on the Lassen National Forest is the culmination of multiple agency decisions over recent decades. Currently, the Forest Service requires 12 or more inches of snow on the ground to operate an OSV on the Lassen National Forest. Although 12 inches of snow may exist at a given time in many higher elevation Areas, there may be less than 12 inches of snow at trailheads, which under current regulations, would leave Areas with 12 or more inches of snow inaccessible to OSV use. All snow trails are located on existing dirt, gravel, or paved trails or roads. These trails and roads are used in the summer for highway vehicles, off-highway vehicles, and non-motorized recreation. Snow grooming currently is allowed when there is a minimum snow depth of 18 inches.

The Forest Service has also identified two Areas in which OSV use should be prohibited, but there are no existing orders or directives that have formally prohibited OSV use within them. One Area is located in the southwest corner of the Lassen National Forest, below 3,500 feet in elevation. Snowfall is typically not adequate in this Area for OSV use to occur. This Area is approximately 29,130 acres in size. The second Area in which OSV use should be prohibited is the Black Mountain Research Natural Area (RNA). The Lassen National Forest Land and Resource Management Plan (Forest Plan) prohibits motorized vehicles within research natural areas, but no formal directive prohibiting such use has been issued. This Area is approximately 520 acres in size.

The following summarizes how the Forest Service currently manages OSV use on the approximately 1,150,020-acre Lassen National Forest:

- Approximately 406 miles of National Forest System OSV trails;
- Of the approximately 406 miles of National Forest System OSV trails, approximately 324 miles are groomed OSV trails;
- Approximately 148 miles of National Forest System trail closed to OSV use;
- Approximately 976,760 acres of National Forest System land open to off-trail cross-country OSV use; and

Approximately 173,260 acres of National Forest System land closed to OSV 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 – No Action

Summary of Effects – Alternative 1

Table 19. Transportation and engineering 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 Lassen 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 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	18” (grooming) and 12” (OSV use) snow depth requirement provides more than adequate protection of underlying roads.

Alternative 2 – Proposed Action

Direct and Indirect Effects - Alternative 2

Table 20. Transportation and engineering resource indicators and measures for alternative 2

Resource Element	Resource Indicator	Measure	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.

Resource Element	Resource Indicator	Measure	Alternative 2
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 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" (grooming) and 6" (OSV use) snow depth requirement provides adequate protection of underlying roads.

Cumulative Effects – Alternative 2

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis (applicable to all action alternatives)

- Burney-Hat Creek Basins Project
- FHP 2011 IRSC Timber Sale PHP R5-11-CA-P-NE011
- Polydent Stewardship
- Orphan DFPZ Stewardship
- Arid TS 2012 Sale Area
- Peacock Stewardship Project
- Jellico Fire Salvage TS
- Bald Fire Salvage TS
- HC Salvage & Haz Tree Reoffer TS Sale Area

Table 21. Transportation and engineering resource indicators and measures for alternative 2 cumulative effects

Resource Element	Resource Indicator	Measure	Alternative 2
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 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 logging and forest operations activities would minimize cumulative effects.

Alternative 3

Direct and Indirect Effects - Alternative 3

Table 22. Transportation and engineering resource indicators and measures for alternative 3

Resource Element	Resource Indicator	Measure	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 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	18” (grooming), 12” (general OSV use) and 6” (OSV use on underlying routes) snow depth requirements provide adequate protection of underlying roads.

Cumulative Effects – Alternative 3

Table 23. Transportation and engineering resource indicators and measures for alternative 3 cumulative effects

Resource Element	Resource Indicator	Measure	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 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 logging and forest operations activities would minimize cumulative effects.

Alternative 4

Direct and Indirect Effects - Alternative 4

Table 24. Transportation and engineering resource indicators and measures for alternative 4

Resource Element	Resource Indicator	Measure	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 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” (grooming, general OSV use) and snow depth requirements and no visible damage on underlying routes provide adequate protection of underlying roads.

Cumulative Effects – Alternative 4

Table 25. Transportation and engineering resource indicators and measures for alternative 4 cumulative effects

Resource Element	Resource Indicator	Measure	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 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 logging and forest operations activities would minimize cumulative effects.

Summary

Summary of Environmental Effects

Table 26. Summary comparison of environmental effects to transportation and engineering resources

Resource Element	Indicator/ Measure	Alt 1	Alt 2	Alt 3	Alt 4
Safety	Public Safety & Traffic	The current Lassen 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.	Same as Alternative 2	Same as Alternative 2
Cost	Affordability	Minor effects due to over-snow vehicle use for access roads to popular parking and staging areas.	Minor effects due to over-snow vehicle use for access roads to popular parking and staging areas.	Minor effects due to over-snow vehicle use for access roads to popular parking and staging areas.	Minor effects due to over-snow vehicle use for access roads to popular parking and staging areas.
Transportation property	Effects to underlying NFS roads and trails	18” (grooming) and 12” (OSV use) snow depth requirement provides more than adequate protection of underlying roads.	12” (grooming) and 6” (OSV use) snow depth requirement provides adequate protection of underlying roads.	18” (grooming), 12” (general OSV use) and 6” (OSV use on underlying routes) snow depth requirements provide adequate protection of underlying roads.	12” (grooming, general OSV use) and 6” snow depth requirements and no visible damage on underlying routes provide adequate protection of underlying roads.

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

Alternatives 2, 3, and 4 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 is otherwise compliant with all applicable direction.

Hydrology

Management activities on National Forest System lands must be planned and implemented to protect hydrologic function and water quality of forest watersheds, including the volume, timing, and quality of streamflow. The use of roads, trails, and other areas on national forests for public operation of OSVs has the potential to affect these hydrologic functions through runoff changes and changes in water quality. OSV use has the potential to impact water and watersheds several ways including through chemical contamination, ground surface disturbance, runoff timing, or through altering stream side vegetation. The hydrologic analysis includes all aquatic resources that could be affected by OSVs. This includes perennial and seasonal streams, lakes, ponds, meadows, and springs.

Relevant Laws, Regulations, and Policy

Regulatory Framework

Land and Resource Management Plan

The Lassen National Forest Land and Resource Management Plan (LRMP) provides standards and guidelines for water-related concerns. This following 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 27). The 2004 Sierra Nevada Forest Plan Amendment modified the forest plan guidance as follows:

Sierra Nevada Forest Plan Amendment

The 2001 Sierra Nevada Framework established a comprehensive aquatic and riparian conservation strategy for all National Forest System 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 constructing and relocating roads and trails and for managing riparian conservation areas. These standards and guidelines require the Forest Service (USFS) to avoid road construction, reconstruction, and relocation in meadows and wetlands; maintain and restore the hydrologic connectivity of streams, meadows, and wetlands by identifying 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 before 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.

Wheeled Vehicles or OSVs

Standard and Guideline. Minimize resource impacts from wheeled off-highway (and over-snow) vehicle use and cross-country use of OSVs. Each national forest may designate where off-highway vehicle or OSV use will occur. Unless otherwise restricted by current forest plans or other specific area standards and guidelines, cross-country travel by OSVs would continue.

Riparian Conservation Areas: Activity-Related Standards and Guidelines

Where a proposed project encompasses a riparian conservation area (RCA) or a critical aquatic refuge (CAR), conduct a site-specific project area analysis to determine the appropriate level of management within the RCA (or CAR). Determine the type and level of allowable management activities by assessing how proposed activities measure against the riparian conservation objectives (RCO) and their

associated standards and guidelines. Areas included in RCAs 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 waterbody 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 waterbody. 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 streambanks 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 off-highway vehicle routes.

Riparian Conservation Objective 4

Ensure that management activities within RCAs and CARs enhance or maintain physical and biological characteristics associated with aquatic- and riparian-dependent species.

Standard and Guideline 116: Identify roads, trails, off-highway vehicle 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 reissuing 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.

Table 27. Lassen National Forest Land and Resource Management Plan (1992)

Page	Forest-wide Guidelines
Ch. 4, Sec. E, p. 4-31, WR a. (1-2)	a. Provide water of sufficient quality and quantity to meet current needs. Meet additional future demand where compatible with other resource needs. (1) Implement Best Management Practices (BMP) (Appendix Q) to meet water quality objectives stated in 22. c. below, and maintain and improve the quality of surface waters on Lassen NF. Identify methods for applying the BMPs during environmental analysis of proposed projects, and incorporate them into project planning documents. (2) Provide water for Lassen NF uses by filing for and maintaining all water rights needed for such uses. Deny special use permit applications and protest other parties' water rights applications that jeopardize forest uses or fish and wildlife needs.
Ch. 4, Sec. E, p. 4-32, WR b. (4)	(4) Conduct formal cumulative watershed effects analysis in accordance with Pacific Southwest Region FSH2509.22, Chapter 20. Adjust project impacts and/or timing to keep disturbance below the appropriate threshold of concern (TOC) in all affected sub basins and watersheds.
Ch. 4, Sec. E, p. 4-32, WR b. (5)	(5) Where formal analysis of a project's cumulative watershed effects is not necessary or feasible, document the reasons and limit disturbance to five percent per decade in sensitive areas, per Land Management Planning Direction for the Pacific Southwest Region (4-1.H.2.b(2)). Sensitive areas are defined as watershed acres that have high erosion potential, steep slopes, or high instability. See FEIS Glossary under "sensitive watershed lands."
Ch. 4, Sec. E, p. 4-32, WR c. (1-2)	c. Comply with Federal, State, regional, and local water quality regulations, requirements and standards. (1) Comply with discharge requirements of the Clean Water Act, state drinking water and sanitary regulations, and State and Regional Water Quality Control Board basin plans and rulings. (2) Take immediate remedial action if activities under Forest Service management violate water quality standards.

Page	Forest-wide Guidelines
Ch. 4, Sec. E, p. 4-33, WR d. (3)	(3) Analyze environmental effects of proposed projects within riparian areas in a NEPA document.
Ch. 4, Sec. F, p. 4-51, D, FI #3	3. Where natural conditions permit, achieve or maintain stable channel conditions over at least 80 percent of the total linear distance of stream channels.
Page	**Roads**
LRMP Ch. 4, Sec. F, p. 4-50, D, FC #1	1. Limit stream crossings to stable rock or gravel areas or where stream bank damage will be minimal. Where this is not feasible, develop crossings that minimize disturbance to riparian-dependent resources. Crossings will be as near right angles as possible.
LRMP Ch. 4, Sec. F, p. 4-50, D, FC #2	2. Disperse flows from ditches or culverts to keep upland area run off from reaching riparian zones.
Ch. 4, Sec. F, p. 4-50, D, FC #3	3. Route roadside drainage through armored ditches or culverts across erodible areas.
Ch. 4, Sec. F, p. 4-51, D, FC #6	6. Out slope roads to minimize collection of water.
Page	**Recreation**
Ch. 4, Sec. F, p. 4-52, D, RC #3	3. Confine off-highway vehicles, except over-snow vehicles, to designated roads, trails, and stream crossings in riparian areas.

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 §§ 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 (CWA) 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 CWA 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 best management practices. These best management practices, 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 CWA. The agreements include best management practices related to OSV use, and to road construction and maintenance. The implementation and effectiveness of the best management practices are reviewed annually. In recent years, the Forest Service has emphasized monitoring in national forests to ensure the implemented projects follow approved control measures (USFS 2000, 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 (USFS 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 best management practices that include the following best management practice 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 best management practices 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 best management practices most relevant to the OSV Program pertain to snow removal and monitoring (Appendix D).

Federal Law

The Organic Administration Act of 1897 (16 U.S.C. 475) states that one of the purposes for which the national forests were established was to provide for favorable conditions of water flow.

The Federal Water Pollution Control Act, (Clean Water Act, CWA) as amended, intends to restore and maintain the chemical, physical, and biological integrity of the nation's waters. Required are: (1) compliance with state and other Federal pollution control rules to the same extent of nongovernmental entities, (2) in stream water quality criteria needed to support designated uses, (3) control of nonpoint source water pollution by using conservation or "best management practices," (4) permits to control discharge of pollutants into waters of the United States. Compliance with the Clean Water Act by national forests in California is achieved under state law

The National Forest Management Act of 1976 (NFMA) prevents watershed conditions from being irreversibly damaged and protects streams and wetlands from detrimental impacts. Land productivity must be preserved. Fish habitat must support a minimum number of reproductive individuals and be well distributed to allow interaction between populations.

The Safe Drinking Water Act Amendment of 1996 provides the states with more resources and authority to enact the Safe Drinking Water Act of 1977. This amendment directs the states to identify source areas for public water supplies that serve at least 25 people or 15 connections at least 60 days a year.

Executive Order 11988 directs Federal agencies to provide leadership and take action on Federal lands to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains. Agencies are required to avoid the direct or indirect support of development on floodplains whenever there are practicable alternatives and evaluate the potential effects of any proposed action on floodplains.

Executive Order 11990, as amended, requires Federal agencies exercising statutory authority and leadership over Federal lands to avoid to the extent possible, the long- and short-term adverse impacts associated with the destruction or modification of wetlands. Where practicable, direct or indirect support of new construction in wetlands must be avoided. Federal agencies are required to preserve and enhance

the natural and beneficial values of wetlands. Other laws pertinent to watershed management on National Forest System lands can be found in Forest Service Manual 2501.1.

Topics and Issues Addressed in This Analysis

Scope of Analysis

The hydrologic analysis includes all water resources that could be affected by OSVs. This includes perennial and seasonal streams, lakes, ponds, vernal pools, meadows, wetlands, and springs. Seasonal streams include intermittent and ephemeral streams. Ephemeral streams run for a short period of time with rainfall and snowmelt, whereas intermittent streams run for most of the year, except during times when water loss exceeds water availability in the channel. Vernal pools are seasonal ponds that usually develop during snowmelt and dissipate into the summer season.

Data Sources

We compiled data on OSV routes and uses from geographic information systems (GIS) data obtained from the Lassen National Forest, and from communication with forest recreation personnel or other specialists on the forest. We used available scientific literature combined with an assessment of local conditions to assess OSV effects on the plan area.

Analysis Assumptions

Assumptions used for the analysis are based on published literature and professional judgement based on experience as a hydrologist with the USDA Forest Service. These sources of information framed the key indicators, as shown in Table 28 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

Trail grooming occurs over an existing road and trail network and does not alter landforms or result in perceptible 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. Consequently, 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 2

OSV use on trails. OSVs include snowmobiles, snowcats, and other tracked vehicles designed for use over snow. 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 number one source of potential nonpoint source of pollution. Fine-grained sediment from roads and trails that reaches waterbodies impairs water quality.

Much of the OSV use would occur on groomed trails where adequate snow cover would ensure negligible potential for contact with bare soil and practically no disturbance of trail and road surfaces. OSV use on the groomed trail system with adequate snow coverage would not cause substantial impacts to water quality in perennial, intermittent, or ephemeral streams, or in wetlands or other bodies of water.

Assumption 3

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 a negligible effect on vegetation, especially along streams and other waterbodies. Some researchers have found that OSVs 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 OSV traffic. Similar results could occur when OSVs use exposed southern exposures. OSV use in off-trail open riding areas where there is minimal snow cover or bare patches of ground could potentially result in destruction of vegetation, soil compaction, and erosion in areas of repeated and concentrated use.

Off-trail OSV use would be generally dispersed and would not result in high concentration of OSV use on bare soil. Also, OSV operators generally avoid travel over bare soil because it can damage their machines. With adequate minimum snow levels, no more than incidental soil erosion would occur, and therefore, would not create water quality impacts to streams or waterbodies by introducing sediment in water runoff.

Cross-country OSV use has the potential to 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 at 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 OSVs and potential impacts to riparian resources from OSV use would be considered negligible with adequate snowpack coverage.

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 OSVs 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 cross-country OSV uses are consistent with the Lassen LRMP including riparian conservation objectives and watershed management standards and guidelines and management prescriptions.

Assumption 4

Exhaust emissions deposited in the snow pack in the amounts anticipated on the Lassen National Forest from grooming equipment or 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 OSV 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 Mountain region provide some indication of the potential effects of pollution deposition from 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 use was allowed, and OSVs were concentrated on one main trail into the park.

The purpose of the study was to evaluate whether increased OSV 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, (2) determine if concentrations of any volatile organic compounds exceed safe drinking water criteria, and (3) predict the potential for impacts by volatile organic compounds on the fauna of streams near roads heavily used by OSVs 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 volatile organic compounds 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 volatile organic compounds analyzed, and were below levels that would adversely impact aquatic ecosystems (Arnold and Koel 2006).

The number of OSVs that entered Yellowstone in 2003 and 2004 was 47,799 and 22,423, respectively (Arnold and Koel 2006). The estimated seasonal day use of OSV Program trails across the Lassen National Forest is around 10,000 OSVs. 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 Lassen National Forest trailhead or trail system are considerably less than at Yellowstone National Park, and are considered very low. Since Yellowstone OSV use levels studied had not resulted in impaired water quality, it follows that OSV use in the Lassen National Forest would not adversely affect water quality of snowmelt. Therefore, operation of OSVs on system trails and cross-country is consistent with water quality objectives in the Lassen LRMP including riparian conservation objectives and watershed management standards and guidelines and management prescriptions.

Assumption 5

Monitoring is required. Although there is no indicated adverse damage caused by OSV use to water resources, further monitoring and, if needed, implementing other protective measures would ensure that aquatic resources are adequately protected. Possible protective measures include restricting access to aquatic communities where substantial impacts are observed through educational materials and signage, or, if necessary, through the use of barriers or trail re-routes. Annual OSV monitoring should include streams and riparian systems, wetland, and other sensitive aquatic habitats occurring near the groomed trail system. The Forest Service water quality BMP 4-7 (USFS 2000) should be followed for monitoring guidelines.

Assumption 6

Other hydrology impacts. OSV use would 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. People or property would not be exposed to a risk of flooding nor increase the risk of flooding for existing development in floodplains in the analysis area. OSV use would not place housing or other structures within a flood hazard area and would 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. OSV use would not involve an increase in impervious surfaces, and does not involve discharges of storm water or wastewater.

Assumption 7

The equivalent roaded acre model (FSH 1990a: chapter 20) was not used for this analysis to show cumulative watershed effects. As long as adequate snow depths are maintained, because there are virtually no direct or indirect effects, using the equivalent roaded acre model will not show any detectable differences between alternatives and is not appropriate for this scale of analysis, which covers nearly a million acres. OSV use does not create a new disturbance on the landscape for any alternative, and 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 equivalent roaded acre method would not show any detectable differences within the 6th field watersheds in this analysis.

Assumption 8

Global 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 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 off-highway vehicle use effects on water resources on national forests:

- As floods become more frequent and of greater magnitude, roads and trails 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 role of roads and trails in increasing runoff and peak flows (Ziemer 1981, Jones and Grant 1996) is likely to increase. 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. Routes through riparian areas that are currently not causing resource damage could cause damage in the future as runoff becomes more extreme.
- 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.

Effects Analysis Methodology

This section describes the methodology used for the effects analysis for water resources. This section establishes indicators (Table 28) chosen to measure potential effects, the analysis area, timeframe, methods used, and assumptions made for the effects analysis of water resources of all action alternatives.

As defined in the regulations for implementing NEPA, Code of Federal Regulations, Chapter 40, Sections 1500-1508, direct effects are those effects caused by the proposed action (or action alternative) and which occur at the same time and place as the action. Indirect effects are those caused by the action that are later in time or farther removed in distance from the location of the action.

We will analyze the direct and indirect effects and cumulative watershed effects for each of the action alternatives. Direct and indirect effects of each project alternative will be analyzed together. At the end of these analyses there is a summarized comparison of alternatives.

We used key indicators (Table 28) to summarize the direct and indirect effects of alternatives and compare them to the no-action alternative. A summary compares each alternative by the indicators, Forest Plan consistency, and consistency with the Federal Clean Water Act and the Porter Cologne Act.

Key Indicators

Table 28. Indicators used for the hydrologic analyses

	Resource Indicator	Usefulness of Indicator Measure	Geographic Scales for Each Indicator Measure
Indicator Measure 1	Designated use area for OSV use	Impacts are widely dispersed and differences in alternatives are minor	Lassen National Forest
Indicator Measure 2	Minimum Snow Depth for OSV Use on Designated Trails (Inches)	Minimum snow depths on trails can be evaluated for effectiveness for protecting the trail surface	
Indicator Measure 3	Minimum Snow Depth for Cross-country OSV Use (Inches)	Minimum snow depths for cross-country travel can be evaluated for effectiveness for protecting the ground surface and vegetation	
Indicator Measure 4	Number of OSVs per year using trails across forest	Total amount of use can be compared to use amounts in Yellowstone and other studies to gauge potential water quality effects	
Indicator Measure 5	Consistency with Riparian Conservation Objectives 1, 2, 4, 5, and 6	Evaluation of the effects to RCAs, water quality and beneficial uses of water	

Note: The Sierra Nevada Forest Plan Amendment requires that RCO analyses be conducted during environmental analyses for new proposed management activities within CARs and RCAs (Standard and Guideline 92). There are no additional routes proposed for addition to the NFTS within CARs in the analysis area. Consequently, consistency with the RCOs is an indicator to ensure that goals of Aquatic Management Strategy are met (USDA FS PSW Region 2004: 32). The RCO Analysis is in appendix F.

Methodology and Information Sources

We used GIS data, a variety of reports and assessments of OSV impacts, and professional experience and judgement using scientific literature on OSV impacts for this analysis.

Incomplete and Unavailable Information

We performed no field observations or site-specific water quality or ground-disturbance monitoring for this analysis. And, we conducted very little monitoring of OSV impacts on hydrology at specific sites on the Lassen National Forest. Lassen National Forest recreation staff monitor OSV and other winter recreation use on the Forest, but no water quality sampling or hydrology assessments were made supporting this assessment of OSV impacts. We based assessments of OSV water quality impacts primarily on scientific literature.

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 Lassen National Forest.

Short-term effects are generally around up to 1 year in duration, and long-term effects are over 1 year in duration.

Affected Environment—Hydrology

The OSV Program trail sites on the Lassen National Forest are located in the southern Cascades with the majority occurring on the east side of the crest. There are many streams, lakes, and reservoirs within the analysis area. Many waterbodies are directly accessed or crossed by the trails and many more can be accessed by off-trail cross-country riding.

The Lassen National Forest is subdivided into 124 6th-level watersheds. The watershed average size is about 35,000 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.

Surface Water

Approximately 514 miles of perennial stream channels and 1,442 miles of intermittent streams flow through the Lassen National Forest. The Forest also has 1,057 lakes totaling over 6,207 acres, and 321,752 meadow acres, ranging in size from less than an acre to over 1,000 acres (table 30). The hydrology of the plan area is dynamic and evolving. There can be large annual variations in water availability and quality, seasonal flow rates, and water temperatures.

Precipitation and snow accumulation also can change over time as a result of climate change. 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.

Major waterbodies within the Lassen National Forest include Eagle Lake, Susan River, Hat Creek, Lake Almanor (reservoir), and headwaters of the North Fork of the Feather River. Other streams of significance include Battle Creek, Antelope Creek, Deer Creek, Mill Creek, and Butte Creek. These streams flow unimpaired all the way to the Sacramento River downstream of Shasta reservoir and

support anadramous fish. Table 27 summarizes the affected environment for water resources, which includes watershed areas on NFS lands.

Water flowing from the Forest in creeks and streams is vital for its fisheries and downstream uses. The Forest includes significant reaches of the last unobstructed anadromous fisheries in the Sacramento River system—Deer Creek, Mill Creek, and Antelope Creek.

Surface Water Quality

At high elevations of the Cascades, snowpack forms the headwaters of many watersheds. These elevations generally produce excellent quality surface water. Contaminant levels in most waters meet State standards and the fishable and swimmable objectives of the Clean Water Act. Most pollutants come from nonpoint sources, such as erosion from roads and parking areas. Sediment at levels above natural rates of erosion is the most common nonpoint source pollutant in forested ecosystems (USFS 2001).

Table 29. Major waterbodies accessible by OSVs

National Forest Trail System	Major Waterbody
Cascade Mountain Range – East Side	
Lassen/Ashpan	North Battle Creek Reservoir
Lassen/Bogard	Crater Lake
Lassen/Fredonyer	McCoy Flat Reservoir and Hog Flat Reservoir. Both devoid of water in 2007, 2008, and 2009.
Lassen/Swain Mountain	Silver Lake, Caribou Lake, Echo Lake, Lake Almanor
Cascade Mountain Range – West Side	
Lassen/Morgan Summit	No lakes occur near trail system
Lassen/Jonesville	Lake Almanor

Quality of surface water is affected by the integrity of the fluvial system. Some concerns exist for watersheds where 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.

Section 305(b) of the Clean Water Act requires that states prepare and submit every 2 years a water quality summary report to the U.S. Environmental Protection Agency (EPA). In addition, Clean Water Act 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 Eagle Lake for nitrogen and phosphorous, Susan River for mercury and other toxics, N. F. Feather River downstream of Lake Almanor for mercury and temperature, and Pit River for nutrients (table 30).

Surface Water Uses

Surface water from the Forest is used both consumptively and nonconsumptively. Uses in both categories depend on high-quality water. Nonconsumptive water uses include recreation, wildlife, fisheries, and the aesthetic quality of this resource. Value on the Forest is high for these uses. The Lassen National Forest contains no municipal watersheds that are managed under any type of agreement

Much of the recreation use on the Forest revolves around waterbodies, including sightseeing, camping, fishing, and boating. Most campgrounds on the Forest are located near lakes and streams. Consumptive water uses include hydropower generation, fish hatcheries, downstream agriculture, road construction, fire protection, dust abatement, and special use permits.

Surface Water Protection Measures

Public water supplies are protected by the Safe Drinking Water Act, which was amended in 1996. The Safe Drinking Water Act 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 (BMPs) have been adopted to protect water quality in compliance with the Clean Water Act. BMPs 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 BMPs 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 seeps and springs are in some cases vitally important in providing habitat for over-wintering salmon eggs and fry. 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. People often seek water and riparian environments for recreation activities. Management of riparian areas is considered in the context of the environment in which they are located, while recognizing their special values. Riparian-dependent resources include fisheries, stream channel stability, water quality, and wildlife.

Table 30. Hydrologic characteristics of the OSV analysis area in Lassen National Forest

Feature	Hydrologic Characteristics
Landscape	Sierra Nevada Mountains (northern end of range) and Cascade Mountains (southern end of range) Elevation ranges between 2,000 feet (foothills near Tehama State Wildlife Refuge) and 7,800 feet (unnamed butte north of Caribou wilderness).
Climate[a]	Highly variable across Lassen National Forest due to elevation and rain shadow effect of Lassen Peak and Sierra Nevada Mountain Range. Mediterranean climate, whereby most precipitation occurs between November and April. Winter precipitation below 3,500 feet is primarily rain and above 3,500 feet is primarily snow. Mean annual precipitation ranges between: 24–26 inches at the Sacramento Valley foothills, 80–90 inches at the crest of the Sierra Nevada and Cascade Mountains, and 16–32 inches at Eagle Lake.
Aquatic features	514 miles of perennial streams. 1,442 miles of intermittent streams. 1,057 lakes with total acreage of 6,207 acres, ranging between <0.01 acre to 1,407 acres (McCoy Flat Reservoir). 1,086 meadows with total acreage of 321,752 acres, ranging between <0.01 acre to 1,380 acres.
Beneficial Uses[b]	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	Marten Creek, which supplies water to the community of Mineral.
Clean Water Act 303 (d) Water Bodies[c]	Eagle Lake for nitrogen and phosphorous from multiple sources, Susan River for mercury and unknown toxicity (source unknown), NF Feather River below Lake Almanor for mercury (unknown source) and temperature (flow regulation and hydromodification), and Pit River for nutrients (agriculture and agriculture grazing).

Feature	Hydrologic Characteristics
Watersheds[d]	124 sixth-field watersheds on the Lassen NF within the affected environment. Average size of entire watersheds (includes all ownerships): 34,526 acres Average watershed acreage within affected environment: 8,649 acres

[a]Source: Young 1998.

[b]Source:Cal EPA LRWQCB 2005, Cal EPA CVWQCB 2007

[c]Source: Cal EPA State Water Resources Control Board 2006

[d]Does not include Butte, Sacramento River/Antelope Creek, Sacramento River/Thomes Creek, or Sacramento-Deer Creek Watersheds. Watershed size of these watersheds ranges between 153,000 and 519,000 acres and meaningful comparisons could not be made.

Environmental Consequences

Effects Common to all Alternatives

For the purposes of this analysis, current and proposed winter recreation activities include non-motorized activities such as backcountry skiing and snowshoeing, and motorized activities such as private snowcats and snowmobiling. Non-motorized effects will not have a measurable impact on hydrology. Only the effects of motorized OSV activities will be considered in the environmental consequences section.

For all alternatives including the no-action alternative, OSV use is allowed in the analysis area. A comparison of alternatives based on trails and areas open to OSV use, and minimum snow depth for OSV use on trails and cross-country are shown in table 31. Effects common to all alternatives from OSV uses are outlined in the assumptions in the previous section and include effects to water quality from OSV exhaust and lubricants, and snow compaction and trampling of vegetation from OSV tracks.

Table 31. Alternative comparisons

OSV Management	Alternative 1	Alternative 2	Alternative 3	Alternative 4
National Forest System (NFS) Lands within the Lassen National Forest (Acres)	1,150,020	1,150,020	1,150,020	1,150,020
OSV Use Allowed:				
• Designated OSV Areas (Acres)	976,760	947,120	878,690	879,690
• Designated OSV Trails (Miles)	406	406	406	408
Minimum Snow Depth for OSV Use on Designated Trails (Inches)	12	6 on a limited basis	6 on a limited basis	Dependent on snow conditions. No restriction with 6 or more inches on trails identified for grooming.
Minimum Snow Depth for Cross-country OSV Use (Inches)	12	12	12	12

Alternative 1 – No Action

Indicators for the no-action alternative are shown in table 32. Indicators focus on use levels and required snow depths needed for OSV use under the alternative. Effects of the alternative depend in part on the amount of use by OSVs, and on the effectiveness of required snow depths as mitigation for anticipated effects of OSV use.

Table 32. Hydrologic resource indicators and measures for alternative 1, no action

Resource Indicator	Usefulness of Indicator	Alternative 1 Measure
Designated use area for OSV use	Impacts are widely dispersed and differences in alternatives are minor	976,760 acres
Minimum Snow Depth for OSV Use on Designated Trails (Inches)	Minimum snow depths on trails can be evaluated for effectiveness for protecting the trail surface	12 inches
Minimum Snow Depth for Cross-country OSV Use (Inches)	Minimum snow depths for cross-country travel can be evaluated for effectiveness for protecting the ground surface and vegetation	12 inches
Number of OSVs per year using trails across forest	Total amount of use can be compared to use amounts in Yellowstone and other studies to gauge potential water quality effects	10,000
Consistency with Riparian Conservation Objectives 1, 2, 4, 5, and 6	Evaluation of the effects to RCAs, water quality and beneficial uses of water	Complies with RCOs 1,2,4,5, and 6

Summary of Effects

Current OSV use would continue on 976,760 designated acres under the no-action alternative. Minimum snow depths would be 12 inches for both groomed trails and for cross-country OSV use.

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 into 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 OSV use currently occurs on groomed trails where the plan calls for 18 inches snow cover before grooming can occur, with low potential for contact with bare soil, and practically no disturbance of trail and road surfaces.

For OSV use on the OSV trail system, the ungroomed 12-inch minimum snow depth standard snow coverage has been observed to be adequate to mitigate and eliminate substantial water quality impacts such as stream sedimentation in perennial, intermittent, or ephemeral streams, and in wetlands or other bodies of water. For proposed 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.

OSV use in off-trail open riding areas where there is minimal snow cover or bare patches of ground could potentially 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 leading to erosion and sedimentation in streams or other waterbodies, and a negligible effect on vegetation, especially along streams and other waterbodies.

There has been and will 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 currently is generally dispersed and does not result in 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 in water runoff.

Cross-country OSV use has the potential to directly affect woody riparian species by trampling, including bending and breaking of branches by OSVs running over the branches. This has potential to directly affect shade along streams by reducing vegetation cover. Direct effects to vegetation probably do occur under current conditions, but at this time the effects are limited by requiring adequate snow cover before allowing OSV use. As a result, vegetation trampling from OSVs and potential 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 stream courses would continue to be protected by the 12-inch snow cover requirement by limiting the direct physical trampling effect from OSVs on vegetation.

The direct effect of widespread snow compaction from cross-country OSV use 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. About 10,000 OSVs per year are currently using forest trails and would have access to cross-country use areas. OSV users would be spread over several trailheads, so actual user numbers would 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 emissions. 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. Since the much higher Yellowstone OSV use levels studied had not resulted in impaired water quality, it follows that the OSV use in this alternative does not adversely affect water quality of snowmelt.

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, resulting in the deposition of pollutants directly in stream courses and waterbodies.

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, OSV use would not result in more than incidental soil erosion, and therefore, would not create water quality impacts to streams or waterbodies by introducing sediment into water runoff. Therefore, with adequate snow depths, OSV use on trails is consistent with the Lassen LRMP including riparian conservation objectives and watershed management standards and guidelines and management prescriptions.

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 OSVs on system trails and cross-country is consistent with water quality objectives in the Lassen 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 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.

RCO 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.

RCO 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.

Alternative 1 Cumulative Effects

Past, present, and reasonably foreseeable activities in the analysis area include vegetation management, livestock grazing, prescribed burns, and recreation. There are many past, ongoing, and reasonably foreseeable projects identified in the Lassen National Forest which may be ground-disturbing and could add sediment or other pollutants to surface waters within the forest. The Forest Service uses best management practices in compliance with the Clean Water Act to minimize water quality impacts. The Lassen 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, as a result of the 12-inch minimum snow depth, 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**. There would be negligible effects from exhaust emissions stored in snowpack. This alternative would not implement the recommended project design criteria or mitigation measures, and has the highest amount of land area open to OSVs. However, 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, and would not result in irreversible or irretrievable effects to soil, water, or riparian resources.

Alternative 2 – Proposed Action

The proposed action is similar to the current use in terms of effects to hydrology. It restricts OSV use to 947,120 acres of Lassen National Forest, and recommends at least 6 inches of snow on OSV trails that allows access to trails with more snow at higher elevations. It calls for a 12-inch snow cover minimum for cross-country OSV use, and 12-inch snow cover before grooming of trails can occur.

Table 33. Hydrologic resource indicators, alternative 2

Resource Indicator	Usefulness of Indicator	Alternative 2 Measure
Designated use area for OSV use	Impacts are widely dispersed and differences in alternatives are minor	947,120 acres
Minimum Snow Depth for OSV Use on Designated Trails (Inches)	Minimum snow depths on trails can be evaluated for effectiveness for protecting the trail surface	6 inches on a limited basis
Minimum Snow Depth for Cross-country OSV Use (Inches)	Minimum snow depths for cross-country travel can be evaluated for effectiveness for protecting the ground surface and vegetation	12 inches
Number of OSVs per year using trails across forest	Total amount of use can be compared to use amounts in Yellowstone and other studies to gauge potential water quality effects	10,000
Consistency with Riparian Conservation Objectives 1, 2, 4, 5, and 6	Evaluation of the effects to RCAs, water quality and beneficial uses of water	Complies with RCOs 1, 2, 4, 5, and 6

Direct and Indirect Effects

The effects of alternative 2 are similar to alternative 1, except for a slightly lower number of acres open to OSVs, and the snow depth requirement for use of OSV trails. Under this alternative, about 30,000 fewer acres (table 33) are open to OSV use. Because direct and indirect effects of this alternative are negligible, having less acreage open to OSVs will lead to a minimal increase in direct or indirect effects on hydrology.

As in alternative 1, incidental direct effects including ground disturbance in low-snow areas may occur under this alternative. One substantial difference in this alternative is the minimum 6-inch snow depth required for the use of designated trails (table 33). Because minimum snow levels under alternative 2 are lower than the current conditions on designated trails, there is a slightly higher risk of ground disturbance and subsequent water quality impacts. On designated trails with only 6 inches of snow cover, snowmobile tracks have a higher capacity to break through a thinner snowpack and churn soil, litter, or trail surfaces into the snow, and create isolated ruts in the trail surface. 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 6-inch 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 will damage machinery. The 6-inch 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 depth may be sufficient for operation of a snowmobile, but other OSVs may need more depth to avoid ground disturbance.

For this alternative, as a result of a minimum 6-inch snow depth on trails, there likely is a much 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, and direct and indirect effects to hydrology would likely be isolated and incidental. As a result, for proposed minimum snow levels, OSV use 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. With adequate snow depths, OSV use on trails is consistent with the Lassen LRMP including riparian conservation objectives and watershed management standards and guidelines and management prescriptions. Although adverse effects are not expected, **periodic monitoring is required consistent with BMP 4-7** as mitigation in areas with a 6-inch minimum snow depth to ensure there are no impacts to the trail surface that could lead to stream sedimentation. Further, **it is recommended that the 6-inch OSV use depth only be applied to well-surfaced trails** such as graveled or paved roads.

As in alternative 1, much of the OSV use under this alternative would occur on groomed trails where the plan calls for 18 inches snow cover before grooming can occur, negligible potential for contact with bare soil, and practically no disturbance of trail and road surfaces. For OSV use on the groomed OSV trail system, the 18-inch 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.

As in alternative 1, for proposed 12-inch minimum snow levels for cross-country use, OSVs used for cross-country travel would not result in more than incidental and isolated direct effects such as soil erosion of groomed trail surfaces, and therefore, would not create indirect water quality impacts to streams or waterbodies by increasing sediment in water runoff. 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 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 in water runoff.

Similar to alternative 1, cross-country OSV use would have the potential to directly affect woody riparian species by trampling, including bending and breaking of branches by OSVs running over vegetation. This would have the potential to 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 OSVs and potential 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. Riparian woody shrub species along stream courses would continue to be protected by the 12-inch snow cover requirement by limiting the direct physical trampling effect from OSVs 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 snow melt 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 OSV cross-country uses will 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, water quality effects from OSV exhaust hydrocarbon emissions stored in snowpack under alternative 2 would be negligible and not exceed water quality standards.

Under alternative 2, operation of OSVs on system trails and cross-country is consistent with water quality objectives in the Lassen 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 layer of snowpack protecting the ground surface, there is negligible resource damage potential. No restrictions on OSVs in riparian areas, lakes or meadows are currently in place, and no adverse impacts to these areas have been observed or monitored.

RCO 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.

RCO 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.

Alternative 2 Cumulative Effects

Past, present, and reasonably foreseeable activities in the analysis area include vegetation management, livestock grazing, prescribed burns, and recreation. There are many ongoing and reasonably foreseeable projects identified in the Lassen National Forest which may be ground-disturbing and could add sediment or other pollutants to surface waters within the forest. Wildfires are unforeseeable events that may directly impair water quality until vegetation recovers.

The Forest Service uses best management practices in compliance with the Clean Water Act to minimize water quality impacts. In 2008, Lassen National Forest's best management practices were rated and were implemented 92 percent of the time and effective 90 percent of the time for 77 site evaluations (Breibart 2008). Projects whose best management practice results were not effective were related to roads, developed and dispersed recreation, and in one case, water source development.

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 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 second highest amount of land area open to OSVs. This alternative would have 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.

Required Monitoring

For the 6-inch minimum snow depths allowed on trails, operation of OSVs should be monitored periodically when use is allowed at every site where the 6-inch standard applies when snow is less than 12 inches deep. Monitoring should focus on whether OSVs are impacting trail surfaces, and be reported to the Forest or District hydrologist and soil scientist. If adverse effects are observed to occur on trail surfaces, use should be discontinued. Monitoring would help ensure adverse effects are not occurring, and would reduce the risks of adverse effects by providing information on effects of OSV use.

Alternative 3

Alternative 3 is similar to alternative 2 in terms of effects to hydrology. It restricts OSV use to 878,690 acres of national forest, and recommends at least 6 inches of snow on OSV trails that allow access to trails with more snow at higher elevations. It calls for a 12-inch snow cover minimum for cross-country OSV use, and 12-inch snow cover before grooming of trails can occur.

Table 34. Hydrologic resource indicators, alternative 3

Resource Indicator	Usefulness of Indicator	Alternative 3 Measure
Designated use area for OSV use	Impacts are widely dispersed and differences in alternatives are minor	878,690 acres
Minimum Snow Depth for OSV Use on Designated Trails (Inches)	Minimum snow depths on trails can be evaluated for effectiveness for protecting the trail surface	6 inches on a limited basis
Minimum Snow Depth for Cross-country OSV Use (Inches)	Minimum snow depths for cross-country travel can be evaluated for effectiveness for protecting the ground surface and vegetation	12 inches
Number of OSVs per year using trails across forest	Total amount of use can be compared to use amounts in Yellowstone and other studies to gauge potential water quality effects	10,000
Consistency with Riparian Conservation Objectives 1, 2, 4, 5, and 6	Evaluation of the effects to RCAs, water quality and beneficial uses of water	Complies with RCOs 1, 2, 4, 5, and 6

Direct and Indirect Effects

The direct and indirect effects of alternative 3 are the same as alternative 2; however, fewer acres (70,000 acres less) would be open to OSVs. Because direct and indirect effects of this alternative are negligible, having less acreage open to OSVs would lead to a minimal increase in direct or indirect effects on hydrology. As in alternative 2, incidental direct effects including ground disturbance in low-snow areas may occur under this alternative. And, as in alternative 2, this alternative requires a minimum 12-inch snow depth for cross-country travel and for grooming of OSV trails, and a 6-inch snow depth for the use of designated trails (table 34).

As in alternative 2, although adverse effects are not expected, **periodic monitoring is required consistent with BMP 4-7** as mitigation in areas with a 6-inch minimum snow depth to ensure there are not impacts to the trail surface that could lead to stream sedimentation. Further, **it is recommended that the 6-inch OSV use minimum depth only be applied to well-surfaced trails** such as graveled or paved roads.

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 layer of snowpack protecting the ground surface there is negligible resource damage potential. No restrictions on OSV operations in riparian areas, lakes or meadows are currently in place. No adverse impacts to these areas have been observed or monitored.

RCO 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.

RCO 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.

Alternative 3 Cumulative Effects

Past, present, and reasonably foreseeable activities in the analysis area include vegetation management, livestock grazing, prescribed burns, and recreation. There are many ongoing and reasonably foreseeable projects identified in the Lassen National Forest which may be ground-disturbing and could add sediment or other pollutants to surface waters within the forest. Wildfires are unforeseeable events that may directly impair water quality until vegetation recovers.

The Forest Service uses best management practices in compliance with the Clean Water Act to minimize water quality impacts. In 2008, Lassen National Forest's best management practices were rated and were implemented 92 percent of the time and effective 90 percent of the time for 77 site evaluations (Breibart 2008). Projects whose best management practice results were not effective were related to roads, developed and dispersed recreation, and in one case, water source development.

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 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 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.

Required Monitoring

For the 6-inch minimum snow depths allowed on trails, operation of OSVs would be monitored periodically when use is allowed at every site where the 6-inch standard is applied when snow is less than 12 inches deep. Monitoring would be consistent with BMP 4-7 and focus on whether OSVs are impacting trail surfaces, and be reported to the Forest or District hydrologist and soil scientist. If adverse effects are observed to occur on trail surfaces, use would be discontinued. Monitoring would help ensure adverse effects are not occurring, and would reduce the risks of adverse effects by providing information on effects of OSV use.

Alternative 4

Alternative 4 is similar to alternative 2 in terms of effects to hydrology. It differs slightly in that it reduces OSV use to 878,690 acres of national forest, and OSV use would be allowed on snow trails designated for OSV use if there were less than 6 inches of uncompacted snow on the trail, as long as it would not cause visible damage to the underlying surface. It calls for a 12-inch snow cover minimum for cross-country OSV use, and 12 inches snow cover before grooming of trails can occur.

Table 35. Hydrologic resource indicators, alternative 4

Resource Indicator	Usefulness of Indicator	Alternative 4 Measure
Designated use area for OSV use	Impacts are widely dispersed and differences in alternatives are minor	879,690 acres
Minimum Snow Depth for OSV Use on Designated Trails (Inches)	Minimum snow depths on trails can be evaluated for effectiveness for protecting the trail surface	Dependent on snow conditions. No restriction with 6 or more inches (on) trails identified for grooming. Allows for travel with less than 6" snow on designated routes with underlying road bed so long as no visible damage is occurring.
Minimum Snow Depth for Cross-country OSV Use (Inches)	Minimum snow depths for cross-country travel can be evaluated for effectiveness for protecting the ground surface and vegetation	12 inches
Number of OSVs per year using trails across forest	Total amount of use can be compared to use amounts in Yellowstone and other studies to gauge potential water quality effects	10,000
Consistency with Riparian Conservation Objectives 1, 2, 4, 5, and 6	Evaluation of the effects to RCAs, water quality and beneficial uses of water	Complies with RCOs 1,2,4,5,and 6

Direct and Indirect Effects

The direct and indirect effects of alternative 4 are the same as for alternative 2. There would be slightly fewer acres (70,000 acres less) open to OSVs. Because direct and indirect effects of this alternative are negligible, having less acreage open to OSVs will lead to a minimal decrease in direct or indirect effects on hydrology. As in alternative 2, incidental direct effects including ground disturbance in low-snow areas may occur under this alternative. And, as in alternative 2, this alternative requires a minimum 12-inch snow depth for cross-country travel and for grooming of OSV trails. However, this alternative allows travel with less than 6" snow on designated routes with underlying road bed so long as no visible damage is occurring (table 35). Because it also allows for a less than 6-inch minimum snowpack for OSV use on trails identified for grooming, there is a risk for trail and road surface disturbance from this alternative. Further, similar to alternative 2, for low-snow conditions more monitoring would be required of trail conditions before OSV use is allowed.

As in alternative 2, although adverse effects are not expected, **periodic monitoring is required consistent with BMP 4-7** as mitigation in areas with a 6-inch minimum snow depth to ensure there are not impacts to the trail surface that could lead to stream sedimentation. Further, **it is recommended that the 6-inch OSV use minimum depth only be applied to well-surfaced trails** such as graveled or paved roads.

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 layer of snowpack protecting the ground surface, there is 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.

RCO 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.

RCO 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.

Alternative 4 Cumulative Effects

Past, present, and reasonably foreseeable activities in the analysis area include vegetation management, livestock grazing, prescribed burns, and recreation. There are many ongoing and reasonably foreseeable projects identified in the Lassen National Forest which may be ground-disturbing and could add sediment or other pollutants to surface waters within the forest. Wildfires are unforeseeable events that may directly impair water quality until vegetation recovers.

The Forest Service uses best management practices in compliance with the Clean Water Act to minimize water quality impacts. In 2008, Lassen National Forest's best management practices were rated and were implemented 92 percent of the time and effective 90 percent of the time for 77 site evaluations (Breibart 2008). Projects whose best management practice results were not effective were related to roads, developed and dispersed recreation, and in one case, water source development.

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 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 lowest 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.

Required Monitoring

For the 6-inch minimum snow depths allowed on trails, operation of OSVs would be monitored periodically when use is allowed at every site where the 6-inch standard is applied when snow is less than 12 inches deep. Monitoring would be consistent with BMP 4-7 and focus on whether OSVs are impacting trail surfaces, and be reported to the Forest or District hydrologist and soil scientist. If adverse effects are observed to occur on trail surfaces, use would be discontinued. Monitoring would help ensure adverse effects are not occurring, and would reduce the risks of adverse effects by providing information on effects of OSV use.

Summary of Effects

All alternatives protect water resources, including the no-action alternative.

Alternative 1 (No Action) would best protect water resources:

For OSV use on the OSV trail system and cross-country uses, the ungroomed 12-inch minimum snow depth standard has been observed to be adequate to mitigate and eliminate substantial water quality impacts such as stream sedimentation in perennial, intermittent, or ephemeral streams, and 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 it would be consistent with all of the applicable RCOs in the 2004 Sierra Nevada Forest Plan Amendment.

Beneficial uses would be protected because 12-inch snow depths would be maintained on trails, reducing the risks of trail disturbance.

Alternatives 2, 3, and 4 would do the second best job at protecting water resources:

For OSV use on the OSV trail system, the ungroomed 6-inch minimum snow depth standard is probably adequate to mitigate and eliminate substantial water quality impacts such as stream sedimentation in perennial, intermittent, or ephemeral streams, and in wetlands or other bodies of water. However, consistent and timely monitoring is needed 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 this alternative, as only 6 inches of snow would be required for use of designated OSV trails. As a result, alternatives 2 through 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 they would be consistent with applicable riparian conservation objectives in the 2004 Sierra Nevada Forest Plan Amendment.

Cumulative Effects—Hydrology

Common to All Alternatives

Snow plowing and removal occurs on paved surfaces as part of this plan 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 on-going and reasonably foreseeable action that should be considered for cumulative effects, if determined relevant and useful for that level of analysis. Snow removal at trailhead parking areas has been occurring for decades. Best management practices 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 best management practices, snow removal would not cause perceptible 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 to designated storage areas where the snow melt 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 best management practices, which ensure compliance with Federal Clean Water Act requirements. Consequently, project activities including snow removal are consistent with LRMP watershed management standards and guidelines and management prescriptions.

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 CARs and RCAs (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). Allowing use of over-snow vehicles when the ground is covered with a protective layer of snow will have a negligible effect on RCAs because direct and indirect effects would be negligible, and OSV use will result in negligible

effects to RCAs. Hydrocarbon pollution from OSVs and grooming equipment will have a negligible effect on water quality.

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 36. Riparian conservation areas adjacent to aquatic features as designated by the Sierra Nevada Forest Plan Amendment Record of Decision (SNFPROD 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 routes that pass 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 alternatives 2, 3, and 4, 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 Lassen National Forest, designated by the State Lahontan Regional Water Quality Control Board, are identified in table 37. OSV uses do not impact CWA 303 (d) waterbodies.

RCO 2: Under the no-action alternative, 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 analysis, 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, and 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 does not disturb shorelines of natural and man-made lakes and ponds.

RCO 4: Under the no-action alternative, 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 the no-action alternative 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 (Alternative 2, 3, and 4)

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, and 4, beneficial uses of waterbodies would be protected. OSV uses would not impact beneficial uses of waterbodies, especially municipal watersheds. Beneficial uses within the major hydrologic areas, units, or creeks on the Lassen National Forest, designated by the State Lahontan Regional Water Quality Control Board, are identified in table 37. OSV uses do not impact CWA 303 (d) waterbodies.

RCO 2: Under alternatives 2, 3, and 4, 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 analysis, 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 alternatives 2, 3, and 4, management activities within RCAs would enhance or maintain physical and biological characteristics associated with aquatic- and riparian-dependent species. For this analysis, 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, and 4, 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.

Compliance with Beneficial Uses (Riparian Conservation Objective)

Table 37. Beneficial uses of water in the Lassen 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
[1]Susan River	637.20	X	X			X	X	X		X	X	X		X	X		X	X	X	X		X	
[1]Eagle Drainage	637.30	X	X			X	X	X		X	X	X		X	X		X	X	X	X	X	X	X
[2]Pit River	526.00	X	X						X	X	X			X	X		X	X				X	
[2]Hat Creek	526.30	X	X						X	X	X				X		X	X			X	X	X
[2]Cow Creek	507.3	X	X						X	X	X				X		X	X				X	
[2]Battle Creek	507.12		X						X	X	X				X		X	X			X	X	X
[2]Antelope Creek	509.63	X	X							X	X				X		X	X			X	X	X
[2]Mill Creek	509.42	X	X							X	X				X		X	X			X	X	X
[2]Deer Creek	509.20	X	X							X	X				X		X	X			X	X	X
[2]Butte Creek	521.30	X	X							X	X				X		X	X			X	X	X
Feather River	520.3		X								X				X		X					X	

[1, 2] Cal LRWQCB EPA 1995

Table 38. Impaired waterbodies on or adjacent to the Lassen National Forest[1]

Waterbody	Impaired characteristics
Eagle Lake	*Phosphorous and Nitrogen Sources:* Agriculture (N only), Grazing-Related Sources, Silviculture, Other Urban Runoff, Highway/Road/Bridge Runoff, Wastewater, Onsite Wastewater Systems (Septic Tanks), Marinas and Recreational Boating, Atmospheric Deposition, Internal Nutrient Cycling (primarily lakes), Sediment Resuspension, Natural Sources, Recreational and Tourism Activities (non-boating), and Nonpoint Source. Eagle Lake lies within the analysis area and nitrogen and phosphorous, which bind to sediment, can reach Eagle Lake at hydrologically connected road segments.
Susan River	Mercury from unknown source. Unknown toxicity from unknown source. Headwaters are located within analysis area.
NF Feather River below Lake Almanor	Mercury from unknown source. Water Temperature from flow regulation/Modification and Hydromodification. Water temperature in the NF Feather Rivers results from water released from the dam on Lake Almanor.
Pit River	Nutrients from agriculture and agriculture-grazing. Organic Enrichment/Low Dissolved Oxygen from agriculture and agriculture grazing. Temperature, water due agriculture and agriculture grazing. Within analysis area, but constituents of concern are not related to roads.

[1] State of California, Water Quality Control Board 2006

Table 39. State water quality standards that are relevant to motorized routes

Category	Standard	Beneficial Uses Potentially Affected
Bacteria	Fecal coliform concentration shall not exceed a geometric mean of 200/100 ml (min. of 5 samples / 30-day period), nor more than 10 percent of samples (30-day period) exceed 400/100 ml.	Contact Recreation (REC-1)
Color	Water shall be free of discoloration that causes nuisance or adversely affects beneficial uses.	Domestic or municipal Contact Recreation Non-contact Recreation
Floating Material	Water shall not contain floating material in amounts that cause nuisance or adversely affect beneficial uses.	Domestic or municipal Contact Recreation Non-contact 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 Contact Recreation 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 Power 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: For natural turbidity between 0 and 5 NTUs, increases shall not exceed 1 NTU For natural turbidity between 5 and 50 NTUs, increases shall not exceed 20 percent For natural turbidity between 50 and 100 NTUs, increases shall not exceed 10 NTUs For natural turbidity Greater than 100 NTUs, increases shall not exceed 10 percent	All

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

This analysis complies with the Lassen National Forest Land and Resource Management Plan 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 comply 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 ungroomed OSV trails and cross-country travel would be allowed within RCAs, but because of the layer of snowpack protecting the ground surface, there is a very low resource damage potential. No restrictions on OSVs in riparian areas, on frozen lakes, or in meadows are currently in place. No adverse impacts to these areas have been observed or monitored.

RCO 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.

RCO 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 analysis 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.

Heritage (Cultural Resources)

Cultural resources are an object or definite location of human activity, occupation, or use identifiable through field survey, historical documentation, or oral evidence. Cultural resources are prehistoric, historic, archaeological, or architectural sites, structures, places, or objects and traditional cultural properties (FSM2360.5). These resources are not mutually exclusive and can oftentimes overlap either in time and space (e.g., an historic building on a prehistoric archaeological site). Descriptions of each type are given below.

Cultural resources are archaeological, cultural, and ecological legacies from out past. Cultural resource information often includes environmental data, and can explain past relationships between people, climate, and the land. Study of cultural-ecological relationships help us understand how cultures changed, how culture affected and was affected by the environment, and how that information can be used to influence our future.

Current Management Direction

Cultural Resources are protected under the Organic Act of 1897 (Title 16, United States Code (U.S.C.), section 473-478, 479-482, 551), Antiquities Act of 1906 (16 U.S.C. 431), Historic Sites Act of 1935 (16 U.S.C. 461), National Historic Preservation Act of 1966, as amended (NHPA) (16 U.S.C. 470) and its implementing regulation 36 CFR 800, National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321-4346), Archeological and Historic Preservation Act of 1974 (AHPA) (16 U.S.C. 469), Federal Land Policy and Management Act of 1976 (FLPMA), (43 U.S.C. 1701), National Forest Management Act of 1976 (NFMA) (16 U.S.C. 1600), Archaeological Resources Protection Act of 1979 as amended (ARPA) (16 U.S.C. 47Oaa et seq.) as implemented by 36 CFR part 296, Native American Graves Protection and Repatriation Act of 1990 as amended (NAGPRA) (25 U.S.C. 3001) as implemented by 43 CFR part 10, Subpart B – Human Remains, Funerary Objects, Sacred Objects, or objects of Cultural Patrimony From Federal or Tribal Lands, Federal Lands Recreation Enhancement Act of December 8, 2004, (REA) (16 U.S.C. 6801-6814), Executive Order 11593 - Protection and Enhancement of the Cultural Environment, issued May 13, 1971, Executive Order 13007 - Indian Sacred Sites, issued May 24, 1996, Executive Order 13175 – Consultation and Coordination with Indian Tribal Governments, issued November 6, 2000, and Executive Order 13287 – Preserve America, issued March 3, 2003. In addition archaeological collections are managed by Curation of Federally-owned and Administered Archaeological Collections, 36 CFR part 79.

The Forest Service implements these laws and regulations through Forest Service Manual 2300, Chapter 2360, Heritage Program Management.

The Forest Service mandates its Heritage Program activities to address three broad areas of responsibilities to:

1. Protect historic properties,
2. Share their values with the American people, and
3. Contribute relevant information and perspectives to natural resource management (FSM 2360.6).

Also, it is the policy of the Forest Service to:

1. Establish and maintain effective relationships with federal, state, Tribal, and local governments and historic preservation organizations at all levels of the agency to ensure protection of cultural resources and to promote Heritage Program efficiencies.

2. Fully integrate opportunities for preservation, protection, and utilization of cultural resources into land use planning and decisions.

3. Manage cultural resources through a process of identification, evaluation, and allocation to appropriate management categories that protect cultural resource values and benefit the public.

4. Recognize cultural resources through National Register of Historic Places nomination, National Historic Landmark recommendation, and other special designations.

5. Provide opportunities for public use and enjoyment of cultural resources through education and outreach programs that promote resource stewardship.

6. Facilitate scientific research of cultural resources to increase understanding of past human cultures and environments.

7. Use cultural resource data to increase scientific understanding of the evolution and condition of ecosystems and to benefit Forest Service land management practices.

8. Protect cultural resources from the effects of Forest Service or Forest Service-authorized undertakings, unauthorized use, and environmental damage (FSM 2360.3).

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 project areas to identify types and locations of heritage resources
- Determining sites that are eligible for the National Register of Historic Places
- Assessing potential project effects of cultural resources
- Avoiding or mitigating effects on sites eligible for the National Register or other significant sites
- Follow-up monitoring to assess the effectiveness of management procedures.

In addition the Lassen National Forest conducts 36 CFR 800 pursuant to the *Programmatic Agreement Among the U.S.D.A. Forest Service, Pacific Southwest Region (Region 5), California State Historic Preservation Officer, Nevada State Historic Preservation Officer, And the 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* (Regional PA).

Types of Cultural Resources

Archaeological Sites: Prehistoric and Historic

Archaeology is the physical evidence of human actions in specific locations and interactions with the environment over the broader landscape. This evidence includes structures, remains of structures, accumulated or deposited trash, physical evidence of food extraction, mining, logging, livestock grazing, or agriculture. Archaeological evidence is often defined as a site, which under the NRHP is the location of a significant event, a prehistoric or historic occupation or activity, or a building or structure (whether standing, ruined, or vanished), where the location itself possesses historic, cultural, or archeological value regardless of the value of any existing structure.

The Lassen National Forest currently has over 3,377 recorded archaeological sites. These sites are the physical remains of human occupation over the last 9,000 years and range from small-scale obsidian flake scatters to large-scale complex Native American village sites occupied for thousands of years. Historic sites chronicle some of the earliest Euro-American exploration, settlement, and development of the southern Cascades. Historic sites in this part of California date from roughly 1850 to the 1960s.

Architectural Resources: Buildings and Structures

The NRHP divides architectural sites into buildings and structures. A building is created principally to shelter any form of human activity, while a structure is used to distinguish buildings whose functional constructions were usually made for purposes other than creating human shelter (e.g., dams, railroad grades, canals).

Cultural Landscapes and Districts

Cultural landscapes are geographic areas, subsuming both cultural and natural resources, and the wildlife or domestic animals therein, associated with an historic event, activity, or person, or exhibiting other cultural or aesthetic value. Cultural landscapes are not a recognized property type under the NRHP but are recognized as districts. The NRHP defines districts as possessing a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development. A district derives its importance from being a unified entity, even though it is often composed of a wide variety of resources. The identity of a district results from the interrelationship of its resources, which can convey a visual sense of the overall historic environment or be an arrangement of historically or functionally related properties. Cultural landscapes are also ecological legacies from our past.

Ethnographic and Traditional Cultural Properties

Traditional Cultural Properties (TCPs) are important places because of their association with the cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community. TCPs include sacred sites, natural resource collection areas, and the occasional archaeological site associated with ancestral Native American groups. TCPs must be a tangible property, that is a district, site, building, structure, or object as defined in 36 CFR 64.4 (FSM 2360.5). While TCPs are closely associated with Native American Cultures, a site need not be associated with a Native American cultural group to qualify as a TCP for the purposes of the NRHP.

Objects and Museum Collections

The NRHP describes objects to be relatively small things that are associated with a specific setting or environment. These objects are often recorded or catalogued and then remain in their original context (e.g., large mining and logging equipment), where they can be used for interpretation. All artifacts and associated records (i.e. catalogues and photographs) removed from NFS lands remain federal property and must be managed according to 36 CFR Part 79.

The types and distribution of cultural resources in the OSV designation areas are determined by what, where, why, and how people of the past used the land. An overview of prehistoric and historic land use patterns and how that is manifested in currently known cultural resources is presented below.

Affected Environment

Our knowledge of cultural resources on the Lassen is derived from archaeological surveys and excavation on the Forest Service, Bureau of Land Management, National Park and private lands in the region that have been completed over the last 40 years.

The Lassen encompasses four cultural regions: northern Sierra Nevada Mountains, the southern Cascade mountains, the southern Modoc Plateau and the Pit River watershed.

Prehistoric Background

Cultural Periods are highly variable with each study determining its own new time periods not only in name but in timespan. This overview makes no attempt to reconcile these, but rather represent general patterns.

Early Holocene/Paleoindian (prior to 7,500 B.P.): This period is poorly represented on the Lassen. The earlies part of this period is recognized by Clovis-like projectile points, characterized by a lanceolate shape and distinctive basal thinning or fluting. Populations during this period were highly mobile, traveling in small groups that made frequent residential moves and exploiting a large subsistence territory while focusing on big game hunting with habitation of the uplands being highly sporadic and mostly sites being lower elevation and associated with the Great Basin's Western Pluvial Lakes Tradition (WPLT; 6,000-9,000 B.P.). The WPLT focused on the lacustrine environments common to the northeastern portion of the Forest. It is represented by Great Basin Stemmed series and lanceolate shaped points (Layton 1970; Pippin and Hattori 1980).

Post Mazama (7,500-5,000 B.P.): Mount Mazama erupted c. 7,600 B.P. causing a dramatic change in Northeastern California and Southern Oregon. This disrupted human habitation in the region. Following the eruption this period reflects increased use upland areas on the Lassen. This may represent the expansion of Great Basin populations into the Sierran Transition Zone, during Tahoe Reach and Spooner Phases of 4,000-8,000 B.P. (Elston 1971). The earliest sites are located on mid-slope terraces and tend to be situated somewhat away from the river (Cleland 1997). On the east side populations remained highly mobile with no systematic dependence on storage (Hildebrandt and Mikkelsen 1995).

Diagnostic artifacts include Clikapudi Side-notched, Pinto, Humboldt, Gateciff, Fish Slough, Great Basin Stemmed projectile point styles (Cleland 1997; Hildebrandt and King 2002; 18-21). This expansion may also be represented by the Northern Side-notched point styles on the Lassen (Gruhn 1961). On the western Sierra Nevada foothills and Cascade Mountain is potentially connected to the Windmiller Culture of the central California (Ritter 1970).

Early Archaic (5,000- 3,500 B.P.): "The Early Archaic, at least in comparison to the two preceding periods, marks the beginning of major increases in archaeological visibility across the entire study area (Kowta 1988)" (King et al. 2004:31). This period has been identified in upland contexts along both the eastern and western flanks of the Sierra Nevada and Cascade Range as the Martis Complex. The Martis Complex is distinguished by a use of basalt in flaked stone tool manufacture. Settlement systems became oriented along major east-west trending drainages extending from lowland villages to quarries near the crest of the Sierra Nevada (King et al. 2004:32). Cleland (1997) shows an increased occupation of lithic sites, and pit houses were constructed in the uplands. Groundstone begins to show up in assemblages from this period and freshwater mussels were commonly used. This shift may have been the adaptation reaction to Middle Holocene warming where populations from adjacent desert and lower elevations were affected by decreased resource productivity. Diagnostic projectile points include Elko, Siskiyou Side-notched and Northern Side-notched, Gatecliff and Martis.

Middle Archaic (ca 3,500-1,500 B.P.): A substantial expansion into these mountainous areas with medium to high elevation areas occurred post 4000 B.P. Cleland (1997) states that the use of lithic sites peaks during this period and habitation site use increases; the overall settlement pattern diversifies. Habitation sites increase in number while becoming larger with rich and diverse assemblages of artifacts and proliferation of house structures, midden deposits, hearths, ovens and burials. There is change in obsidian procurement practices occurs during the Late Archaic: "source diversity actually reaches its lowest level at this time, The focus seems to have shifted to more regularized acquisition of a few key glasses procured during logistical forays emanating from larger villages and base camps" (King et al. 2004:33). "Populations were regularly targeting a few key quarry localities, as contrasted with more ad hoc toolstone procurement conducted during the course of the seasonal subsistence round. It is this systematic and regular use of a few favored toolestone localities over a broad sweep of time that results in greater homogeneity of obsidian source profiles" (King et al. 2004:33). In addition, regionally this period shows an increased trade and exchange. Occupation of the higher terraces continues, but habitation sites closer to the river are also used. Midden development is recognizable at habitation sites, and freshwater mussel shell lenses appear, often superimposed over midden deposits. Clikapudi Series points continue in use. It appears that people associated with the Martis Complex moved into the southern portion of the forest and the northern and western portions may have been occupied by Hokan speakers.

Late Archaic (1,500-750 B.P.): During this period there seems to be a sharply increased expansion into the Forests Plateau uplands and lakes with more permanency of human occupation and increase in population as lithic site occupation appears to reduce during this period, and intensive occupation of habitation sites continue. Some of these changes may have resulted from the warm/dry interval from 1,100 to 600 B.P. known as the Medieval Climatic Anomaly.

This drought period no doubt had major effects on prehistoric populations, although the exact relationships between climatic change and certain cultural shifts observed in the archaeological record is not well understood. Whether induced by climatic change, increases in population density or other factors 1,000 B.P. marks a time of instability and upheaval throughout much of California and the western Great Basin (King et al. 2004:33-34).

Lower elevation and Great Basin habitation sites show distinct changes during this period prior to 1,000 B.P. they are larger with rich and diverse assemblages of artifacts and proliferation of house structures. Post 1,000 B.P. they "generally lack complexity and can occur as more isolated domestic features, rock rings, or living surfaces….appear to have been occupied for only short durations and lack the semi-sedentary quality of their Middle Archaic counterparts" (King et al 2004:34). At higher elevations these changes brought resource intensification, there is a shift in "resource zones and diet breath with procurement increasingly directed at more marginal upland habitats. In the Middle Pit River region at this time, Chatter and Cleland (1995:27-9) document escalating population densities coupled with expanding resource intensification, the latter indicated by intensive exploitation of freshwater mussels, and increased use of seeds and manzanita berries" (King et al. 2004:34).

Gunther Barbed and Rose Spring projectile points come into use early in the period and are associated with bow and arrow technology. Clikapudi Side-notched points are not represented, but Clikapudi Corner-notched types continue into the early part of this period. The introduction of the bow and arrow is also seen in a shift to generally smaller, flake-based instead of bifacial tools. During this period brownware ceramics also begin to occur.

Terminal Prehistoric/Emergent (150–1,000 B.P.): A greatly intensified occupation of habitation sites associated with a concurrent decline in the production of obsidian tools occurs during this period. A major change in obsidian procurement and use is suggested. Settlement patterns remain strongly riverine-oriented. Intra-site movement of activities closer to the river is reported. Gunther Barbed projectile points

continue to be produced. Desert Side-notched and Cottonwood points occur late in the period. A rebound in obsidian use may have occurred around 600. B.P. This period shows “wholesale shifts in populations centering on the arrival of desert-oriented Numic groups (Northern Paiutes)” on the eastern portion of the Lassen (King et al 2004). Around A.D. 500, a general change in the human use of the northern Sierra Nevada is hypothesized by Elston (1971), Elston et al (1977); Ritter (1970); and Moratto (1972). These researchers all suggest that populations on the western slopes stabilized and returned to a more sedentary lifestyle. Riverine and oak woodland resources were heavily exploited, and seasonal transhumance became less necessary. Artifact association indicative of both the Great Basin and the Columbia Plateau became common, leading some (e.g. Kowta 1978) to postulate that the Northeastern Maidu entered their ethnographic territory via the Great Basin/Columbia Plateau at this time. Obviously, post-depositional processes or observational differences could explain part or all of this apparent increase in use. Nevertheless, based on current data, it appears that more people were in the upland valleys after A.D. 500. Both the riverine and oak woodland environments mentioned by Elston and others occur marginally in these valleys today, but the paleoenvironment is poorly understood at best. Projectile point types show similarities to both the Great Basin (Rosegate) and the Columbia Plateau (Gunther-like), although the representative cultural histories and affiliations of these point types are not well defined at present.

Near Crooks Canyon, on the South Fork drainage of the Pit River and adjacent uplands, the settlement system also differed from the Numic lifeway described above. Here, house structures and other residential features dramatically appear at about 500 BP. These are both single- and multi-family residential camps containing a variety of stone and bone tools, roasting features, hearths, work areas, and storage pits, reflecting a full range of residential activities, including plant and animal processing and tool maintenance and production (Delacorte 2002; Waechter 2002d).

While this village pattern may relate to the aforementioned intensification of upland root crops that commenced during the Late Archaic period, an equally plausible explanation for the appearance of upland villages can be derived from a social-conflict model (LeBlanc 1999). According to this thesis, a major settlement shift to a more remote location like the Pit River Uplands may well reflect mounting inter-group hostilities perhaps related to the arrival of Numic-speaking populations. In essence, the rugged canyon and rimrock country of the Modoc and Pit River Uplands may have served as a safe refuge during times of conflict, and this conflict may have been the driving force behind these late-prehistoric settlement shifts. Interestingly, faunal remains from this period show a marked rebound in the use of large game animals, a phenomenon that might be associated with increased periods of conflict (Bayham and Holanda 1997; Broughton 1999; Carpenter 2002). [King et al. 2004:36]

This increased usage was apparently short-lived. The point types generally associated with the period after A.D. 1500 (Desert Side-Notch and Cottonwood Triangular) are quite rare. Again, a number of explanations are possible, but it appears that at least the amount of hunting in the forest environs decreased. It may be that the trend toward resource specialization and increased sedentism may have occurred at a slightly later date here than elsewhere in California and the western Great Basin.

Ethnography

The Lassen is traditional territory of four distinct ethnographic groups: Northeastern Maidu, Pit River, Yana and Northern Paiute.

Northeastern Maidu occupied the mountain valleys in the southern portion of the Forest. They are Maiduan branch of the Penutian linguistic stock (Shipley 1978; Riddell 1978b:370)

Pit River includes two distinct linguistic groups, Achumawi and Atsugewi that share broad cultural similarities. Achumawi and Atsugewi form the Palaihnihan branch of the Hokan linguistic stock (Olmsted

1964:1; Garth 1978:236; Shipley 1978:86). Within the Achumawi there are four bands (dialect divisions) that occupied areas currently administered by the Lassen: Madesiwi, Ilmawi, Itsatawi and Ajumawi.

- Ajumawi small group on Fall River north of present day Fall River Mills
- Ilmawi occupied a canyon of the Pit River below Fall River to the divide between Clark and Rock Creeks and Cayton Valley.
- Itsatawi occupied Goose Valley and lower Burney Valley and stretches of the Pit River northwest of Goose Valley.
- Madesiwi were centered around Big Bend.

The Atsugewi are composed of two groups: Atsuge and Apwaruge.

- Atsuge were concentrated on Hat Creek and in Burney Valley.
- Apwaruge occupied Dixie Valley. Little Valley and portions of the Pit River between Horse Creek and Beaver Creek.

Yana have four dialect subdivisions, and occupied the area between the Sacramento River on the west, the Pit River on the north, Chico Creek on the south and the peaks of the Cascades on the east. Yana is a Hokan language (Dixon and Kroeber 1919:104; Sapir 1917:1)

Northern Paiute on the eastern side in western Nevada and north eastern California. (The Honey Lake Paiute (Paviotso), is a Numic (Shoshonean) branch of the Uto-Aztecan stock (Miller 1966:77; Jacosen 1966;115; Stewart 1966;192-193) The Wadatkut of Honey Lake Valley.

Historical Background

Contact, and Explorers

1820s-1848: The earliest exploration of the Lassen area occurred between 1826 and 1836 by small Hudson Bay Company trapping parties who developed one of the earliest routes into northern California along the Pit River and Hat Creek. John Work explored the Pit River territory during 1831–1833. In 1843 Peter Lassen filed for a Mexican land grant and named Mt. Lassen Sister Buttes. In 1846 Captain John Fremont visited that area and Lassen's ranch as part of his mapping of the Oregon Trail.

During this period diseases introduced to Native Americans by European settlers reached epidemic proportions and decimated local populations. John Work's expedition was responsible for the pandemic of 1833, variously diagnosed as cholera, typhus, or malaria. The effects of this pandemic were apocalyptic for many California groups—Cook (1976:269) estimates a 40 percent population decline as a result

The Gold Rush and Native Decline

1849-1905: Settlement and early industrial development period. This period saw an expansion of Non-Native occupation and conflict between these settlers and the Natives. Mining was established on the southern portion of the Forest in 1849. Gold mining was not extensive in the Forest but did occur primarily in the southern portion.

As the Lassen (established in 1849) and Nobles Emigrant (established in 1851) Trails brought increased numbers of Europeans to and through the region ranching began. Ranching mostly occurred in the high mountain meadows consisted of dairy, cattle and sheep. By the late 1850s, more than 4,000 people were

engaged in agriculture in Shasta County (Bevill and Nilsson 1999:135). Primary crops included grains (wheat, barley, and hay), and smaller amounts of fruit and vegetable crops. Along the Sacramento River, vegetable farmers also raised dairy cows and several dairies were established in the area. In northeastern Shasta County, starting in the 1870s, homesteads were established primarily in river valleys, where residents were able to eke out a living practicing a combination of cattle ranching, dairy farming, and mixed agriculture. Seasonally, men would work in the nearby logging camps and would also supply the camps with food (Owens 1984:118).

During the late 1850s a “scorched earth” policy was implemented by-Lieutenant Crook, who ran the military campaign in the area (Woods and Raven 1992; Wheeler-Voegelin 1974:91). Throughout the 1850 and 1860s the Yahi, Pit River and Maidu resisted and at times were openly hostile to Non-Native expeditions and settlers, while local Militia and U.S. Military pursued and battled the tribes.

A second epidemic occurred in 1856 when H.M. Judah’s expedition which was suffering from dysentery and malaria, visited Fort Crook in Fall River Valley in the Pit River area, further decimating the population.

The first major logging activity occurred in the southwestern portion of the forest in the 1870s.

Government Management

The Forest Service was established in 1905 when the Forest Reserves was transferred to the Department of Agriculture. In the 1930’s, forest experiment stations were set up in order to conduct research concerning all phases of forest and range land use, such as timber, wildlife habitat, watershed management, fire, economics, and utilization of wood products. In 1933 the Civilian Conservation Corps (CCC) program was created, which led to many improvements to the nation’s resources. The CCC planted over two billion trees in eight years, cleared trails, fought fires, built campgrounds and improved recreation facilities. By 1945, the Forest Service had developed into a network of research specialists and resource managers. A 1941 report on the Cornaz Tract indicates a temporary work camp was located adjacent to the Burney Springs and Cornaz Lake area. The report notes concerns for the “increasingly hazardous slash areas being left by nearby logging operations.” It is mentioned that Burney Springs was of significant importance in potentially battling a wildfire if one were to erupt within this area due to these slash piles.

Red River mill one of the nation’s largest was established. The eastern portion of the Forest became an important source of lumber in the 1910s following the construction of railroads. In 1936 Burney developed into a lumber mill center.

Following WWII – Period of Expanding commodity production.

Environmental Effects

Effects on cultural resources are described in terminology consistent with the regulations of the Council on Environmental Quality and in compliance with the requirements of both the National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act (NHPA). The determination of effect for the undertaking (implementation of the alternative) required by Section 106 of the NHPA is included in the summary of effects for each alternative.

Legal and Regulatory Compliance

Applicable law, policy and Forest Service Manual direction provide the basis for protection of cultural resources. Activities are subject to the regulations implementing Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and as promulgated by 36 CFR 800, to address effects to

cultural resources. Section 106 of the NHPA requires a federal agency to consider the effects of its actions on properties included in, eligible for inclusion in; or potentially eligible for inclusion in the National Register of Historic Places and provide the Advisory Council on Historic Preservation a reasonable opportunity to comment.

In addition to following 36 CFR 800, the Lassen uses a number of Programmatic Agreements outlining alternative procedures, per 36 CFR 800.14, developed by the Pacific Southwest Region including the Programmatic Agreement Among the U.S.D.A. Forest Service, Pacific Southwest Region (Region 5), California State Historic Preservation Officer, Nevada State Historic Preservation Officer, and the 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 (Regional PA).

Analysis Assumptions and Methodology

This impact analysis methodology applies to primary types of cultural resources found within the Area of Potential Effect (APE), archaeological sites.

The assumptions used in this effects analysis include:

- Cultural resources will be managed according to existing laws, regulations, and policy to protect these resources according to societal expectations.
- Ground-disturbing management activities could have direct adverse effects on cultural resources.
- Snow pack creates a protective barrier between vehicles and archaeological sites. Snow levels greater than 12 inches provide the greatest protection while levels below 12 inches may allow greater impacts to sites.
- Paved roads, gravel or roads with other base material act 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)]
- Limited use of maintained designated roads by OSV with 6-12 inches of snow has similar effects to vehicles and OHV use on the same road.
- For existing roads that may not be paved or have a rock base this analysis assumes that they were analyzed and monitored under the Forest’s previous Travel Management Off-Highway Vehicle (OHV) NEPA and followed the 2006 Motorized Recreation PA guidelines if historic properties were bisected a road or OHV trail. The analysis also assumes that OHV and OSV have similar potential impacts to historic properties.

As a rule, any activity that causes ground disturbance (disturbance to the soil matrix that contains the cultural resource) has the potential to adversely affect cultural resources, both directly and indirectly. This results in changes to the physical attributes of the resources that, in turn, compromise the integrity of the cultural resource and its context. Its context (the spatial relationship between the various artifacts, features and components of the cultural resource) is what is scientifically studied and interpreted and is the basis for the site significance determination. This effect is irreparable and considered adverse. Even a scientific archaeological excavation has an adverse effect because it is destroying the integrity and context of the cultural resource by removing its artifacts, features and components. In addition the significance of cultural resources is often dependent on their context in the larger landscape as much as on their immediate physical features. Combined effects of ground disturbing activities may jeopardize the quality

of cultural resources. Ground disturbing activities may affect the "feeling" of a cultural site, even when the activities occur beyond site boundaries. Indirect effects to setting, association, or feeling may also detract from the value of a cultural site for public interpretation and education.

Impact analysis follows established procedures and stipulations outlined in regulations implementing Section 106 of the NHPA (36 CFR 800) and Region PA. These include: (1) identifying areas and types of resources that could be impacted, (2) assessing information regarding historic properties within this area and conducting additional inventories and resource evaluations, as necessary, (3) comparing the location of the impact area with that of important cultural resources, (4) identifying the extent and types of effects, (5) assessing those effects according to procedures established in the Advisory Council on Historic Preservation’s regulations, and (6) considering ways to avoid, minimize, or mitigate adverse effects.

This methodology focuses on specific activities proposed in the alternatives, as well as areas containing known cultural resources that would be most likely to be adversely affected. Limits to current knowledge add uncertainty to the effects analysis of the alternatives.

Analysis consists of identifying the total number of sites within road and trail corridors based on GIS data for the forest. Under this definition, the route ―corridor‖ is defined as the route itself plus a ―buffer‖ area of 30 meters on both sides and running parallel to the route. However, many sites that fall within the corridors are not on or adjacent to the route and may not be directly impacted by OSV use. Sites within the buffer zone or adjacent to the route may not experience direct effects from OSV activity along the route. Site effects will depend on the absolute proximity to the site (sites located directly adjacent to the route are more likely to be affected than those located further away), characteristics of OSV use on the route as well as soil and landform characteristics. Sites considered ―At Risk‖ are generally those that are bisected by roads or trails, tend to be smaller in size (thus having a greater proportion of their surface areas affected by OSV use), and/or may have routes impacting major features of the site surface. In many cases, however, GIS, site and field data indicate the site is not being directly impacted by the route, the route exhibits very light OSV use, or in the case of linear site features such as railroad grades and ditches, the route crosses the site at a single point. Sites with these characteristics are not considered to be at-risk.

Methodology: Use existing data from cultural resource site atlas, historic archives, maps, site record files, and GIS spatial layers, and information obtained from archaeological inventories of OSV routes to identify cultural resources in the APE that may have direct, indirect, or cumulative effects.

Types of Impacts

Impacts are considered either adverse or beneficial to historic properties (cultural resources) when analyzed under NEPA. However, impact type is not viewed this way when conducting analysis under Section 106 of the NHPA for the purposes of assessing effects to historic properties under the Section 106 of NHPA, effects are either adverse or not adverse. Overall, non-beneficial effects usually result in compromising the nature of the cultural resource and may affect its eligibility for inclusion in the NRHP.

Impacts can be either direct and / or indirect. Direct impacts result from specific actions, such as vegetation removal or use of a bulldozer through a historic property. Direct effects can result both from natural events or processes and human activities.

Indirect impacts generally occur after an action, and are a result of changes in the condition of the landscape (such as loss of vegetation and subsequent erosion). Indirect effects can result from changed visitor use patterns and improved access that brings more visitors, resulting in the deterioration or loss of the site. Studies have shown that effects on sites have three basic characteristics: (1) impacts tend to be multiple (that is, several different impacts to the same site); (2) impacts are cumulative; and (3) many

impacts are the result of land use activities rather than deliberate vandalism (Marshall and Walt 1984, US Army Corps of Engineers 1988).

There is also the potential for previously unknown cultural resources to be discovered through exposure and/or damage by land use activities that involve surface disturbance.

Duration of Impact

Impacts to historic properties (cultural resources) could be of short-term, long-term, or permanent duration. Analysis of the duration of impacts is required under NEPA, but is not required and is not usually considered in assessing effects in terms of Section 106 of NHPA.

For cultural resources, the duration of an impact is usually not considered in assessing effects in terms of the NHPA. This is because, unlike most other types of resources, cultural resources are basically non-renewable resources. Damage or destruction to cultural resource sites is generally permanent. Effects on some cultural resources (such as the upgrading of windows in an historical building with non-compatible materials [wooden windows to aluminum]) can be reversed; however, until that happens, the effect is ongoing and potentially adverse.

Intensity of Impact

The main focus of the effects analysis for cultural resources is the intensity within the context of NRHP eligibility and integrity. The significance of cultural resources, particularly ethnographic, and cultural landscapes, often depends on their context in the larger landscape as much as their immediate physical features. Activities that occur beyond the physical boundaries of the cultural resource can affect the historic property if they affect the larger, landscape-level context.

Negligible: Impacts would be barely perceptible changes in significant characteristics, contributing elements or character defining features of a historic property.

Minor: Impacts would be perceptible and noticeable, but would remain localized and confined to a single element or significant characteristic of a historic property (such as a single archaeological site containing low data potential within a larger archaeological district or a single contributing element of a larger historic district).

Moderate: Impacts would be sufficient to cause a noticeable change which may or may not contribute to a significant change in characteristics of a historic property.

Major: Impacts would result in substantial and highly noticeable changes or loss of significant characteristics of a historic property.

Duration plays a key role in the overall effect; impacts of minor intensity over a long duration may have the same effect on the characteristics of heritage resources as would impacts of moderate intensity over a short duration.

Mitigation of Impacts to the Cultural Environment

NEPA calls for a discussion of the "appropriateness" of mitigation, and an analysis of the effectiveness of mitigations. A reduction in intensity of impact from mitigation is an estimate of the effectiveness of this mitigation under NEPA. It does not suggest that the level of effect, as defined by implementation regulations for Section 106 of the National Historic Preservation Act (36 CFR 800), is similarly reduced. Although adverse effects under Section 106 may be mitigated, the effects remain adverse. Therefore, measures to address impacts under NEPA may not be sufficient to address the effects under NHPA. The

Secretary of the Interior has published regulations designed for the preservation, restoration and rehabilitation of cultural resources. The Regional PA provides a list of standard protection measures that can be used, per 36 CFR 800.14. Ultimately, the universal mitigation measures will always be in compliance with the vast array of historic preservation legislation and mandates.

Mitigation generally includes the avoidance of adverse effects. Standard mitigation measures in this document are from the Regional PA developed in consultation with the State Historic Preservation Officer and the Advisory Council on Historic Preservation.

Archaeological Resources

Type and Duration of Impacts

A change in the physical attributes of an archaeological site that affects the information contained in that site is irreparable and considered adverse and of permanent duration. Adverse impacts to archaeological resources can result from soil movement and artifact displacement. The intensity of impacts to archaeological resources can range from negligible to major, depending on the management actions taken and/or the effects resulting from the intensity of burning during fire events or ground disturbance. The majority of these impacts are long-term in duration.

Intensity of Impact

The intensity of impact to an archaeological resource would depend on the potential of the resource to yield important information, as well as the extent of the physical disturbance and/or degradation. For example, moving earth at an archaeological site(s) with low data potential might result in a minor, adverse impact, though still an effect.

Negligible: Barely perceptible and not measurable, and would usually be confined to archaeological site(s) with low data potential.

Minor: Perceptible and measurable, and would remain localized and confined to archaeological site(s) with low to moderate data potential.

Moderate: Sufficient to cause a noticeable change, and would generally involve one or more archaeological site(s) with moderate to high data potential.

Major: Substantial and highly noticeable changes, involving archaeological site(s) with high data potential.

Mitigation of Impacts

For archaeological resources, mitigation includes site avoidance during activities, protection of archaeological soils through use of a barrier or other protection measures. In some situations standard treatments such as complete site documentation may be appropriate as a way to preserve site information and forego continued site management.

Measures or Factors Used to Assess Environmental Consequences

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 NHPA, as amended and as promulgated by 36 CFR 800, to address those effects to cultural resources.

The following factors were determined to be the best factors indicating potential effects on cultural resources:

- Total acres of areas open for OSV use.
- Total number or miles of roads of potential use.
- Ability to mitigate impacts through the application of the Regional PA standard protection measures

Direct Effects to Cultural Resources

Direct Effects

Direct Effects of OSV on cultural resources include impacts from soil compaction, erosion, and displacement. OSV use also has the potential for releasing burned and unburned fuel and lubricants into archaeological deposits.

Trail use based on snow depth. OSVs on unpaved roads, trails and areas of Forest Service lands that occurs during periods of no or low snow amounts, less than 12 inches, have the potential to breaking or crushing artifacts, changing artifact provenance, and mixing and dispersal of archaeological soils. OSVs treads can move historic and prehistoric artifacts to new locations within a site or spread artifacts and archaeological soil outside the original site boundaries. This change in artifact and soil provenance alters site integrity.

Indirect Effect

Indirect effect of OSV is increased access to sensitive tribal areas and historic sites that are not easily accessible at other times of the year, due to lack of vehicle access. Tribal areas that are some distance from trails and/or roads or are isolated due to water or rough terrain may have increased visitation due to OSV use across frozen lakes or smoothing of the terrain due to snow compaction.

Wooden historic sites and artifact can be scavenged for burnable materials by OSV users building campfires.

Summary of Environmental Consequences by Alternative for Cultural Resources

Table 40. Comparison of environmental consequences to cultural resources by alternative

Issue	Alt 1	Alt 2	Alt 3	Alt 4
OSV Areas Acres	976,760	947,120	878,690	966,270
Acres Surveyed	818,483	789,870	730,168	781,069
% surveyed	84%	83%	83%	81%
OSV Area Acres Prohibited	173,260	202,900	271,330	183,750
Sites in OSV Areas		3414	3225	3473
Snow Trails	406	406	406	408
Sites bisected by ungroomed trails		15	26	26
Sites within 30m of trails	78	78	78	78
Miles of groomed trails	324	324	324	324
Sites bisected by groomed trails		57	55	57
Sites within 30m of groomed trails	57	57	57	57
Miles of prohibited trails	148	148	148	146
Minimum Snow Depth for OSV Use on Snow trails designated for OSV use (inches)	12	6 on limited basis	6 on limited basis	Dependent on snow conditions. No restrictions with 6 or more inches on trails identified for grooming.
Minimum Snow Depth for OSV Use on off-trails, Cross-county Use (inches)	12	12	12	12
Minimum Snow Depth for Snow Trail Grooming to Occur	18	12	18	12
Grooming Season	12/26-3/31	12/26-3/31	12/26-3/31	Discretion of groomer
Plowed Parking areas	5	5	5	5
Site in Parking	3	3	3	3

Alternative 1

Alternative 1 has the largest area open to OSV and thus has the highest potential for direct and indirect effects from OSV use.

Alternative 2

Alternative 2 has the second smallest area open to OSV and thus has the second lowest potential for direct and indirect effects from general OSV use. Minimal snow depth is 6 inches and on a limited basis has a higher potential impact to cultural resources than the 12 inch minimum in Alternative 1. Impacts on roads due to snow depth are equal to Alternative 3 with less potential impacts than Alternative 4 with no restrictions with 6 inches or more of snow depth.

Alternative 3

Alternative 3 has the smallest area open to OSV and thus has the lowest potential for direct and indirect effects from general OSV use. Minimal snow depth is 6 inches and on a limited basis has a higher potential impact to cultural resources than the 12 inch minimum in Alternative 1, but the same as Alternative 2 and less potential impacts than Alternative 4 with no restrictions with 6 inches or more of snow depth.

Alternative 4

Alternative 4 has the second largest area open to OSV and thus has the second highest potential for direct and indirect effects from OSV use. Alternative 4 has the highest potential impact due to no restrictions of OSV use on roads with 6 or more inches on trails identified for grooming and potential of longer season when snow pack is less during the fall and spring.

Mitigations

Mitigations used to protect soils and aquatic species will also protect cultural resources.

Soil Project Design Features

- Grooming shall not occur when the ground surface is exposed and soil damage or rutting could occur. The operator shall consider recent, current, and forecasted weather and snow conditions to ensure these conditions are met.
- Prohibit OSV use and grooming in wetlands unless protected by at least 1 foot of packed snow or 2 inches of frozen soil, unless there is no other practicable alternative. If OSV trails must enter wetlands, use bridges or raised prisms with diffuse drainage to sustain flow patterns. Set crossing bottoms at natural levels of channel beds and wet meadow surfaces. Avoid actions that may dewater or reduce water budgets in wetlands.

Aquatic Species and Habitat

- Prohibit OSV use on lakes, reservoirs, ponds and any open surface water.

By following the mitigation measures outlined below from the Regional PA, impacts and surface effects to cultural resource from OSV use will be reduced to No Affect or No Adverse Effect to Cultural Resources. In areas where the Standard Protection Measures are unable to be used, consultation with the SHPO will take place for the purpose of developing mitigation measures with a 12 inch snow depth (uncompacted) to reach a no adverse effect determination.

2.0 Class II: On-Site Historic Property Protection Measures

(b) Accumulation of sufficient snow over archaeological deposits or historic features to prevent surface and subsurface impacts. Undertaking activities may be implemented over snow cover on historic properties under the following conditions:

(1) The cover must have at least 12 inches depth of compacted snow or ice throughout the duration of undertaking activities on sites.

(2) All concentrated work areas (e.g., landings, skid trails, turnarounds, and processing equipment sites) shall be located prior to snow accumulation and outside historic property boundaries.

(c) Placement of foreign, non-archaeological material (e.g., padding or filter cloth) within transportation corridors (e.g., designated roads or trails, campground loops, boat ramps, etc.) over archaeological deposits or historic features to prevent surface and subsurface impacts caused by vehicles or equipment. Such foreign material may be utilized on historic properties under the following conditions:

(1) Engineering will design the foreign material depth to acceptable professional standards;

(2) Engineering will design the foreign material use to assure that there will be no surface or subsurface impacts to archaeological deposits or historic features;

(3) The foreign material must be easily distinguished from underlying archaeological deposits or historic features;

(4) The remainder of the archaeological site or historic feature is to be avoided, and traffic is to be clearly routed across the foreign fill material;

(5) The foreign material must be removable should research or other heritage need require access to the archaeological deposit or historic feature at a later date; and

(6) Indian tribe or other public concerns about the use of the foreign material will be addressed prior to use.

Monitoring

The Forest shall ensure that:

- Post-project monitoring shall be implemented and qualified Heritage Program staff shall complete in treatment areas where deferred inventory was approved. The qualified Heritage Program staff shall determine the scope and schedule for any additional associated monitoring. Information from any post-project inventory, monitoring, or evaluation shall be used to assess the effectiveness of this non-intensive inventory approach. The results shall be reported in the Forest's Annual PA Report or supplemental report.
- Resource damage is not occurring when there is less than the prescribed minimum snow depth (depending on alternative) with certain exceptions as described in the alternative descriptions above. Snow depths measurement locations and techniques would be developed using an interdisciplinary team approach and would consider terrain, season, proximity to sensitive areas, and resource damage criteria.
- Where resource damage is suspected due to OSV use in less than the prescribed minimum snow depth, monitoring would occur to help inform the line officer if damage is occurring, the extent of the damage, and what steps need to be taken to address the issue.

Monitoring will be consistent with *Programmatic Agreement Among The U.S.D.A. Forest Service, Pacific Southwest Region, U.S.D.A. Forest Service, Intermountain Region's Humboldt-Toiyabe National Forest, California State Historic Preservation Officer, And Advisory Council On Historic Preservation Regarding The Process For Compliance With Section 106 Of The National Historic Preservation Act For Designating Motor Vehicle Routes And Managing Motorized Recreation On The National Forests In California)*(2006) and consist of:

System routes should be periodically monitored to determine if ongoing OSV recreation uses, changes in use, or maintenance activities have the potential to affect historic properties. Priority for monitoring

should be placed on routes at lower elevation where minimum snow depth was more likely to have occurred.

1. Where monitoring indicates effects are ongoing, develop appropriate resource protection or treatment measures (e.g., barriers, fencing, trail reroutes, padding, signing, site mitigation, etc.) to minimize effects. Implement treatment measures.

2. Within two years, assess the need for either continued monitoring or change in resource protection measures to ensure adverse effects are minimized or eliminated.

Forests shall report monitoring all activities undertaken in the annual PA report to SHPO

At a minimum, annual reports prepared will include:

a) Summaries of all studies conducted for undertakings covered by this decision, including information regarding:

b) management measures employed to protect any identified historic properties;

c) findings from monitoring efforts;

d) descriptions of any inadvertent effects or unanticipated discoveries, and steps taken to resolve effects;

e) assessments of the effectiveness of the Motorized Recreation PA, including any reasonably reliable estimates of cost savings and/or increases in management efficiency; and

f) other available information to clarify the effects to historic properties from motorized vehicle recreation undertakings that the Regions or the SHPO request be incorporated into annual reports.

Cumulative Effects for Cultural Resources

Plowing of roads and trailheads that access OSV areas is a reasonably foreseeable effect to cultural resources within the OSV project area and occur in the same time period as OSV use. Plowing effects differ based on whether the road and trailheads are paved or unpaved. Plowing unpaved areas has the potential to breaking or crushing artifacts, changing artifact provenance, and mixing and dispersal of archaeological soils. Plows can move historic and prehistoric artifacts to new locations within a site or spread artifacts and archaeological soil outside the original site boundaries. This change in artifact and soil provenance alters site integrity.

There are no other reasonably foreseeable projects that will be occurring in this project area that would also affect the cultural resources analyzed in this document. Cultural Resources outside this project are analyzed on a project by project basis and for sites on Lassen National Forest the vast majority of projects use standard mitigations which greatly reduce or eliminate effects to those resources. The greatest cumulative effect to cultural resources comes from projects not on federal lands. Because of the rapid rate of urbanization, the loss of cultural resources, often unmitigated, is putting greater significance on the cultural resources on Lassen National Forest. The cultural resources on National Forest System lands are afforded a higher level of protection than those on private lands, thus the public looks to the national forest cultural resources as a more valued resource. At the same time, given the changing cultural demographics, some national forest users may not see the relevance of cultural resource protection to their cultural norms and values, which impedes the effort to protect cultural resource sites.

Through implementation of the above mitigation measures which are consistent with the Regional PA, there are no differences in cumulative effects on cultural resources by authorized activities, which appear to be categorically low under the different alternatives. The difference between alternatives and their potential effects to cultural resources comes from the potential difference in open area indirect effects.

When Avoidance Is Not Possible.

If procedures described above cannot be implemented to protect heritage resources, the Forests shall immediately consult with State Historic Preservation Office (SHPO) to ascertain the expected severity of damage. If the SHPO and Forest agree that the activity will not diminish or destroy those qualities that may make the property eligible, including potential visual impacts if NRHP criteria A or C may be relevant, the Forest shall remove the fuels using all appropriate protection measures.

Unanticipated Discoveries

There is always the possibility that surface and sub-surface cultural resources will be located during project operations. Should any additional project cultural resources be located, the find must be protected from operations and reported immediately to the Heritage Resource Staff. All operations in the vicinity of the find will be suspended until the site is visited and appropriate recordation and evaluation is made by a Forest Service Archaeologist.

Effects

Through the use of these mitigation measures, previous identification and effects monitoring that took place under the 2010 Record of Decision Motorized Travel Management Lassen National Forest and through the use of Programmatic Agreement Among The U.S.D.A. Forest Service, Pacific Southwest Region, U.S.D.A. Forest Service, Intermountain Region's Humboldt-Toiyabe National Forest, California State Historic Preservation Officer, And Advisory Council On Historic Preservation Regarding The Process For Compliance With Section 106 Of The National Historic Preservation Act For Designating Motor Vehicle Routes And Managing Motorized Recreation On The National Forests In California)(2006; Travel Management PA), with survey and monitoring that took place from 2010-2013. All Alternatives have been determined to have a No Adverse Effect to cultural resources. All Alternatives have been determined to have a No Adverse Effect to cultural resources.

Because all surveys and site protection measures have and will follow standards defined in the Regional PA and/or Travel Management PA all alternatives have a No Adverse Effect to historic properties under NHPA and have no direct, indirect effects or cumulative effects under NEPA.

Recreation

This analysis will consider and disclose potential effects to recreation settings and opportunities, access, scenery, and designated areas such as: wilderness, inventoried roadless areas, wild and scenic rivers, national trails, and research natural areas that could result from the following proposed actions:

- Designating roads, trails and areas for over-snow vehicle (OSV) use
- Identification of snow trails for grooming for OSV use

This analysis will consider how the proposed actions and alternatives would potentially impact quality recreation opportunities and experiences for both motorized and non-motorized users.

In accordance with the Travel Management Regulations, Subpart C, and following a decision on the OSV use designations, the Forest Service would publish an OSV use map identifying snow trails and areas that would be designated for OSV use on the Lassen National Forest.

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 (NFS) 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, Forest-wide Standard and Guideline number 69 (USDA Forest Service 2009).

Land and Resource Management Plan

The 1992 Lassen LRMP summarizes the dispersed recreation opportunities relevant to winter use as follows:

> *Recreationists hike and horseback ride, mainly on 465 miles of trails; they also snowmobile and cross-country ski on trails, unplowed roads, and open areas. The Forest has 125 miles of the Pacific Crest National Scenic Trail, and several National Recreation Trails: the McGowan Cross Country Ski Trail, Colby Meadows, Swain Mountain, the Heart Lake Trail, and the Spencer Meadow Trail…The Bizz Johnson Trail (a "Rails to Trails" project) provides excellent opportunities for hiking, biking, and cross-country skiing between Westwood and Susanville….Cross-country skiers ski the McGowan Cross Country Ski Trail and the Butte Lake Trail. Much of the Forest's road system is skiable during winter months when snow plowing does not occur. Use of the Forest trail system is light to moderate and its user capacity is undetermined. New trails would be built to improve or disperse existing use and provide additional opportunities. Reconstruction is generally a higher priority than new construction. (LRMP 3-21)*

> *Because snowmobile use has increased recently, the Forest has improved snowmobiling opportunities by constructing snowmobile parking areas and warming huts financed by State Off-Highway Vehicle funds. Additional OHV recreation developments are likely (LRMP 3-33).*

The Lassen LRMP provides forest-wide and management area-specific standards and guidelines relevant to winter recreation as follows:

Forest Goals:

Recreation:

(a) Provide a wide range of outdoor recreation opportunities to meet public demand by furnishing different levels of access, service, facilities, and information.

d. Provide diverse opportunities for winter sports.

Visual Resources:

a. Throughout the Forest, maintain visual quality commensurate with other resource needs Adopt and apply specific Visual Quality Objectives (VQOs) for all areas of the Forest.

Wild and Scenic Rivers:

b. Protect and enhance outstandingly remarkable values and free-flowing condition of recommended and designated Wild and Scenic Rivers

Wilderness and Further Planning Areas

a. Protect Wilderness character in designated and recommended Wilderness

Special Areas

a. Protect areas of outstanding scientific, scenic, botanic or geologic value as Research Natural Areas (RNAs), or Special Interest Areas (SIAs)

Standards and Guidelines:

15. Recreation

(a)(3). Manage recreation according to the Recreation Opportunity Spectrum (ROS) classes described in the ROS User's Guide, as specified in Appendix J, and the Management Prescriptions Refer to the separate ROS Map for the distribution of ROS classes throughout the Forest.

(b)(1) Continue to implement the preferred alternative of the 1989 Winter OHV Management Plan, for the construction of trailheads and trail networks for winter recreation.

(b)(2) Cooperate with the State of California to identify locations where snow removal is needed to accommodate safe, off-highway parking for dispersed winter use.

(b)(3) Designate and mark trails needed for additional dispersed winter recreation.

(b)(4) Designate and sign cross-country ski trails.

(b)(5) Accommodate snowmobile use over most of the Forest where not in conflict with other uses or resources. Due to the dispersed nature of the activities, do not provide regular patrols. Provide first aid services only as Forest personnel happen to be available.

(b)(6) Minimize user conflicts by specifying allowable winter use on certain roads and trails (for example cross-country ski trails, snowmobile-only trails or winter 4-wheel drive only).

(b)(7) Prohibit snow removal on designated snowmobile and cross-country ski trails between specified dates.

(b)(8) Areas for snow play will not be designated. (LRMP 4-34)

18. Special Areas

(a)(4) Protect and preserve the values of each special area as identified in an establishment report or area management plan, in conformance with the Special Areas Prescription and Management Area direction.

23. Wild and Scenic Rivers

(b)(1) Administer river corridors commensurate with their proposed Wild and Scenic designations, as provided in the Wild and Scenic Rivers Act, the Special Areas Prescription, and Management Area direction.

24. Wilderness and Further Planning Areas

(a)(1) Conduct management activities according to the Wilderness Act of 1964, the Wilderness Prescription in this Plan, and any applicable wilderness plan.

Desired Condition

The desired future condition for recreation and designated areas is described in the Lassen LRMP as follows:

> *Recreation facilities are well maintained and are sufficient to handle the increased demand. Wilderness, semi-primitive, Wild and Scenic Rivers, Special Interest Areas, and other special areas are managed to provide generally primitive recreational experiences while maintaining healthy, natural ecosystems* (LRMP 4-2).

The desired future condition for scenery is described in the Lassen LRMP as follows:

> *The appearance of the Forest from designated throughways and vantage points appears mostly unchanged by management activities, from other areas, harvest openings and roads may be visible* (LRMP 4-3).

The desired outcome of this OSV use designation process is a manageable, designated OSV system of trails and areas within the Lassen National Forest, which is consistent with and achieves the purposes of the Forest Service Travel Management Regulations at 36 CFR part 212, Subpart C. The system of trails and areas will provide access, ensure that 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.

This is consistent with the goal in the Lassen LRMP to provide diverse opportunities for winter sports.

Management Area

F – Riparian – Fish Prescriptions (Recreation)

> 3. Confine off-highway vehicles, except over-snow vehicles, to designated roads, trails, and stream crossings in riparian areas. (LRMP 4-75)

M – Semi-Primitive Motorized Recreation

This prescription is derived from the Recreation Opportunity Spectrum (ROS) class of semi-Primitive Motorized (SPM) (see Appendix J for the definition of this class). It is intended to facilitate dispersed, motorized recreation, such as snowmobiling, four-wheel driving, and motorcycling, in areas essentially undisturbed except for the presence of four-wheel drive roads and trails Non-motorized activities such as hiking, fishing, hunting, picnicking, and cross-country skiing are also possible. Motorized travel may be seasonally prohibited or restricted to designated routes to protect other resources. (LRMP 4-60)

N – Semi-Primitive Non-Motorized Recreation:

This prescription is derived from the Recreation Opportunity Spectrum (R0S) class of Semi-Primitive

Non-Motorized (SPNM) See Appendix J for the definition of this class. It is intended to facilitate dispersed recreation such as hiking, mountain bicycling, horseback riding, hunting, and cross-country skiing in unroaded, essentially undisturbed areas outside of existing and proposed wilderness areas Motorized recreation is prohibited (LRMP 4-63)

> Prohibit motorized recreation, including four wheel driving, motorcycling, and snowmobiling (LRMP 4-64)

S – Special Areas

> Recreation: 2. Prohibit motorized vehicles within Research Natural Areas (LRMP 4-68)
>
> Wild and Scenic Rivers: 1. Allow public recreation and other resource use activity based on the recommended category of each river segment. (LRMP 4-69)

W – Wilderness Prescription

> The prescription specifies management direction in accordance with the Wilderness Act of 1964, assuming no permanent or long-lasting evidence of human use. Motorized and mechanized equipment is prohibited (LRMP 4-76)

Management Areas – Logan:

Recreation: 1. Continue designation of trails and restrict snow plowing of snowmobile trails for timber sales between December 1 and April 1 (LRMP p 4-118)

Special Area Designations

Special area designations present within the Lassen National Forest include eligible wild and scenic rivers, wilderness, proposed wilderness, inventoried roadless areas, national trails, and research natural areas.

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
- 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
- 2001 Roadless Area Final Rule (36 CFR Part 294)
- 2005 Travel Management Regulations – Subpart C (36 CFR Parts 212 and 261) as amended in 2015 - Use by Over Snow Vehicles (Travel Management Regulations)

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).

Topics and Issues Addressed in This Analysis

The recreation opportunities and desired experiences for both motorized and non-motorized winter activities are key drivers behind the purpose and need for this analysis. Effectively managing OSV use and identifying snow trails for grooming will help the Lassen National Forest move toward the Forest Plan goals of providing a wide range of outdoor recreation opportunities to meet public demand by furnishing different levels of access, service, facilities, and information, and providing diverse opportunities for winter sports (USDA Forest Service 1992).

Issues

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) 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 the OSV use on trails to the detriment of non-motorized users.

Designating trails and areas 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. In the same way, OSV designations have the potential to enhance opportunities for non-motorized winter users in some areas while limiting or displacing those users in other areas. Conflict between motorized and non-motorized winter users 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 through illegal encroachment, noise, and increased human presence (i.e., Pacific Crest Trail, wilderness).

For this analysis, quality recreation experiences are defined as the forest's most popular winter recreation activities, according to the National Visitor Use Monitoring (NVUM) Report, along with the importance of motorized and non-motorized winter recreation opportunities as described in the Forest Plan and Recreation Facility Analysis (RFA) niche statements.

Other Resource Concerns

Other resources relevant to this analysis that were addressed in public scoping comments include potential impacts to wilderness, research natural areas, wild and scenic rivers, and the Pacific Crest Trail.

Environmental Consequences

Methodology

This analysis used ArcMap and relevant Geographic Information System (GIS) data layers from the Lassen National Forest, including recreation opportunity spectrum (ROS) classes, 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 Regulations, 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 NFS 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 NVUM results, California State Parks, California Outdoor Recreation Plan, National Recreation Survey and the Environment information and online visitor information sources provided by the Lassen 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 RFA 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 NFS lands are for this use (motorized or non-motorized) compared to other non-NFS lands.

The NVUM visitor use information from 2001, 2006, and 2010 was considered. The best available site-specific visitor use information for Lassen 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 Lassen 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 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

The resource indicators and measures shown in table 41 will be used to measure and disclose effects to recreation resources related to OSV use designations and grooming trails for OSV use.

Table 41. Resource indicators and measures for assessing effects

Resource Element	Resource Indicator	Measure	Used to address: P/N, or key issue?	Source (LRMP S&G,[1] law or policy, BMPs,[2] etc.)?
Recreation Settings and Opportunities	Recreation Opportunity Spectrum	Consistency of OSV designations with ROS classes	Yes	LRMP S&G 15 (3) – p 4-24:.*Manage recreation according to the Recreation Opportunity Spectrum (ROS) classes described in the ROS User's Guide, as specified in Appendix J, and the Management Prescriptions. Refer to the separate ROS Map for the distribution of ROS classes throughout the Forest.*
	Opportunities for motorized winter uses	Acres open to OSV use, percent change	Yes	
	Opportunities for non-motorized winter uses	Acres closed to OSV use, percent change	Yes	
	OSV designations	Miles of designated OSV trails/Miles of groomed OSV trails	Yes	
Conflicts between motorized and non-motorized winter experiences	Noise	Acres potentially affected by noise/acres closed to winter motorized use	Yes	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.*
	Access to desired motorized and non-motorized recreation settings and opportunities	Proximity of opportunities to plowed trailheads, snow depth requirements	Yes	

[1] Standard and guideline
[2] Best management practices

Resource Element	Resource Indicator	Measure	Used to address: P/N, or key issue?	Source (LRMP S&G,[1] law or policy, BMPs,[2] etc.)?
Conflicts between motorized and non-motorized winter experiences (continued)	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.).	Yes	
	Public Safety	Degree of separation of motorized and non-motorized use areas	Yes	
Designated Areas	Proximity and frequency of OSV designations in relation to designated areas	Distance of groomed OSV trails from designated areas/number of OSV trails within designated areas	Yes	Wilderness Act of 1964 Wild and Scenic Rivers Act of 1968 National Trails System Act of 1968 Pacific Crest Trail Comprehensive Plan

OSV Use Assumptions for Analysis

The following OSV use assumptions were developed based on information in the State EIR and 2009 Trailhead Survey, and based on local knowledge and observations of resource specialists from the Lassen 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. The maps of OSV use potential for the Almanor, Eagle Lake, and Hat Creek Ranger Districts are included as appendix A of the hydrology specialist report.

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.
- Open areas with many shrubs, OSVs won't use without adequate snow depth.
- 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 at trailheads.
    - Higher 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), 3,500 feet and below for the Lassen.
- 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; 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 educational messages including messages encouraging trail sharing to reduce potential use conflicts.

Spatial and Temporal Context for Effects Analysis

Spatial Context:

- Forest Boundary

Effects Timeframe:

- Short-term effects occur within one year.
- Long-term effects occur up to 20 years.

Affected Environment

Existing Condition

Recreation Settings and Opportunities

The Lassen National Forest offers a variety of high quality recreation opportunities in a range of settings, year round. Three geomorphic provinces meet within the national forest and contribute to its diversity—the Sierra Nevada Mountains, the Southern Cascade Mountains, and the Modoc Plateau. Elevations range from 900 feet to 8,677 feet. Topography varies from deep river canyons and vast sage brush flats to sharp rocky peaks. The forest completely surrounds Lassen Volcanic National Park, and the 10,457-foot Lassen Peak is a prominent feature visitor's view from many national forest locations. Proximity to the national park and a variety of access points from the forest increase visitors' opportunities for quiet recreation. Other public lands adjacent to the Lassen National Forest include the Plumas National Forest (south), Shasta-Trinity National Forest (north), Bureau of Land Management (BLM) (north and east), and Tehama Wildlife area (State of California) (west). Private lands surrounding the Lassen National Forest vary between rural or sparsely populated to residential subdivisions. In addition, private timber companies like Sierra Pacific Industries, Collins Pine Company, Beaty & Associates, and Fruit Growers hold significant acreage (USDA Forest Service 2009).

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 Lassen. The recreation niche statement of Lassen National Forest is:

> *Your Crossroads to Discovery–The Lassen National Forest is a crossroads of landscape and people. Here the granite of the Sierra Nevada, the lava of the Cascades and the Modoc Plateau, and the ranges of the Great Basin converge. The geologic crossroads has influenced the cultural crossroads throughout time. For generations, the Forest has and continues to provide quality of*

> *life and livelihood for local families and native people while enriching the experiences of a changing and diverse group of visitors. In this high country oasis, water is the key attraction. Large, high elevation lakes provide a social weekend get-away and clear streams offer premier fishing. The Volcanic Legacy All-American Road, Lassen Backcountry Discovery Trail and other major routes traverse the Forest offering outstanding viewing and learning opportunities and access to the Forest backcountry.* (USDA Forest Service 2007)

Water-based recreation, hiking or walking, viewing scenery and wildlife, developed camping, and driving for pleasure, as well as geologic and cultural interpretation, provide the focus for recreation on the Lassen National Forest. Four broad niches describe this focus: lakes and special waterways, travel ways, backcountry, and wildlands.

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 Lassen include Primitive (P), Semi-Primitive Non-Motorized (SPNM), Semi-Primitive Motorized (SPM), Roaded Natural (RN), and Rural (R). OSV designations that remain consistent with the ROS classes will provide for a diversity of opportunities for both motorized and non-motorized winter activities and the associated desired experiences.

Primitive: High opportunity for isolation from sights and sounds of man, unmodified natural environment. Very low interaction with other users.

Semi-Primitive Non–Motorized: Moderate opportunity for isolation from sights and sounds of man, natural appearing environment. Low interaction with other users.

Semi-Primitive Motorized: Moderate opportunity for isolation from sights and sounds of man, natural appearing environment. Low interaction with other users. Access permitted by four-wheel drive or motor bikes.

Roaded Natural Appearing: Sights and sounds of man are moderate. Mostly natural appearing as viewed from sensitive roads and trails. Landings, roads, slash, and other debris are evident. Access travel is conventional motorized.

Rural: Sights and sounds of man are evident. Natural environment is culturally modified, yet attractive. Access and travel facilities are for individual intensive motorized use.

A majority of Lassen National Forest acres are in the Roaded Natural class.

Table 42. Lassen National Forest recreation opportunity spectrum classes

Recreation Opportunity Spectrum	ROS Class Acres
Primitive	3,393
Semi-Primitive Non-Motorized	146,387
Semi-Primitive Motorized	59,350
Roaded Natural	910,774
Rural	9,681

LRMP Table 3.1 (3-21)

On the Lassen National Forest, all wilderness and proposed wilderness areas are classified as Semi-Primitive Non-Motorized and Primitive. All Semi-Primitive Non-Motorized and Primitive areas are closed to OSV use. Groomed trails are located in Semi-Primitive Motorized, Roaded Natural, and Rural classes.

Motorized Winter Recreation

The Lassen National Forest has a well-developed winter recreation program, which emphasizes snowmobile use and includes 406 miles of snowmobile trails that connect to six well-placed developed staging areas.

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 NFS trails (snow 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.

The groomed OSV trail system on the Hat Creek, Eagle Lake, and Almanor Ranger Districts is described below.

Ashpan Snowmobile Area

The Ashpan Snowmobile Area, which has been in operation for 26 years, is on State Route 44/89, 4 miles northeast of the north entrance to Lassen Volcanic National Park. Ashpan offers 35 miles of groomed trails and access to another 30 miles of groomed trails associated with neighboring Latour State Forest. The Latour State Forest trails are not groomed by State of California OSV Program funds.

This trail system travels through mixed conifer forests with the higher sections containing views of Mount Lassen, Mount Shasta, and the upper Sacramento Valley. Trail elevations range from 5,400 feet to 6,000 feet. The Ashpan trailhead has a parking lot, warming hut, and restroom.

The Forest Service (Hat Creek Ranger District) is responsible for operating and maintaining the Ashpan Snowmobile Area. Caltrans provides plowed trailhead access, but a private vendor could provide the service under contract to the Forest Service (Lassen National Forest) in the future.

Bogard Snowmobile Area

The Bogard Snowmobile Area is located 25 miles northwest of Susanville on State Route 44. Trailhead parking and restrooms are provided off State Route 44 at Forest Route 10. Bogard offers 80 miles of groomed trail ranging in elevation from 5,600 feet to 7,700 feet.

To the east of the highway are ungroomed meadows and two groomed trails: Antelope Mountain Lookout and Crater Lake. Antelope Mountain Lookout has 16 miles of trail with panoramic views of Mount Lassen, Mount Shasta, and the Warner Mountains. Crater Lake has 7 miles of trail.

The meadows of Pine Creek Valley are the focal point of snowmobile use in Bogard. There are also 30 miles of ungroomed forest roads that travel through the Pine Creek Valley to Eagle Lake. To the west of the highway are trails that travel through pine and fir forests and connect to Hat Creek rim to the north and Swain Mountain to the south.

The Forest Service (Eagle Lake Ranger District) is responsible for operating and maintaining the Bogard Snowmobile Area. Caltrans provides plowed trailhead access, but a private vendor could provide the service under contract to the Forest Service (Lassen National Forest) in the future.

Fredonyer Snowmobile Area

The Fredonyer Snowmobile Area is located on State Route 36, 10 miles west of Susanville. The area has 80 miles of groomed trails, a parking area, a warming hut, and a restroom.

The Fredonyer Snowmobile Area can be accessed from three different areas. Primary access is from the Fredonyer trailhead on State Route 36 at Fredonyer Pass. Additional pullout parking is available along the road shoulder, dependent upon plowed conditions. Willard Hill, a few miles farther east on State Route 36 also provides access with pullout parking along the road. South of Susanville, Gold Run Road (County Road 204) provides an ungroomed trail link to the Fredonyer trails.

The Fredonyer trails are located on both the north and south sides of State Route 36 with the northern trail route linking to the Swain Mountain Snowmobile Area. Trails on the south side of State Route 36 offer various loop trails which traverse through a combination of forest and open meadow and offer views of the Great Basin and the high country around Mount Lassen. Trail elevations range from 4,800 feet to 7,000 feet.

The Forest Service (Eagle Lake Ranger District) is responsible for operating and maintaining the Fredonyer Snowmobile Area. Caltrans provides plowed trailhead access, but a private vendor could provide the service under contract to the Forest Service (Lassen National Forest) in the future.

Jonesville Snowmobile Area

The Jonesville Snowmobile Area is located in the Lake Almanor area between State Routes 32 and 89. The Jonesville trailhead is located on Humboldt Road off State Route 32 about 2 miles east of the Cherry Hill Campground and provides a parking lot and restrooms. The Jonesville trails can also be accessed from the Almanor Picnic Area on State Route 89 on the west shore of Lake Almanor.

Jonesville offers 70 miles of groomed trails and three loop routes that follow Humbug and Humboldt county roads. Trail elevations range from 4,600 feet to 6,600 feet. Views of the Lake Almanor Basin can be seen from the Yellow Creek loop. Colby Mountain Lookout is a popular destination in the Jonesville area.

Butte Meadows Hillsliders Snowmobile Club provides trail grooming under contract to Butte County. The Butte County Road Department plows 7 miles of Humboldt Road from State Route 32 to the trailhead.

Morgan Summit Snowmobile Area

The Morgan Summit Snowmobile Area is located 4 miles east of Mineral on State Route 36 and State Route 89. This snowmobile area has 77 miles of groomed trails, a parking lot, restrooms, and a warming hut maintained by the Forest Service (Almanor Ranger District).

It contains loop trails and the trail to Turner Mountain Lookout that has views of the central Sacramento Valley, Sutter Buttes, Lake Almanor, and Mount Shasta. Trail elevations range from 4,800 feet to 6,900 feet.

Both volunteers and Forest Service groomer operators groom the Morgan Summit trail system. Caltrans provides plowed trailhead access, but a private vendor could provide the service under contract to the Forest Service (Lassen National Forest) in the future.

Swain Mountain Snowmobile Area

The Swain Mountain Snowmobile Area is located north of Lake Almanor off Mooney Road (County Road A-21). The area can also be accessed from the Chester-Lake Almanor staging area at Lake Almanor on Forest Route 10 off State Route 36. Each trailhead provides parking and restrooms.

Swain Mountain has 60 miles of groomed trails and three loop trails, and is the hub of the snowmobile system on the Lassen National Forest. Trail elevations range from 5,200 feet to 6,800 feet. It provides direct access to Fredonyer and Bogard Snowmobile Areas and 200 miles of marked trails (groomed and ungroomed).

The Forest Service (Almanor Ranger District) is responsible for operating and maintaining the Swain Mountain Snowmobile Area. The Plumas County Road Department plows the Swain Mountain trailhead and Chester-Lake Almanor trailhead along with 0.25 mile of Forest Route 10.

Table 43. Overview of State of California OSV Grooming Program Activity on the Lassen National Forest

Project Location National Forest (NF) and County	Recreation Facility	State of California OSV Program Funded Activity
Lassen NF, Hat Creek Ranger District Shasta County near Latour State Forest and Lassen Volcanic National Park	Ashpan Snowmobile Area	Groom 35 miles of trail, plow 1 trailhead, service 1 restroom, and refuse collection.
Lassen NF, Eagle Lake Ranger District Lassen County, near Eagle Lake (Bogard) and Westwood (Fredonyer)	Bogard and Fredonyer Snowmobile Areas	Groom 160 miles of trail, plow 2 trailheads, service 2 restrooms, and refuse collection
Lassen NF, Almanor Ranger District Butte and Plumas Counties, near Jonesville and Lake Almanor	Jonesville Snowmobile Area	Groom 70 miles of trail, plow 7 miles of road and 1 trailhead
Lassen NF, Almanor Ranger District Plumas and Lassen Counties, near Chester (Swain Mountain) and Tehama County near Mineral (Morgan Summit)	Swain Mountain and Morgan Summit Snowmobile Areas	Groom 137 miles of trail, plow 0.25 mile of road and 3 trailheads, service 2 restrooms, and refuse collection

Non-Motorized Winter Recreation

The Lassen National Forest contains three designated wildernesses (78,060 acres), three proposed wilderness areas (61,686 acres); three eligible Wild and Scenic Rivers (84 miles), and six research natural areas. Most of the managed non-motorized lands lie within the Primitive (P) and Semi-Primitive Non-Motorized (SPNM) settings, which are free of conflicts with motorized activities (USDA Forest Service 2009).

The Lassen has abundant opportunities for cross-country skiing. Several locations on the national forest are closed to motorized vehicles by Forest Order to allow for solitude on designated cross-country ski trails. These trails are designed to challenge a variety of skill levels and are marked from easy to most difficult. They are groomed periodically during the snow season.

Popular cross-country ski trails include the McGowan cross-country ski trail, the Butte Lake trail, the Bizz Johnson Trail, and Colby Meadows. The Pacific Crest trail (PCT) runs through the center of the Lassen National Forest from north to south. The PCT is closed to motorized OSV use and provides non-motorized winter trail opportunities.

The 106,372-acre Lassen Volcanic National Park is located near the center of the Lassen National Forest. A variety of winter non-motorized activities are available in the park including cross-country skiing, telemarking, snowshoeing, and snowplay. The NPS offers ranger-led snowshoe trips from the Manzanita Lake area. Throughout the winter, the park highway is plowed to the southwest parking area on the south side of the park and to the Loomis Museum on the north side of the park. Non-motorized access is allowed year-round (USDI National Park Service 2015).

Visitor use

To determine the potential effects of management alternatives, it is important to understand the characteristics of people who visit and recreate on Lassen National Forest. Responding to the need for improved information about visitors to NFS 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 users 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 Lassen National Forest during calendar year 2000 and fiscal years 2005 and 2010, the results of which were published in 2001, 2006, and 2010, respectively (USDA Forest Service 2001, 2006, 2010). 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.

The Lassen serves a largely local client base. Over 43 percent of visits came from people living within 50 miles of the national forest; another 7 percent came from people living 50 to 75 miles away. Most visits are short, day use lasting 6 hours or less. Almost 60 percent are people who visit five times or less per year.

In 2010, the three most reported main activities were fishing (22 percent), viewing natural features (19 percent), and snowmobiling (8 percent). In 2005, the three most reported main activities were hunting (16.4 percent), hiking/walking (15.4 percent), and fishing (13.1 percent). Winter activities were lower during this survey year with cross-country skiing (3.5 percent), downhill skiing (2.3 percent), and snowmobiling (1.2 percent). In 2001, the top primary activities were: fishing (20.9 percent), other non-motorized activities such as swimming, games and sports (14 percent), developed camping (9.2 percent), and driving for pleasure (9 percent). Winter activities were lower with downhill skiing and snowboarding (3.3 percent), OSV travel (2 percent), cross-country skiing and snowshoeing (1 percent).

Table 44 shows the estimated visitor use based on the percentage of visitors reporting snowmobiling and cross-country skiing as their main activity.

Table 44. 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
2010	Snowmobiling	300,000	8.4%	25,200	3.9
2010	Cross-country skiing	300,000	1.8%	5,400	0
2005	Snowmobiling	607,200	1.2%	7,286	4
2005	Cross-country skiing	607,200	3.5%	21,252	2.7
2001	Snowmobiling	656,038	2.0%	13,120	Not reported
2001	Cross-country skiing	656,038	1.0%	6,560	Not reported

*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 Lassen National Forest falls within the seven counties shown in table 45.

Table 45. California OSV registration for counties in Lassen National Forest, 2009 through 2014

	2009	2010	2011	2012	2013	2014
Butte	1,093	1,054	1,057	991	1,014	955
Lassen	394	364	352	322	315	279
Modoc	41	35	42	39	37	28
Plumas	1,236	1,180	1,111	1,025	1,022	920
Shasta	417	432	471	410	433	399
Siskiyou	508	505	474	472	457	420
Tehama	103	108	111	112	106	110
TOTAL	**3,792**	**3,678**	**3,618**	**3,371**	**3,384**	**3,111**

*Data from CA State Parks, not official DMV records

Table 46 shows total statewide OSV registrations and out-of-state registrations.

Table 46. 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

OSV registrations in the Lassen National Forest counties and statewide have remained nearly stable, or declined slightly over the past 6 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.

OSV visitor use varies based on the amount of snowfall and the length of the season. All districts on the Lassen National Forest receive some snow; however, the Front Country, Ishi Wilderness area, Almanor Ranger District, generally does not get sufficient snow for OSV use.

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 for the 2015/2016 winter season is 10,020 OSV users forest-wide.

Table 47. Lassen National Forest OSV visitor use

Location	Day description	Number of vehicles	Number of OSVs*
Forest-wide	Weekend or holiday (approx. 33 per season)	106	212
Forest-wide	Weekday (approx. 65 per season)	21	42
Individual trailheads	Weekend or holiday	15 (average)	30
Individual trailheads	Weekday	3.5	7

Based on 2009 data from California State Draft EIR
*assumes an average of 2 OSVs per vehicle parked at a trailhead

Conflicts between Motorized and Non-motorized Winter Experiences

The 2010 NVUM report indicates that 81.4 percent of visitors to the Lassen National Forest are very satisfied, and 12.2 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 the environment, parking availability, parking lot condition, feeling of safety and scenery, all were rated “keep up the good work” while signage adequacy was rated as “concentrate here” (USDA Forest Service 2010).

There are occasional OSV incursions in wilderness and adjacent non-motorized areas (reports of OSV trespass into Caribou Wilderness, Lassen Volcanic National Park, and occasionally on designated cross-country ski trails), but law enforcement has determined many of the incursions to be inadvertent. OSV trespass into designated wilderness facilitated by groomed trails could occur and may increase as use increases. There are no other known conflicts between OSV use and other uses on NFS land or neighboring Federal lands, no known conflicts among classes of OSVs, and no known areas where use is adversely affecting cultural, tribal, or historic resources (USDA Forest Service 2014).

Conflict between motorized and non-motorized winter users 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 the OSV use on trails to the detriment of non-motorized users.

Motorized winter users expressed concerns regarding additional limitations on use; however, they generally did not describe conflicts with non-motorized users.

Opportunities for quality recreation experiences depend on a both the settings (physical, social, and managerial aspects), and on the desired experience of the user. 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).

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 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).

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 OSVs. Areas must be accessible from plowed trailheads, as non-motorized users typically do not travel long distances. Non-motorized visitors spend an average of 2.3 hours on the snow per visit (Rolloff et al. 2009).

Opportunities for quality motorized winter recreation experiences are typically characterized by groomed trail system and open hills for high marking. 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 users are also interested in travelling through and experiencing a natural environment. According to the Lassen National Forest recreation staff, a majority of OSV use on the national forest would fall into the “trail touring” category described above (O’Brien, personal communication 2015).

Designated Areas

Wilderness

Three designated wilderness areas on the Lassen National Forest cover approximately 78,240 acres, Caribou Wilderness (20,546 acres), Thousand Lakes Wilderness (16,355 acres), and Ishi Wilderness (41,399 acres). The Ishi Wilderness Area is located in the lower-elevation country that typically does not receive adequate snow for OSV use. Proposed wilderness areas include Heart Lake, Wild Cattle Mountain, Caribou extension, and Mill Creek.

Designated wilderness areas are closed to motorized OSV use by the Wilderness Act of 1964. There are groomed OSV trails within one-quarter mile of the south and east boundaries of the Caribou Wilderness and Caribou extension proposed wilderness and north of the Mill Creek proposed wilderness. There are groomed OSV trails within one-half mile south of Thousand Lakes Wilderness.

Research Natural Areas

Research Natural Areas

Grahams Pinery, Soda Ridge, Green Island Lake, Cub Creek, Mayfield, Timbered Carter, and Indian Creek Research Natural Areas are closed to OSV use under existing conditions.

The Lassen LRMP prohibits motorized vehicles within research natural areas, but no formal directive prohibiting such use has been issued for the Black Mountain Research Natural Area. This Area covers approximately 520 acres.

No groomed or ungroomed routes are within any of the research natural areas.

Inventoried Roadless Areas:

Approximately 169,400 acres of inventoried roadless areas are located within Lassen National Forest. Inventoried roadless areas 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).

There are no groomed OSV trails within the inventoried roadless areas. A majority of the roadless acreage is closed to cross-country OSV use, with the exception of roadless areas that are within the Semi-Primitive Motorized or Roaded Natural ROS classes where OSV use could occur, but is not likely due to the proximity of other closed acres and because they are located in areas where low to no OSV use is expected based on the OSV use assumptions (see OSV use potential maps in appendix A of the hydrology specialist report).

Wild and Scenic Rivers:

There are three eligible wild and scenic rivers located in the southwest portion of the Lassen National Forest near the Ishi Wilderness and Mill Creek proposed wilderness. They are Mill Creek (five segments having either wild, scenic, or recreational eligibility, 24.0 miles), Deer Creek (seven segments having either wild, scenic, or recreational eligibility, 22.0 miles) and Antelope Creek (three segments with wild eligibility, North Fork 5.72 miles, south fork 7.05 miles). Most of the eligible wild and scenic corridors are within areas closed to OSV use. There are groomed OSV trails adjacent to the two northernmost segments of Mill Creek with eligibility as a recreational wild and scenic river. With the presence of groomed OSV trails, this is an area where OSV use is expected to be high to moderate. The scenic and recreational segments of Deer Creek that are outside of existing OSV closure area falls within an area where low to no OSV use is expected (see OSV use potential maps in appendix A of the hydrology specialist report).

Pacific Crest National Scenic Trail

The Lassen National Forest contains 125 miles of the Pacific Crest National Scenic Trail (PCT) that is managed for non-motorized trail uses. The PCT runs roughly through the center of the national forest from north to south.

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. Along with the Appalachian Trail, the PCT is acknowledged as one of the premier non-motorized trails in the Nation (USDA Forest Service 2009).

Most of the PCT on the Lassen National Forest passes through areas that are either closed to OSV use, or within areas where low to no OSV use is expected. Approximately 11 miles of the PCT on the Almanor Ranger District pass through the Jonesville Snowmobile Area with high to moderate OSV use. Groomed OSV trails cross the PCT in three locations (see OSV use potential maps in appendix A of the hydrology specialist report).

Table 48. Resource indicators and measures for the existing condition, alternative 1

Resource Element	Resource Indicator	Measure (Quantify if possible)	Existing Conditions
Recreation Settings and Opportunities	Recreation Opportunity Spectrum	Consistency of OSV designations with ROS classes	Motorized OSV use prohibited in Primitive and Semi-Primitive Non-Motorized ROS classes. Motorized OSV use allowed in Semi-Primitive Motorized, Roaded Natural and Rural ROS classes.
	Opportunities for motorized winter uses	Acres open to OSV use	976,760 acres open to OSV use
	Opportunities for non-motorized winter uses	Acres closed to OSV use/miles of trail closed to OSV use	173,260 acres closed to OSV use/148 miles of trail closed to OSV use
	OSV designations	Miles of designated OSV trails/Miles of groomed OSV trails	406 miles of designated OSV trails/324 of those miles are groomed OSV trails
Conflicts between motorized and non-motorized winter experiences	Noise	Acres potentially affected by noise/acres closed to winter motorized use	976,760 acres open to OSV use and potentially affected by noise/173,260 acres closed to OSV use and available for quiet recreation
	Access to desired motorized and non-motorized recreation settings and opportunities	Proximity of opportunities to plowed trailheads, snow depth requirements	Six plowed trailheads provide access for motorized and non-motorized winter use, including 324 miles of groomed OSV trails for motorized use and six non-motorized trails with a total of 148 miles for non-motorized use. • 12-18 inches of snow required for OSV trail grooming
	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.).	Groomed OSV trails in close proximity to the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries, and to the boundary of Lassen Volcanic National Park. No known conflicts with tribal/spiritual areas, historic areas or populated areas.
	Public Safety	Degree of separation of motorized and non-motorized use areas	Non-motorized and motorized users share trailheads for access.
Designated Areas	Proximity and frequency of OSV designations in relation to designated areas	Distance of groomed OSV trails from designated areas/number of OSV trails within designated areas	Groomed OSV trails within ¼ mile of Wilderness and proposed Wilderness boundaries. Groomed OSV trails cross PCT in 3 locations, PCT crossings in open areas not designated.

Alternative 1 – No Action

By definition, direct and indirect effects (40 CFR 1508.8), and cumulative effects (40 CFR 1508.7) result from the proposed action, and thus, are not germane to the no-action alternative.

Recreation Settings and Opportunities

In the no-action alternative, OSV use would remain consistent with existing ROS classes and no changes would occur.

Conflicts between Motorized and Non-motorized Winter Experiences

Conflicts between motorized and non-motorized winter experiences on the Lassen are currently minor and infrequent; existing conflicts would continue and may increase as population and visitor use increase.

Designated Areas

Occasional incursions into adjacent wilderness areas and non-motorized areas on other Federal lands would continue to occur, and possibly increase as population and visitor use increase. The PCT would remain non-motorized, as it is currently managed. No OSV crossings of the PCT would be designated; OSVs would be allowed to cross the PCT in any areas open to OSV use, as in current conditions,

Alternative 2 – Modified Proposed Action

Project Design Features and Mitigation Measures

1. Coordinate timing of trail grooming to minimize impact on recreation experiences.

2. Configure OSV system to minimize impact on other resource values.

3. As staffing and funding allows, consider areas where additional signage along the PCT may be needed to enhance wayfinding for winter users. Agency signage procedures would be followed. As a guideline, ensure trail markers are at eye level (approximately 40 inches above average maximum snow depth).

4. All action alternatives would include identification of the PCT on the over-snow vehicle use map. The PCT would remain closed to motorized use. OSV crossings of the PCT would be designated based on the following assumptions:
    a. Designate crossings consistent with the PCT Comprehensive Plan
    b. Designate PCT crossings consistent with the crossings identified for summer motorized use, as designated by the motor vehicle use maps (MVUM), unless the road terminates at a wilderness boundary, or other OSV closure area.
    c. Other crossings may be identified that are not on summer roads as long as they are consistent with the PCT Comprehensive Plan management guidance.

Required Monitoring

1. Monitor wilderness boundaries and other closed areas near groomed snow trails and areas open to OSV use for OSV incursions; coordinate and implement increased education or enforcement actions as needed.

2. Monitor trailheads and groomed trail areas for user conflicts and public safety concerns, coordinate and implement 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).

Direct and Indirect Effects - Alternative 2

Recreation Settings and Opportunities

Alternative 2 would provide a range of winter motorized and non-motorized recreation opportunities similar to that currently found on the Lassen National Forest. Having a clearly designated system of trails and areas where OSV use is allowed 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.

The proposed OSV 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 remain closed to OSV use, while motorized opportunities would be available in Semi-Primitive Motorized, Roaded Natural and Rural settings.

The new prohibition for use in areas below 3,500 feet in elevation in the southwestern corner of the Lassen National Forest would have only minor impacts to motorized OSV use opportunities as snow depths are generally not adequate for OSV use in this area. The new prohibition in the Blacks Mountain Research Natural Area (520 acres within the Black Mountain Experimental Forest on the Eagle Lake Ranger District) to be consistent with Forest Plan management area direction to prohibit motorized vehicles in research natural areas is also expected to be minor. Closure of the two areas would minimize impacts to resources such as wildlife (as described in the wildlife section), eligible wild and scenic rivers (described in the designated areas section below), and the natural conditions of the research natural area that are managed for baseline and research purposes.

Grooming 324 miles of OSV trails would maintain the existing level of groomed trail riding opportunities, which Lassen National Forest staff indicates is adequate to meet demand (USDA Forest Service 2014). The State EIR information also shows that Lassen National Forest trailheads have rare or no overflow capacity issues (California Department of Parks and Recreation 2010). Existing OSV support facilities/services (access roads, trailhead parking, toilets, and garbage service) are provided in sufficient quantities to satisfy winter OSV recreation demand (USDA Forest Service 2014).

The forest-wide snow depth requirement of 12 inches for Areas 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. Establishing the forest-wide minimum snow depth 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 minimum snow depth of 6 inches for OSV use on trails with underlying roads and trails would provide improved trail access for OSV users to reach areas of higher terrain with adequate snow levels.

Conflicts between Motorized and Non-motorized Winter Experiences

Conflicts between motorized and non-motorized winter experiences on the Lassen National Forest are currently minor and infrequent (USDA Forest Service 2014); however, conflicts between motorized and non-motorized uses that do currently exist would likely continue with designation of a similar OSV trail system. Conflict may increase as population and visitor use increase.

Motorized use has inherent conflicts with non-motorized users 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 users. OSV use may impact the setting for non-motorized users 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 further than non-motorized users, they often “consume” the fresh powder slopes, limiting opportunities for backcountry skiers who are seeking similar opportunities on snow covered slopes (Snowlands 2015).

Occasional incursions into adjacent wilderness areas and non-motorized areas on other Federal lands would continue to occur, and possibly increase as population and visitor use increase. Monitoring to determine the need for additional education or enforcement actions would be implemented. Monitoring is also a requirement of participation in the State OSV grooming program.

There are 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 Lassen National Forest.

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 Lassen 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

The existing OSV prohibitions in designated wilderness areas, semi-primitive non-motorized areas, and research natural areas would continue, protecting these areas from OSV impacts.

Designated crossings of the PCT would minimize potential motorized impacts along the trail and would enhance the quiet, non-motorized experience while accommodating motorized access to OSV Areas and maintaining OSV loop riding opportunities. Using the PCT crossings as designated in Subpart B for off-highway vehicle use, and shown on the motor vehicle use maps, would limit motorized disturbance to areas of the trail that already contain summer road crossings. With the exception of the three groomed OSV trail crossings of the PCT in the Almanor Ranger District, the PCT passes through national forest system lands that are either closed to OSV use, or areas where little to no OSV use is anticipated. Limiting OSV crossings of the PCT would adequately protect quiet non-motorized opportunities along the trail while maintaining OSV access and loop trail riding opportunities. The specific designated crossing locations would be in compliance with the PCT Comprehensive Plan. The frequency of designated crossings would be consistent with the ROS class through which the trail passes, based on PCT management direction and would ensure consistency with recreation settings along the trail.Formalizing the closure of the Blacks Mountain Research Natural Area to OSV use would be in compliance with the Lassen Forest Plan to prohibit motorized vehicles in research natural areas.

The prohibition of OSV use in areas below 3,500 feet would provide further protection to Antelope Creek and Mill Creek eligible Wild and Scenic River corridors.

Table 49. Resource indicators and measures for alternative 2 direct and indirect effects

Resource Element	Resource Indicator	Measure (Quantify if possible)	Alternative 2 – Modified Proposed Action
Recreation Settings and Opportunities	Recreation Opportunity Spectrum	Consistency of OSV designations existing with ROS classes	OSV designations consistent with ROS, no change from existing conditions
	Opportunities for motorized winter uses	Acres open to OSV use, percent change	947,120 acres open to OSV use, a 3 percent decrease from existing conditions.
	Opportunities for non-motorized winter uses	Acres closed to OSV use, percent change	202,900 acres closed to OSV use, a 15 percent increase from existing conditions.
	OSV designations	Miles of designated OSV trails/Miles of groomed OSV trails	406 miles of designated OSV trails/324 miles of groomed OSV trails, no change from existing conditions.
Conflicts between motorized and non-motorized winter experiences	Noise	Acres potentially affected by noise/acres closed to winter motorized use	947,120 acres open to OSV use and potentially affected by noise/202,900 acres closed to OSV use and available for quiet recreation
	Access to desired motorized and non-motorized recreation settings and opportunities	Proximity of opportunities to plowed trailheads, snow depth requirements	Six plowed trailheads provide access for motorized and non-motorized winter use, including 324 miles of groomed OSV trails for motorized use and six non-motorized trails with a total of 148 miles for non-motorized use. • 12 inches of snow required for OSV trail grooming and cross-country travel. • 6 inches for OSV use on trails with underlying roads and trails.
Conflicts between motorized and non-motorized winter experiences (continued)	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.).	Groomed OSV trails in close proximity to the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries, and to the boundary of Lassen Volcanic National Park. No known conflicts with tribal/spiritual areas, historic areas or populated areas.
	Public Safety	Degree of separation of motorized and non-motorized use areas	Non-motorized and motorized users share trailheads for access.

Resource Element	Resource Indicator	Measure (Quantify if possible)	Alternative 2 – Modified Proposed Action
Designated Areas	Proximity and frequency of OSV designations in relation to designated areas	Distance of groomed OSV trails from designated areas/number of OSV trails within designated areas	Groomed OSV trails within ¼ mile of Wilderness and proposed Wilderness boundaries. Groomed OSV trails cross PCT in 3 locations, designated PCT crossings consistent with the PCT Comprehensive Plan and project design features.

Cumulative Effects – Alternative 2

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Past, present, and reasonably foreseeable projects in the area include vegetation management, livestock grazing, prescribed burns, and recreation. There are many on-going and scheduled projects identified in the Lassen National Forest which may increase the management presence forest-wide.

Recreation Settings and Opportunities

The OSV route designations and restrictions increase the management presence across the forest, 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.

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 is not a change from existing conditions.

Conflicts between Motorized and Non-Motorized Winter Experiences

Non-motorized winter visitors to the Lassen National Forest could experience noise from OSV, in addition to other noise such as 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.

Designated Areas

OSV use is prohibited in designated areas on the Lassen National Forest, 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 closure areas could occur, potentially adding to other ongoing future activities impacting designated areas and causing cumulative impacts, but would be monitored and dealt with as a law enforcement issue.

Alternative 3

Project Design Features and Mitigation Measures

The project design features and mitigation measures listed for alternative 2 would apply, in addition to the following:

- Education on responsible practices, trail restrictions, or separations to reduce conflicts.

Direct and Indirect Effects - Alternative 3

Recreation Settings and Opportunities

Alternative 3 would prohibit OSV use on more acres than alternative 2, and would designate areas where motorized OSVs are restricted to designated trails. With additional areas closed or restricted to OSVs, the opportunities for non-motorized use (in areas not influenced by the sights, sounds and exhaust smells of OSV use) are enhanced.

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 remain closed to OSV use, while motorized opportunities would be available in Semi-Primitive Motorized, Roaded Natural, and Rural settings. The additional closures of areas to OSVs, which are located primarily within the Roaded Natural 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.

The new OSV prohibitions in the McGowan, Colby Mountain, Lake Almanor, and Eagle Lake Addition areas, and the OSV restrictions to designated trails within the Butte Lake Area and Fredonyer-Goumaz/Willard Hill Areas would reduce opportunities for motorized OSV use to some extent. However, grooming 324 miles of OSV trails would maintain the current level of groomed trail riding opportunities.

The forest-wide snow depth requirement of 12 inches for Areas 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. Allowing use on trails with underlying roads with at least 6 inches of snow on a limited basis on specific, identified routes for OSVs to access higher terrain and legal snow levels when snow depths are less than 12 inches, as long as this use does not cause visible damage to the underlying surface and can be readily enforced is slightly more restrictive than alternative 2. It would also require the Lassen to identify routes where the 6-inch minimum would be allowed and additional monitoring for resource damage.

The effects of the closure to OSVs below 3,500 feet and the groomed trails system would be the same as described for alternative 2.

Conflicts between Motorized and Non-motorized Winter Experiences

Although conflicts are currently minimal on the Lassen National Forest, alternative 3 would provide more areas where OSV use would be prohibited, enhancing opportunities for non-motorized experiences, and reducing the potential for conflict since there would be greater separation of motorized and non-motorized uses.

Designating OSV use limited to designated trails through the Butte Lake Area and Fredonyer-Goumaz/Willard Hill Area provides an opportunity to minimize impacts on non-motorized recreation experience while also maintaining access and opportunities for motorized OSV use.

Designating the McGowan Frontcountry non-motorized area and the Butte Lake Backcountry Solitude non-motorized area would also potentially minimize impacts from OSV encroachment into Lassen Volcanic National Park.

Otherwise alternative 3 effects would be the same as described for alternative 2.

Designated Areas

Designation of the McGowan Frontcountry non-motorized area would minimize motorized impact on the Heart Lake and Wild Cattle Mountains Proposed Wilderness Areas.

Designation of the Butte Lake Backcountry Solitude Area would minimize motorized impact on the Caribou Wilderness and Caribou extension proposed wilderness and Lassen Volcanic National Park.

Otherwise, alternative 3 would be the same as alternative 2 in regard to designated areas.

Table 50. Resource indicators and measures for alternative 3 direct and indirect effects

Resource Element	Resource Indicator	Measure (Quantify if possible)	Alternative 3
Recreation Settings and Opportunities	Recreation Opportunity Spectrum	Consistency of OSV designations existing with ROS classes	OSV designations consistent with ROS, no change from existing conditions. Slightly more restrictions on OSV use as compared to the modified proposed action
	Opportunities for motorized winter uses	Acres open to OSV use, percent change	878,690 acres open to OSV use, a 10 percent reduction from existing conditions.
	Opportunities for non-motorized winter uses	Acres closed to OSV use, percent change	271,330 acres closed to OSV use, a 36 percent increase from existing conditions.
	OSV designations	Miles of designated OSV trails/Miles of groomed OSV trails	406 miles of designated OSV trails/ 324 miles of groomed OSV trails, no change from existing conditions.
Conflicts between motorized and non-motorized winter experiences	Noise	Acres potentially affected by noise/acres closed to winter motorized use	878,690 acres open to OSV use and potentially affected by noise/ 271,330 acres closed to OSV use and available for quiet recreation
	Access to desired motorized and non-motorized recreation settings and opportunities	Proximity of opportunities to plowed trailheads, snow depth requirements	Six plowed trailheads provide access for motorized and non-motorized winter use, including 324 miles of groomed OSV trails for motorized use and six non-motorized trails with a total of 148 miles for non-motorized use. • 18 inches of snow required for OSV trail grooming. • 12 inches of snow required for cross-country travel. • 6 inches on a limited basis for OSV use on specific trails with underlying roads and trails
	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.).	Groomed OSV trails in close proximity to the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries, and to the boundary of Lassen Volcanic National Park. No known conflicts with tribal/spiritual areas, historic areas or populated areas.

Resource Element	Resource Indicator	Measure (Quantify if possible)	Alternative 3
Conflicts between motorized and non-motorized winter experiences (continued)	Public Safety	Degree of separation of motorized and non-motorized use areas	Non-motorized and motorized users share trailheads for access. Additional areas provided for non-motorized use that is separated from motorized use will enhance safety for non-motorized users.
Designated Areas	Proximity and frequency of OSV designations in relation to designated areas	Distance of groomed OSV trails from designated areas/number of OSV trails within designated areas	Groomed OSV trails within ¼ mile of Wilderness and proposed Wilderness boundaries. Designation of the McGowan Frontcountry non-motorized area minimizes motorized impact on the Heart Lake and Wild Cattle Mountains Proposed Wilderness Areas. Designation of the Butte Lake Backcountry Solitude Area minimizes motorized impact on the Caribou Wilderness and Caribou extension proposed wilderness and Lassen Volcanic National Park. Groomed OSV trails cross PCT in 3 locations, designated PCT crossings consistent with the PCT Comprehensive Plan and project design features.

Cumulative Effects – Alternative 3

The cumulative effects of alternative 3 would be the same as described for alternative 2.

Alternative 4

Direct and Indirect Effects - Alternative 4

Recreation Settings and Opportunities

Alternative 4 would allow OSV use on more acres than alternative 3, and slightly fewer acres than alternative 2. Allowing use of OSV below 3,500 feet would enhance OSV opportunities when snow depths are adequate for use in that area. Alternative 4 also allows more flexibility in application of minimum snow depth on OSV trails with underlying NFS roads and trails, to allow motorized users access to higher elevations and adequate snow levels. This would enhance OSV opportunities.

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 remain closed to OSV use, while motorized opportunities would be available in Semi-Primitive Motorized, Roaded Natural and Rural settings.

Conflicts between Motorized and Non-motorized Winter Experiences

The McGowan Frontcountry area would be closed to OSV use, similar to alternative 3, with the exception of one designated OSV trail, where OSVs are restricted to the trail only. This would minimize conflicts between motorized and non-motorized use in this area, which is popular for non-motorized recreation. This would also potentially minimize impacts from OSV encroachment into Lassen Volcanic National Park.

Otherwise, alternative 4 effects would be the same as described for alternative 2.

Designated Areas

Alternative 4 would be the same as alternative 2 in regard to designated areas, with the exception of the area below 3,500 feet. Allowing use in areas below 3,500 feet in the southwestern portion of the Lassen National Forest would not provide additional protection from OSV use near Antelope and Mill Creek eligible Wild and Scenic River corridors; however, a majority of the corridors are located in areas that are closed to OSVs under existing conditions, or are in areas where low to no OSV use is expected.

Table 51. Resource indicators and measures for alternative 4 direct and indirect effects

Resource Element	Resource Indicator	Measure	Alternative 4
Recreation Settings and Opportunities	Recreation Opportunity Spectrum	Consistency of OSV designations existing with ROS classes	OSV designations consistent with ROS, no change from existing conditions. Slightly fewer restrictions on OSV use as compared to the modified proposed action
	Opportunities for motorized winter uses	Acres open to OSV use, percent change	966,270 acres open to OSV use, a 1 percent reduction from existing conditions.
	Opportunities for non-motorized winter uses	Acres closed to OSV use, percent change	183,750 acres closed to OSV use, a 5 percent increase from existing conditions.
	OSV designations	Miles of designated OSV trails/Miles of groomed OSV trails	406 miles of designated OSV trails/324 miles of groomed OSV trails, no change from existing conditions.
Conflicts between motorized and non-motorized winter experiences	Noise	Acres potentially affected by noise/acres closed to winter motorized use	966,270 acres open to OSV use and potentially affected by noise/183,750 acres closed to OSV use and available for quiet recreation
	Access to desired motorized and non-motorized recreation settings and opportunities	Proximity of opportunities to plowed trailheads, snow depth requirements	Six plowed trailheads provide access for motorized and non-motorized winter use, including 324 miles of groomed OSV trails for motorized use and six non-motorized trails with a total of 148 miles for non-motorized use. • 12 inches of snow required for OSV trail grooming. • 12 inches of snow required for cross-country travel. • 12 inches with exceptions on OSV trails with underlying roads and trails with less than 12 inches to reach higher terrain and legal snow depths as long as no resource damage.

Resource Element	Resource Indicator	Measure	Alternative 4
Conflicts between motorized and non-motorized winter experiences (continued)	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.).	Groomed OSV trails in close proximity to the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries, and to the boundary of Lassen Volcanic National Park. No known conflicts with tribal/spiritual areas, historic areas or populated areas.
	Public Safety	Degree of separation of motorized and non-motorized use areas	Non-motorized and motorized users share trailheads for access. One additional area provided for non-motorized use that is separated from motorized use will enhance safety for non-motorized users.
Designated Areas	Proximity and frequency of OSV designations in relation to designated areas	Distance of groomed OSV trails from designated areas/number of OSV trails within designated areas	Groomed OSV trails within ¼ mile of Wilderness and proposed Wilderness boundaries. Designation of the McGowan non-motorized area with OSVs restricted to one designated trail minimizes motorized impact on the Heart Lake and Wild Cattle Mountains Proposed Wilderness Areas. Groomed OSV trails cross PCT in 3 locations, designated PCT crossings consistent with the PCT Comprehensive Plan and project design features.

Cumulative Effects – Alternative 4

The cumulative effects of alternative 4 would be the same as described for alternative 2.

Summary

Degree to Which the Purpose and Need for Action is Met

All of the action alternatives (alternatives 2, 3, and 4) equally meet the purpose and need to effectively manage OSV use by identifying a manageable system of OSV trails and areas per Subpart C of the Travel Management Regulations and to identify OSV trails for grooming to provide a high quality OSV trail system.

Degree to Which the Alternatives Address the Issues

Table 52 provides a comparison of the alternatives and the degree to which the alternatives address the recreation related issues.

Table 52. Summary comparison of how the alternatives address the key issues

Resource Element	Resource Indicator/Measure	Alternative 1 No Action	Alternative 2 Modified Proposed Action	Alternative 3	Alternative 4
Recreation Settings and Opportunities	Recreation Opportunity Spectrum/Consistency with ROS class	Consistent	Consistent	Consistent – with enhanced opportunities for non-motorized recreation experiences	Consistent – with enhanced opportunities for motorized recreation experiences
	Opportunities for motorized winter uses/acres and percent change	976,760 acres open to OSV use	947,120 acres open to OSV use, a 3 percent reduction from existing conditions.	878,690 acres open to OSV use, a 10 percent reduction from existing conditions.	966,270 acres open to OSV use, a 1 percent reduction from existing conditions.
	Opportunities for non-motorized winter uses/acres and percent change	173,260 acres closed to OSV use/ 148 miles of trail closed to OSV use	202,900 acres closed to OSV use, a 15 percent increase from existing conditions	271,330 acres closed to OSV use, a 36 percent increase from existing conditions.	183,750 acres closed to OSV use, a 5 percent increase from existing conditions.
	OSV designations/miles and percent change	406 miles designated/ 324 miles groomed	406 miles designated / 324 miles groomed No change from existing conditions.	406 miles designated/ 324 miles groomed No change from existing conditions.	406 miles designated/ 324 miles groomed No change from existing conditions.
Conflicts between motorized and non-motorized winter experiences	Noise	976,760 acres open to OSV use and potentially affected by noise/ 173,260 acres closed to OSV use and available for quiet recreation	947,120 acres open to OSV use and potentially affected by noise/ 202,900 acres closed to OSV use and available for quiet recreation	878,690 acres open to OSV use and potentially affected by noise/ 271,330 acres closed to OSV use and available for quiet recreation	966,270 acres open to OSV use and potentially affected by noise/ 183,750 acres closed to OSV use and available for quiet recreation
	Access to desired motorized and non-motorized recreation settings and opportunities	Six plowed trailheads provide access for motorized and non-motorized winter use, including 324 miles of groomed OSV trails for motorized use and six non-motorized trails with a total of 148 miles for non-motorized use.	Six plowed trailheads provide access for motorized and non-motorized winter use, including 324 miles of groomed OSV trails for motorized use and six non-motorized trails with a total of 148 miles for non-motorized use. • 12 inches of snow required for OSV trail grooming and	Six plowed trailheads provide access for motorized and non-motorized winter use, including 324 miles of groomed OSV trails for motorized use and six non-motorized trails with a total of 148 miles for non-motorized use. • 18 inches of snow required for OSV trail grooming.	Six plowed trailheads provide access for motorized and non-motorized winter use, including 324 miles of groomed OSV trails for motorized use and six non-motorized trails with a total of 148 miles for non-motorized use. • 12 inches of snow required for OSV trail grooming.

Resource Element	Resource Indicator/Measure	Alternative 1 No Action	Alternative 2 Modified Proposed Action	Alternative 3	Alternative 4
		• 12-18 inches of snow required for OSV trail grooming	cross-country travel. • 6 inches for OSV use on trails with underlying roads and trails.	• 12 inches of snow required for cross-country travel. • 6 inches on a limited basis for OSV use on specific trails with underlying roads and trails,	• 12 inches of snow required for cross-country travel. • 12 inches with exceptions on OSV trails with underlying roads and trails with less than 12 inches to reach higher terrain and legal snow depths as long as no resource damage.
Conflicts between motorized and non-motorized winter experiences (continued)	Potential conflict with other resource values	Groomed OSV trails in close proximity to the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries, and to the boundary of Lassen Volcanic National Park. No known conflicts with tribal/spiritual areas, historic areas or populated areas.	Groomed OSV trails in close proximity to the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries, and to the boundary of Lassen Volcanic National Park. No known conflicts with tribal/spiritual areas, historic areas or populated areas.	Groomed OSV trails in close proximity to the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries, and to the boundary of Lassen Volcanic National Park. No known conflicts with tribal/spiritual areas, historic areas or populated areas.	Groomed OSV trails in close proximity to the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries, and to the boundary of Lassen Volcanic National Park. No known conflicts with tribal/spiritual areas, historic areas or populated areas.
	Public Safety	Non-motorized and motorized users share trailheads for access.	Non-motorized and motorized users share trailheads for access.	Non-motorized and motorized users share trailheads for access. Additional areas provided for non-motorized use that is separated from motorized use	Non-motorized and motorized users share trailheads for access. One additional area provided for non-motorized use that is separated from motorized use will enhance safety for non-motorized users.

Resource Element	Resource Indicator/Measure	Alternative 1 No Action	Alternative 2 Modified Proposed Action	Alternative 3	Alternative 4
Designated Areas	Proximity and frequency of OSV designations in relation to designated areas	Groomed OSV trails within ¼ mile of Wilderness and proposed Wilderness boundaries. Groomed OSV trails cross PCT in 3 locations, PCT crossings in open areas not designated.	Groomed OSV trails within ¼ mile of Wilderness and proposed Wilderness boundaries. Groomed OSV trails cross PCT in 3 locations, designated PCT crossings consistent with the PCT Comprehensive Plan and project design features	Groomed OSV trails within ¼ mile of Wilderness and proposed Wilderness boundaries. Designation of the McGowan Frontcountry non-motorized area minimizes motorized impact on the Heart Lake and Wild Cattle Mountains Proposed Wilderness Areas. Designation of the Butte Lake Backcountry Solitude Area minimizes motorized impact on the Caribou Wilderness and Caribou extension proposed wilderness and Lassen Volcanic National Park. Groomed OSV trails cross PCT in 3 locations, designated PCT crossings consistent with the PCT Comprehensive Plan and project design features.	Groomed OSV trails within ¼ mile of Wilderness and proposed Wilderness boundaries. Designation of the McGowan Frontcountry non-motorized area with OSVs restricted to one designated trail minimizes motorized impact on the Heart Lake and Wild Cattle Mountains Proposed Wilderness Areas. Groomed OSV trails cross PCT in 3 locations, designated PCT crossings consistent with the PCT Comprehensive Plan and project design features.

Summary of Environmental Effects

Recreation Settings and Opportunities

All action alternatives provide the same level of groomed motorized OSV trail opportunities. Cross-country travel by OSV is limited by minimum snow depth requirements for all action alternatives; however, alternative 4 provides the most flexibility in application of the minimum snow depth requirements on OSV trails with underlying NFS system roads and trails to access higher elevations and adequate snow depths. Alternative 4 provides the most access for motorized OSV use, compared to alternatives 2 and 3.

Alternative 3 enhances opportunities for quiet, non-motorized recreation with the designation of areas where OSVs would be prohibited, or restricted to designated OSV trails, while maintaining the existing level of groomed OSV trail opportunities.

Alternative 2 maintains OSV opportunities most similar to the existing conditions on the Lassen National Forest.

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 will allow visitors to choose areas to recreate that will best meet their expectations and desired settings.

Alternative 3 minimizes conflicts between motorized and non-motorized uses to the greatest extent by designating three non-motorized areas and two areas where OSVs are restricted to designated OSV trails. These designations provide separate areas for non-motorized recreation that are not influenced by the noise, smell of exhaust and presence of OSVs. Alternative 3 also enhances public safety for non-motorized users by providing areas that are separated from the influence of OSVs.

Alternative 4 provides the most acres open to OSV use, and therefore, has the potential for continued or increased conflict with non-motorized users in the future, with the exception of one area where OSVs are restricted to the designated OSV trail. Alternative 4 would also enhance public safety for non-motorized users in this area.

Designated Areas

Potential impacts to designated areas related to the groomed OSV trail system, such as encroachment into Wilderness and adjacent Federal lands, are the same for all action alternatives. Alternatives 2 and 3 provide slightly more protection for the Antelope and Mill Creek eligible Wild and Scenic River corridors, with the closure of areas below 3,500 feet in elevation. All of the action alternatives designate crossings of the Pacific Crest Trail that would minimize the influence of motorized use on non-motorized opportunities and quiet settings along the trail.

In all action alternatives, Wilderness Areas, Semi-Primitive non-motorized areas and research natural areas are closed to OSV use.

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 regulations that requires designation of roads, trails, and areas on NFS lands to provide for over-snow vehicle use.

Alternative 1 would not implement the management area direction from the Lassen Forest Plan to prohibit motorized use in the Blacks Mountain Research Natural Area.

Alternatives 2, 3, and 4 would comply with Subpart C of the Travel Management regulations and the Lassen 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 NFS 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.

Other Agencies and Individuals Consulted

California State Parks, Department of Off-Highway Motor Vehicle Recreation

Terrestrial Wildlife

This section discloses and analyzes potential effects of OSV use and trail grooming to terrestrial threatened, endangered, proposed, candidate and sensitive (TEPCS) wildlife species and terrestrial wildlife species of public interest. Species considered for analysis are shown in Table 53 and Table 54.

Table 53. Terrestrial threatened, endangered, proposed, and candidate (TEPC) species and designated or proposed critical habitat considered within this analysis

Species Name	TEPC Status[3]	Project Area Within Species' Range	Detections in or Near the Project Area	Suitable Habitat Present	Species Addressed Further/Rationale
Fisher (*Pekania pennanti*)	FP/FSS	Yes	Yes	Yes	Yes
Giant garter snake (*Thamnophis gigas*)	FT	No	No	No	No Project area is outside the species range
Sierra Nevada red fox (*Vulpes vulpes necator*	FC/FSS	Yes	Yes	Yes	Yes
Gray wolf (*Canis lupus*)	FE	Yes	Yes	Yes	Yes
Greater sage-grouse (*Centrocercus urophasianus*)	FC[4]/FSS	No	No	Yes	No Project area is outside the species range
Northern spotted owl (*Strix occidentalis caurina*)	FT	Yes	Yes	Yes	Yes
Northern spotted owl designated critical habitat	NA	No	No	No	See northern spotted owl section
Valley elderberry long-horned beetle (*Desmocerus californicus dimorphus*)	FT	No	No	Yes	No Project area is outside the species range
Valley elderberry long-horned beetle designated critical habitat	NA	No	No	No	No; Project area is outside the species range
Yellow-billed cuckoo (*Coccyzus americanus*)	FSS	No	No	No	No Project area is outside the species range
Yellow-billed cuckoo proposed critical habitat	NA	No	No	No	No Project area is outside the species range

[3] FE = federally endangered; FT = federally listed as threatened; FC = 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 9/29/2015 from the Klamath Falls, Sacramento, Yreka, and Nevada U.S. Fish and Wildlife Service Field Offices and USDA Forest Service, Pacific Southwest Region, Sensitive Animal Species by Forest, June 30, 2013.
[4] USFWS recently determined that Federal listing was not warranted.
http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B06W#candidate

Table 54. Terrestrial Forest Service sensitive species[5] considered within this analysis

Species Name	Project Area Within Species' Range	Detections in or Near the Project Area	Suitable Habitat Present	Species Addressed Further/Rationale
Mammals				
Pacific marten (*Martes caurina*)	Yes	Yes	Yes	Yes
California wolverine (*Gulo gulo luteus*)	Yes	Tahoe NF (~ 150–200 miles)	Yes	Yes
Fringed myotis (*Myotis thysanodes*)	Yes	Yes	Yes	Yes
Pallid bat (*Antrozous pallidus*)	Yes	Yes	Yes	Yes
Townsend's big-eared bat (*Corynorhinus townsendii*)	Yes	Yes	Yes	Yes
Birds				
Bald eagle (*Haliaeetus leucocephalus*)	Yes	Yes	Yes	Yes
California spotted owl (*Strix occidentalis occidentalis*)	Yes	Yes	Yes	Yes
Great gray owl (*Strix nebulosa*)	Yes	Near	Yes	Yes
Greater Sandhill crane (*Grus canadensis tabida*)	Yes	Yes	Yes	Yes
Northern goshawk (*Accipiter gentilis*)	Yes	Yes	Yes	Yes
Willow flycatcher (*Empidonax traillii*)	Yes	Yes	Yes	Yes
Yellow rail (*Coturnicops noveboracensis*)	Yes	Yes	Yes	Yes
Reptiles				
Western pond turtle (*Emys marmorata*)	Yes	Yes	Yes	Yes
Invertebrates				
Shasta Hesperian snail (*Vespericola shasta*)	Yes	Yes	Yes	Yes
Western bumble bee (*Bombus occidentalis*)	Yes	Yes	Yes	Yes

[5] Source: USDA Forest Service, Pacific Southwest Region, Sensitive Animal Species by Forest, June 30, 2013.

During the public scoping, a number of animals were brought forward to be considered as part of this analysis. The following are species that were considered but not further analyzed due to not being within the analysis area or being outside the range of the species: Canada lynx *(Lynx Canadensis*); grizzly (brown) bear (*Ursus arctos horribilis*); bighorn sheep (*Ovis Canadensis sierrae* and *Ovis Canadensis nelsoni);* mountain goat (Oreamnos americanus); moose (*Alces alces*); American bison (*Bison bison*); and white-tailed deer (*Odocoileus virginianus*).

Species Not Analyzed in Detail

After considering the cause-effect relationships that might affect all species shown in table 53, we determined that it was not necessary to conduct detailed analysis of to greater sage grouse, valley elderberry longhorn beetle, and species that hibernate or migrate. The decision would not impact these species.

Greater sage-grouse

Data compiled by Schroeder et al. (2004) include the extreme northeastern portion of the Lassen National Forest within the historical distribution of sage-grouse. Potentially suitable habitats (i.e., sagebrush) do occur within the project area, but there are no known modern occurrences of this species on the Lassen National Forest. Due to the project area being outside the range of the species, the wildlife biologist's determination is that all alternatives will have **no effect** on greater sage-grouse.

Valley elderberry longhorn beetle

The valley elderberry longhorn beetle originally occurred in elderberry thickets in moist valley oak woodland along the margins of the Central Valley in California (USDI Fish and Wildlife Service 1980). The habitat of this insect has now largely disappeared throughout much of its former range due to agricultural conversion, levee construction, and stream channelization. Remnant populations are found in the few remaining natural woodlands and in some State and county parks. Critical habitat has been designated in Sacramento County along the American River in the City of Sacramento and along the American River Parkway.

The project area falls within the historical range of this species and potential suitable habitat occurs below 3,000 feet in elevation along the foothills in the southwest portion of the forest (watersheds of Antelope, Deer, Mill and Butte Creeks, Tehama and Butte Counties). Other riparian zones below 3,000 feet in elevation are within the Pitt River watershed around Lake Britton, Shasta County. However, review of USFWS species location information (USDI Fish and Wildlife Service 2014a) shows that lands administered by the Lassen National Forest (i.e., project area) occur outside the distribution of the nearest presumed extant species occurrences (i.e., southern and western Butte County; south-central and central Tehama County). In addition, over-snow vehicles are unlikely to occur at the lower elevations (i.e., less than 3,000 feet) inherent in this species' distribution with an even lower probability of impacts to potentially suitable habitats. Therefore, the wildlife biologist's determination is that all alternatives will have **no effect** on the valley elderberry longhorn beetle or its designated critical habitat.

Species that Hibernate or Migrate

The following species will not be analyzed in detail because they either hibernate or migrate and, therefore, would be absent from the area of potential effect during the OSV season of use. Species that hibernate do so in either in caves or other structures that will not be impacted by over-snow vehicles (OSVs) or underground. 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 (USFS National Core BMP Rec-7: Over-Snow Vehicle Use; please refer to the McNamara (2015) for

additional information). All of the project alternatives will maintain a minimum snow depth of 12 inches in areas open to cross-country use which should provide sufficient depth to protect the ground surface.

Species that migrate, as well as western pond turtle, utilize riparian and/or aquatic environments during the breeding season. 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 (USFS 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, including the existing condition, is expected to be adequate to protect aquatic and riparian habitats from measurable impacts to vegetation or water quality (McNamara 2015).

Bats (fringed myotis, pallid bat, Townsend's big-eared bat)

Fringed myotis occur primarily at middle elevations in desert, riparian, grassland, and woodland habitats, but they have been recorded at 2,850 meters (9,350 feet) in spruce-fir habitat in New Mexico, and at low elevations along the Pacific Coast. They roost in caves, mines, cliff faces, rock crevices, old buildings, bridges, snags, and other sheltered sites. In spring and summer in northern California, this species roosted in snags in early to medium stages of decay and switched roosts often. On the east side of the Cascade Range in Oregon and Washington, female roosts were found primarily in rock crevices and infrequently in ponderosa pine snags. In Colorado, most maternity roosts were in crevices of rock faces, sometimes in abandoned mines or in an abandoned cabin. Fringed myotis does not migrate. Winter habits are poorly known; hibernacula include caves, mines, and buildings (Western Bat Working Group species account, 2005). Primary threats include human disturbance of roost sites, especially maternity colonies, through recreational caving and mine exploration, mine closure and harvest of snags. Fringed myotis have been documented at several locations on and near the Lassen National Forest. The wildlife biologist's determination is that none of the alternatives will impact hibernating fringed myotis because due to its association with caves, mines, rock crevices and snags, habitats that are not impacted by over-snow vehicle use and associated actions.

Habitats for pallid bat include mountainous areas, intermontane basins, and lowland desert scrub; arid deserts and grasslands, often near rocky outcrops and water; in some areas, this species also inhabits open coniferous forest and woodland. Little information is available on seasonal movements, but individuals are believed to hibernate in the general vicinity of their summer range. Hibernation occurs in caves and mines, though not very many hibernation records are available. On a range-wide basis, no major threats are known. Locally, some maternity colonies and hibernacula are susceptible to disturbance and may be negatively affected or destroyed as a result of vandalism, mine closures or reactivation, or other activities. Tree-roosting populations may be detrimentally affected by timber harvest and other forestry practices. (NatureServe 2015a). Pallid bat has been documented on the Lassen National Forest. However, given that the species hibernates during the winter and that neither winter cave and mine habitats nor summer habitats would be impacted by the proposed actions, the wildlife biologist's determination is that none of the alternatives will impact pallid bat or its habitat.

Townsend's big-eared bats commonly occur in mesic habitats characterized by coniferous and deciduous forests, but they occupy a broad range of habitats. On the West Coast, Townsend's big-eared bats are found regularly in forested regions and buildings, and in areas with a mosaic of woodland, grassland, and/or shrub land. In California and Washington, they are known from limestone caves, lava tubes, and human-made structures in coastal lowlands, cultivated valleys, and nearby hills covered with mixed vegetation. These bats are non-migratory or move moderate distances between breeding and nonbreeding sites. Maternity and hibernation colonies typically are in caves and mine tunnels. This species prefers

relatively cold places for hibernation, often near entrances and in well-ventilated areas. In California, most limestone caves are too warm for successful hibernation; solitary males and small groups of females are known to hibernate in buildings in the central part of the state. Hibernation extends from early fall through early spring. Individuals commonly arouse in winter, changing position within a hibernaculum or moving to a nearby cave or mine. The primary threat to Townsend's big-eared bats is the disturbance and/or destruction of roost sites from caving, mine exploration or reclamation or destruction of buildings serving as roosts (NatureServe 2015b). There are historical and fairly recent (1997) records of Townsend's big-eared bat near the Lassen National Forest as well as a documented maternity and hibernaculum in lava tubes located on the Hat Creek Ranger District. The wildlife biologist's determination is that none of the alternatives will impact hibernating Townsend's big-eared bat or its winter cave and mine habitats.

Giant garter snake

The giant garter snake inhabits agricultural wetlands and other waterways such as irrigation and drainage canals, sloughs, ponds, small lakes, low gradient streams, and adjacent uplands in the Central Valley (USDI Fish and Wildlife Service 2009). Because of the direct loss of natural habitat, the giant garter snake relies heavily on rice fields in the Sacramento Valley, as well as, managed marsh areas in Federal and State refuge areas. Giant garter snakes are typically absent from larger rivers because of lack of suitable habitat and emergent vegetative cover, and from wetlands with sand, gravel, or rock substrates. Riparian woodlands typically do not provide suitable habitat because of excessive shade, lack of basking sites, and absence of prey populations. Potential suitable habitats occur downstream from the Lassen National Forest and outside the project area. Due to the project area being outside the range of the species, or due to lack of suitable habitat or habitat components in the project area, the wildlife biologist's determination is that all alternatives will have **no effect** on the giant garter snake.

Sandhill crane

The California breeding population of sandhill cranes winters chiefly in the Central Valley and peak breeding occurs between May and July [California Department of Fish and Wildlife (CDFW) 2015e]. High reproductive habitats for sandhill crane include fresh emergent wetland, irrigated hayfield and wet meadow (CDFW 2015). Greater sandhill cranes have been documented on the Lassen National Forest. Much of the wetland acres on Lassen National Forest, which are important to waterfowl and sandhill crane, are ephemeral; flooding occurs from snow melt and staging and breeding occurs in spring and early summer (Lassen National Forest 2010). 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 and water diversions (Lassen National Forest 2010); predation; human disturbance of crane pairs during the nesting season; and the spread of invasive plants into greater sandhill crane habitats (U.S. Fish and Wildlife Service 2015e). The minimum cross-country snow depth of 12 inches under all of the action alternatives, including the existing condition, 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 (McNamara 2015). The wildlife biologist's determination is that none of the alternatives will impact greater sandhill crane or its habitat because it is a migratory species that breeds outside of the OSV season of use, over-snow vehicle 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, including the existing condition, 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.

Shasta Hesperian snail

Shasta Hesperian snail is endemic to the Klamath Province, primarily in the vicinity of Shasta Lake, up to 915 meters elevation and has been found in moist bottom lands, such as riparian zones, springs, seeps, marshes, and in the mouths of caves (Bureau of Land Management 1999). The type locality was given as La Moine, Shasta County, California (Cordero and Miller 1995). Although Shasta Hesperian snail has been documented on the Lassen National Forest, the records are questionable based on its distance from the type locality and elevation. All observations were made in 2000 near the northeastern portion of the Forest in areas that would be expected to receive low OSV use. In the event the records are accurate, it would be expected to hibernate or be beneath the snow surface where no OSV-related impact would occur. In addition, the minimum cross-country snow depth of 12 inches under all of the action alternatives, including the existing condition, is expected to be adequate to protect moist bottomland habitats utilized by this species from measurable impacts to vegetation or water quality (McNamara 2015). Therefore, the wildlife biologist's determination is that none of the alternatives will impact Shasta Hesperian snail or its habitat.

Western pond turtle

The western pond turtle is found on Lassen National Forest in tributaries to the Sacramento River system below 4,500 foot elevation. Pond turtles inhabit fresh and brackish waters in permanent or intermittent ponds, lakes, streams, and rivers. They are restricted to areas near banks or in quiet backwaters having slow currents, basking sites, and refugia from other predatory aquatic species (e.g., bull frogs and bass). (USDA Forest Service PSW Region 2001). Overwintering is a period of reduced or no activity, which may include periods of a hibernation-like state of reduced physiological activity, from mid-October or November to March or April the following year (Hays et al. 1999). According to Holland (1994), there is a tendency for turtles from ponds and lakes to hibernate underwater while turtles from rivers and streams overwinter on land (possibly to avoid being swept away by winter and early spring floods). They can overwinter on land up to 500 m from the nearest watercourse (Reese and Welsh 1997). When overwintering terrestrially, turtles will burrow in duff or soil (Ashton et al. 1997) where the duff and leaf or needle litter is 2–20 cm thick (Holland 1994). Movement to overwintering sites occurs from September to November, while emergence from terrestrial overwintering sites occurs from March to June (Stone 2009). Occasional overland movements (usually less than 3 km) occur (Stone 2009). Turtles can overwinter in the mud at the bottom of ponds, sometimes communally. There is also some degree of winter activity in aquatic hibernacula; they have moved freely in one lake in Oregon at temperatures down to 1°C, and basked in air temperatures as low as 6°C (Holland, 1994).

In a 1992 petition to the U.S. Fish and Wildlife Service (i.e., Service), several western pond turtle experts requested listing of the species based on the following threats: loss and degradation of wetland and terrestrial habitat, predation by introduced species, overexploitation, habitat fragmentation, drought, and various other factors (U.S. Fish and Wildlife Service 1993). The petition was denied based upon lack of consistent information on the long-term effects of the cited threats to pond turtles on a range-wide basis. During a more recent petition, the Service found that the petition presents substantial scientific or commercial information indicating that the petitioned action may be warranted for the western pond turtle based on Factor A: the present or threatened destruction, modification, or curtailment of its habitat or range (U.S. Fish and Wildlife Service 2015f). The minimum cross-country snow depth of 12 inches under all of the action alternatives, including the existing condition, 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 (McNamara 2015). Although the western pond turtle has been documented at various locations on the Lassen National Forest, the wildlife biologist's determination is that none of the alternatives will impact western pond turtle or its habitat because the species hibernates during the OSV

season of use, pond turtles burrow under duff indicative of areas where OSV use does not occur, and OSV use is not expected to fragment or degrade wetland or terrestrial habitat based upon a minimum cross-country snow depth of 12 inches to be maintained under all of the alternatives.

Western bumble bee

U.S. states included in *B. occidentalis'* historic range are northern California, Oregon, Washington, Alaska, Idaho, Montana, western Nebraska, western North Dakota, western South Dakota, Wyoming, Utah, Colorado, northern Arizona, and New Mexico. Canadian provinces included in its historic range are Alberta, British Columbia, Saskatchewan, and the Yukon Territory. *B. occidentalis* was once considered abundant in California and in the Pacific Northwest. Since 1998, *B. occidentalis* has declined most dramatically from western and central California, western Oregon, western Washington, and British Columbia. Although absent from much of its former range, *B. occidentalis* is still found in isolated areas, primarily in the Rocky Mountains. *B. occidentalis* has recently been documented on the Eagle Lake Ranger District of the Lassen National Forest.

Bumble bees require habitats with rich supplies of floral resources with continuous blooming from spring to autumn. Landscape level habitat quality, indicating that isolated patches of habitat are not sufficient to fully support bumble bee populations. Bumblebee colonies are annual. 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. Based upon personal communication with Robbin Thorp (personal communication 2015), although little is known about queen habitat preferences for hibernation sites, extrapolations are made from the limited knowledge available for a few bumble bee species. Generally, observations suggest most Northern Hemisphere species prefer well drained slopes facing north which may prevent them from emerging too early. The only published record of a hibernaculum of *B. occidentalis* was based on an observation in a mating and hibernation cage. In this instance the female dug two inches into sandy soil of a steep west facing slope. The most detailed published observations for hibernating bumble bees were conducted in southern England. Two of the species are closely related to *B. occidentalis* and may serve as examples of what might be expected in *B. occidentalis*. Those two species showed a preference for digging the hibernaculum just below the litter and soil interface and most were under trees rather than on exposed slopes.

Habitat loss and fragmentation may be playing a role in the decline of these bumble bee species. Habitat alterations which destroy, fragment, degrade, or reduce their food supplies, nest sites (e.g., abandoned rodent burrows or undisturbed grass), and hibernation sites for over-wintering queens all can harm these species. (Evans et al. 2008). The minimum cross-country snow depth of 12 inches under all of the action alternatives, including the existing condition, is expected to be adequate to protect vegetation from measurable impacts (McNamara 2015).

The wildlife biologist's determination is that none of the alternatives will impact western bumble bee or its habitat because colonies are annual outside of the OSV season, queens of the species hibernate during the OSV season of use, known information suggests that queens burrow under duff under trees and on steeper slopes where OSV use does not occur (see assumptions below), and OSV use is not expected to degrade terrestrial habitat based upon a minimum cross-country snow depth of 12 inches to be maintained under all of the alternatives.

Western yellow-billed cuckoo

This is an uncommon to rare summer resident of valley foothill and desert riparian habitats in scattered locations in California (CDFW 1999). Along the Colorado River, breeding population on California side was estimated at 180 pairs in 1977. Additional pairs reside in the Sacramento and other riverine habitats

found in Southern California. Formerly the species was much more common and widespread throughout lowland California, but numbers drastically reduced by habitat loss and current population estimations show about 50 pairs existing in California. There are no known occurrences of this species found on the Lassen National Forest. Potential suitable habitats occurring downstream from the Lassen National Forest and outside the project area will not be affected by any alternative. Proposed critical habitat is located more than 10 miles from the project area. Due to the project area being outside the range of the species, or due to lack of suitable habitat or habitat components in the project area, the wildlife biologist's determination is that all alternatives will have **no effect** on yellow-billed cuckoo or its proposed critical habitat.

Willow flycatcher

Willow flycatcher is a rare to locally uncommon, summer resident in wet meadow and montane riparian habitats at 600 to 2,500 meters (2,000 to 8,000 feet) in the Sierra Nevada and Cascade Range. It most often occurs in broad, open river valleys or large mountain meadows with lush growth of shrubby willows (Serena 1982). Lassen National Forest has one of the largest concentrations of breeding willow flycatcher in the Sierra Nevada; most birds are located in Warner Valley Ecological Reserve, managed by California Department of Fish and Game (CDFG), situated upstream from Lake Almanor and near the southwest boundary of Lassen Volcanic National Park (Lassen National Forest 2010). Earliest arrival dates range from late May to early June in the southern Sierra Nevada to the first of June in the northern Sierra Nevada (Green et al. 2003)

Green et al. (2003) identified meadow degradation, which results in meadow drying, loss of nesting and foraging substrates, increased predator access to meadow interiors, and potentially cowbird parasitism as among the key factors likely responsible for the decline of the willow flycatcher. The minimum cross-country snow depth of 12 inches under all of the action alternatives, including the existing condition, is expected to be adequate to protect vegetation from measurable impacts (McNamara 2015). The wildlife biologist's determination is that none of the alternatives will impact willow flycatcher or its habitat because it is a neotropical migrant that arrives well past the end of the OSV season of use, over-snow vehicle 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, including the existing condition, is expected to protect meadow and riparian habitats.

Yellow rail

The continuous breeding range of the yellow rail is from southcentral Northwest Territories through eastern Alberta, Saskatchewan, Manitoba, Ontario, southern Quebec, New Brunswick, and Maine, and south to northern New Hampshire, Vermont, New York, Michigan, Wisconsin, Minnesota, North Dakota, and northeastern Montana; a small, separate breeding population is located in southcentral Oregon. (Goldade et al. 2002). The species has been documented year round in California, but in two primary seasonal roles: as a very local breeder in the northeastern interior (based on records from Mono County in Long Valley in 1922 and 1939 and in Bridgeport Valley in and April records in the late 19th century from Quincy, Plumas County indicating either birds at a former breeding site or passage of spring migrants through the northern Sierra Nevada) and as a winter visitor (early Oct to mid-Apr) on the coast and in the Suisun Marsh region (Shuford and Gardali 2008). The length of the breeding season is poorly known in California, but on the basis of information from Oregon it probably extends from May through early September (Shuford and Gardali 2008). Yellow Rails prefer wet meadows, fens, boggy swales, floodplains, montane meadows, and emergent vegetation in fresh and brackish wetlands (Goldade et al. 2002). There is a single known observation of yellow rail on the Eagle Lake Ranger District of the Lassen National Forest. California is outside of the continuous breeding range of the yellow rail and appears to be primarily a winter visitor to the coastal and central portion of the state as there are no recent records of

reproduction in the state. Therefore, the wildlife biologist's determination is that none of the alternatives will impact yellow rail or its habitat.

Table 55. Summary comparison of alternatives

OSV Management	Alt. 1	Alt. 2	Alt. 3	Alt. 4
National Forest System (NFS) Lands within the Lassen National Forest (Acres)	1,150,020	1,150,020	1,150,020	1,150,020
OSV Use Allowed:				
• OSV Areas (Acres)	976,760	947,120	878,690	966,270
• Snow Trails (NFS Trail Miles)	406	406	406	408
• OSV Use Restricted to Designated Snow Trails (Miles)	0	0	35	2
o Butte Lake – Designated Snow Trails – OSV Use Allowed (Miles)	0	0	22	0
o McGowan Designated OSV Trails – OSV Use Allowed (Miles)	0	0	0	2
o Colby Mountain Designated OSV Trails – OSV Use Allowed (Miles)	0	0	0	0
o Lake Almanor Designated OSV Trails – OSV Use Allowed (Miles)	0	0	0	0
o Fredonyer-Goumaz/Willard Hill Designated OSV Trails – OSV Use Allowed (Miles)	0	0	13	0
OSV Use Prohibited:				
• Total Area (Acres)	173,260	202,900	271,330	183,750
• OSV Management	Alt. 1	Alt. 2	Alt. 3	Alt. 4
• National Forest System (NFS) Lands within the Lassen National Forest (Acres)	1,150,020	1,150,020	1,150,020	1,150,020
OSV Use Allowed:				
• OSV Areas (Acres)	976,760	947,120	878,690	966,270
• Snow Trails (NFS Trail Miles)	406	406	406	408
• OSV Use Restricted to Designated Snow Trails (Miles)	0	0	35	2
• Butte Lake – Designated Snow Trails – OSV Use Allowed (Miles)	0	0	22	0

OSV Management	Alt. 1	Alt. 2	Alt. 3	Alt. 4
• McGowan Designated OSV Trails – OSV Use Allowed (Miles)	0	0	0	2
o Colby Mountain Designated OSV Trails – OSV Use Allowed (Miles)	0	0	0	0
o Lake Almanor Designated OSV Trails – OSV Use Allowed (Miles)	0	0	0	0
Fredonyer-Goumaz/Willard Hill Designated OSV Trails – OSV Use Allowed (Miles)	0	0	13	0
OSV Use Prohibited:				
Total Area (Acres)	173,260	202,900	271,330	183,750
Below 3,500 Feet in Elevation Included in Above Total (Acres)	0	29,130	29,130	0
Black Mountain RNA Included in Above Total (Acres)	0	520	520	520
McGowan – Cross-country OSV Use Prohibited (Acres)	0	0	9,940	9,940
Colby Mountain – Cross-country OSV Use Prohibited (Acres)	0	0	4,400	0
Lake Almanor – Cross-country OSV Use Prohibited (Acres)	0	0	1,980	0
Eagle Lake Addition (Acres)	0	0	1,640	0
Trails (Miles)	148	148	148	0
OSV Use Restricted to Designated OSV Trails (Acres)	0	0	66,790	0
Butte Lake – Cross-country OSV Use Prohibited (Acres)	0	0	30,800	0
Fredonyer-Goumaz/Willard Hill – Cross-country OSV Use Prohibited (Acres)	0	0	19,670	0
Minimum Snow Depth for OSV Use on Snow Trails Designated for OSV Use (Inches)	12	6 on a limited basis	6 on a limited basis	Dependent on snow conditions. No restrictions with 6 or more inches on trails identified for grooming
Minimum Snow Depth for Off-trail, Cross-country OSV Use (Inches)	12	12	12	12
Total Groomed Trail System (Miles)	324	324	324	324
Minimum Snow Depth for Snow Trail Grooming to Occur (Inches)	18	12	18	12
Grooming Season	12/26 – 3/31	12/26 – 3/31	12/26 – 3/31	Discretion of groomer

Monitoring

Once a decision is made on OSV use designation via the record of decision, the implementation phase would begin. We anticipate that an implementation plan, with a monitoring component, would be developed at that time.

The Forest Service has an obligation to monitor the effects of OSV use as required by Subpart C of the Travel Management Regulations. Furthermore, as an ongoing part of our State-funded OSV program, California State Parks provides funding to the Forest Service to monitor our trail systems for evidence of OSV trespass into closed areas, OSV use near or damage of sensitive plant and wildlife sites, and low snow areas subject to erosion concerns.

Monitoring that will occur during implementation of any alternative includes the following:

Effectiveness monitoring, based on available resources. The highest priority for monitoring will ensure that:

1. Resource damage is not occurring when there is less than the prescribed minimum snow depth (depending on alternative) with certain exceptions as described in the alternative descriptions above. Snow depths measurement locations and techniques would be developed using an interdisciplinary team approach and would consider terrain, season, proximity to sensitive areas, and resource damage criteria.

2. Where resource damage is suspected due to OSV use in less than the prescribed minimum snow depth, monitoring would occur to help inform the line officer if damage is occurring, the extent of the damage, and what steps need to be taken to address the issue.

3. OSV use is not damaging sensitive resource locations, in consultation with forest biologists. In particular:

    - Monitor OSV use in the white bark pine stand on Burney Mountain to determine if damage is occurring. If adverse impacts are observed, changes in management of OSV use would be considered, or other appropriate protective measures taken, in consultation with a forest botanist. Considerations will include prohibiting cross-country OSV use in this area.

    - Monitor OSV use in designated Forest Plan botanical Special Areas to determine if damage is occurring. If adverse impacts are observed and it is determined that OSV use in these areas is not compatible with the intended focus of these areas, per each special area's management plan, changes in management of OSV use would be considered, or other appropriate protective measures taken, in consultation with a forest botanist. Considerations will include prohibiting cross-country OSV use in these SIAs or restricting OSV use to designated routes only.

    - Monitor OSV use in sensitive wildlife habitats, in consultation with the forest biologist, to determine if adverse impacts are occurring. If adverse impacts are observed, changes in management would be considered in consultation with the forest biologist.

    - Monitor water quality in spring snowmelt periodically at specified locations, in consultation with the forest hydrologist and aquatic biologist, to determine potential impacts of OSV exhaust on water quality. If adverse impacts are observed, changes in management of OSV use would be considered, or other appropriate protective measures taken, in consultation with a forest botanist.

4. OSV use is not occurring in prohibited areas.

5. OSV use restricted to designated routes is not encroaching outside the trail corridor.

Topics and Issues Addressed in This Analysis

Issues

Several non-significant issues were identified by the public during scoping. Designating roads, trails and areas for OSV use and grooming trails for OSV use has the potential to impact terrestrial wildlife through direct, indirect, or cumulative:

- Injury or mortality
- Disturbance to individuals (e.g., increased noise and human presence resulting in a loss of breeding and/or feeding)
- Impacts to wildlife habitats including
  - Habitat fragmentation or modification
  - Snow compaction in the habitat of species that hibernate, subnivean species habitat, or in or near denning sites.

Resource Indicators and Measures

The following resource indicators and measures will be used in this analysis to measure and disclose effects to TEPCS species and other species of public interest.

Table 56. Resource indicators and measures for assessing effects

Resource Element	Resource Indicator	Measure (Quantify if possible)	Used to address: P/N, or key issue?	Source
Federally Listed, Proposed Species Forest Service Sensitive Species Mule deer on winter range	Potential for disturbance to individuals from OSV use and increased human presence	Percentage of habitat (and mule deer winter range) affected and percentage of habitat within high and moderate OSV use categories, by species Percentage of CSO and NGO PACs and PACs within high and moderate OSV use categories Percentage of known CSO and NGO PACs and nest sites (NGO only) within 0.25 mile of groomed or ungroomed routes Percentage of known bald eagle nest sites within 660 feet of groomed or ungroomed routes Bats: Qualitative discussion	Yes	FSM 2672.4

Resource Element	Resource Indicator	Measure (Quantify if possible)	Used to address: P/N, or key issue?	Source
Federally Listed, Proposed Species Forest Service Sensitive Species Mule deer on winter range	Potential for injury or mortality of individuals	Percentage of habitat (and mule deer winter range) affected and percentage of habitat within high and moderate OSV use categories, by species Percentage of CSO and NGO PACs affected and percentage of PACs within high and moderate OSV use categories Percentage of known CSO and NGO PACs and nest sites (NGO only) within 0.25 mile of groomed or ungroomed routes Percentage of known bald eagle nest sites within 660 feet of groomed or ungroomed routes Western pond turtle: Qualitative discussion	Yes	FSM 2672.4
Applicable Federally Listed, Proposed Species Applicable Forest Service Sensitive Species (CSO, NGO, marten, Sierra Nevada red fox, wolverine, bald eagle) Mule deer on winter range	Potential for habitat fragmentation or modification	Percentage of habitat (and mule deer winter range) affected and percentage of habitat within high and moderate OSV use categories, by species Percentage of CSO and NGO PACs affected and percentage of PACs within high and moderate OSV use categories Percentage of known CSO and NGO PACs and nest sites (NGO only) within 0.25 mile of groomed or ungroomed routes Percentage of known bald eagle nest sites within 660 feet of groomed or ungroomed routes	Yes	FSM 2672.4
Applicable Forest Service Sensitive Species (willow flycatcher, western pond turtle, Shasta Hesperian snail, western bumble bee, bats)	Potential for habitat degradation	Qualitative discussion	Yes	FSM 2672.4

Resource Element	Resource Indicator	Measure (Quantify if possible)	Used to address: P/N, or key issue?	Source
Applicable Federally Listed, Proposed Species, marten, and Sierra Nevada red fox	Potential for effects of snow compaction or snow compaction effects to foraging (marten) or denning (marten or Sierra Nevada red fox) individuals	Percentage of total habitat with the potential for snow compaction and acres and percentage of habitat within high and moderate OSV use categories	Yes	FSM 2672.4
Subnivean Species (prey for Federally Listed and Proposed Species and Forest Service Sensitive Species)	Potential for effects of snow compaction on subnivean species habitat	Percentage of habitat with the potential for snow compaction and percentage of habitat within high and moderate OSV use categories	Yes	FSM 2672.4

Methodology

Species biology, habitat information, and potential for OSV-related effects, from the best available science, were discussed in the Wildlife Report. Species occurrence information specific to the Lassen National Forest was disclosed. For most species [except mule deer (winter range) and subnivean species (meadow habitat within a specific elevational range)], the amount of high reproductive habitat was used to measure and compare effects to species and was modeled using EVEG data. General habitat queries used for modeling habitats are course-filter, and may overestimate potential reproductive habitat. However, they are still useful to compare relative differences by alternative. Specific reproductive site information was also used to measure effects to species.

Analysis Process

Modeled habitat and/or PACs for each species was intersected with OSV use assumptions (see below) and the resulting total acres and percentages of habitat, by assumption and alternative, were disclosed and compared. PACs (0.25 mile) and goshawk (0.25 mile) and bald eagle (660 feet) nest sites were buffered with respect to groomed and ungroomed OSV trails and percentages were disclosed and compared.

Assumptions Specific to the Wildlife Resources Analysis

OSV use patterns vary by day of the week, time of the day, topography, terrain, and vegetation. With assistance from Lassen National Forest staff, the following use patterns and categories were developed to create a more accurate description of potential impacts of each alternative to species and habitats.

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 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 does not persist for very long periods of time (2 to 5 days).
- Ungroomed routes receive 50% less 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).

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

Low-to-No Use:

- Areas where OSV use is prohibited or restricted under current management
- Areas below 3,500 feet elevation (this will vary by forest per previous input)
- CWHR (California Wildlife Habitat Relationships) vegetation (California Department of Fish and Wildlife 1988, 2014) 2D, 3D, 4D, 4M; vegetation size 5 and 6 with a slope greater than 20%
- Meadows 30 acres or greater, 1.5 miles or greater from an OSV trail
- Areas more than 1.5 miles from a groomed OSV trail
- Areas more than 0.5 miles 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).

Information and Data Sources

Best available science with respect to terrestrial wildlife species information and data sources were utilized for this project and largely include the following:

- California Department of Parks and Recreation (DEIR and FEIR 2010)
- Sierra Nevada Forest Plan Amendment Final Environmental Impact Statement (U.S. Forest Service 2001) and Record of Decision for Sierra Nevada Forest Plan Amendment (U.S. Forest Service 200)

- Assessing the Cumulative Effects of Linear Recreation Routes on Wildlife Habitats on the Okanogan and Wenatchee National Forests. Gen. Tech. Rep. PNW-GTR-586 (Gaines et al. 2003)
- Species' literature
- Personal communications with researchers, Forest Service Region 5 Regional Office staff and Lassen National Forest staff
- California Wildlife Habitat Relationships (2014)
- EVEG data
- Available Lassen National Forest GIS Data
- NRM Wildlife and Aquatic Survey Data

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 Lassen National Forest boundary (unless otherwise specified) for the following reasons: the forest is large enough to address the large home range sizes of most of the species under consideration and Forest Service sensitive species' viability is assessed at the unit/forest level. 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.

Environmental Consequences

General Direct and Indirect Effects by Action

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[6], and disturbance at a specific site[7], usually wintering areas. To a lesser degree, hunting, trapping, poaching, collection, and habitat loss and fragmentation[8] were other interactions identified. Specific types of habitat modification that occurred on winter recreation routes include the effect of snow compaction[9] on the subnivean sites used by small mammals and alteration of competitor/predator communities[10]. 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.[11]

[6] Spatial shifts in populations or individual animals away from human activities on or near roads, trails, or networks
[7] Displacement of individual animals from a specific location that is being used for reproduction and rearing of young
[8] Loss and resulting fragmentation of habitat owing modification to the establishment of roads, trails, or networks, and associated human activities
[9] Direct mortality of animals crushed or suffocated as a result of snow compaction from snowmobile routes or groomed ski trails
[10] A physical human-induced change in the environment that provides access for competitors or predators that would not have existed otherwise
[11] Increase in heart rate or stress hormones when near a road or trail or network of roads or trails

Trapping

Trapping of fisher, marten, wolf, wolverine or any of the special-status species under consideration is not legal in the state of 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 disturbance could impact late-successional species, wide-ranging carnivores or mule deer. 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 reactions. Mammals or birds may experience an elevated heart rate and metabolism resulting in high energy expenditures, elevated production of stress hormones (i.e., glucocorticoids), increased susceptibility to predation, decreased reproduction, and diminished nutritional condition (Canfield 1999 in NPS 2007). 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. OSV 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 OSV use facilitate coyote incursion into deep snow areas (Bunnell et al. 2006) and can negatively impact marten, Sierra Nevada red fox, 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 small 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

Northern Spotted Owl (*Strix occidentalis caurina*)

Threatened

Species Account

On the Lassen, northern spotted owls are surveyed and monitored, as needed, on the Hat Creek Ranger District. Surveys are usually associated with forest management practices to determine whether there is a need to implement limited operating periods or other mitigations. Table 57 shows observation data for Northern Spotted Owl on the Lassen National Forest. Northern spotted owls have been observed as single individuals until 2009. No reproduction has been observed. Observations have occurred over multiple years at three sites with close proximity to each other: Screwdriver Creek, Poison Creek and Underground Creek. These three sites are within 1.5 miles of each other. These detections were made during different years. In 1989, a male was detected in the Poison Creek drainage. A single male was detected in 1991 adjacent to Screwdriver Creek. A male was detected in the headwaters of Poison Creek during 1992. A female was detected in the headwaters of Underground Creek during 1995 and 1996. Inventory work did not detect spotted owls at any of these sites during other years.

Surveys conducted in 2009 reported one pair of NSO within the project area, located in the Snow Mountain area. No nest site or reproduction has been documented for this site. In addition, surveys completed in 2011 documented a single male NSO-barred owl cross at various locations in the vicinity of this pair.

Table 57. Northern spotted owl observations and status on the Lassen National Forest

Year	Number of Birds	Sex	Pair	Young	Reproductive Status
1982	1	Unknown	No	No	Single
1989	2	Male	No	No	Single
1991	5	Male	No	No	Single
1992	2	Male	No	No	Single
1995	2	Female	No	No	Single
1996	3	Female	No	No	Single
2000	1	Unknown	Unknown	Unknown	Unknown
2004	0	-	-	-	-
2005	0	-	-	-	-
2009	2	M/F	Yes	No	Unknown
2011	1	M (NSO-barred owl cross	No	No	No

Habitat Status

The spotted owl is a forest-dwelling owl strongly associated with late-successional forests that have a complex multi-layered structure, large-diameter trees, and high overstory tree canopy (Bias and Gutiérrez 1992). Nest stands often have a well-developed hardwood understory (e.g., canyon live oak (*Quercus chrysolepsis*) and a conifer overstory. However, nests on Lassen National Forest generally consist primarily of solely of conifers (Lassen National Forest 2010). Spotted owl habitats are consistently characterized by greater structural complexity compared to available forest habitat.

The spotted owl breeding season is March 1 through August 31. Breeding activity for spotted owls is broken into five stages (pre-laying, laying, incubation, nestling, and fledging) and roughly parallels the time frame of goshawks. Pre-laying behavior in spotted owls begins in March and lasts for 3 weeks prior to the laying of the first egg. Egg-laying starts from April 11 to 25 and can take 1 to 6 days to complete. Incubation starts with laying of the first egg and lasts 28 to 32 days. Nestlings fledge after 34 to 36 days around June 12 to 26 (Forsman et al. 1984). Much of the data available for spotted owl breeding phenology is derived from the Northern spotted owl subspecies.

Approximately 26,240 acres of lands administered by the Lassen National Forest occur within the range of the NSO. Query of existing vegetation information shows that only about 850 acres currently consist of large-diameter dense conifer stands suitable for nesting and roosting (CWHR size class 5D); however, additional acres of suitable habitat may to occur in portions of some denser stands classified as smaller diameter (CWHR class 4D) totaling 5,591 acres.

Northern spotted owl critical habitat was originally designated in 1992, was revised in 2008, and most recently revised in 2012 (USDI Fish and Wildlife Service 2012a). Approximately 2,736 acres of designated critical habitat within the Interior California Coast, Subunit 8 (ICC-8) overlap lands administered by the Lassen National Forest in the northwestern portion of the Hat Creek Ranger District and includes areas of Late Successional Reserve (LSR; 236 ac). Only about 440 acres within designated critical habitat constitute suitable nesting and roosting habitat (CWHR 5D stands), with an additional 1,622 acres in CWHR 4D stands.

Direct and Indirect Effects

Resource Indicators and Measures

Resource indicators and measures (FSH 1909.15, 12.5) used in this analysis to measure and disclose effects to northern spotted owl are listed in Table 58.

Table 58. Resource indicators and measures for assessing effects

Resource Element	Resource Indicator	Measure	All Alternatives
Habitat Quality	Habitat Removal or Degradation	Acres of Habitat Removed or Degraded	0
Species Use of Available Habitats	Disturbance and/or Displacement from All or Portions of a Species Home Range	Overlap of acres of disturbing or potentially displacing activity within species' disturbance distance thresholds	4,519
Injury or Mortality	Potential for Injury or Mortality of Individuals	Risk Level of Potential for Injury or Mortality	Very Low

As found in the Sierra Nevada Forest Plan Amendment (USDA FS PSW Region 2004), habitat types important for late-successional forest 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% canopy cover. The SNFPA provides management direction for Old Forest Emphasis Areas to maintain or develop old forest habitat in areas containing the best remaining large blocks or landscape concentrations of old forest. Direction also includes providing for old forest functions, such as connectivity of habitat over a range of elevations to allow migration of wide-ranging old-forest-associated species.

OSV use within late-successional-forest habitats can have the following direct effects to individuals or their habitat (Gaines et al. 2003): Disturbance and potential for 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.

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).

Forsman et al. (1984) indicate that NSO 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 (USDI Fish and Wildlife Service 2012a). The OSV 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. Inspections conducted of the Lassen National Forest snow parks on April 17 and May 1, 2010, indicated that OSV user activity extends beyond the March 31 termination date closing roads for exclusive OSV use. OSV use was assumed to be very low (< 10 riders per site/ per day on a weekend), varying depending on specific snow depths and daily temperatures. OSV use was documented until the end of April, at which point snow levels no longer allow continued use of designated OSV routes. For purposes of analysis, April 30 is used as a cut-off date for the maximum period of interaction (Tri Environmental Sciences Inc. 2010).

NSO observation points and activity centers in Table 57 reflect a cumulative count of both observations and known nest sites over time for survey efforts since 1982. Under all alternatives (1, 2, 3, and 4) there are no groomed routes, designated ungroomed routes, or plowed parking areas within ¼ mile of known NSO activity or past observations. The nearest such feature consists of a groomed route located approximately 17 miles from the NSO range delineation for lands administered by the Lassen National Forest. Therefore, there would be no effect to NSO resulting from groomed routes, designated ungroomed routes, trail maintenance (including removal of obstacles such as down trees) or plowed parking activities.

Areas within NSO range are, however, open to use of existing routes (roads and trails) as well as open to cross-country travel by OSVs. However, due to the structural nature of suitable habitat (i.e., dense forested stands), the level of cross-country travel in NSO suitable habitat is expected to be low, and most disturbance is likely to occur primarily along existing roads and trails. Review of past observations and mapping shows that NSO locations vary in proximity to roads, with several observations occurring adjacent to existing roads designated as open to vehicular traffic under the travel management system (USDA Forest Service 2011). The activity center for the known owl pair in the Snow Mountain area occurs immediately adjacent to FS Road 37N08 (Snow Camp Road), which is maintained for high clearance vehicle travel. Non-OSV as well as OSV access, including a low potential for cross-country travel, has been occurring over the past 30-plus years. Some species can habituate to disturbance and individuals or pairs can successfully reproduce with a range of minor to substantial disturbance depending on their adaptability and rate of previous exposure. The presumed levels of variable tolerance do not relieve the impacts of disturbance, however, those impacts are difficult to detect or measure (USDI Fish and Wildlife Service 1998).

There is some potential for direct effects due to collisions with vehicles. However, because NSO spend little time at ground level, the potential for injury or mortality due to colliding with an OSV is very low.

The Forest Service considers activities greater than one-quarter mile (400 meters) from a spotted owl nest site to have little potential to affect spotted owl nesting. In addition, Delaney et al. (1999) found that Mexican spotted owls were found to show an alert response to chainsaws at distances less than one-quarter mile. Results on a NSO study on the Mendocino National Forest in northern California indicated that spotted owls did not flush from nest or roost sites when motorcycles were greater than 70 meters (230 ft) away and sound levels were less than 76 owl-weighted decibels (dBO) (Delaney and Grubb 2003). Noise levels of OSVs (e.g., snowmobiles) are considered in this analysis to be comparable to those generated by motorcycles.

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). Research has been conducted to measure the effects of noise on physiological stress levels of northern and California spotted

owls through the analysis of fecal corticosterone (e.g., Wasser et al. 1997, Tempel and Gutierrez 2003, Tempel and Gutierrez 2004) and fecal glucocorticoid (Hayward et al. 2011). There is difficulty in the ability to tease out background differences in fecal corticosterone and fecal glucocorticoid levels from variables such as environment, body condition, and gender (Tempel and Gutierrez 2004; Hayward et al. 2011) making cause and effect determinations of whether disturbance is related to the action being tested or some other factor. The studies varied in design, analysis, and conclusions. The study by Hayward et al. (2011) is most similar to conditions in this project in that it used off-highway vehicles. The vehicles traveled back and forth along a 0.5-mile length of road within 5 to 800 meters of roost or nest locations for a period of one hour. The results from this study indicate that there were increased levels of fecal glucocorticoid and reduced reproductive success in response to this level of activity (Hayward et al. 2011).

OSVs passing within 0.25 mile of unsurveyed nesting/roosting habitat or an active nest have the potential to disturb nesting northern spotted owls. The highest reproductive status observed in the project area was Pair status; however, no NSO surveys have occurred in the project area since 2011. A total of 690 acres of CWHR class 5D stands 81 percent) and 4,519 acres (81 percent) of CWHR class 4D stands occur within one-quarter mile of open roads that may be utilized by OSVs. 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. The noise associated with OSV use in the action area is expected to be of short duration (amount of time it would take to travel through any one given area) and of intermittent intensity (amount of concentrated noise). In addition, the area containing NSO suitable habitatis not near infrastructure that may facilitate OSV use of the area, including snowparks and parking lots, as well as designated ungroomed and groomed trails. Therefore, OSV use in NSO habitats is expected to be low.

None of the alternatives proposes to alter vegetation, and therefore, would not remove, downgrade, or degrade habitat for the northern spotted owl. Northern spotted owl foraging behavior or their ability to locate prey is not expected to be significantly impacted by OSV use. While northern spotted owls may opportunistically forage during the day (e.g., capture prey at the immediate roost or nest site), they primarily forage at night when OSV activity is much less likely to occur. Prey are not expected to be impacted by OSV use as they are not likely to reside in the immediate footprint of the road/trail and because material removed from the trails for safety that could provide cover will be left on site. As stated previously, there is low potential for cross-country OSV travel in dense stands utilized by NSO and their prey. Prey may be temporarily startled by noise as an OSV passes by; however, the overall abundance and availability of prey will not change as a result of the proposed action.

Cumulative Effects

No foreseeable vegetation management or fuels management projects are projected to occur within NSO habitats on lands administered by the Lassen National Forest and adjacent National Forest System lands. Both firewood cutting and Christmas tree cutting are restricted from areas with known NSO observations (USDA Forest Service 2014). Vegetation and fuels management activities in recent years have included primarily thinned, masticated, and/or burned vegetation to reduce the potential for catastrophic wildfires. These projects are usually excluded from spotted owl reproductive habitat (i.e., Late Seral Reserves). Management prescriptions have emphasized recruitment of large snags and logs, as well as retention of large conifer, over a 20-year period. These are all important habitat attributes for spotted owl foraging habitat. Livestock grazing allotments are located within NSO distribution, but because livestock are normally present on allotments during the snow-free period, overlap of effects with this project are unlikely.

Recreational activities such as hunting and fishing are expected to continue at levels similar to existing. Use of roads within NSO habitats for hunting access contributes a level of disturbance during the end of

the NSO breeding season. This is incorporated into the environmental baseline for disturbance. Timber harvest and state and private lands within one-quarter mile of NSO habitats may impact habitat availability outside National Forest System lands and may increase disturbance locally. However, existing availability of suitable NSO habitat on private lands is expected to be low.

In summary, ongoing and reasonably foreseeable actions may be additive locally, but are not expected to contribute substantial impacts to effects discussed for project under any alternative.

Determination Statement

Based on the above discussions, the Lassen National Forest Over-snow Vehicle Use Designation Project **may affect, but is not likely to adversely affect** the northern spotted owl, for **all alternatives**, based on the following rationale:

- The OSV proposed actions will not modify any suitable (nesting, roosting or foraging), dispersal, or capable habitat within the OSV area.
- NSO habitats are not near infrastructure, including snowparks and parking lots, as well as designated ungroomed and groomed trails, that may facilitate OSV use of the area. Therefore, OSV use in northern spotted owl habitats is expected to be low.
- The level of noise disturbance by OSVs and non-OSVs has occurred over the past 30 or more years potentially resulting in some level of acclimation by species.
- The noise would be intermittent and of short duration within and near unsurveyed suitable habitat, and would occur only within the early part of the breeding season.
- OSV use is unlikely to influence NSO foraging or prey availability because owls forage at night when OSV use is low to non-existent.
- OSV use is dispersed across the landscape and is not concentrated in space or time.
- The potential for OSV collision with individual NSOs is very low.

Northern Spotted Owl Designated Critical Habitat

Northern spotted owl critical habitat was originally designated in 1992, revised in 2008, and most recently revised in 2012 (USDI Fish and Wildlife Service 2012a). Approximately 2,736 acres of designated critical habitat within the Interior California Coast, Subunit 8 (ICC-8) overlap lands administered by the Lassen National Forest in the northwestern portion of the Hat Creek Ranger District and includes areas of Late Successional Reserve (LSR; 236 acres). Only about 440 acres within designated critical habitat constitute suitable nesting and roosting habitat (CWHR 5D stands), with an additional 1,622 acres in CWHR 4D stands.

Primary Constituent Elements

The 2012 designation of critical habitat for the NSO identifies the physical and biological features essential to the conservation of the NSO as forested lands that can be used for nesting, roosting, foraging, or dispersal (USDI Fish and Wildlife Service 2012a). The primary constituent elements (PCEs) of the physical or biological features that are essential to the conservation of the NSO are:

PCE 1: forest types that may be in early-, mid-, or late-seral stages and that support the northern spotted owl across its geographical range*;

PCE 2: nesting/roosting habitat;

PCE 3: foraging habitat;

PCE 4: dispersal habitat

*PCE1 must occur with PCE 2, 3, or 4

Determination Statement

No vegetation treatments or alterations are proposed under any alternative. The primary constituent elements of the physical and biological features that are essential to the recovery of the species will not be affected by proposed activities under any alternative. Therefore, there will be **no effect** to NSO designated critical habitat.

Pacific Fisher (*Pekania pennanti*)

Federally Proposed Threatened; Regional Foresters Sensitive Species

Species Account

Between 1992 and 2004, no fishers have been detected from survey efforts by Lassen National Forest personnel or systematic surveys conducted in 2002 by PSW Research (Zielinski et al. 2005). However, two recent confirmed fisher detections have been made, one in Malinda Gulch on Chalk Mountain (Shasta-Trinity National Forest) approximately 5 miles southwest of the administrative boundary and 10 miles west of Lake Britton and the other north of Goose Mountain within the 2009 Goose Fire perimeter 2 miles southeast of the administrative boundary. Zielinski et al. (2005) concluded that Lassen National Forest falls within an area considered a distribution gap within the range of the fisher. From late 2009 through late 2011, a total of 40 fishers were released onto the Stirling Management Area owned by Sierra Pacific Industries west of the Lassen National Forest. Radio-telemetry tracking and camera sets show that fishers from this introduced population ventured onto the extreme southern portion of the Lassen National Forest in 2012 and 2013, including known denning occurrences (Powell et al. 2014).

Habitat Status

Fishers occupy mid-elevation, multi-storied mature and old-growth conifer, mixed conifer and mixed-conifer hardwood forests with contiguous canopy cover. Closed canopies (>50%) are typically selected but fishers will use areas of low to moderate canopy cover (25 to 40 percent) if there is sufficient understory (Lofroth et al. 2010). They do not occur in high-elevation alpine or subalpine habitats.

Rest sites are strongly associated with moderate to dense forest canopy and elements of late-successional forests (Lofroth et al. 2010). Rest sites in northern California typically have >50 percent canopy cover and an average dbh of 30 to 45 inches for the 5 largest trees in the immediate area. These areas will often have a higher density of snags and large downed wood. Due to high temperatures, rest sites in this region often occur in the bottom of drainages or within 100 meters of water. Cavities, mistletoe blooms, branch deformities and platforms in live trees and snags (conifers and hardwoods) are used for rest sites as well as logs, rock areas, brush piles and concentrations of downed woody debris.

Cavities in live trees and snags are critical for reproduction. Females use cavities in a variety of tree species (Douglas-fir, ponderosa pine, black oak, etc.) but live hardwoods appear to be particularly important in northern California. Most cavities used as natal and weaning dens are formed from heartwood decay and are in large (average 36 inches dbh) trees and snags. These trees are often much older than those available with Douglas-fir averaging 177 years (Lofroth et al. 2010).

Potential suitable habitat for the fisher occurs primarily on the lower elevation steep slopes having an oak component typed as montane hardwood or montane hardwood-conifer habitat. As with marten habitat at

the higher elevations, forest management practices and resulting roads have contributed to habitat fragmentation. Fisher generally avoids entering open areas that have no overstory or shrub cover and also avoids roads associated with the presence of vehicles and humans. Fishers are known to modify their behavior near active roads (USDA Forest Service 2001).

Direct and Indirect Effects

Resource indicators and measures (FSH 1909.15, 12.5) used in this analysis to measure and disclose effects to fisher are listed in Table 59.

Table 59. Fisher resource indicators and measures for assessing effects

Resource Element	Resource Indicator	Measure	All Alternatives
Habitat Quality	Habitat Removal or Degradation	Acres and percentage of Habitat Removed or Degraded	0
Species Use of Available Habitats	Disturbance and/or Displacement from All or Portions of a Species Home Range	Overlap of acres of disturbing or potentially displacing activity within species' disturbance distance thresholds	See analysis
Injury or Mortality	Potential for Injury or Mortality of Individuals	Risk Level of Potential for Injury or Mortality	Very Low

The late-successional forest group is comprised of northern spotted owl, California spotted owl, northern goshawk (goshawk), marten, and fisher. These species are associated with late-successional forests that 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. Growing concern over habitat fragmentation for late-successional–forest-associated species has been expressed by individuals, environmental groups, and agency biologists. Various studies have shown that this species group is vulnerable to disturbance, changes in habitat, or displacement by habitat generalists.

As found in the Sierra Nevada Forest Plan Amendment (USDA FS PSW Region 2004), habitat types important for late-successional forest 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. The SNFPA provides management direction for Old Forest Emphasis Areas to maintain or develop old forest habitat in areas containing the best remaining large blocks or landscape concentrations of old forest. Direction also includes providing for old forest functions, such as connectivity of habitat over a range of elevations to allow migration of wide-ranging old-forest-associated species.

OSV use within late-successional-forest habitats can have the following potential direct effects to individuals or their habitat (Gaines et al. 2003): Disturbance and potential for 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.

Potential indirect effects include:

- Altered or dispersed movement as caused by a route or human activities on or near a route.

Based on CWHR habitat types, there are 155,139 acres of high-capability reproduction habitats for fisher on Lassen National Forest.

Areas on Lassen National Forest having a combination of fewer roads, higher canopy cover, and physical structure are typically more abundant in steep slopes and canyons on the Sierran portion of Lassen National Forest (e.g., North Fork Feather River) and Rock Creek/Screwdriver Creek, draining east off of Chalk Mountain into the Pit River west of Lake Britton.

Alternatives 1, 2, 3, and 4

Snow has been posited as limiting suitable fisher habitat and fisher distribution at higher elevations (Aubry and Houston 1992, Powell and Zielinski 1994, Weir et al. 2003, all cited in Lofroth et al. 2010). This is consistent with fisher studies elsewhere in North America that indicated that some snow conditions may limit fishers because they are not efficient at traveling and hunting in terrain covered by soft deep snow. However other factors associated with increasing elevation (e.g., lower forest productivity, changes in forest structure) may also limit fisher distribution through their influence on the abundance of structures critical for denning and resting, and abundance and availability of prey (Franklin and Dyrness 1988, Meidinger and Pojar 1991, McNab and Avers 1994, all cited in Lofroth et al. 2010).

Gaines et al. (2003) described a number of potential direct and indirect effects of linear travel routes to fisher, but identifies increased vulnerability to trapping mortality as the single risk factor associated with winter recreation/snowmobiling routes. However, increased vulnerability is unlikely to be a risk factor under any alternative because trapping of fisher is prohibited in the state of California.

Fishers' tolerance of human presence and various activities appears to range from little effect resulting from moderate degrees of human activities to avoidance and displacement if disturbance occurs near den sites. Foraging behavior of mid-sized carnivores in forested areas may be disrupted along groomed trails and other travel corridors. Displacement or avoidance may occur due to noise of snow machines or to human presence. Snowmobile trails may facilitate travel for some carnivores, but compaction of snow due to grooming or from snowmobile use off existing roads or trails may adversely affect the subnivean habitat of prey species and, therefore, impact foraging opportunities for carnivores. Mortality resulting from an accidental collision with a snowmobile is possible, but the probability is low. Intentional killing of carnivores by a snowmobiler is possible, but most likely it would only occur in rare, isolated incidents (Olliff et al. 1999).

Although initially believed to be primarily nocturnal, more recent studies have reported that fishers tend to be crepuscular (i.e., most active at sunrise and sunset). Periods of activity are generally 2 to 5 hours

long and often are separated by longer stretches (0.10 hour) of inactivity (Arthur and Krohn 1991; Johnson 1984; Kelly 1977; Powell 1993, all cited in Weir and Corbould 2007).

High-value habitat acreages were derived from habitat modeling based on CWHR habitat types and value rankings (CDFW 2014). Gaines et al. (2003) suggest a human influence scale where less than 30 percent influence in high-value habitat is rated low, 30 percent to 50 percent influence is rated moderate, and greater than 50 percent influence is rated high. The trail-effect zone from noise and sight disturbance (200 meters; 656 feet) along designated groomed routes would affect 9,423 acres or 5.9 percent of existing high-value habitat acres (Table 60) which, at 5.9 percent, is a very low human influence rating. Designated ungroomed routes under all alternatives would influence 2,160 acres (1.3 percent), which again is very low disturbance.

Table 60. Acres of fisher high-suitable habitat within 200 meters of designated groomed and designated ungroomed routes

Habitat	Alt 1	Alt 2	Alt 3	Alt 4
Groomed Route	9,423	9,423	9,423	9,423
Ungroomed Route	2,160	2,160	2,160	2,160

Source: GIS query, 10/10/2015

Area open to cross-country OSV use varies among the alternatives. A total of 155,139 acres of fisher high-value habitat currently exist within the project area. Under the existing condition (alternative 1), areas open to OSV travel contain 145,559 acres of fisher high-value habitat, equating to 93.9 percent of existing (Table 61). Open areas are similar under Alternative 2 (Proposed Action) totaling 145,123 acres of high value habitat. Additional areas proposed for OSV restriction under Alternative 3 provide the least exposure to OSV disturbance by reducing acres of high value habitat potentially exposed to OSV disturbance to 127,634 acres (82.3 percent of total). Alternative 4 reduces exposure further than alternatives 1 and 2, but less than Alternative 3 (141,079 acres). Because there are no designated routes concerning cross-country OSV travel, the entire unrestricted area was considered in these calculations, which rate as high human influence under the index proposed by Gaines et al. (2003), which is based on the assumption of access afforded by roads and trails. In reality, OSV area use is actually restricted by such factors as access, topography, vegetation type and density. Therefore, the human rating for cross-country OSV use is likely much lower than portrayed in Table 61. In addition, recent fisher sightings and reported denning occurrences are currently concentrated in the southwestern portion of the project area. The majority of areas proposed open to OSVs are not known to currently support fishers.

Table 61. Fisher high-suitable habitat within 200 meters of area open to OSV use

Habitat	Alt 1	Alt 2	Alt 3	Alt 4
OSV Open Area (acres)	145,559	145,123	127,634	141,079
OSV Open Area (% of existing)	93.9	93.4	82.3	90.9

Source: GIS query, 10/10/2015

Area Currently Known to be Utilized and/or Occupied by Fisher

As stated above, only a small portion of the project area is currently utilized by fishers as a result of movements from the population introduced onto Sierra Pacific Industries lands. Based on maps shown in Powell et al. (2014), 8 subwatersheds in proximity to fisher locations contain approximately 245,220

acres of land administered by the Lassen National Forest. Under the existing condition (Alternative 1) OSV use is restricted from use primarily within designated wilderness areas on about 87,515 acres, leaving about 64 percent of the watersheds open to OSVs (Table 62). Additional restricted areas proposed under Alternative 2 decrease OSV open areas to about 58 percent of the watershed area. Alternative 3 proposed the most restricted area within the watersheds, leaving 56 percent of the area open to OSVs. Alternative 4 would increase restricted area slightly (by 119 acres) in comparison to Alternative 1.

Increased vulnerability to trapping resulting from available access is not a risk factor for the species. Trapping of fishers is currently illegal in the state of California.

Table 62. OSV open area within fisher concentration areas

Habitat	Alt 1	Alt 2	Alt 3	Alt 4
OSV Open Area (acres)	157,705	141,922	137,451	157,586
OSV Open Area (% of existing)	64.3	57.9	56.0	64.3

Cumulative Effects

Vegetation management or fuels management projects are projected to occur within Lassen National Forest lands occupied, utilized, or suitable for use by fishers. These include timber harvest, fuels reduction, and associated activities, as well as road maintenance, firewood gathering, special use activities. Recreational activities such as camping, hiking, hunting and fishing are ongoing and expected to continue at levels similar to existing. Use of roads within fisher habitats for public and administrative access contributes a level of disturbance during a portion of the breeding season. This is incorporated into the environmental baseline for disturbance. Timber harvest and state and private lands within ¼ mile of fisher habitats may impact habitat availability outside FS lands and may increase disturbance locally. In summary, ongoing and reasonably foreseeable actions may be additive locally, but are not expected to contribute substantial impacts to effects discussed for this project under any alternative.

Determination Statement

Alternatives 2, 3, and 4 would have a low level of risk to existing and future introduced fisher. Therefore, alternatives 1, 2, 3, and 4 of the Lassen National Forest Over-snow Vehicle Use Designation Project may affect individuals, but **will not jeopardize** the fisher based on the following rationale:

- The OSV proposed actions will not modify any suitable habitat within the OSV area.
- OSV use is unlikely to influence foraging or prey availability because fishers tend to be crepuscular when OSV use is low to non-existent.
- The noise would be intermittent and of short duration within and in proximity to suitable fisher habitat
- Potential for direct impacts to fisher due to collisions with OSVs is low.

Gray Wolf (*Canis lupus*)

Threatened

Species Account

In February 2011, the Oregon Department of Fish and Wildlife radio-collared a single male gray wolf, designated OR7. Tracking data indicates OR7 entered California on December 28, 2011 and travelled hundreds of miles within the state. As of February 2014, OR7 had returned to Oregon.3 Future movements of OR7 are unpredictable and it is beyond the scope of this BA to predict whether OR7 will move back into California, remain in Oregon or travel elsewhere. However a CDFW trail camera in Siskiyou County, California recorded a lone canid in May and July, 2015. Additional cameras deployed in the vicinity took multiple photos showing two adults, and five pups (CDFW 2015b). This group has been designated as the Shasta Pack by CDFW. Because a portion of the Lassen National Forest lies within Siskiyou County and the pack's location has not been specified, it is possible that gray wolves could occur within the project at any given time in the future. There are currently no known dens or rendezvous sites within the project area.

Habitat Status

Gray wolves are habitat generalists inhabiting a variety of plant communities, typically containing a mix of forested and open areas with a variety of topographic features. Historically, they occupied a broad spectrum of habitats including grasslands, sagebrush steppe, and coniferous, mixed, and alpine forests. They have extensive home ranges and prefer areas with few roads, generally avoiding areas with an open road density >1.0 mi/mi^2 (Witmer et al. 1998).

Dens are usually located on moderately steep slopes with southerly aspects within close proximity to surface water. Rendezvous sites, used for resting and gathering, are complexes of meadows adjacent to timber and near water. Both dens and rendezvous sites are often characterized by having nearby forested cover remote from human disturbance. Wolves are strongly territorial, defending an area of 75 to 150 mi^2, and home range size and location is determined primarily by abundance of prey. Wolves feed largely on ungulates and beavers, but will consume small mammals and fish to a lesser extent (Verts and Carraway 1998). Wolves are generally limited by prey availability and threatened by human disturbance. Generally, land management activities are compatible with wolf protection and recovery, especially actions that manage for viable ungulate populations.

Because wolves are habitat generalists, vegetation types and structural conditions across the project area are potentially open to utilization. However, more suitable areas would contain lower levels of human occurrence, including areas of lower road densities (Paquet and Carbyn 2003, Thiel 1985, and adequate prey (i.e. ungulate) availability (USDI Fish and Wildlife Service 1987). More suitable areas occur in the northern and western portions of the Hat Creek Ranger District; areas within and adjacent to Lassen Volcanic National Park; and south southern portions of the Almanor Ranger District.

Direct and Indirect Effects

Resource Indicators and Measures

Resource indicators and measures (FSH 1909.15, 12.5) used in this analysis to measure and disclose effects to gray wolf are listed in Table 63.

Table 63. Gray wolf resource indicators and measures for assessing effects

Resource Element	Resource Indicator	Measure	All Alternatives
Habitat Quality	Habitat Removal or Degradation	Acres and percentage of Habitat Removed or Degraded	0
Species Use of Available Habitats	Disturbance and/or Displacement from All or Portions of a Species Home Range	Overlap of acres of disturbing or potentially displacing activity within species' disturbance distance thresholds	See analysis
Injury or Mortality	Potential for Injury or Mortality of Individuals	Risk Level of Potential for Injury or Mortality	Very Low

Large and mid-sized carnivores are unique in their response to human-induced habitat changes due to their large spatial habitat needs and their sensitivity to landscape patterns, including road edge effects and road density (Buskirk and Zielinski 2003). OSV use and associated activities within habitats for wide-ranging carnivores can have the following effects to individuals or their habitat (Gaines et al. 2003). Potential direct effects include: (1) Displacement or avoidance away from 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 a 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 Sierra Nevada red fox or wolverine would negatively affect that particular animal, but the likelihood of occurrence is assumed to be rare.

Potential indirect effects include behavioral modification such as altered or dispersed movement as caused by a route or human activities on a near a route.

Common Effects of Travel Management

Effects to gray wolves is described in terms of those parameters that threaten wolves through human contact and conflict (i.e., livestock/grazing concerns), through activities that compromise denning or rendezvous sites, or through activities that affect prey base.

Human Conflict

Wolves initially experienced population declines due mainly to conflicts with humans. This included human settlement, direct conflict with livestock, a lack of understanding of wolf ecology and habits, and the subsequent eradication programs (USDI Fish and Wildlife Service 1987). Today, human conflict still exists most notably over livestock depredations and the associated economic losses.

Denning and Rendezvous Sites

Wolves may use den sites from year to year and certain areas may contain several den sites that are used in different years by wolves (USDI Fish and Wildlife Service 1987). Wolf packs appear sensitive to human disturbance near den sites and may abandon the site (Ballard et al. 1987). Subsequently, most den sites are located away from trails and backcountry campsites.

Rendezvous sites refer to specific resting and gathering areas used by wolves during the summer and early fall. Several rendezvous sites are used with the first one generally located between 1 to 6 miles from the natal den. Rendezvous sites are used by a pack until the pups are mature enough to travel with the

adults, generally early autumn. Wolves appear to be most sensitive to human disturbance at the first rendezvous site and become less sensitive at later sites. However, wolf response to human disturbance is due to a variety of factors including specific setting, individuality of wolves, and whether the population is exploited or protected (USDI Fish and Wildlife Service 1987).

Prey Base

Wolves primarily prey on ungulates (USDI Fish and Wildlife Service1987). During all seasons, ungulates constitute the highest percentage of biomass. Because they are an important prey item, factors affecting ungulate distribution and abundance (e.g., habitat and access management, winter range productivity) also affect wolves. Mule deer can be expected to provide the most frequent foraging opportunities for wolves because they are the most numerous and accessible ungulate within the planning area. Due to seasonal overlap between the proposed activities (over snow vehicle use) and potential effects to wolf prey base, impacts considered in this analysis are confined primarily to mule deer occurrence on winter range.

There are no effects to den or rendezvous sites since these sites are not present in the project area, No impacts to structure and composition of habitats would occur under any alternative. Due to proximity to known wolf locations to the north, wolves may be transient in the project area. However, since there have been no recent reported sightings and no known mortalities it is assumed that the existing potential for direct effects as a result of injury or mortality due to vehicle collisions is very low.

Incidental disturbance of individual wolves from OSV use of established routes and cross-country travel is possible. The degree of effect is likely related to the intensity and duration of OSV disturbance. Studies of OSV use and wolf movements in Voyagers National Park (NPS 1996 cited in Olliff 1999) have shown that wolves tended to avoid areas of OSV activity in restricted-use areas. The studies also showed that repeated avoidance or displacement could result in permanent displacement, an impact to an animal's winter energy budget, and/or a conditioning of the animal to avoid certain areas. The literature also shows that wolves both used and avoided roads and trails designated for winter use. Although wolves use OSV trails for travel and foraging, they show decreased use or avoidance of roads and trails that received higher levels of human presence (Olliff et al. 1999, Whittington et al. 2005).

OSV use of groomed routes is expected to be frequent under all alternatives. Consequently, there is an increased likelihood that wolves would avoid these areas. All alternatives contain nearly identical amounts of groomed trails (406 to 408 miles); therefore the effect of groomed trails is similar. Existing linear routes (i.e., roads and trails) in areas outside groomed routes open to OSV travel (including existing roads, trails) are expected to receive less human use resulting in a decreased degree of disturbance and potential displacement of wolves. Areas outside of existing linear routes and open to cross-country are also expected to receive less OSV use due to potential for physical barriers and slope limitations, although open meadows or parks adjacent to linear routes may attract more use. The amount of area open to OSV travel varies by alternative. Alternative 1 is the least restrictive, prohibiting OSV use within 173,260 acres. Alternative 4 restricts travel on within 183,750 acres while the proposed action provides restrictions on 202,900 acres. Alternative 3 is the most restrictive; prohibiting OSV travel on 271,330 acres. Both the proposed action and Alternative 3 restrict travel in areas below 3,500 feet elevation that include portions of mapped mule deer winter range.

Impacts to Primary Prey

Wintering deer are sensitive to disturbances of all kinds. Both OSVs and cross-country skiers are known to cause wintering ungulates to flee (Freddy et al. 1986). Dorrance et al. (1975) found that OSV traffic resulted in increased home range size, increased movement, and displacement of deer from areas along

trails. Direct environmental impacts of OSVs include collisions causing mortality and harassment that increased metabolic rates and stress responses (Canfield et al. 1999 in NPS 2007).

No groomed or ungroomed designated OSV routes occur within mule deer winter range under any alternative. However, OSV use of existing linear routes and cross-country travel is allowed within winter range at some level under all alternatives. Approximately 119,333 acres of mule deer winter range occurs within the project area. A total of 59,453 acres of winter range (roughly 50 percent of existing) is closed to OSV use under Alternatives 1 and 4 (Table 64). Roughly 34,000 acres (34,283, 29 percent) are open, but receive low to no use under the OSV use assumptions, and 25,601 acres (21 percent) did not meet the criteria for high, moderate, or low OSV use assumptions. Therefore, under alternatives 1 and 4, mule deer would have the potential to be subject to disturbance, mortality, injury, or altered movement from low to no OSV use across 50 percent of their winter range. OSV use would be restricted on an additional 15,000+ acres of winter range under both the Proposed Action and Alternative 3, totaling approximately 63 percent of existing mule deer winter range on the Lassen National Forest. Therefore, under alternatives 2 and 3, mule deer would have the potential to be subject to disturbance, mortality, injury, or altered movement from low to no OSV use across 37 percent of their winter range.

Table 64. OSV area restrictions by alternative

OSV Management	Current OSV Management	Proposed Action Designations	Alternative 3 Designations	Alternative 4 Designations
Total Area (Acres)	173,260	202,900	271,330	183,750
Below 3,500 Feet in Elevation Included in Above Total (Acres)	0	29,130	29,130	0
OSV Restricted within Mule Deer Winter Range (Acres)	59,453	74,719	74,686	59,453

Summary of Effects

By comparison, Alternative 3 provides the largest amount of area where OSVs would be excluded, thereby potentially producing the lowest amount of disturbance spatially. The Proposed Action, Alternative 4, and Alternative 1 follow in order of increasing disturbance potential to wolves based on total acres available for OSV use. However, because wolves are known to follow prey species seasonally, potential effects during the project's active period (December through April) are more likely to occur at lower elevations where deer would be distributed during that time of year. While all alternatives provide some disturbance-free portions within winter range, both the Proposed Action and Alternative 3 provide the largest amount of OSV-restricted area within mule deer winter range.

Cumulative Effects

Vegetation management or fuels management projects are projected to occur within Lassen National Forest lands suitable for use by wolves. These include timber harvest, fuels reduction, and associated activities, as well as road maintenance, firewood gathering, special use activities , Recreational activities such as camping, hiking, hunting and fishing are ongoing and expected to continue at levels similar to existing. Existing levels of livestock grazing may incur wolf-livestock conflicts if wolves become established, but because livestock are normally present on allotments during the snow-free period, overlap of effects with this project are unlikely. Use of roads for public and administrative access contributes a level of disturbance primarily during the snow-free period. This is incorporated into the environmental baseline for disturbance. Livestock on state and private lands adjacent to suitable habitats may increase risk of conflicts locally. In summary, ongoing and reasonably foreseeable actions may be additive locally, but are not expected to contribute substantial impacts to effects discussed for project under any alternative.

Determination Statement

All alternatives of the Lassen National Forest Over-snow Vehicle Use Designation Project would have a low level of risk to wolves. Therefore, Alternatives 1, 2, 3, and 4 of the Lassen National Forest Over-Snow Vehicle Use Designation Project **may affect, but are not likely to adversely affect** gray wolves based on the following rationale:

- There are currently no known established wolf packs within the project area.
- There are no known denning or rendezvous sites within the project area.
- The noise would be intermittent and of short duration within habitats suitable for wolves.
- Potential for direct impacts to wolves due to collisions with OSVs is low.
- Wolves are less likely to occur within most of the project area from December through April due to seasonal elevation shifts of prey species.
- Approximately 50 percent of mule deer winter range would be restricted from OSV use under all alternatives.

Valley Elderberry Longhorn Beetle

Threatened

Species Account

The valley elderberry longhorn beetle originally occurred in elderberry thickets in moist valley oak woodland along the margins of the Central Valley in California (USDI Fish and Wildlife Service 1984). The habitat of this insect has now largely disappeared throughout much of its former range due to agricultural conversion, levee construction, and stream channelization. Remnant populations are found in the few remaining natural woodlands and in some State and county parks. Critical habitat has been designated in Sacramento County along the American River in the City of Sacramento and along the American River Parkway.

Habitat Status

The project area falls within the historical range of this species and potential suitable habitat occurs below 3,000 feet in elevation along the foothills in the southwest portion of the forest (watersheds of Antelope, Deer, Mill and Butte Creeks, Tehama and Butte Counties). Other riparian zones below 3,000 feet in elevation are within the Pitt River watershed around Lake Britton, Shasta County. However, review of USFWS species location information (USDI Fish and Wildlife Service 2014a) shows that lands administered by the Lassen National Forest (i.e., project area) occur outside the distribution of the nearest presumed extant species occurrences (i.e., southern and western Butte County; south-central and central Tehama County). In addition, over-snow vehicles are unlikely to occur at the lower elevations (i.e., less than 3,000 feet) inherent in this species' distribution with an even lower probability of impacts to potentially suitable habitats. Therefore, the wildlife biologist's determination is that all alternatives will have **no effect** on the valley elderberry longhorn beetle.

Direct, Indirect, and Cumulative Effects

Resource Indicators and Measures

Resource indicators and measures (FSH 1909.15, 12.5) used in this analysis to measure and disclose effects to valley elderberry longhorn beetle are listed in Table 65.

Table 65. Resource indicators and measures for assessing effects to valley elderberry longhorn beetle

Resource Indicator and Effect	Measure	Alternatives 1 and 2	Alternative 3	Alternative 4
Potential for injury or mortality of individuals	Percentage of habitat affected within the known extant range of the species	0	0	0

Review of USFWS species location information (USDI Fish and Wildlife Service 2014a) shows that lands administered by the Lassen National Forest (i.e. project area) occur outside the known distribution of the nearest presumed extant species occurrences (i.e. southern and western Butte County; south-central and central Tehama County). In addition, over-snow vehicles are unlikely to occur at the lower elevations (i.e. less than 3,000 ft) inherent in this species' historical distribution with an even lower probability of impacts to potentially suitable habitats. All areas within historical distribution are located outside moderate and high OSV use categories. There are no plowed parking lots or groomed trails that would facilitate trail or off-trail use within 4 miles of potential habitat where OSV use is allowed, under all alternatives.

Determination Statement

All alternatives of the Lassen National Forest Over-Snow Vehicle Use Designation Project will have no effect on the valley elderberry longhorn beetle or its designated critical habitat based on the following rationale:

- There are no known historic or recent occurrences of the species within the project area.
- The project area is located outside the known extant distribution of the species.
- There are no plowed parking lots or groomed trails within 4 miles of the historical distribution of the species.
- Areas within the species' historical distribution are located at elevations below 3,000 feet in areas outside moderate and high OSV use categories.

Valley Elderberry Longhorn Beetle Designated Critical Habitat

There is no designated critical habitat for Valley elderberry longhorn beetle within the Lassen OSV area; hence there is **no effect** to the designated critical habitat.

Western Yellow-billed Cuckoo (*Coccyzus americanus*)

Threatened

Species Account

Western yellow-billed cuckoos are California State endangered and were once considered widespread and common throughout lowland California, but numbers have declined due to loss of habitat (Grinnell and Miller, 1944; Gaines and Laymon, 1984; Garrett and Dunn, 1981). Now, western yellow-billed cuckoos are considered uncommon to rare summer residents of valley foothill and desert riparian habitats. River drainages that they are known to nest by include upper Sacramento Valley portions of the Sacramento River, the Feather River in Sutter County, Owens Valleys, South Fork Kern River, Santa Ana River, Amargosa River, lower Colorado Rivers, and San Luis Rey River. Gaines (1977a) estimated breeding populations along the California side of the Colorado River to be around 180 pairs.

There are no known occurrences of this species found on the Lassen National Forest. Potential suitable habitats occurring downstream from the Lassen National Forest and outside the project area will not be affected by any alternative.

Habitat Status

Western yellow-billed cuckoos breed in large blocks of riparian habitat that contain a dense understory, and cottonwood trees appear to be an important component of foraging habitat. Willows are the dominant component of the vegetation for nesting and foraging, but they are noted to use walnut woodlands, orchards, and mesquite when willows are not present. Gaines (1974b) noted a preference of vegetated areas with a minimum size of 300 feet in width and 25 acres in size. Typically there is dense, low-level or understory foliage that abuts slow-moving watercourses, backwaters, or seeps. This species returns from South American wintering areas in June, and departs by late August or early September (Small 1994).

Direct and Indirect Effects

There are no known occurrences of this species found on the Lassen National Forest. In addition, cuckoos are migratory and are not expected to be in the general vicinity of the project area when snow is on the ground. Potential suitable habitats occurring downstream from the Lassen National Forest and outside the project area will not be affected by any alternative.

OSVs 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 (USFS National Core BMP Rec-7: Over-Snow Vehicle Use; please refer to McNamara (2015) for additional information). All of the project alternatives will maintain a minimum snow depth of 12 inches in areas open to cross-country use, which should provide sufficient depth to protect the ground surface.

Species that migrate, such as yellow-billed cuckoos, utilize riparian and/or aquatic environments during the breeding season. 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 (USFS 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, including the existing condition, is expected to be adequate to protect aquatic and riparian habitats from measurable impacts to vegetation or water quality (McNamara 2015).

Cumulative Effects

None; the Lassen National Forest Over-snow Vehicle Use Designation Project will not result in measurable direct or indirect impacts to yellow-billed cuckoo and, therefore, there will be no cumulative impacts to this species.

Determination Statement

All alternatives of the Lassen National Forest Over-snow Vehicle Use Designation Project will have no effect on the Western Yellow-billed cuckoo as they are not known from the project area and no downstream habitat effects are expected. Should cuckoos return to their historical habitat, OSV activities would occur during winter when cuckoos are not within the vicinity of the project area.

Western Yellow-billed Cuckoo Proposed Critical Habitat

Proposed critical habitat is located more than 10 miles from the project area.

Determination Statement

The Lassen National Forest Over-Snow Vehicle Use Designation Project project will have no effect on the Proposed Critical Habitat for Western Yellow-billed cuckoo as it does not intersect the project area.

Forest Service Sensitive Species

Late-successional Forest Species

Pacific Marten (*Martes caurina*)

Regional Foresters Sensitive Species

Species Account

The Pacific marten (*Martes caurina*) is a Region 5 Forest Service Sensitive species and a Management Indicator Species (MIS) for the late seral, closed canopy coniferous forest habitat component. Additional information for the marten as an MIS is provided in the section entitled Management Indicator Species.

This species was previously classified as American marten (*Martes americana)* but recent genetic and morphological evidence led to a re-classification as Pacific marten (*Martes caurina*) and of the subspecies *sierrae* (Dawson and Cook 2012).

There are numerous marten detections documented on the Lassen National Forest, primarily in three areas of concentration. The largest concentration of observations, in the Swain Mountain Experimental Forest area, is likely the result of unequal survey effort (i.e., greater in the Swain Mountain Experimental Forest) as part of a research project. Smaller concentrations occur in the Humboldt Peak area and on National Forest System lands adjacent to the Latour State Forest. Systematic surveys conducted by PSW Research suggest that persistent marten occurrences are primarily associated with late-successional habitats in and near Lassen Volcanic National Park (Zielinski et al. 2005).

Habitat Status

Marten prefers coniferous forest habitat with large diameter trees and snags, large down logs, moderate-to-high overstory tree canopy, and an interspersion of riparian areas and meadows. Important habitat attributes are: vegetative diversity, with predominately mature forest; snags; dispersal cover; and large woody debris (Allen 1987). Spencer et al. (1983) found that martens select stands with 40 to 60 percent overstory tree canopy for both resting and foraging and avoided stands with less than 30 percent overstory tree canopy. Martens generally avoid habitats that lack overhead cover (Allen 1984), presumably because these areas do not provide protection from predators (Buskirk and Powell 1994, Spencer et al. 1983).

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 comprised of an abundance of large dead and downed wood (Buskirk and Powell 1994 *in* Buskirk and Ruggiero 1994, Zielinksi 2013). 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, Zielinksi 2013). Riparian areas, especially near mature forest, are important for foraging (Zielinksi 2013). The abundant large trees and dead-wood structures associated with marten presence provide prey resources, resting structures, and escape cover (Zielinksi 2013). Rest structures typically include snags, logs, and stumps; trees and snags used for resting are often the largest available (>35 inches in diameter) (Purcell et al. 2012). Rest structures vary with season such that above-ground cavities are used in summer and subnivean logs, snags, and stumps are used during the winter (Zielinski 2013). Den structures typically include arboreal cavities in live trees, snags (Gilbert et al. 1997, Raphael

and Jones 1997, Bull and Heater 2000) and logs, rock crevices and red squirrel middens (Ruggiero et al. 1998). Resting and denning structures may be the most limiting resource for marten on the landscape since this species uses multiple structures within their ranges (Purcell et al. 2012).

Two marten dens have been positively identified in the Lake Tahoe basin with a third possible, although there are likely greater than 30 breeding females in the Lake Tahoe Basin Management Unit in any given year, each using many dens for kit rearing (Slauson, pers. comm. 2011). All known or possible dens were discovered opportunistically in 2009 and 2012, and are predominantly on the western and southern portion of the basin. One den that was positively identified in 2012 is located at an elevation of approximately 6,650 feet and within the California Wildlife Habitat Relationships (CWHR) Jeffrey Pine type, class 5M. The den identified in 2009 is located at an elevation of approximately 6,560 feet and within the CWHR Sierra Mixed Conifer type, class 4M. Moriarty et al. (Table 1, 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.

Because marten predictive denning habitat models are currently lacking, the best that can be done at this point, is to utilize 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 utilizing the reproductive component of CWHR as a predictive model (B. Zielinksi, personal communication). Based on CWHR habitat types, currently, there are 327,810 acres of high-capability reproduction habitat[12] on Lassen National Forest.

Competition and Predation

Predation on marten by coyotes, red foxes, and great-horned owls has been documented (Buskirk and Powell 1994). Roads that are driven during the winter months provide travel corridors for coyotes to enter into marten winter habitat, affecting marten through competition or direct predation. Competition by coyotes has been identified as an important threat within lynx habitats. Since both lynx and marten have unique morphologies that allow 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 OSV trails, can eliminate this advantage and increase access for predators and competitors. Perrine et al. (2008) 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 (USDI Fish and Wildlife Service 2015h) noted there isn’t any information to indicate that coyotes are increasing at any of the Sierra Nevada red fox sighting areas.

Threats

Some of the threats facing martens include habitat loss and fragmentation, especially clear-cutting, fuel reduction treatments, and wildfire (Zielinksi 2013). Marten are also sensitive to recreation activities, particularly snow activities (e.g., ski facilities). In addition, marten occupancy and geographic range is predicted to be influenced by climate change such that the species will be highly sensitive to climate change, and would probably experience the largest climate impacts at the southernmost latitudes (i.e., in the southern Sierra Nevada) (Lawler et al. 2012).

[12] 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

Direct and Indirect Effects

Resource indicators and measures (FSH 1909.15, 12.5) used in this analysis to measure and disclose effects to species are marten in Table 66.

Table 66. Resource indicators and measures for assessing effects to marten

Resource Indicator and Effect	Measure	Alternatives 1 and 2	Alternative 3	Alternative 4
Potential for disturbance to individuals from OSV use 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	Percentage of habitat affected and percentage of habitat within high and moderate OSV use categories	91/41	81/34	89/39

The late-successional forest group is comprised of northern spotted owl, California spotted owl, northern goshawk (goshawk), marten, and fisher. These species are associated with late-successional forests that 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. Growing concern over habitat fragmentation for late-successional–forest-associated species has been expressed by individuals, environmental groups, and agency biologists. Various studies have shown that this species group is vulnerable to disturbance, changes in habitat, or displacement by habitat generalists.

As found in the Sierra Nevada Forest Plan Amendment (USDA FS PSW Region 2004), habitat types important for late-successional forest 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. The SNFPA provides management direction for Old Forest Emphasis Areas to maintain or develop old forest habitat in areas containing the best remaining large blocks or landscape concentrations of old forest. Direction also includes providing for old forest functions, such as connectivity of habitat over a range of elevations to allow migration of wide-ranging old-forest-associated species.

The most common interactions between OSV 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 were other interactions identified. Trapping of marten, or any of the special-status species under consideration, is not legal in the state of California and, therefore, will not be considered as a potential impact in this analysis.

OSV use within late-successional-forest habitats can have the following potential direct effects to individuals or their habitat (Gaines et al. 2003): Disturbance and potential for injury or mortality to individuals from vehicle collisions.

[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

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 (marten only, but as prey base for several of the other late-successional forest species under consideration).

In the winter, OSV (i.e., snowmobile) use compacts snow and creates noise. Data for one study conducted in the Lake Tahoe Basin Management Unit found 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 <20 percent of a typical home range (Zielinski et al. 2008).

As previously described, the main direct and indirect effects of OSV use on marten include potential for disturbance to individuals from OSV use and increased human presence, injury or mortality of individuals, or altered movement due to OSV use. As OSV trail use is an existing condition, animals that occur in the areas affected by the OSV Program 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/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 OHV/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. In addition, martens tend to avoid open areas preferred by OSV users, decreasing the potential for disturbance or collision.

Based upon personal communication with Bill Zielinski, potential impacts of 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. Existing SNFPA direction for marten den sites[15] has essentially been useless for martens since there are very few documented den sites.

As previously noted, martens access subnivean space beneath the snow to prey on subnivean species and they use a variety of structures, including rock crevices, for maternal den sites and subnivean habitat could be compacted by OSV use. Although the forested structure or connectivity of marten habitat would not be physically altered by OSV use or related activities, martens could be subject to OSV-related impacts from snow compaction, including crushing or burying while foraging in the subnivean space beneath the snow. 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. 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. The habitat query used for this analysis overestimates potential reproductive habitat because it is based on coarse habitat filters. However, it may still be useful to compare relative differences by alternative.

Under alternatives 1 and 2, 91 percent of reproductive habitat is or would be open to OSV use and a total of 41 percent of habitat falls within the combined high and moderate OSV use categories (Table 15). Under alternative 3, 81 percent of reproductive habitat is open to OSV use and 34 percent is within high and moderate use areas combined. Under alternative 4, the percentages of reproductive habitat open to OSV use and within high and moderate OSV-use categories combined are 89 percent and 39 percent, respectively. There are no known marten den sites within the analysis area.

Table 67. Acres of marten high reproductive habitat and percentages () with potential for disturbance, mortality, injury, modification by OSV use, or snow compaction effects, by alternative and OSV use assumption

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Acres Closed to OSV Use	28,749 (9)	28,749 (9)	63,076 (19)	36,277 (11)
Acres (High OSV Use Assumption)	63,585 (19)	63,585 (19)	57,354 (17)	63,191 (19)
Acres (Low to No OSV Use Assumption)	67,112 (20)	67,112 (20)	60,875 (19)	65,284 (20)
Acres (Moderate OSV Use Assumption)	70,613 (22)	70,613 (22)	55,529 (17)	67,021 (20)
Acres (Areas Outside of Use Assumptions)	97,750 (30)	97,750 (30)	90,977 (28)	96,037 (30)
Total Acres Habitat Open to OSV Use	299,061 (91)	299,061 (91)	264,734 (81)	291,533 (89)
Total Acres High Reproduction Habitat Across the Lassen NF	327,810 (100)	327,810 (100)	327,810 (100)	327,810 (100)

[15] "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."

Cumulative Effects

Past, present, and foreseeable future actions that could result in a cumulative impact to marten, when combined with alternatives 1, 2, 3 or 4, include the Castle DFPZ 2 vegetation management project, Dutch and Tamarack fire salvage projects, firewood cutting, Christmas tree cutting, non-motorized winter recreational activities, or use of roads by wheeled vehicles during the season of overlap between OSVs and wheeled vehicles. The Castle DFPZ 2 is proposed on 39 acres and the Dutch and Tamarack Fire Salvage Projects would remove standing dead or dying trees across roughly 1,500 and 1,300 acres, respectively, of coniferous forest including some suitable marten reproductive habitat. However, none of these areas are within 0.25 mile of any documented marten observations. In addition, vegetation and fuels management activities in recent years have included primarily thinned, masticated, and/or burned vegetation to reduce the potential for catastrophic wildfires. These projects are usually excluded from larger CWHR types and/or management prescriptions have emphasize recruitment of large snags and logs, as well as retention of large conifer, all important attributes of marten habitat. Marten habitat also overlaps with areas open to Christmas tree cutting and firewood cutting. However, wheeled motorized vehicles may not be used off of authorized Forest Service roads or motorized trails to scout for fuelwood or to harvest Christmas trees (USDA Forest Service 2014), 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 marten breeding season under alternatives 1, 2, and 3. Under alternative 4, in which trail grooming would begin at the discretion of the groomer, there is the potential for a somewhat larger degree of overlap during years in which heavy snowfall begins early. Use of roads within marten 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 denning season, but would the potential for impact would be expected to be localized. 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. 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 potential for this type of disturbance is unknown; state and privately-held lands make up about 20 percent of the area within the forest boundary. In summary, ongoing and reasonably foreseeable actions may be additive locally, but are not expected to contribute significant impacts to those discussed for marten for the project under any of the alternatives. In addition, seasonal LOPs that prevent disturbance to marten denning sites will be used to minimize disturbance to these sites once they have been identified.

Determination Statement

Alternatives 1, 2, 3, and 4 of the Lassen 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:

- 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 suitable marten habitat is expected to be relatively low under all alternatives
- 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.

- Noise-based disturbance is not a key threat to the species.
- Although roughly 90 percent of calculated high reproductive habitat would be open to OSV use under alternatives 1, 2, and 4, and 40 percent of habitat falls within the combined high and moderate use assumptions, and 81 percent of habitat would be open to OSV use under alternative 3, and 34 percent of habitat falls within the combined high and moderate use assumptions, these numbers are based on coarse habitat filters that do not take the finer elements of marten denning habitat (rock crevices, snags, red squirrel middens, and logs) into account and, therefore, overestimate the amount of available habitat.

California Spotted Owl (*Strix Occidentalis occidentalis*)

Regional Foresters Sensitive Species

Species Account

The California spotted owl (*Strix occidentalis occidentalis*) is a Region 5 Forest Service Sensitive Species and a Management Indicator Species (MIS) for the late seral, closed canopy coniferous forest habitat.

The range of the California spotted owl is divided into two major physiographic provinces, the Sierra Nevada Province and the Southern California Province, with Tehachapi Pass as the dividing line (Verner et al. 1992). The Sierra Nevada Province is comprised of the southern Cascade and Sierra Nevada ranges, while the Southern California Province is comprised of all the mountain ranges of Southern California and the Central Coast ranges at least as far north as Monterey County (Ibid). The range of the California spotted owl was revised in 2005, based on mitochondrial deoxyribonucleic acid (mtDNA) haplotypes as follows: west slope (locally on east slope) of Sierra Nevada in California from Shasta (Pit River) and Lassen Counties south to Kern County, and mountains of central, coastal, southern, and transverse ranges of California from Monterey (south side of Carmel Valley) and Kern Counties south through San Diego County to Cuyamaca Mountains in California, and Sierra San Pedro Martir in Baja California Norte, Mexico (Gutierrez and Barrowclough 2005).

Lassen National Forest currently has 88 designated California spotted owl Protected Activity Centers (csoPAC).

Habitat Status

Across the range of this species, a broad array of habitat types such as western hemlock, mixed evergreen, mixed conifer, Douglas-fir, pine-oak, ponderosa pine, western incense cedar, redwood, Douglas-fir/hardwood, and conifer/hardwood are used (Guiterrez et al. 1995). In the Sierra Nevada Province, spotted owls occur in conifer, mixed conifer and hardwood, and hardwood forests (Verner et al. 1992). More specifically, 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 2001). Mixed-conifer forest is used most frequently 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, seven percent in ponderosa pine/hardwood forest, and the remaining three percent in foothill riparian/hardwood forest and eastside pine (Ibid).

Spotted owl home ranges, and nesting and roosting locations are strongly associated with mature coniferous forests with high tree canopy cover (≥70 percent), multilayered canopies, and an abundance of large trees and snags (Forsman et al. 1984, Bias and Guitierrez 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. It has been suggested that some level of landscape (forest) heterogeneity may be an important consideration for spotted owl management and can improve spotted owl conservation (Williams et al. 2011, Roberts and North 2012).

Bond et al. (2004) described spotted owl nesting habitat as typically comprised of “forested stands with large trees, moderate-to-high tree densities, high canopy cover, and structural complexity”. Structural complexity may be both horizontal and vertical. Habitats used for nesting typically have “greater than 70 percent total canopy cover (all canopy above 7 feet), except at very high elevations where canopy cover as low as 30 to 40 percent may occur (as in some red fir stands of the Sierra Nevada)” (Verner et al. 1992). Large snags and an accumulation of downed woody debris are typically present (Ibid).

Spotted owl habitat use and life history requirements may be discussed at spatial scales varying from the nest area (smallest) to the non-breeding home range (largest). The nest stand (approximately 100 acres) includes one or more forest stands, the nest tree, and possibly several roost sites. Nest stands may be occupied by breeding spotted owls from February until October, and are the focus of all movements and activities associated with nesting. Spotted owls may have more than one nest stand within their home range, and nest stands may be used intermittently for many years. 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). The average incubation period is 30 ± 2 days, hatching peaks May 7-21 (Sierra Nevada), and fledging (i.e., defined as young leaving the nest) occurs generally when the nestlings are 34-36 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. 1995, Miller 1989). A spotted owl ecology study on the Lassen National Forest (study area 1,200-2,100 meters) found that approximately 90 percent of juveniles fledged by July 8 (Blakesley et al. 2005b).

The following CWHR classes provide high capability nesting habitat for this species: Montane Hardwood and Red Fir (5D); and Montane Hardwood-Conifer, Montane Riparian, Sierran Mixed Conifer, and White Fir (5D and 6). Within CWHR, size class 6 is only recognized for a subset of the forest vegetation types (Montane Hardwood Riparian, Montane Riparian, Sierran Mixed Conifer, and White Fir). The following CWHR classes provide moderate capability nesting habitat for this species: Eastside Pine and Lodgepole Pine (5D). There are 388,767 acres of high-capability reproductive habitat[16] on Lassen National Forest.

Throughout the Sierra Nevada, California spotted owl nesting habitat is protected in Protected Activity Centers (PACs). The PAC 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 2004b). The csoPAC is considered to be suitable for nesting and foraging. The 88 csoPACs on the Lassen National Forest have a sum total of 27,577 acres, which are managed under that habitat allocation.

Four demographic studies of California spotted owl have been ongoing for a number of years within the Sierra Nevada: (1) Eldorado National Forest (since 1983); (2) Lassen National Forest (since 1990); (3) Sierra National Forest (since 1990); and (4) Sequoia-Kings Canyon National Park (since 1990). One of the primary objectives of the demographic studies is to monitor rate of change (lambda (λ)) in owl populations (i.e., the number of owls present in a given year divided by the number of owls present the year before). For these demographic models, a lambda of one indicates a stable population; less than one

[16] blue oak – foothill pine, Sierran mixed conifer, ponderosa pine, red fir, montane hardwood, montane hardwood-conifer , montane riparian and white fir (and to a lesser degree, Jeffrey pine) California Wildlife Habitat Relationships types 4M, 4D, 5M, 5D, 6

indicates the population is decreasing and greater than one indicates an increasing population. Lambda is estimated from models and is typically presented as an estimate of the rate of population change, along with the standard error or a 95 percent confidence interval (CI). The 95 percent confidence interval represents the reliability of the estimate of lambda. Managers typically view a population as stable if the 95 percent confidence interval overlaps a lambda of 1.

A meta-analysis of the data from 1990 to 2005 for the four spotted owl populations in the study areas concluded that, with the exception of the Lassen study area, owl populations were stable, with adult survival rate highest at the Sequoia-Kings Canyon study site (Blakesley et al. 2010). The 95 percent confidence limit for lambda in the Lassen study area ranged from 0.946 to 1.001 (estimated value 0.973), indicating a stable population.

Recent analyses from the same four demography study areas suggest that there may be a concern for decline in spotted owls within the three National Forest demography study areas in the Sierra Nevada. A preliminary analysis conducted by the Sierra Nevada Adaptive Management Project (SNAMP) in 2011 indicates that the owl population on the Eldorado National Forest may be declining, but the 95 percent confidence interval for lambda overlaps 1. (Gutierrez et al. 2012). Tempel and Gutiérrez (2013)) conclude that data from the Eldorado Density Study Area (60 percent USFS managed land in Eldorado National Forest and 40 percent private land managed timber companies) suggest a 31 percent decline in the spotted owl population size from1993 to 2010 but again, the 95 percent confidence interval slightly overlapped 1 for all parameters. Using data for an 18-year study period, Conner et al. (2013) found that the different estimators for ‘realized population change’ (expressed as ‘delta’ - ratio of population size at end time to initial population size) indicated population declines of 21 to 22 percent for the Lassen study area and 11 to 16 percent for Sierra study area, and an increase of 16 to 27 percent for Sequoia-Kings Canyon study area. The annual rate of population change (lamda) also showed a declining trend. However, similar to the analyses conducted by Tempel and Gutiérrez (in press) the confidence intervals overlapped one (1.0) for all estimators and all study areas. As stated in Conner et al. (in press) “If a population is growing (lambda greater than 1), managers cannot tell whether the growth is from internal recruitment or immigration. Likewise, if a population is declining, managers cannot determine whether the declines are due to deaths within the population or emigration. Thus, additional information on specific vital rates is necessary to understand what is driving lambda and ultimately, the mechanisms driving population dynamics.” Causation for any potential decline in occupancy is unknown.

Using data collected at 3 of the 4 long-term California spotted owl study areas, including Lassen National Forest, Connor et al. (2013) compared mean λ and Δ_t as summaries of population change over time and evaluated the use of the posterior distribution of Δ_t as a means for estimating the probability of population decline retrospectively. For the Lassen study area, estimated median Δ_t over the 18-year monitoring period was 0.78, suggesting a 21 percent decline in population size. The probability of a $\geq$15 percent decline over 18 years was 0.69, whereas the probability the population was stationary or increasing was 0.07. However, if a population is declining (mean λ <1), managers cannot determine whether the declines are due to deaths within the population or emigration. Thus, additional information on specific vital rates is necessary to understand what is driving λ and ultimately, the mechanisms driving population dynamics. Although mean λ and Δ_t are important metrics, they may not suffice for a full assessment of a population’s health (Blakesley et al. 2010).

As previously described, focused studies on northern spotted owls (Shasta-Trinity and Mendocino National Forests), a species whose biology is very similar to California spotted owls, 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). Research has been conducted to measure the effects of noise on physiological stress levels of northern and California spotted owls through the analysis of fecal corticosterone (e.g., Wasser et al. 1997, Tempel and Gutierrez 2003, Tempel and Gutierrez 2004) and fecal glucocorticoid (Hayward et al. 2011). There is difficulty in the ability to tease out background differences in fecal corticosterone and fecal glucocorticoid levels from variables such as environment, body condition, and gender (Tempel and Gutierrez 2004; Hayward et al. 2011) making cause and effect determinations of whether disturbance is related to the action being tested or some other factor. The studies varied in design, analysis, and conclusions. The study by Hayward et al. (2011) is most similar to conditions in this project in that it used off-highway vehicles. However, it is dissimilar in that exposure was applied by conducting simulated endure events in which motorcycles traveled back and forth along a 0.5 mile length of road within 5 to 800 meters of roost or nest locations for a period of one hour. Conditions such as these would only be expected on OSV routes with heavy use or near trailheads. The results from this study indicate that there were increased levels of fecal glucocorticoid, particularly in adult males in response to acute traffic exposure (i.e., and reduced reproductive success in response to this level of activity (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 NSO territories (Ibid.). There was no evidence that GC response to enduro diminished with exposure to routine road noise in May or among NSO within 50 meters of a road in July. Traffic appeared always to be highly disturbing to these NSO. The fact that male NSO 50 to 800 meters from loud roads showed lower GC response to acute motorcycle exposure compared to NSO an equivalent distance from quiet roads in July suggests that partial habituation to noise from traffic may occur in this species among individuals as long as they are a sufficient distance (> 50 meters) from the road.

Potential threats and stressors to this species 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 68.

Table 68. Resource indicators and measures for assessing effects to California spotted owl

Resource Indicator and Effect	Measure	Alternatives 1 and 2	Alternative 3	Alternative 4
Potential for disturbance to or altered movement of individuals from OSV use and increased human presence, or injury or mortality of individuals	Percentage of high-reproduction habitat and PACs affected and percentage of habitat within high and moderate OSV use categories	88/34	79/28	88/37
Potential for disturbance to or altered movement of individuals from OSV use and increased human presence, or injury or mortality of individuals	Percentage of CSO PACs affected and percentage of PACs within high and moderate OSV use categories	96/45	90/41	91/42
Potential for disturbance to or altered movement of individuals from OSV use and increased human presence, or injury or mortality of individuals	Percentage of known CSO PACs within 0.25 mile of groomed or ungroomed routes	23	23	23

The late-successional forest group is comprised of northern spotted owl, California spotted owl, northern goshawk (goshawk), marten, and fisher. These species are associated with late-successional forests that 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. Growing concern over habitat fragmentation for late-successional–forest-associated species has been expressed by individuals, environmental groups, and agency biologists. Various studies have shown that this species group is vulnerable to disturbance, changes in habitat, or displacement by habitat generalists.

As found in the Sierra Nevada Forest Plan Amendment (USDA FS PSW Region 2004), habitat types important for late-successional forest 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. The SNFPA provides management direction for Old Forest Emphasis Areas to maintain or develop old forest habitat in areas containing the best remaining large blocks or landscape concentrations of old forest. Direction also includes providing for old forest functions, such as connectivity of habitat over a range of elevations to allow migration of wide-ranging old-forest-associated species.

OSV use within late-successional-forest habitats can have the following direct effects to individuals or their habitat (Gaines et al. 2003): Disturbance and potential for 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.

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).

The Forest Service considers activities greater than one-quarter mile (400 meters) from a spotted owl nest site to have little potential to affect spotted owl nesting. OSVs passing within 0.25 mile of unsurveyed nesting/roosting habitat or an active nest have the potential to disturb nesting northern spotted owls.

Biologists on Lassen National Forest monitored specific wildlife and botanical resources, including California spotted owl (CSO) and northern goshawk (NGO), relative to their proximity, or sensitivity to designated OSV routes because CSO and NGO have a breeding season which overlaps with OSV use in the southern Cascade/ northern Sierra Nevada areas (California Department of Parks and Recreation 2010). No relationship was apparent between a PAC's distance from a snow park and whether it has been recently occupied. Based on the overlap with the breeding seasons for both NGO and CSO, it was recommended that snow grooming activities should not be allowed to extend beyond the Forest Order expiration date of March 31, and under the existing condition, it does not.

As previously described, OSV use has the potential to 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 CSO 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 potential for direct and indirect effects to csoPACSs within 0.25 mile of groomed trails would decrease after March 31 for alternatives 1 through 3, but not necessarily for alternative 4. 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 alternatives 1, 2, and 3, the snow grooming season would conclude on March 31; under alternative 4, it would be left to the discretion of the groomer and could extend for as long as 12 inches of snow remain on the ground. Therefore, under all of the alternatives, snow grooming season overlaps with a portion of the March 1 through August 31 spotted owl breeding season. However, under alternative 4, it has the potential to last longer, which is not consistent with Lassen National Forest OSV monitoring report recommendations. 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. The passage of a trail grooming machine or an 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[17] 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.

Table 69 and Table 70 show and compare, by alternative, the amount of California spotted owl high reproduction habitat and csoPACs, respectively, with the potential for direct and indirect effects. Potential for vehicle collision with an individual bird is assumed to be rare. Under alternatives 1, 2, and 4, there would be very little difference, by alternative, in the amount of acres of high reproductive habitat or csoPACs open to OSV use under the high, moderate, or low OSV use assumptions. Of the roughly 388,800 acres of California spotted owl high reproductive habitat available across the Lassen National Forest, 88 percent would be open to cross-country OSV use under Alternatives 1, 2 and 4; 79 percent

[17] 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 and 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 (CA Parks and Recreation 2010).

would be open to cross-country OSV use under alternative 3. Under alternatives 1, 2 and 4, 16 percent of high reproductive habitat falls within the high OSV use category, roughly 18 percent in the moderate OSV use category, and 25 percent in the low OSV use category. Under alternative 3, 14 percent of high reproductive habitat is within the high OSV use category, 14 percent in the moderate OSV use category, and 23 percent in the low OSV use category. .

Table 69. Acres of California spotted owl high reproductive habitat and percentages () with potential for disturbance, mortality, injury, or displacement by OSV use, by alternative and OSV use assumption

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Acres Closed to OSV Use	44,716 (11)	44,716 (11)	80,624 (21)	46,605 (12)
Acres (High OSV Use Assumption)	62,404 (16)	62,404 (16)	55,906 (14)	62,009 (16)
Acres (Low to No OSV Use Assumption)	93,524 (24)	93,524 (24)	88,157 (23)	96,990 (25)
Acres (Moderate OSV Use Assumption)	71,480 (18)	71,480 (18)	55,257 (14)	67,864 (17)
Acres (Areas Outside of Use Assumptions)	116,643 (30)	116,643 (30)	108,822 (28)	115,298 (30)
Total Acres Habitat Open to OSV Use	344,051 (88)	344,051 (88)	308,143 (79)	342,162 (88)
Total Acres High Reproduction Habitat Across the Lassen NF	388,767 (100)	388,767 (100)	388,767 (100)	388,767 (100)

Of the 27,577 acres of csoPACs, 96 percent would be open to OSV use under alternatives 1 and 2, and 90 - 91 percent under alternatives 3 and 4. Twenty-four percent of total csoPAC acres are within the high OSV use category under all of the alternatives. Twenty-one percent of total csoPAC acres are in the moderate OSV use category under alternatives 1 and 2 compared to 17 percent and 18 percent under alternatives 3 and 4, respectively. Nineteen percent of total csoPAC acres are within the low OSV use category under all four alternatives.

Table 70. Acres of California spotted owl PACs and percentages () with potential for disturbance, mortality, injury, or displacement by OSV use, by alternative and OSV use assumption

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Acres Closed to OSV Use	996 (4)	996 (4)	2,721 (10)	2,412 (9)
Acres (High OSV Use Assumption)	6,706 (24)	6,706 (24)	6,628 (24)	6,702 (24)
Acres (Low to No OSV Use Assumption)	8,779 (32)	8,779 (32)	8,229 (30)	8,229 (30)
Acres (Moderate OSV Use Assumption)	5,756 (21)	5,756 (21)	4,767 (17)	5,001 (18)
Acres (Areas Outside of Use Assumptions)	5,340 (19)	5,340 (19)	5,233 (19)	5,233 (19)
Total Acres PACs Open to OSV Use	26,581 (96)	26,581 (96)	24,856 (90)	25,165 (91)
Total Acres PACs Lassen NF	27,577 (100)	27,577 (100)	27,577 (100)	27,577 (100)

OSV trail locations, where the highest use occurs, were assessed relative to csoPACs. Table 19 displays the number and percent of csoPACs within 0.25 mile of groomed and ungroomed OSV trails. Under all of the alternatives, approximately 15 miles of groomed OSV trails fall within 0.25 mile of 17 csoPACs (19 percent of the total number of csoPACs occurring across the Lassen National Forest) and 2 miles of ungroomed trails fall within 0.25 mile of 3 csoPACs (3 percent of the total number of csoPACs occurring across the Lassen National Forest). Activity center (i.e., nest) locations were unavailable, so for this exercise, we assumed the nest could be located anywhere within the csoPAC. Therefore, the greatest

potential impact from groomed and ungroomed trails would be in the same relative proportions as the 0.25-mile buffered PACs. However, it is likely a large overestimate of the activity centers that would actually have the potential to be impacted.

Table 71. Number and percent () of California spotted owl PACs within 0.25 mile of groomed and ungroomed OSV trails, by alternative

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Groomed Trails	17 (19)	17 (19)	17 (19)	17 (19)
Ungroomed Trails	3 (3)	3 (3)	3 (3)	3 (3)
Total PACs Affected by Groomed & Ungroomed Trails	20 (23)	20 (23)	20 (23)	20 (23)
Total PACs Unaffected by Groomed and Ungroomed Trails	68 (77)	68 (77)	68 77)	68 (77)
Total Number of PACs Across Lassen NF	88 (100)	88 (100)	88 (100)	88 (100)

Cumulative Effects

Past, present, and foreseeable future actions that could result in a cumulative impact to California spotted owl, when combined with alternatives 1, 2, 3 or 4, include the Castle DFPZ 2 vegetation management project, Dutch and Tamarack fire salvage projects, firewood cutting, Christmas tree cutting, non-motorized winter recreational activities, or use of roads by wheeled vehicles during the season of overlap between OSVs and wheeled vehicles. The Castle DFPZ 2 is proposed on 39 acres within 0.25 mile of PAC PL 121; PL 121 is also within 0.25 mile of groomed OSV trail 27N11. However, seasonal LOPs required for vegetation projects would prevent disturbance to breeding individuals. The Dutch and Tamarack Fire Salvage Projects would remove standing dead or dying trees across roughly 1,500 and 1,300 acres, respectively, of coniferous forest including Sierran mixed conifer, suitable California spotted owl habitat, in the northwestern portion of the analysis area. However, the area does not overlap with any known csoPACs. In addition, vegetation and fuels management activities in recent years have included primarily thinned, masticated, and/or burned vegetation to reduce the potential for catastrophic wildfires. These projects are usually excluded from spotted owl reproductive habitat. Management prescriptions have emphasized recruitment of large snags and logs, as well as retention of large conifer, over a twenty year period. These are all important habitat attributes for spotted owl foraging habitat. California spotted owl habitat also overlaps with areas open to Christmas tree cutting and firewood cutting. However, wheeled motorized vehicles may not be used off of authorized Forest Service roads or motorized trails to scout for fuelwood or to harvest Christmas trees (USDA Forest Service 2014), 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 12/26), and disturbance or displacement from this activity would occur outside of the CSO breeding season under alternatives 1, 2, and 3. Under alternative 4, in which trail grooming would begin at the discretion of the groomer, there is the potential for a somewhat larger degree of overlap during years in which heavy snowfall begins early. Use of roads within CSO 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 CSO breeding season, particularly for nests within 0.25 mile of roads. In general, most non-motorized winter recreation occurs along designated trails and CSO would either avoid roosting in those areas, if too great a disturbance, or become habituate to the noise. Similar activities on state and private lands within the Forest boundary and within ¼ mile of CSO 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; state and privately-held lands make up about 20 percent of the area within the forest boundary. In summary, ongoing and reasonably foreseeable actions may be additive locally to individual CSO, 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 science, all of the alternatives of the Lassen 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 the California spotted owl. Although 79 to 88 percent of high reproductive habitat and 90 to 96 percent of acres of csoPACs would be open under all of the alternatives under consideration, 28 to 34 percent of the total amount of high reproductive habitat and 41 to 45 percent of acres of csoPACs occurring forest-wide could have the potential to be subject to high and moderate OSV use, respectively, and 23 percent of current csoPACs and up to 23 percent of activity centers fall within 0.25 mile of OSV trails, where highest OSV use occurs, under all alternatives:

- OSV proposed actions will not physically modify 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 CSO suitable habitat is expected to be relatively low, and most disturbance is likely to occur primarily along existing roads and trails.
- The potential for OSV-related noise-based disturbance would overlap with only the early part of the March 1 – August 31 CSO 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 potential for direct and indirect effects to csoPACs 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).
- Lassen National Forest monitoring found no apparent relationship between a csoPAC's distance from a snow park and whether it had been recently occupied.
- Noise-based disturbance is not a key threat to the species.
- 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 CSO foraging behavior would largely be limited to areas adjacent to OSV trails and short-term in nature during trail grooming because the CSO is nocturnal and OSV use largely occurs during the daytime.
- The potential for OSV collision with individual CSOs is very low.

Northern Goshawk

Regional Foresters Sensitive Species

Species Account

Northern goshawks occupy boreal and temperate forests throughout the Holarctic zone (Squires and Reynolds 1997). This broad range of forested communities includes mixed conifer, true fir, montane riparian, Jeffrey pine, ponderosa pine, and lodgepole pine forests (USDA 2004a). Within California, this species occurs in the Sierra Nevada, Klamath, Cascade, Inyo-White, Siskiyou, and Warner Mountains, and the North Coast Ranges. Goshawks may also inhabit suitable habitats in the Transverse Ranges and other mountainous areas in southern California (Zeiner et al. 1990).

The northern goshawk (herein referred to as goshawk) is a Forest Service Sensitive on the Lassen National Forest. Goshawk territories are managed on Lassen National Forest as Protected Activity Centers (ngoPAC) under direction prescribed by the SNFPA (USDA FS PSW Region 2004). Best upon the best available data, there are 172 designated ngoPACs on Lassen National Forest totaling 31,433 acres. The SNFPA (USDA FS PSW Region 2004) requires that goshawk surveys be conducted for any new vegetation management activities. Ongoing surveys have occurred since 1993 and much of the suitable habitat, within roaded, commercial forest areas has been surveyed (Lassen National Forest 2010).

Habitat Status

The 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). Goshawks typically utilize multiple nesting sites within a nesting territory, which can sometimes be located more than ½ mile apart (Woodbridge and Detrich 1994). Because of this behavior, locating active nesting locations and verifying occupancy of a territory can be difficult using only irregular broadcast surveys or searches for active nests. As a result, verification of an inactive stand requires multiple visits in subsequent years.

The goshawk is a year-round resident throughout most of California. Since the early 1970s, research has resulted from concerns about the effects of forest management on populations (Squires and Reynolds 1997). The nesting home range of goshawks contains three components: the nest area, the post-fledging family area, and the foraging area, each with its individual characteristics and management requirements.

The goshawk breeding season is February 15 through September 15. Breeding activity for goshawks can be broken down into 5 general activity stages: courtship (pre-breeding), laying, incubation, nestling and fledgling stages. The courtship stage typically begins in mid-February or early March and extends through the formation of breeding pairs, nest building, and copulation. Egg laying and incubation overlap in goshawks, with eggs being laid every 3 days, and incubation beginning with the laying of the second egg. The average incubation period is approximately 33 days and the nestling period typically extends from early June through early July, with most young fledged by mid-July. The post-fledging dependency period extends until mid/late August (Woodbridge and Hargis 2006). The onset of the incubation in the Lassen National Forest region (southern Cascades/ northern Sierra Nevada) occurs between April 10 and May 15 (USFS 2000), though it can be delayed by up to a month with cool or damp spring weather (Younk and Bechard 1994), and lasts 28-38 days. Nestlings typically fledge at 35-42 days old (Squires and Reynolds 1997).

The following CWHR classes provide high capability nesting habitat for this species: Jeffrey Pine, Lodgepole Pine, Montane Hardwood, and Subalpine Conifer (4M, 4D, and 5D); Montane Hardwood-Conifer, Montane Riparian, Sierran Mixed Conifer, and White Fir (4M, 4D, 5D, and 6); and Red Fir (5D).

Within CWHR, size class 6 is only recognized for a subset of the forest vegetation types (Sierran Mixed Conifer, White Fir, Montane Hardwood-Conifer, Montane Riparian, and Aspen).

In the Sierra Nevada, northern goshawk nesting habitat is protected by the delineation of Protected Activity Centers (PACs). 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 2001, USDA 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 150-200 acres (USDA 2001).

Some of the threats facing goshawk include habitat loss and fragmentation (e.g., loss of large diameter trees), forest structure changes and changes in prey populations due to fire suppression and climate change, risk of habitat loss due to stand-replacing fires, and disturbance from human activity in and near territories. 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, has the potential to 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 or not there was evidence of an effect of ATVs or hikers on the behavior or reproduction of goshawks. No evidence was found indicating experimental treatments, or research visits in general, influenced goshawk reproduction. The data suggest that recreational and research activities would have to be more intensive and extensive than those that were conducted to negatively affect goshawk reproduction (Ibid.).

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 72.

Table 72. Northern goshawk resource indicators and measures for assessing effects

Resource Indicator and Effect	Measure	Alternatives 1 and 2	Alternative 3	Alternative 4
Potential for disturbance to or altered movement of individuals from OSV use and increased human presence, or injury or mortality of individuals	Percentage of high-reproduction habitat and PACs affected and percentage of habitat within high and moderate OSV use categories	87/36	79/30	87/35

Resource Indicator and Effect	Measure	Alternatives 1 and 2	Alternative 3	Alternative 4
Potential for disturbance to or altered movement of individuals from OSV use and increased human presence, or injury or mortality of individuals	Percentage of NGO PACs affected and percentage of PACs within high and moderate OSV use categories	70/31	63/26	68/29
Potential for disturbance to or altered movement of individuals from OSV use and increased human presence, or injury or mortality of individuals	Percentage of known NGO PACs and nest sites within 0.25 mile of groomed or ungroomed routes	13/1	11/1	13/1

As found in the Sierra Nevada Forest Plan Amendment (USDA FS PSW Region 2004), habitat types important for late-successional forest 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. The SNFPA provides management direction for Old Forest Emphasis Areas to maintain or develop old forest habitat in areas containing the best remaining large blocks or landscape concentrations of old forest. Direction also includes providing for old forest functions, such as connectivity of habitat over a range of elevations to allow migration of wide-ranging old-forest-associated species.

The late-successional forest group is comprised of northern spotted owl, California spotted owl, northern goshawk (goshawk), marten, and fisher. These species are associated with late-successional forests that 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. Growing concern over habitat fragmentation for late-successional–forest-associated species has been expressed by individuals, environmental groups, and agency biologists. Various studies have shown that this species group is vulnerable to disturbance, changes in habitat, or displacement by habitat generalists.

OSV use within late-successional-forest habitats can have the following potential direct effects to individuals or their habitat (Gaines et al. 2003): Disturbance and potential for 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.

As previously described in the California spotted owl section, monitoring and analysis specific to CSO and NGO PACs and OSV use was conducted on the Lassen National Forest. Lassen National Forest had 174 NGO PACs, at the time, of which 33 (19 percent) were within 400 meters of designated OSV routes. Twenty-three NGO 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 has been recently occupied.

Currently, there are 420,060 acres of high-value reproduction habitats[18] and 172 designated ngoPACs on Lassen National Forest totaling 31,433 acres.

The potential for OSV-related noise-based disturbance would overlap with only the early part of the February 15 to September 15 goshawk breeding season and once OSV trail grooming season ends on March 31, trail use declines by roughly 50 percent. Therefore, the potential for 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). Table 73 and Table 74 show and compare, by alternative, the amount of northern goshawk high reproduction habitat and PACs, respectively, with the potential for direct (disturbance or displacement of individuals from routes, breeding or rearing habitats; physiological response to disturbance; or potential for injury or mortality from collision) and indirect (altered or dispersed movement as caused by a route or human activities on or near a route) effects as previously described and based upon the OSV assumptions previously listed. Due to the structural nature of suitable habitat (i.e. dense forested stands), the level of cross-country travel in NGO suitable habitat is expected to be relatively low, and most disturbance is likely to occur primarily along existing roads and trails under all alternatives. Habitat would not be physically modified by OSV use and related activities. Potential for vehicle collision with an individual bird is assumed to be rare.

Overall, there would be very little difference, by alternative, in the amount of acres of high reproductive habitat or PACs open to OSV use under the high, moderate, or low OSV use assumptions. Of the roughly 420,000 acres of northern goshawk high reproductive habitat available across the Lassen National Forest, 87 percent would be open to cross-country OSV use under Alternatives 1, 2 and 4, with seventeen percent of high reproductive habitat, overall, within the high OSV use category, roughly 19 percent in the moderate OSV use category, and 23 percent in the low OSV use category. Seventy-nine percent of northern goshawk high reproductive habitat would be open under alternative 3, with 15 percent of high reproductive habitat, overall, falling within the high OSV use category, 19 percent in the moderate OSV use category, and 22 percent in the low OSV use category.

Of the 31,433 acres of ngoPACs, 70 percent would be open to OSV use under alternatives 1 and 2. Sixty-three percent under alternative 3 and 68 percent under alternative 4 would be open. Fifteen percent of PAC acres are within the high OSV use category under alternatives 1 and 2 compared to 13 percent and 14 percent under alternatives 3 and 4, respectively. Sixteen percent of ngoPAC acres are within the moderate OSV use category under alternatives 1 and 2 compared to 13 percent and 15 percent under alternatives 3 and 4, respectively. Seventeen percent of PAC acres are within the low OSV use category under alternatives 1 and 2 compared to 16 percent and 18 percent under alternatives 3 and 4, respectively.

[18] Jeffrey pine, lodgepole pine, montane hardwood, montane hardwood-conifer, montane riparian, ponderosa pine, red fir, Sierran mixed conifer, subalpine conifer, and white fir in California Wildlife Habitat Relationship types 4M, 4D, 5M, 5D, 6.

Table 73. Acres of northern goshawk high reproductive habitat and percentages () with potential for disturbance, mortality, injury, or displacement by OSV use, by alternative and OSV use assumption

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Acres Closed to OSV Use	52,613 (13)	52,613 (13)	90,289 (21)	54,644 (13)
Acres (High OSV Use Assumption)	70,039 (17)	70,039 (17)	63,363 (15)	69,645 (17)
Acres (Low to No OSV Use Assumption)	97,928 (23)	97,928 (23)	91,897 (22)	101,279 (24)
Acres (Moderate OSV Use Assumption)	79,252 (19)	79,252 (19)	62,631 (15)	75,633 (18)
Acres (Areas Outside of Use Assumptions)	120,228 (29)	120,228 (29)	111,880 (27)	118,589 (28)
Total Acres Habitat Open to OSV Use	367,447 (87)	367,447 (87)	329,771(79)	365,146 (87)
Total Acres High Reproduction Habitat Across the Lassen NF	420,060 (100)	420,060 (100)	420,060 (100)	420,060 (100)

Seventy-nine to 87 percent of northern goshawk high reproductive habitat and 63 to 70 percent of acres of ngoPACs would be open under all of the alternatives under consideration and 30 to 36 percent of the total amount of high reproductive habitat and 26 to 31 percent of acres of ngoPACs occurring forest-wide could be subject to high and moderate OSV use, respectively. This appears relatively high. However, when OSV trail locations, where the highest use occurs, are looked at with respect to ngoPAC and activity center (nest) locations, the potential impact to reproducing goshawk is placed into greater context. In addition, OSV groomed trail use is estimated to decline by 50 percent once the grooming season ends. Therefore, the potential for direct and indirect effects on ngoPACs within 0.25 miles of groomed trails would be expected to decrease after March 31st for alternatives 1 through 3, but not necessarily for alternative 4.

Table 74. Acres of northern goshawk PACs and percentages () with potential for disturbance, mortality, injury, or displacement by OSV use, by alternative and OSV use assumption

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Acres Closed to OSV Use	9,478 (30)	9,478 (30)	11,740 (37)	10,109 (32)
Acres (High OSV Use Assumption)	4,645 (15)	4,645 (15)	4,135 (13)	4,539 (14)
Acres (Low to No OSV Use Assumption)	5,514 (17)	5,514 (17)	5,093 (16)	5,508 (18)
Acres (Moderate OSV Use Assumption)	5,186 (16)	5,186 (16)	4,135 (13)	4,809(15)
Acres (Areas Outside of Use Assumptions)	6,610 (21)	6,610 (21)	6,330 (20)	6,468 (21)
Total Acres PACs Open to OSV Use	21,955 (70)	21,955 (70)	19,693 (63)	21,324 (68)
Total Acres PACs Lassen NF	31,433 (100)	31,433 (100)	31,433 (100)	31,433 (100)

Table 75 displays the number and percent of ngoPACs within 0.25 miles of groomed and ungroomed OSV trails. Under alternatives 1, 2, and 4 approximately 5 miles of groomed OSV trails fall within 0.25 miles of a total of 15 ngoPACs (9 percent of the total number of ngoPACs occurring on the Forest) and 3 miles of ungroomed trails fall within 0.25 miles of a total of 7 goshawk PACs (4 percent of the total number of ngoPACs occurring on the Forest). Under alternative 3, approximately 4 miles of groomed

OSV trails fall within a total of 14 ngoPACs (8 percent of the total number of ngoPACs occurring on the Forest) and 2 miles of ungroomed trails fall within 0.25 miles of a total of 5 ngoPACs (8 percent of the total number of ngoPACs occurring on the Forest). Under all of the alternatives, only 2 out of 172 (or 1 percent) goshawk activity centers (i.e., nests) are or would be located within 0.25 miles of ungroomed OSV trails and 0 nests are or would be within 0.25 miles of groomed OSV trails.

Table 75. Number and percent () of northern goshawk PACs within 0.25 mile of groomed and ungroomed OSV trails, by alternative

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Groomed Trails	15 (9)	15 (9)	14 (8)	15 (9)
Ungroomed Trails	7 (4)	7 (4)	5 (3)	7 (4)
Total PACs Affected by Groomed and Ungroomed Trails	22 (13)	22 (13)	19 (11)	22 (13)
Total PACs Unaffected by Groomed and Ungroomed Trails	150 (88)	150 (88)	153 (89)	150 (88)
Total Number of PACs Across Lassen NF	172 (100)	172 (100)	172 (100)	172 (100)

Cumulative Effects

Past, present, and foreseeable future actions that could result in a cumulative impact to goshawk, when combined with alternatives 1, 2, 3 or 4, include the Castle DFPZ 2 vegetation management project, Dutch and Tamarack fire salvage projects, firewood cutting, Christmas tree cutting, non-motorized winter recreational activities, or use of roads by wheeled vehicles during the season of overlap between OSVs and wheeled vehicles. The Castle DFPZ 2 is proposed on 39 acres within 0.25 mile of the Little Grizzly PAC that is also within 0.25 mile of groomed OSV trail 27N11. However, seasonal LOPs required for vegetation projects would prevent disturbance to breeding individuals. The Dutch and Tamarack Fire Salvage Projects would remove standing dead or dying trees across roughly 1,500 and 1,300 acres, respectively, of coniferous forest including Sierran mixed conifer, suitable NGO reproductive habitat, in the northwestern portion of the analysis area. However, the area does not overlap with any known ngoPACs. Vegetation and fuels management activities in recent years have included primarily thinned, masticated, and/or burned vegetation to reduce the potential for catastrophic wildfires. These projects are usually excluded from NGO reproductive habitat. Management prescriptions have emphasized recruitment of large snags and logs and retention of large conifer that are important attributes of goshawk habitat. Goshawk habitat also overlaps with areas open to Christmas tree cutting and firewood cutting. However, wheeled motorized vehicles may not be used off of authorized Forest Service roads or motorized trails to scout for fuelwood or to harvest Christmas trees (USDA Forest Service 2014), 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 NGO breeding season under alternatives 1, 2, and 3. Under alternative 4, in which trail grooming would begin at the discretion of the groomer, there is the potential for a somewhat larger degree of overlap during years in which heavy snowfall begins early. 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 miles 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 NGO would either avoid roosting in those areas, if too great a disturbance, or become habituate to the noise. Similar activities on state and private lands within the Forest boundary and within ¼ 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; state and privately-held lands make up about 20 percent of the area within the forest boundary. 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, and 4 of the Lassen 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. Although 79 to 87 percent of northern goshawk high reproductive habitat and 63 to 70 percent of acres of ngoPACs would be open under all of the alternatives under consideration, 30 to 36 percent of the total amount of high reproductive habitat and 26 to 31 percent of acres of ngoPACs occurring Forest-wide could be subject to high and moderate OSV use, and 11 to 13 percent of current ngoPACs fall within 0.25 mile of OSV trails, where highest OSV use occurs:

- 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 NGO suitable habitat is expected to be relatively low, and most disturbance is likely to occur primarily along existing roads and trails under all alternatives.
- The potential for OSV-related noise-based disturbance would overlap with only the early part of the February 15 to September 15 goshawk breeding season and only 1 percent of current goshawk activity centers are located within 0.25 mile of OSV trails under all of the alternatives.
- 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 potential for 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).
- Lassen National Forest monitoring found no apparent relationship between an ngoPAC's distance from a snow park and whether it has been recently occupied; and Dunk et al. (2011) found no evidence indicating experimental recreational treatments influenced goshawk reproduction.
- The potential for OSV collision with individual NGOs is very low.

Wide-Ranging Carnivores

Sierra Nevada Red Fox (*Vulpes vulpes necator*)

Candidate Species; Regional Foresters Sensitive Species

Species Account (Excerpted from U.S. Fish and Wildlife Service 2015h)

Following publication of the U.S. Fish and Wildlife Service 90-day finding in the Federal Register (77 FR 45; January 3, 2012), the Sierra Nevada red fox's range has been confirmed (via a combination of genetics and photographic evidence) to extend into the Oregon Cascades as far north as Mt. Hood, significantly extending the subspecies' range beyond its historically known range in California. Specifically, five sighting areas (i.e., clustered locations of recent Sierra Nevada red fox sightings) have been identified on Federal lands in Oregon where surveys have occurred, in addition to the two known

sighting areas in California as described in the 90-day finding (77 FR 45). Sierra Nevada red fox are thus known from a total of seven sighting areas, located in the vicinity of (north to south) Mt. Hood, Mt. Washington, Dutchman Flat, Willamette Pass, and Crater Lake in Oregon; and Lassen and Sonora Pass in California.

The Service found the areas occupied by the Sierra Nevada red fox within the Southern Cascades and Sierra Nevada Mountain Ranges are separated by a geologic gap in the range. The best available data currently indicate this gap represents a lack of population connectivity between the two geographic areas. This separation is further supported by recent genetic studies which demonstrate that the two closest sighting areas (i.e., known populations that reside at the Lassen and Sonora Pass sighting areas) show genetic differences, and there is no indication of gene flow between these populations. Therefore, the Service concluded that the two areas are discrete under their DPS policy. In conclusion, the Southern Cascades DPS includes the Cascade Mountains of Oregon from the Columbia River south into the California Cascades around Lassen Peak, including Lassen National Forest, and the Sierra Nevada DPS that includes the upper elevations of the Sierra Nevada Mountain Range from Tulare to Sierra Counties, including Stanislaus National Forest.Sierra Nevada red fox likely occur at low population densities even within areas of high relative abundance (Perrine et al. 2010). The Lassen sighting area includes lands managed by Lassen National Forest and Lassen Volcanic National Park (including the Caribou Wilderness), and some private inholdings primarily as timberlands (CDFW 2015, p. 1).

Habitat Status (Excerpted from U.S. Fish and Wildlife Service 2015h)

Sierra Nevada red fox use multiple habitat types in the alpine and subalpine zones (near and above treeline) (California Department of Fish and Game (CDFG) 1987, p. 3). In addition to meadows and rocky areas (U.S. Department of Agriculture (USDA) 2009, p. 506), Sierra Nevada red fox use high-elevation conifer habitat of various types (Perrine 2005, pp. 63–64). Nearest the treeline in the Lassen sighting area, where habitat use has been best documented, the subspecies frequents subalpine conifer habitat dominated by whitebark pine and mountain hemlock (*Tsuga mertensiana*) (Perrine 2005, pp. 6, 63–64; California Department of Fish and Wildlife (CDFW) undated, p. 3; Verner and Purcell undated, p. 3). Such conifer habitat has been described as typically “open” (Verner and Purcell undated, p. 1), and “patchy” (Lowden 2015, p. 1). For this analysis a total of 23,563 acres of habitat[19] is found within the project area.

Sierra Nevada red fox in Oregon and at the Lassen sighting area in California have also been found to descend during winter months into high-elevation conifer areas below the subalpine zone (Perrine 2005, pp. 63–64; Aubry et al. 2015, p. 1). In the Lassen sighting area, this habitat consists primarily of red fir (*Abies magnifica*), white fir, and lodgepole pine (Perrine 2005, pp. 63–64; CDFW undated, p. 3; Barrett 1988, p. 3). Winter sightings have occurred as low as 1,410 m (4,626 ft) in the Lassen sighting area (Perrine 2005, pp. 2, 162), and 1,280 m (4,200 ft) in Oregon (Aubry et al. 2015, p. 1). Possible reasons for this elevational migration include lessened snow depths at lower elevations (Perrine 2005, pp. 80, 81), unsuccessful dispersal movements by nonbreeding individuals (Statham et al. 2012, p. 130), and lack of suitable prey at high elevations in the Lassen area (Perrine 2005, p. 30). While on these lower winter ranges, the subspecies has shown a preference for mature closed canopy conifer forests, despite the rarity of this forest structural category (less than 7 percent) in the area studied (Perrine 2005, pp. 67, 74, 90). Similar elevational migrations are not known for the Sonora Pass sighting area (Statham et al. 2012, p. 130).

[19] Based upon Perrine et al. (2010) and USDI Fish and Wildlife Service (2015): Sub-alpine zone and high-elevation conifer (red fir, white fir, lodgepole pine) with forest cover comprised of large trees (CWHR types 5M and 5D) 4,600 – 10,170 ft.

Although little direct information exists regarding the Sierra Nevada red fox's reproductive biology, there is no evidence to suggest it is markedly different from lowland-dwelling North American red fox subspecies (Aubry 1997, p. 57). Those subspecies are predominately monogamous and mate over several weeks in the late winter and early spring (Aubry 1997, p. 57). The gestation period for North American red fox is 51 to 53 days, with birth occurring from March through May in sheltered dens (Perrine et al. 2010, p. 14). Sierra Nevada red fox use natural openings in rock piles at the base of cliffs and slopes as denning sites (Grinnell et al. 1937, p. 394). They may also dig earthen dens similar to Cascade red foxes (although this has not been directly documented) (Aubry 1997, p. 58; Perrine 2005, p. 153). Sierra Nevada red fox are most active at dusk and at night (Perrine 2005, p. 114), when many rodents are most active.

Potential threats that may impact the subspecies in Oregon and California are those actions that may affect individuals or sighting areas either currently or in the future, including: wildfire and fire suppression; climate change; hunting and trapping; disease, to include salmon poisoning disease, elokomin fluke fever (EFF), and potentially mange, distemper, or rabies); competition and predation by coyotes, which could be exacerbated in the future dependent on climate change impacts to habitat; predation by domestic dogs; hybridization with nonnative red fox; vehicles; and small population size and isolation, specifically for the Lassen and Sonora Pass sighting areas. Potential impacts associated with logging/vegetation management and grazing were evaluated but found to result in low or no impacts, overall, across the subspecies' range. Due to regulatory protections, hunting and trapping do not constitute a current or likely future stressor to Sierra Nevada populations in California.

Because there is considerable uncertainty about effects to this species, current direction requires project analysis within a 5-mile radius of any verified detection of Sierra Nevada red fox. If necessary, a limited operating period is applied from January 1 to June 30 to avoid adverse impacts to potential breeding (Forest Service 2001, 2004).

Direct and Indirect Effects

Resource indicators and measures (FSH 1909.15, 12.5) used in this analysis to measure and disclose effects to Sierra Nevada red fox are listed in Table 76.

Table 76. Resource indicators and measures for assessment of effects to Sierra Nevada red fox

Resource Indicator and Effect	Measure	Alternatives 1 and 2	Alternative 3	Alternative 4
Potential for disturbance to individuals from OSV use and increased human presence, injury or mortality of individuals, habitat modification, or snow compaction near denning sites	Percentage of Sierra Nevada red fox high reproductive habitat* affected and percentage of habitat within high and moderate OSV use categories	66/34	59/32	63/33

*These numbers are based on coarse habitat filters that do not take the finer elements of Sierra Nevada red fox denning habitat (natural openings in rock piles at the base of cliffs and slopes) into account and, therefore, overestimate the amount of available habitat.

Large and mid-sized carnivores are unique in their response to human-induced habitat changes due to their large spatial habitat needs and their sensitivity to landscape patterns, including road edge effects and road density (Buskirk and Zielinski 2003). The gray wolf, Sierra Nevada red fox, and California wolverine are considered sensitive to the presence of humans and human activities.

The most common interactions between OSV 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, and disturbance at a specific site, usually wintering areas.

To a lesser degree, hunting, trapping, poaching, collection, and habitat loss and fragmentation were other interactions identified. Trapping of Sierra Nevada red fox, or any of the special-status species under consideration, is not legal in the state of California and, therefore, will not be considered as a potential impact in this analysis.

OSV use and associated activities within habitats for wide-ranging carnivores can have the following potential effects to individuals or their habitat (Gaines et al. 2003). Potential direct effects include: (1) Displacement or avoidance away from 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 a potential for injury or mortality to individuals from vehicle collision or OSV-related snow compaction because Sierra Nevada red fox dens under the snow. 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 Sierra Nevada red fox or wolverine would negatively affect that particular animal, but the likelihood of occurrence is assumed to be rare.

Possible indirect effects include behavioral modification such as altered or dispersed movement as caused by a route or human activities on a near a route and, secondarily, creation of a vector pathway for competitors or predators.

Sierra Nevada red fox habitat would not be physically modified by OSV use and related activities and, therefore, habitat connectivity would not be altered. No studies have been conducted on OSV use related to this population at the current time. However, in its finding (U.S. Fish and Wildlife Service 2015i), the Service analyzed potential stressors on the subspecies, including those that may be caused or exacerbated by OSV use, such as competition and predation by coyotes and vehicle collisions.

Potential for Injury or Mortality to Individuals from Vehicle Collision (U.S. Fish and Wildlife Service 2015h, unless otherwise noted):

Collision with vehicles is a known source of mortality for the Sierra Nevada red fox currently and is expected to continue into the future, given the presence of roads within the range of the subspecies. A low density of roads with heavy traffic traveling at high speeds (greater than 45 miles per hour) suggest that few individuals die from vehicle collisions.

OSVs are another potential source for collisions and noise disturbance in all sighting areas with the exception potentially of the Lassen sighting area and a small area in the northwest portion of the Crater Lake sighting area, given the high level of recreational activity within or adjacent to those sighting areas. However, no OSV-related incidents have been reported. Additionally, although no studies have been completed, the mere location of the Sierra Nevada red fox sightings in these areas suggest that the subspecies adjusts to the noise involved, and that sufficient Sierra Nevada red fox prey remain in such areas.

Overall across the Sierra Nevada red fox’s range, few Sierra Nevada red fox are killed as the result of collisions with vehicles. We expect that in the future a small number of individuals will be struck by vehicles, including dispersing juveniles searching for unoccupied suitable habitat for establishment of a

home range. However, the best available information does not suggest any significant increases in vehicular traffic or new roads are likely in areas where the subspecies occurs. Therefore, based on the information presented above and in the Species Report (Service 2015, pp. 53–55), the best available data indicate that the impact of vehicle collisions on Sierra Nevada red fox will be minor and continue at similar levels into the future, resulting in a low-level impact on the subspecies (i.e., impacts to individual Sierra Nevada red foxes as opposed to populations); therefore, this stressor does not rise to the level of a threat.

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, California Department of Parks and Recreation 2010).

Habitat Modification (U.S. Fish and Wildlife Service 2015h, unless otherwise noted):

Both coyotes and Sierra Nevada red foxes are opportunistic predators with considerable overlap in food consumed (Perrine 2005, pp. 36–37). Perrine (2005, pp. 84, 105) suggests that competition with coyotes, as well as predation, is likely a primary reason why the range of Sierra Nevada red fox is restricted to such high elevations. Any competition likely varies in intensity with prey availability, specifically including in the Lassen sighting area where competition may be stronger during winter months when Sierra Nevada red fox descend in elevation.

Coyotes occur throughout the current range of the Sierra Nevada red fox, but typically at lower elevations during winter and early spring when snowpacks are high. If snowpacks are reduced in area due to climate change, coyotes would likely encroach into high-elevation areas during early spring when Sierra Nevada red fox are establishing territories and raising pups. Even in the absence of direct predation, the tendency of coyotes to chase off red foxes generally, and to compete with Sierra Nevada red fox for prey, may interfere with the ability of the subspecies to successfully raise offspring (Service 2015, pp. 48–51).

Overall, the potential increase of coyote competition as it relates to shifting or modified habitats, or diminished snowpack levels from potential climate change impacts, may still occur throughout the range of the subspecies. The best available data indicate presence of coyotes at the same elevations as Sierra Nevada red fox during certain times of the year; however, there is no information to indicate any population-level impacts.

Sierra Nevada red fox could also be predated by coyotes. Sierra Nevada red fox and coyotes both are opportunistic predators with considerable overlap in food consumed (Perrine 2005, pp. 36–37). Although no direct documentation of coyote predation on Sierra Nevada red fox is available, coyotes will chase and occasionally kill other North American red fox subspecies, and are considered important competitors of red fox generally (Perrine 2005, pp. 36, 55; Perrine et al. 2010, p. 17). Thus, red foxes tend to avoid areas frequented by coyotes (though not necessarily to the point of complete exclusion) (Perrine 2005, p. 55).

The general tendency of red foxes to avoid coyotes often relegates them to suboptimal habitats and has likely been an important factor determining red fox distribution (Perrine 2010, p. 20; Sacks et al. 2010b, p. 17). Perrine (2005, pp. 84, 105) suggests that predation (and competition; see Competition With Coyotes, above) from coyotes is likely a primary reason why the range of Sierra Nevada red fox is restricted to such high elevations.

During winter months in the Lassen sighting area, Perrine (2005, pp. 30, 78) found that both Sierra Nevada red fox and coyotes descended to lower elevations, where mule deer (and more specifically in the case of Sierra Nevada red fox, mule deer carrion) became important components of their diets. Perrine (2005, p. 31) also notes that Sierra Nevada red fox may potentially benefit from the presence of coyotes during winter by scavenging deer carcasses killed by coyotes. However, Sierra Nevada red fox, whose

main winter food source (at the Lassen study site) was small rodents rather than deer (Perrine 2005, p. 24), tend to stay at higher elevations than coyotes, thereby reducing potential predation.

At this time, the best available data indicate that coyotes are present year-round throughout the subspecies' range, but generally at lower elevations than Sierra Nevada red fox during winter and early spring when snowpacks are high (Service 2015, p. 52). Regardless, information does not indicate there has been any coyote predation on Sierra Nevada red fox, nor is there any information to indicate that coyotes are increasing at any of the sighting areas. However, as climate change progresses, climatologists predict that snowpacks are expected to diminish in the future (Kapnick and Hall 2010, pp. 3446, 3448; Halofsky et al. 2011, p. 21). Thus, higher elevations with deep snowpack that currently deter coyotes may become more favorable to them, potentially increasing the likelihood of coyote predation in the future.

Recently, two packs of gray wolves have become established in the Southern Cascades between the Crater Lake and Lassen sighting areas (one pack each in Oregon and California). It is probable that restoration of wolves to the Southern Cascades in sustainable populations would lower coyote population numbers or exclude them from higher elevation forested areas , thereby facilitating the persistence of nearby Sierra Nevada red fox populations (Levi and Wilmers 2012, p. 926); wolves are unlikely to compete heavily with Sierra Nevada red fox because they tend to take larger game (ODFW 2015, p. 8).

Based on the best available scientific and commercial data, the Service found that predation may have had an overall low-level impact to the Sierra Nevada red fox due to the presence of coyotes co-occurring at multiple sighting areas within the subspecies' range; the potential for predation in the Crater Lake, Lassen, and Sonora Pass sighting areas into the future given climate model projections of decreased snowpack levels that may make the habitat more favorable to coyotes; and the overall inability of the populations at those three locations to shift up in elevation (i.e., the Crater Lake, Lassen, and Sonora Pass populations appear at or near the highest elevations available for the subspecies). However, at this time, the best available data indicate that predation is not impacting the Sierra Nevada red fox at the subspecies-level to the degree that any more than individuals at a couple of the sighting areas may be affected both currently and into the future. Further, the best available data do not indicate that potential future changes in shifting habitat at high elevations (as suggested by climate models) would occur within the next 50 years to such a degree that coyote numbers would increase significantly throughout the subspecies' range to the point that coyote predation would rise to the level of a threat. Therefore, based on the analysis contained within the Species Report and summarized above, the Service has determined that predation does not rise to the level of a threat currently nor is it likely to increase into the future.

Site Disturbance:

As OSV trail use is an existing condition, Sierra Nevada red fox that occur in the areas affected by the OSV Program during winter may be habituated to OSV disturbance or may have already modified their behavior to avoid trail areas or OSV noise resonating in the forest may cause an alert or startle response in individual Sierra Nevada red foxes or may be accepted as ambient noise conditions of the environment similar to what was suggested by the aforementioned study on martens.

Snow Compaction Near Denning Sites (Potential for Injury or Mortality to Denning Individuals):

The habitat query used for this analysis is an overestimate of potential denning habitat because as previously noted, Sierra Nevada red fox use natural openings in rock piles at the base of cliffs and slopes as denning sites and they may also dig earthen dens similar to Cascade red foxes. However, it may still be useful to compare relative differences by alternative. If the Sierra Nevada red fox uses earthen dens for denning sites, then OSV use would not be expected to have a potential direct effect on dens. If rock piles

at the bases of cliffs and slopes are used, then the potential for injury or mortality to denning individuals would be expected to be low based on the OSV assumptions and the rocky structure of the dens.

Table 77. Acres of Sierra Nevada red fox habitat and percentages () with potential for disturbance, mortality, injury, or habitat modification by OSV use, by alternative and OSV use assumption

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Acres Closed to OSV Use	7,965 (34)	7,965 (34)	9,503 (40)	8,612 (37)
Acres (High OSV Use Assumption)	4,460 (19)	4,460 (19)	4,363 (19)	4,389 (19)
Acres (Low to No OSV Use Assumption)	4,757 (20)	4,757 (20)	4,102 (17)	4,523 (19)
Acres (Moderate OSV Use Assumption)	3,543 (15)	3,543 (15)	3,034 (13)	3,382 (14)
Acres (Areas Outside of Use Assumptions)	2,838 (12)	2,838 (12)	2,560 (11)	2,657 (11)
Total Acres Habitat Open to OSV Use	15,598 (66)	15,598 (66)	14,060 (59)	14,951 (63)
Total Acres Habitat Across the Lassen NF	23,563 (100)	23,563 (100)	23,563 (100)	23,563 (100)

Based upon the information displayed in Table 77, 66 percent of Sierra Nevada red fox high reproductive habitat is/would be open to OSV use under alternatives 1 and 2 and could be subject to direct or indirect impacts. Fifty-nine percent would be open under alternative 3 and 63 percent under alternative 4. Thirty-four percent of habitat falls within the combined high and moderate OSV use assumptions under alternatives 1 and 2 compared with 32 percent and 33 percent of habitat under alternatives 3 and 4, respectively.

Cumulative Effects

Past, present, and foreseeable future actions that could result in a cumulative impact to Sierra Nevada red fox, when combined with alternatives 1, 2, 3 or 4, include the Castle DFPZ 2 vegetation management project, Dutch and Tamarack fire salvage projects, firewood cutting, Christmas tree cutting, non-motorized winter recreational activities, or use of roads by wheeled vehicles during the season of overlap between OSVs and wheeled vehicles. The Castle DFPZ 2 is proposed on 39 acres and the Dutch and Tamarack Fire Salvage Projects would remove standing dead or dying trees across roughly 1,500 and 1,300 acres, respectively, of coniferous forest including some suitable Sierra Nevada red fox reproductive habitat. However, none of these areas is within 0.25 mile of any documented Sierra Nevada red fox observations. In addition, vegetation and fuels management activities in recent years have included primarily thinned, masticated, and/or burned vegetation to reduce the potential for catastrophic wildfires. These projects are usually excluded from larger CWHR types, an attribute of Sierra Nevada red fox denning habitat. Sierra Nevada red fox habitat also overlaps with areas open to Christmas tree cutting and firewood cutting. However, wheeled motorized vehicles may not be used off of authorized Forest Service roads or motorized trails to scout for fuelwood or to harvest Christmas trees (USDA Forest Service 2014), 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 Sierra Nevada red fox breeding season under alternatives 1, 2, and 3. Under alternative 4, in which trail grooming would begin at the discretion of the groomer, there is the potential for a somewhat larger degree of overlap during years in which heavy snowfall begins early. Use of roads within Sierra Nevada red fox 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 denning season. In general, most non-motorized winter recreation occurs along designated trails, where individuals would either avoid the area, if too great a disturbance, or habituate to the noise. 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 potential for this type of disturbance is unknown; state and privately-held lands make up about 20 percent of the area within the forest boundary. In summary, ongoing and reasonably foreseeable actions are not expected to contribute significant impacts to effects discussed for Sierra Nevada red fox for the project under any of the alternatives. Although impacts may be additive locally, particularly to foraging individuals, they would be much less likely to individuals utilizing reproductive dens in rocky areas at the base of cliffs and slopes.

Determination Statement

Alternatives 1, 2, 3, and 4 of the Lassen 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 Sierra Nevada red fox based on the following rationale:

- Suitable Sierra Nevada red fox habitat would not be physically modified and connectivity would not be altered by OSV use and related activities.
- Although 63 to 66 percent of calculated high reproductive habitat would be open to OSV use under the alternatives, and 32 to 34 percent of habitat falls within the combined high and moderate use assumptions, these numbers are based on coarse habitat filters that do not take the finer elements of Sierra Nevada red fox denning habitat (natural openings in rock piles at the base of cliffs and slopes) into account and, therefore, overestimate the amount of available habitat.
- Sierra Nevada red fox tends to be nocturnal and, therefore, potential impacts to foraging behavior or movement would be low.
- The potential for OSV collision with individuals is very low. In addition, the Service has determined that vehicle collisions do not rise to the level of a threat currently nor are they likely to increase into the future.

Although OSV trails and use can result in the creation of vector pathway, for competitors or predators, such as coyotes, the Service has determined that predation does not rise to the level of a threat currently nor is it likely to increase into the future.

North American Wolverine (*Gulo gulo luscus*)

Regional Foresters Sensitive Species

Species Account

Wolverines have a circumpolar distribution and occupy the tundra, taiga, and forest zones of North America and Eurasia (Wilson 1982). The species uses a wide variety of forested and non-forested habitats in North America (Banci 1994). In California, wolverines once occurred throughout the Sierra Nevada, Cascades, Klamath, and northern Coast ranges in alpine, boreal forest, and mixed forest vegetation types (Schempf and White 1977). Following dramatic increases in human development and disturbance (e.g., increased mining, fur trapping, and timber harvest) associated with the California gold rush of the mid-1800's (summarized in Zielinski et al. 2005) the distribution of wolverine in California was limited to the central and southern Sierra Nevada only (Ibid, Schempf and White 1977).

Primarily nocturnal, wolverines are difficult to observe, even when they are abundant (Banci 1994). An empirical wolverine habitat model developed for the Rocky Mountains found that wolverine occurrence was strongly associated with low human population density and low road density (Carroll et al. 2001).

An extensive furbearer study conducted from 1996 to 2002 by the USFS, Pacific Southwest Research Station (PSW) using track plates and cameras on approximately 7,500,000 acres in the southernmost Cascades and Sierra Nevada range (estimated 150 of 344 sample units located within suitable wolverine habitats) did not detect this species and found that wolverines may be extirpated from or occur in extremely low densities within the area sampled (Zielinski et al. 2005).

On February 28, 2008, a detection of a lone male wolverine occurred near Truckee, California. This was the first verified record of a wolverine from California since 1922. Agency biologists and researchers used genetic samples (i.e., hair and scat) to determine that the wolverine is 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 (compared to samples taken from museum specimens) or contemporary northern Cascades (Washington) population (Moriarty et al. 2009). This attempted dispersal event may represent a continuation of the wolverine expansion in the contiguous United States and other wolverines may have travelled to the Sierra Nevada and remain undetected (USFWS 2013). Although incidental, unconfirmed sightings of wolverine have been reported throughout the Sierra Nevada, including Lassen National Forest (Lassen National Forest 2010), 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 (U.S. Fish and Wildlife Service 2013).

Along the Pacific Coast, historical records show that wolverines occurred in two population centers in the North Cascades Range and the Sierra Nevada (U.S. Fish and Wildlife Service 2013). However, records do not show occurrences between these centers from southern Oregon to northern California, indicating that the historical distribution of wolverines in this area is best represented by two disjunct populations rather than a continuous peninsular extension from Canada (U.S. Fish and Wildlife Service 2013). This conclusion is supported by genetic data indicating that the Sierra Nevada and Cascades wolverines were separated for at least 2,000 years prior to extirpation of the Sierra Nevada population (U.S. Fish and Wildlife Service 2013). Only one Sierra Nevada record exists after 1930, indicating that this population was likely extirpated in the first half of the 1900s.

Habitat Status

There are few studies about wolverine habitat use in the coterminous U.S.; the results of a 5-year study (Copeland 2007), wolverines used modestly higher elevations in summer versus winter, and they shifted use of cover types from whitebark pine in summer to lower elevation Douglas-fir and lodgepole pine communities in winter.

Within their geographic range, wolverine use diverse coniferous forest types (Copeland 1996, Hornocker and Hash 1981) and unlike fisher and marten, this species also uses non-forested alpine habitats (Banci 1994 and Copeland 1996). 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). Wolverines are dependent on persistent snow cover for successful reproduction (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 2001). A major threat to this species is loss of alpine habitat from climate change. Other potential threats to this species include habitat loss and fragmentation and increasing human presence.

Breeding occurs from late spring to early fall and females undergo delayed implantation until the following winter or spring when offspring are born typically from mid-February through March, although females will give birth in natal dens as early as January or as late as April (Banci 1994). Female

wolverines use natal dens that are excavated in the snow and require persistent, stable snow conditions greater than five 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 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).

Although not currently known to exist on the Lassen National Forest, wolverine has been known to occupy habitats from 4,000 to over 10,000 feet elevation in the Sierra Nevada (Lassen National Forest 2010). Habitat for this species occurs in subalpine conifer habitats interspersed with meadows (USDA Forest Service 2001). For this analysis a total of 40,276 acres of habitat, based on the aforementioned criteria, is found within the project area.

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 U.S. Fish and Wildlife Service (2013) noted climate change as the threat with the greatest potential to impact wolverine. A warming climate will likely result in a loss of suitable habitat due to increased summer temperatures and a reduced incidence of persistent spring snowpack. The U.S. Fish and Wildlife Service (2013) noted recreation as an additional threat to wolverines because mother wolverines tend to move their kits to alternate denning areas once humans have been 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 78.

Table 78. Resource indicators and measures for assessing effects to wolverine

Resource Indicator and Effect	Measure	Alternatives 1 and 2	Alternative 3	Alternative 4
Potential for disturbance to or altered movement of individuals from OSV use and increased human presence, or injury or mortality of individuals	Percentage of habitat affected and percentage of habitat within high and moderate OSV use categories	81/27	74/31	81/27

Although not currently known to exist on the Lassen National Forest, wolverine has been known to occupy habitats from 4,000 to over 10,000 feet elevation in the Sierra Nevada (Lassen National Forest 2010). Habitat for this species occurs in subalpine conifer habitats interspersed with meadows (USDA Forest Service 2001). For the purposes of this analysis, high and moderate capability wolverine denning habitat includes the following CWHR vegetation classes that are also in areas free of significant human disturbance and located above 10,000 feet elevation: Alpine Dwarf Shrub (all strata), Lodgepole Pine (5M and 5D), Red Fir (5M and 5D), and Subalpine Conifer (5M and 5D); and moderate capability denning and resting habitats as Lodgepole Pine (all strata except 2S, 5M, and 5D), Red Fir (all strata except 5M and 5D), and Subalpine Conifer (all strata except 5M and 5D).

Large and mid-sized carnivores are unique in their response to human-induced habitat changes due to their large spatial habitat needs and their sensitivity to landscape patterns, including road edge effects and road density (Buskirk and Zielinski 2003). The gray wolf, Sierra Nevada red fox, and California wolverine are considered sensitive to the presence of humans and human activities.

The most common interactions between OSV 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[20], and disturbance at a specific site[21], usually wintering areas.

To a lesser degree, hunting, trapping, poaching, collection, and habitat loss and fragmentation were other interactions identified. Trapping of wolverine, or any of the special-status species under consideration, is not legal in the state of California and, therefore, will not be considered as a potential impact in this analysis.

OSV use and associated activities within habitats for wide-ranging carnivores, such as wolverine, have the potential to affect individuals or their habitat (Gaines et al. 2003). Direct effects include:
(1) Displacement or avoidance away from 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 a 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 Sierra Nevada red fox or wolverine would negatively affect that particular animal, but the likelihood of occurrence is assumed to be rare.

Indirect effects include behavioral modification such as altered or dispersed movement as caused by a route or human activities on a near a route.

Although recreational activities such as snowmobiling and backcountry skiing have the potential to affect wolverines (USFWS 2013), there are no verified detections of wolverine within one-quarter mile of any OSV routes or anywhere on the Lassen National Forest. Except for the anomaly of one recent wolverine detection on the Tahoe National Forest, the species is thought to be extirpated from the Sierra Nevada. Suitable wolverine habitat would not be physically modified by OSV use and related activities. Wolverines, if present, would be expected to have little interaction with OSVs or snow grooming equipment: whereas the majority of OSV 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.

Table 79 shows the amounts and percentages of wolverine habitat in which a wolverine, if present on the Lassen National Forest, could be subject to direct or indirect effects of OSV use and associated activities. Under alternatives 1, 2, and 4 about 81 percent of habitat would be open to OSV use as opposed to 74 percent under alternative 3. Twenty-one percent of habitat falls within the combined high and moderate use assumptions under alternative 3 compared to 27 percent of habitat under alternatives 1, 2, and 4.

Table 79. Acres of wolverine habitat and percentages () with potential for disturbance, mortality, or injury by OSV use, by alternative and OSV use assumption

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Acres Closed to OSV Use	7,644 (19)	7,644 (19)	10,614 (26)	7,778 (19)
Acres (High OSV Use Assumption)	5,932 (15)	5,932 (15)	4,739 (12)	5,931 (15)

[20] Spatial shifts in populations or individual animals away from human activities on or near roads, trails, or networks
[21] Displacement of individual animals from a specific location that is being used for reproduction and rearing of young

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Acres (Low to No OSV Use Assumption)	16,047 (40)	16,047 (40)	15,862 (39)	15,989 (40)
Acres (Moderate OSV Use Assumption)	4,799 (12)	4,799 (12)	3,443 (9)	4,743 (12)
Acres (Areas Outside of Use Assumptions)	5,854 (15)	5,854 (15)	5,619 (14)	5,836 (15)
Total Acres Habitat Open to OSV Use	32,632 (81)	32,632 (81)	29,662 (74)	32,498 (81)
Total Acres Habitat Across the Lassen NF	40,276 (100)	40,276 (100)	40,276 (100)	40,276 (100)

Cumulative Effects

Past, present, and foreseeable future actions that could result in a cumulative impact to wolverine, when combined with alternatives 1, 2, 3 or 4, include the Castle DFPZ 2 vegetation management project, Dutch and Tamarack fire salvage projects, firewood cutting, Christmas tree cutting, non-motorized winter recreational activities non-motorized winter recreational activities, or use of roads by wheeled vehicles during the season of overlap between OSVs and wheeled vehicles. The Castle DFPZ 2 is proposed on 39 acres and the Dutch and Tamarack Fire Salvage Projects would remove standing dead or dying trees across roughly 1,500 and 1,300 acres, respectively, of coniferous forest including some within suitable wolverine reproductive habitat. Vegetation and fuels management activities in recent years have included primarily thinned, masticated, and/or burned vegetation to reduce the potential for catastrophic wildfires. These projects are usually excluded from larger CWHR types and management prescriptions emphasize recruitment of large snags and logs, as well as retention of large conifer that are attributes of wolverine habitat. Wolverine habitat overlaps with areas open to Christmas tree and firewood cutting and use of roads within wolverine suitable wolverine habitat after the March 31 termination date of the Forest Order closing roads for exclusive OSV use could occur. However, wheeled motorized vehicles may not be used off of authorized Forest Service roads or motorized trails to scout for fuelwood or to harvest Christmas trees (USDA Forest Service 2014) and, 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 heavily used trails would probably be avoided by wolverine. 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 potential for this type of disturbance is unknown; state and privately-held lands make up about 20 percent of the area within the forest boundary. In summary, ongoing and reasonably foreseeable actions may be additive locally, but are not expected to contribute significantly to potential impacts to wolverine discussed for the project under any of the alternatives. In addition, seasonal LOPs that prevent disturbance to wolverine denning sites will be used to minimize disturbance to these sites if they are identified.

Determination Statement

Alternatives 1, 2, 3, and 4 of the Lassen 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 wolverine based on the following rationale:

- Suitable wolverine habitat would not be physically modified by OSV use and related activities.
- Wolverine is not currently known to be present on the Lassen National Forest and there is no evidence that California currently hosts a wolverine population.
- Although about 81 percent of habitat would be open to OSV use under alternatives 1, 2, and 4, and 27 percent of habitat falls within the combined high and moderate use assumptions, and 74 percent of habitat would be open to OSV use under alternative 3, and 21 percent of habitat falls within the combined high and moderate use assumptions, wolverines, if present, would be

expected to have little interaction with OSVs or snow grooming equipment: whereas the majority of OSV 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.

Bats

Fringed Myotis (*Myotis thysanodes*)

Regional Foresters Sensitive Species

Species Account

M. thysanodes widely distributed across southern British Columbia, Washington, Oregon, Idaho, Montana, Wyoming, Colorado, Utah, Nevada, California (including Santa Cruz Island), Arizona, New Mexico, western Texas, western South Dakota, western Nebraska, and south to Chiapas, Mexico. In California, the species is found the length of the state, from the coast (including Santa Cruz Island) to >1,800 meters (5,900 feet) in the Sierra Nevada. Records exist for the high desert and east of the Sierra. 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 everywhere rare. Our personal experience is that although this species occurs in netting and night roost surveys in a number of localities, it is always one of the rarest taxa (Pierson et al. 1996).

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, Pierson et al. 2006, Weller and Zabel 2001). In mist-netting surveys it is often found on secondary streams. Although nowhere common, the species occurs in netting records from sea level to at least 2,000 meters (6,500 feet) in the Sierra Nevada, California. It occurs primarily from sea level to approximately 1,200 to 2,100 meters (3,900 to 6,900 feet) (O'Farrell and Studier 1980) with an isolated record from 2,900 meters (9,500 feet) in New Mexico (Barbour and Davis 1969).

A paucity of records makes it difficult to assess habitat preferences for this species in California.

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, Pierson et al. 2006). Most of the tree roosts were located within the tallest or second tallest snags in the stand, were surrounded by reduced canopy closure, and were under bark (ibid.). *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 Durrant 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 known to fly during colder temperatures (Hirshfeld and O'Farrell 1976) and precipitation does not appear to affect emergence (O'Farrell and Studier 1975).

Mating occurs in fall following break-up of 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.

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).

Direct and indirect Effects

OSV on the Lassen National Forest will have no change in 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, it 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 Lassen, 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 point in 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 upon emerging from roosts. In addition, they forage in riparian areas and meadows. 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 (USFS 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, including the existing condition, is expected to be adequate to protect aquatic and riparian habitats from measurable impacts to vegetation or water quality (McNamara 2015).

Cumulative Effects

Past, present, and foreseeable future actions that could result in a cumulative impact to *M. thysanodes*, when combined with alternatives 1, 2, 3 or 4, include the Castle DFPZ 2 vegetation management project, Dutch and Tamarack fire salvage projects, firewood cutting, Christmas tree cutting, non-motorized winter recreational activities, or use of roads by wheeled vehicles during the season of overlap between OSVs and wheeled vehicles. The Castle DFPZ 2 is proposed on 39 acres. However, seasonal LOPs required for raptor species for vegetation projects to prevent disturbance to breeding individuals could also prevent disturbance to breeding bats. The Dutch and Tamarack Fire Salvage Projects would remove standing dead or dying trees across roughly 1,500 and 1,300 acres, respectively, of coniferous forest in the northwestern portion of the analysis area. Vegetation and fuels management activities in recent years have included primarily thinned, masticated, and/or burned vegetation to reduce the potential for catastrophic wildfires. These projects are usually excluded from areas with larger, mature trees that serve as roosts for bats. In addition, management prescriptions have emphasized recruitment of large snags and logs and retention of large conifer.

M. thysanodes habitat also overlaps with areas open to Christmas tree cutting and firewood cutting. However, wheeled motorized vehicles may not be used off of authorized Forest Service roads or motorized trails to scout for fuelwood or to harvest Christmas trees (USDA Forest Service 2014), 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), minimizing the potential for disturbance or displacement of roosting bats from this activity. 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 small potential for an additive effect from 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 become habituate to the noise. Similar activities on state and private lands that make up about 20 percent of the area within the Forest boundary 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 Lassen 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 based on the following:

- Proposed actions will not physically modify fringed myotis bat habitat.
- Proposed actions will 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 will be mitigated by the 12-inch minimum snow depth that will protect aquatic and riparian habitats from measurable impacts to vegetation or water quality.

Pallid Bat (*Antrozous pallidus*)

Regional Foresters Sensitive Species

Species Account

A. pallidus is distributed throughout much of the West, from southern British Columbia to central Mexico, and as far east as western portions of Kansas, Oklahoma, and Texas, with an isolated subspecies in Cuba

(Hermanson and O'Shea 1983; Simmons 2005). Pallid bat has been documented on the Lassen 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).

A. pallidus is primarily a low to mid-elevation species, with an elevation record of 2,440 meters (8,000 feet) in the mountains of New Mexico (Black 1974). In California, it is found from sea level up to approximately 2,250 meters (7,400 feet) (Baker et al. 2008, Pierson et al. 2001, 2009), although it is most commonly found below 1,800 meters (5,900 feet) (Barbour and Davis 1969, Orr 1954, Pierson et al. 2001 and 2009), and there is a record from –178 feet in Death Valley (Orr 1954). It is found along the coast, in the coast ranges, the Central Valley, up to mid-elevation in the Sierra Nevada and Cascade ranges, and in the more xeric and desert habitats east of the Sierra Nevada and in southern California.

Pallid bats are quite eclectic in their roosting habits (Barbour and Davis 1969, Hermanson and O'Shea 1983, Lewis 1994 and 1996, Orr 1954, Pierson et al. 1996). They roost in rock crevices (Orr 1954, Hermanson and O'Shea 1983, Pierson et al. 2002), under rock slabs (Vaughan and O'Shea 1976, Lewis 1996), in tree hollows (Orr 1954, Rainey and Pierson 1996, Rabe et. al. 1998, Pierson et al. 2004), caves, abandoned mines, and a variety of other anthropogenic structures, including buildings (vacant and occupied), porches and garages (van Zyll de Jong 1985), properly designed bat houses (Tatarian 2001a), and bridges (Barbour and Davis 1969, Beck and Rudd 1960, Johnston et al. 2004, Lewis 1996, Orr 1954, Pierson et al. 1996, Pierson et al. 2001, Pierson et al. 2002, Vaughan and O'Shea 1976). 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 (P.A. Heady pers. comm., 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).

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).

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 sometimes form a bachelor colony (Johnston et al 2006).

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 1.7 kilometers (1 mile) from the primary maternity colony roost. During January and February, pallid bats foraged about once every 6 nights, at temperatures down to 4 °C (39 °F) and on rainy nights. Occasional winter activity has been reported in southern portions of its range and has been observed in Nevada flying during winter when temperatures were as low as 36 °F (O'Farrell et al. 1967, O'Farrell and Bradley 1970). Barbour and Davis (1969) reported hibernating or mildly torpid bats in buildings, a hollow post, limestone cliffs (Orr 1954), caves, or mines (Hall 1946).

Direct and indirect Effects

OSV on the Lassen National Forest will have no change in 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 °F), or males moving between winter roosts, or an occasional feeding (once every 6 nights), there is a low likelihood that pallid bat behavior could be modified by the noise or disruption of grooming trails for OSV.

Disturbance at the winter roost could occur from the noise of OSV. 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 Lassen, 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 point in time. There should be no impact to the maternal roosts as they would start in April or May, following snowmelt.

Species such as pallid bat forage on invertebrates in areas including riparian and/or aquatic environments. 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 (USFS 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, including the existing condition, is expected to be adequate to protect aquatic and riparian habitats from measurable impacts to vegetation or water quality (McNamara 2015).

Cumulative Effects

Past, present, and foreseeable future actions that could result in a cumulative impact to pallid bats, when combined with alternatives 1, 2, 3 or 4, include the Castle DFPZ 2 vegetation management project, Dutch and Tamarack fire salvage projects, firewood cutting, Christmas tree cutting, non-motorized winter recreational activities, or use of roads by wheeled vehicles during the season of overlap between OSVs and wheeled vehicles. The Castle DFPZ 2 is proposed on 39 acres. However, seasonal LOPs required for raptor species for vegetation projects to prevent disturbance to breeding individuals could also prevent disturbance to breeding bats. The Dutch and Tamarack Fire Salvage Projects would remove standing dead or dying trees across roughly 1,500 and 1,300 acres, respectively, of coniferous forest in the northwestern portion of the analysis area. Vegetation and fuels management activities in recent years have included

primarily thinned, masticated, and/or burned vegetation to reduce the potential for catastrophic wildfires. These projects are usually excluded from areas with larger, mature trees that serve as reproductive habitat and roosts for bats. In addition, management prescriptions have emphasized recruitment of large snags and logs and retention of large conifer.

Pallid bat habitat also overlaps with areas open to Christmas tree cutting and firewood cutting. However, wheeled motorized vehicles may not be used off of authorized Forest Service roads or motorized trails to scout for fuelwood or to harvest Christmas trees (USDA Forest Service 2014), 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), minimizing the potential for disturbance or displacement of roosting bats from this activity. Use of roads within pallid 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 pallid bat breeding season. There is a small potential for an additive effect from 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 pallid bats would either avoid roosting in those areas, if too great a disturbance, or become habituate to the noise. Similar activities on state and private lands that make up about 20 percent of the area within the Forest boundary 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 pallid 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 Lassen 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 based on the following:

- Proposed actions will not physically modify pallid bat habitat.
- Proposed actions will 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 from oil, gas, or other vehicle fluids entering waterways will be mitigated by the 12-inch minimum snow depth that will protect aquatic and riparian habitats from measurable impacts to vegetation or water quality.

Townsend's Big-eared Bat (*Corynorhinus townsendii*)

Regional Foresters Sensitive Species

Species Account

In California, *C. townsendii* is found throughout much of the state, except for the Central Valley and very high elevations. The largest populations are concentrated in areas offering caves (commonly limestone or basaltic lava) or mines as roosting habitat. The species is found from sea level along the coast to 1,820 m (6,000') in the Sierra Nevada (Dalquest 1947, Pearson et al. 1952, Pierson and Rainey 1996). In the White Mountains, summer records for males extend up to 2,410 meters (7,900 feet), and hibernating groups have been found in mines as high as 3,188 meters (10,460 feet) (Szewczak et al. 1998). Maternity colonies are more frequently found below 2,000 meters (6,560 feet) (Pierson and Fellers 1998, Szewczak et al. 1998). Outside California, it has been found to 2,400 meters (7,900 feet) (Jones 1965, Jones and Suttkus 1972) and 2,900 meters (9,500 feet) (Findley and Negus 1953). There are historical and fairly recent (1997) records of Townsend's big-eared bat near the Lassen National Forest as well as a documented maternity and hibernaculum in lava tubes located 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 Ranges 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, Perkins et al. 1994, 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.

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). The discovery of a maternity roost in a hollow redwood tree (Mazurek 2004) suggests that coastal populations may have historically relied on these structures.

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.).

C. townsendii is very sensitive to human disturbance, however, in some instances can become habituated to reoccurring and predictable human activity. Maternity aggregations forming between March and June (based on local climate and latitude). Hibernation sites are generally caves or mines (Pearson et al. 1952, Barbour and Davis 1969), although animals are occasionally found in buildings (Dalquest 1947). The period of hibernation is shorter at lower elevations and latitudes.

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 2001, Pierson et al. 2002). They forage as long as weather permits in the fall, and are periodically active in winter (Pierson et al. 1991).

Direct and Indirect Effects

OSV on the Lassen National Forest will have no change in the habitat for Townsend's big-eared bat as no habitat modifications are anticipated

Townsend's big-eared bats have very little known about their wintering behavior. Some limited migration to lower elevation may occur. However, it Townsend's big-eared bats remain on the landscape in winter, there is a low likelihood that Townsend's big-eared bats 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 Lassen, 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 point in 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 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 (USFS 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, including the existing condition, is expected to be adequate to protect aquatic and riparian habitats from measurable impacts to vegetation or water quality (McNamara 2015).

Cumulative Effects

Past, present, and foreseeable future actions that could result in a cumulative impact to Townsend's big-eared bats, when combined with alternatives 1, 2, 3 or 4, include the Castle DFPZ 2 vegetation management project, Dutch and Tamarack fire salvage projects, firewood cutting, Christmas tree cutting, non-motorized winter recreational activities, or use of roads by wheeled vehicles during the season of overlap between OSVs and wheeled vehicles. The Castle DFPZ 2 is proposed on 39 acres. However, seasonal LOPs required for raptor species for vegetation projects to prevent disturbance to breeding individuals could also prevent disturbance to breeding bats. The Dutch and Tamarack Fire Salvage Projects would remove standing dead or dying trees across roughly 1,500 and 1,300 acres, respectively, of coniferous forest in the northwestern portion of the analysis area. Vegetation and fuels management activities in recent years have included primarily thinned, masticated, and/or burned vegetation to reduce the potential for catastrophic wildfires. These projects are usually excluded from areas with larger, mature trees that serve as roosts for bats. In addition, management prescriptions have emphasized recruitment of large snags and logs and retention of large conifer.

Townsend's big-eared bat habitat also overlaps with areas open to Christmas tree cutting and firewood cutting. However, wheeled motorized vehicles may not be used off of authorized Forest Service roads or motorized trails to scout for fuelwood or to harvest Christmas trees (USDA Forest Service 2014), 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), minimizing the potential for disturbance or displacement of roosting bats from this activity. Use of roads within Townsend's big-eared 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 Townsend's big-eared bat breeding season. There is a small potential for an additive effect from 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

Townsend's big-eared bat prey 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 become habituate to the noise. Similar activities on state and private lands that make up about 20 percent of the area within the Forest boundary 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 Lassen 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 based on the following:

- Proposed actions will not physically modify Townsend's big-eared bat habitat.
- Proposed actions will generally occur when the species is hibernating and is generally 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 will be mitigated by the 12-inch minimum snow depth that will protect aquatic and riparian habitats from measurable impacts to vegetation or water quality.

Species that Utilize Riparian or Wetland Habitats

Bald Eagle (*Haliaeetus leucocephalus*)

Regional Foresters Sensitive Species

Species Account

The bald eagle, (*Haliaeetus leucocephalus*), was federally de-listed on August 8, 2007 (Federal Registrar Vol. 72, No. 130, pp. 37346-37372) and then placed on the USFS Region 5 Regional Forester's sensitive species list.

Bald eagles occur throughout most of North America and have undergone large population fluctuations over the past two centuries (Buehler 2000, Murphy and Knopp 2000, USDA 2001). This species occurs and winters throughout California, except in desert areas. Migratory individuals from north and northeast 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, Lassen, Modoc, Plumas, Shasta, Siskiyou, and Trinity counties), typically at low elevations; breeding in the high Sierra Nevada is rare (USDA 2001).

Lassen National Forest has some of the most productive bald eagle breeding habitat in California (Lassen National Forest 2010). Based upon the best available data, thirty-three breeding territories currently exist within Lassen National Forest boundary.

Habitat Status

Bald eagles winter throughout California 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. 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. In forested areas, bald eagles often select the tallest trees with limbs strong enough to support a nest that can weigh more than 1,000 pounds; nest sites typically include at least one perch with a clear view of the water where the eagles usually forage (U.S. Fish and Wildlife Service 2007). Egg laying dates vary throughout the U.S. On the Lassen 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 (Lassen National Forest 2010).

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). This species typically perches in “large, robustly limbed trees, on snags, on broken topped trees, or on rocks near water” (Peterson 1986 and Laves and Romsos 2000). Perches function as resting, preening, foraging, and feeding sites for bald eagles.

Roost trees are perches where one or more bald eagles rest at night and may occur long distances from open water bodies. Roost trees are similar in structure compared to perch trees; “dominant trees that have open and robust branches, are sometimes defoliated (i.e., snags), are protected from prevailing winds, and are typically far from human development” (Anthony et al. 1982 in Murphy and Knopp 2000).

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. Incubation lasts for approximately 35 days, and hatching occurs in mid-June. Both parents provide care for the nestlings for approximately 10 to 12 weeks. Juveniles fledge in late August and exhibit nest site dependency for 4 to 11 weeks following the first flight. Bald eagles require 4 to 5 years to reach sexual maturity and full adult plumage. Dispersal distances can be substantial; this species often disperses several hundred miles from the natal site. Females tend to disperse farther than males. 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 2001).

Nest trees are “typically established in large, dominant live trees with open branch work and are often located within 1.6 kilometers [0.96 mile] of open water” (Murphy and Knopp 2000). Nest trees must be sturdy to support the large, heavy stick nests built by this species at or just below the tree canopy (Ibid). Nests are located most frequently in stands with less than 40 percent canopy cover (Call 1978 in Murphy and Knopp 2000).

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 80.

Table 80. Resource indicators and measures for assessing effects to bald eagle

Resource Indicator and Effect	Measure	Alternatives 1 and 2	Alternative 3	Alternative 4
Potential for disturbance to individuals from OSV use and increased human presence or injury or mortality of individuals	Percentage of habitat affected and percentage of habitat within high and moderate OSV use categories	85/40	78/35	84/39

Resource Indicator and Effect	Measure	Alternatives 1 and 2	Alternative 3	Alternative 4
Potential for disturbance to individuals from OSV use and increased human presence or injury or mortality of individuals	Percentage of known nest sites within 660 feet of groomed or ungroomed trails	0	0	0

Bald eagles are 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, Grubb et al. 1998). 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 (U.S. Fish and Wildlife Service 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 there are no other undisturbed and productive feeding and roosting sites available.

In Washington, bald eagles have been found to be adversely affected by recreation that involves both pedestrian traffic and boat use by adversely affecting feeding activity (Stalmaster and Kaiser 1998). 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. Knight and Knight (1984) found that bald eagles became habituated to canoes in areas where they were common.

Studies in Yellowstone National Park indicated that successful nesting and fledging could not be correlated with cumulative OSV traffic (USDI National Park Service 2007). Additional studies indicate that animals, including bald eagles, infrequently demonstrated active responses to OSVs and associated human presence (USDI National Park Service 2013). In a study based on approximately 5,688 interactions[22] 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 have become desensitized to OSV use and other human disturbance in the park during winter to some extent (USDI National Park Service 2013).

[22] 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 1500 feet (500 m) of the road.

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 (U.S. Fish and Wildlife Service 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.

The Lassen National Forest currently has 90,146 total acres of high-value reproductive habitat[23], 10,857 total acres of eagle territories, and 33 bald eagle nest trees on National Forest System lands.

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 potential for injury or mortality to individuals from vehicle collisions. 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.

OSV proposed actions will not physically modify any suitable bald eagle habitat within the project area. However, they do have the potential to disturb individuals. Table 81 displays and compares, by alternative, the amount of bald high reproduction habitat with the potential for direct and indirect effects. Like other raptor species discussed thus far, the potential for vehicle collision with an individual eagle is assumed to be rare. Alternatives 1, 2, and 4 would have roughly the same amount of acres and percentage of the total high reproductive habitat (approximately 76,660 acres) open to OSV use (85 percent) and have the potential to impact the same amount of this type of habitat under the high (21 percent), moderate (18 to 19 percent), or low (30 to 31 percent) OSV use assumptions. Roughly 70,000 acres or 78 percent of bald eagle high reproductive habitat would be open under alternative 3, with 19 percent of high reproductive habitat, overall, falling within the high OSV use category, 16 percent in the moderate OSV use category, and 28 percent in the low OSV use category.

Table 81. Acres of bald eagle high reproductive habitat and percentages () with potential for disturbance, mortality, or injury by OSV use, by alternative and OSV use assumption

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Acres Closed to OSV Use	13,484 (15)	13,484 (15)	20,128 (22)	14,416 (16)
Acres (High OSV Use Assumption)	18,750 (21)	18,750 (21)	17,478 (19)	18,608 (21)
Acres (Low to No OSV Use Assumption)	27,446 (30)	27,446 (30)	25,657 (28)	27,598 (31)
Acres (Moderate OSV Use Assumption)	16,890 (19)	16,890 (19)	14,629 (16)	16,170 (18)
Acres (Areas Outside of Use Assumptions)	13,576 (15)	13,576 (15)	12,255 (14)	13,354 (15)
Total Acres Habitat Open to OSV Use	76,662 (85)	76,662 (85)	70,018 (78)	75,730 (84)
Total Acres Habitat Across the Lassen NF	90,146 (100)	90,146 (100)	90,146 (100)	90,146 (100)

Table 82 displays the number and percent of Lassen National Forest known bald eagle nests occurring within high, medium, low OSV use areas, by alternative. Under alternatives 1, 2, and 4, 15 percent of bald eagle nests have any potential to be impacted by OSV use and up to 12 percent have the potential to be

[23] Ponderosa pine (CWHR types 5S, 5P, 5M, 5D) and Sierran mixed conifer and white fir (CWHR types 5S, 5P, 5M, 5D, and 6)

impacted under alternative 3. Under all of the alternatives, no nests are located within the high OSV-use assumption areas and 3 nests (9 percent of the total number of nests across the Forest) are located within low OSV-use assumption areas. Under alternatives 1, 2, and 4, 2 nests (6 percent of total) are located within moderate OSV-use assumption areas; under alternative 3, only 1 nest (3 percent of total) is within moderate OSV-use assumption areas. More importantly, none of the bald eagle nests occurring on the Lassen National Forest are within 660 feet of groomed or ungroomed OSV trails.

Table 82. Number and percent () of bald eagle nests with potential for disturbance, mortality, or injury by OSV use[24], by alternative and OSV use assumption

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Total Nests (High OSV Use Assumption)	0 (0)	0 (0)	0 (0)	0 (0)
Total Nests (Low to No OSV Use Assumption)	3 (9)	3 (9)	3 (9)	3 (9)
Total Nests (Moderate OSV Use Assumption)	2 (6)	2 (6)	1 (3)	2 (6)
Total Nests (Areas Outside of Use Assumptions)	0 (0)	0 (0)	0 (0)	0 (0)
Total Number of Nests With Potential to be Affected by Cross Country OSV Use	5 (15)	5 (15)	4 (12)	5 (15)
Total Number of Nests Without Potential to be Affected by Cross Country OSV Use	28 (85)	28 (85)	29 (88)	28 (85)
Total Number of Nests Across Lassen NF	33 (100)	33 (100)	33 (100)	33 (100)

Cumulative Effects

Past, present, and foreseeable future actions that could result in a cumulative impact to bald eagle, when combined with alternatives 1, 2, 3 or 4, include firewood cutting, Christmas tree cutting, non-motorized winter recreational activities, or use of roads by wheeled vehicles during the season of overlap between OSVs and wheeled vehicles. Bald eagle habitat overlaps with areas open to Christmas tree cutting and firewood cutting. However, wheeled motorized vehicles may not be used off of authorized Forest Service roads or motorized trails to scout for fuelwood or to harvest Christmas trees (USDA Forest Service 2014), 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 alternatives 1, 2, and 3. Under alternative 4, in which trail grooming would begin at the discretion of the groomer, there is the potential for a somewhat larger degree of overlap during years in which heavy snowfall begins early. 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 one-quarter 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; state and privately-held lands make up about 20 percent of the area within the forest boundary. In summary, ongoing and reasonably foreseeable actions may locally increase the potential for 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

[24] bald eagle nests within 660 ft. of high, medium, and low OSV use assumptions

Determination Statement

Alternatives 1, 2, 3, and 4 of the Lassen 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.

- OSV proposed actions will not physically modify any suitable bald eagle habitat within the project area.
- Noise-based impacts to individuals would primarily have potential to impact foraging individuals. Although the bald eagle breeding season overlaps with the OSV use season, 78 to 85 percent of bald eagle high reproductive habitat would be open under all of the alternatives under consideration, 35 to 40 percent of the total amount of high reproductive habitat could be subject to high and moderate OSV use, and noise-based disturbance from the action would overlap with the bald eagle breeding season beginning in January, only 6 percent of all documented nests are located within high and moderate OSV-use assumption areas under alternatives 1, 2, and 4 and only 3 percent of all nests are within high and moderate OSV-use assumption areas under alternative 3.
- In addition, no nests are within 660 feet (the U.S. Fish and Wildlife Service recommended buffer for off-road vehicle use, including snowmobiles, in open landscapes) of groomed or ungroomed OSV trails, so effects to breeding would not be expected.
- The potential for OSV collision with individual bald eagles is very low.

Great Gray Owl (*Strix nebulosa*)

Regional Foresters Sensitive Species

Species Account

The primarily nocturnal great gray) owl is a Forest Service Sensitive Species. The great gray owl population estimate for the state of California is fewer than 300 individuals (Wu et al. 2015). The present known population is centered in and adjacent to Yosemite National Park. Nesting activity on the Stanislaus National Forest has been documented at five distinct locations. 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 NFs, as well as privately owned lands adjacent to the Lassen National Forest.

Sightings have been reported on the Lassen National Forest. However, to date none have been confirmed and recorded. Since 1996 there have been 15 survey efforts on various meadow/forest areas which are potential suitable habitat for great gray owl. Additional surveys were conducted by CDFG in 2008. There have been no positive detections from these survey efforts (USFS LNF 2670 survey files).

Habitat Status

As described by Beck and Winter (2000), great gray owls require mid- or late-succession conifer forests at size class 4 (dominant and co-dominant trees 12/23 inches), containing large (> 24 inches dbh), broken-top snags in the forest matrix in sufficient numbers (5 to 6 snags per acre) to provide nest sites. These sites are typically red and/or white firs vegetation types; however, old and decadent black oaks have been used for nesting at lower elevations. More recently, Wu et al. (2015) characterized habitat at known nesting sites and found that 30 percent of nests were in oak trees and 21 percent were below 1,000 meters (3,281 feet), which loosely corresponds to the lower conifer-zone limit. Across all elevations and tree

species, degree of deterioration was the most important factor with nest trees being significantly more decayed than paired reference trees in the same meadow.

Located suitable nest sites located were in close proximity (< 440 yards or approximately 400 meters) to 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 microtine rodents (i.e,. meadow voles); pocket gophers and meadow voles are believed to comprise the majority of the owl's diet (Kalinowski et al. 2014). Meadows or portions of meadows, with standing water remaining at mid-summer, are not suitable because they would be void of these prey rodents. Potential territories include meadows which total 10 acres or more in size 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.

Potentially suitable habitat for the great gray owl is scattered across the Lassen National Forest. Most habitats meeting the above mentioned description occur on the southwest side of the forest south and west of Lassen Volcanic NP. Given that there have been no great gray owls confirmed breeding on the Lassen National Forest, to date there have been no protected activity centers established. There are approximately 213,164 acres 15,546 acres of habitat[25] on the Lassen National Forest within the project area, some portion of which could be potential suitable great gray owl habitat.

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 83.

Table 83. Resource indicators and measures for assessing effects to great gray owl

Resource Indicator and Effect	Measure	Alternatives 1 and 2	Alternative 3	Alternative 4
Potential for disturbance to individuals from OSV use and increased human presence or injury or mortality of individuals	Percentage of habitat affected and percentage of habitat within high and moderate OSV use categories	91/31	85/25	90/30

The majority of associated risk factors within wetland and riparian habitats apply to roads and trails and primarily include the following potential direct effects (Gaines et al. 2003): site disturbance and potential for 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. 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.

[25] Areas < 440 yards (~ 400 m) to montane meadows >10 acres in size and between 2,000 and 8,000 feet in elevation with forest canopy closures >60% (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.

Although great gray owls have not been confirmed on the Lassen National Forest, they have been observed in the nearby vicinity and, over time, could have the potential to be affected by Forest OSV activities. Snowplay in meadows may prevent GGO use of in or adjacent to those meadows. Like the other raptor species under consideration in this analysis, potential noise-based disturbance to breeding individuals is the primary concern. If GGOs area present on the Lassen National Forest, the potential for disturbance to breeding individuals would be limited to the early portion of March 1 to August 15 GGO breeding season that overlaps with the OSV use season.

As previously discussed in the spotted owl section, owls are nocturnal whereas the majority of OSV use and associated activities, with the exception of trail grooming, occur during the daytime, so the potential for collisions of OSVs with GGOs would be negligible and foraging behavior would generally not be interrupted. Trail grooming would not physically modify GGO habitat. Under alternatives 1, 2, and 3, the snow grooming season would conclude on March 31; under alternative 4, it would be left to the discretion of the groomer and could extend for as long as 12 inches of snow remain on the ground. Therefore, under all of the alternatives, snow grooming season overlaps with at least a portion of the March 1 through August 15 GGO breeding season. 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. The passage of a trail grooming machine or an 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[26] 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 GGOs.

Great gray owl subnivean prey has the potential to be affected by off-trail OSV-related snow compaction (Gaines et al. 2003). Please refer to that discussion below.

As described above, owls could be expected to nest within 400 meters of suitable wet meadow areas greater than 10 acres in size and forage in adjacent meadows. Of the 213,164 acres of suitable habitat, the majority of habitat would be open to OSV use under all of the alternatives and without much difference between alternatives (Table 84): alternatives 1 and 2 (91 percent), alternative 3 (85 percent), and alternative 4 (90 percent). Alternatives 1, 2, and 4 have roughly the same amount of habitat falling within the high and moderate use categories: 30 to 30 percent; alternative 3 has slightly less at 25 percent.

Table 84. Acres of great gray owl habitat and percentages () with potential for disturbance, mortality or injury from OSV use, by alternative and OSV use assumption

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Acres Closed to OSV Use	18,859 (9)	18,859 (9)	32,728 (15)	21,343 (10)
Acres (High OSV Use Assumption)	35,529 (17)	35,529 (17)	30,239 (14)	35,506 (17)
Acres (Low to No OSV Use Assumption)	37,559 (18)	37,559 (18)	36,878 (17)	37,079 (17)
Acres (Moderate OSV Use Assumption)	29,738 (14)	29,738 (14)	24,429 (11)	28,683 (13)
Acres (Areas Outside of Use Assumptions)	91,477 (43)	91,477 (43)	88,889 (42)	90,553 (42)
Total Acres Habitat Open to OSV Use	194,302 (91)	194,302 (91)	180,436 (85)	191,821 (90)

[26] 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 and 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 (CA Parks and Recreation 2010).

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Total Acres Habitat Across the Lassen NF	213,164 (100)	213,164 (100)	213,164 (100)	213,164 (100)

Cumulative Effects

Past, present, and foreseeable future actions that could result in a cumulative impact to great gray owl, when combined with alternatives 1, 2, 3 or 4, include those with the potential for disturbance to or displacement of GGOs such as the Castle DFPZ 2 vegetation management project, Dutch and Tamarack fire salvage projects, firewood cutting, Christmas tree cutting, non-motorized winter recreational activities or use of roads by wheeled vehicles during the season of overlap between OSVs and wheeled vehicles. The Dutch and Tamarack Fire Salvage Projects would remove standing dead or dying trees across roughly 1,500 and 1,300 acres, respectively, of coniferous forest, including some within or adjacent to suitable GGO reproductive habitat. Vegetation and fuels management activities in recent years have included primarily thinned, masticated, and/or burned vegetation to reduce the potential for catastrophic wildfires. These projects are usually excluded from larger CWHR types. Great gray owl habitat also overlaps with areas open to Christmas tree cutting and firewood cutting. However, wheeled motorized vehicles may not be used off of authorized Forest Service roads or motorized trails to scout for fuelwood or to harvest Christmas trees (USDA Forest Service 2014), 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 GGO breeding season under alternatives 1, 2, and 3. Under alternative 4, in which trail grooming would begin at the discretion of the groomer, there is the potential for a somewhat larger degree of overlap during years in which heavy snowfall begins early. Use of roads within GGO 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 GGO breeding season, particularly for nests within 0.25 mile of roads. However, no GGO nests have been identified on the Lassen 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 one-quarter 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; state and privately-held lands make up about 20 percent of the area within the forest boundary. 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, and 4 of the Lassen 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 great gray owl. Although, 85 to 91 percent percent of habitat would be open to OSV use under the alternatives and 25 to 27 percent of habitat would fall within the combined high and moderate use assumptions where the greatest potential for noise-based disturbance might occur:

- Great gray owls have not been confirmed on the Lassen National Forest and great gray owl habitat would not be physically modified by OSV use and related activities.
- In addition, due to their nocturnal behavior, great gray owls, if present, would be expected to have little interaction with OSVs or snow grooming equipment resulting in little potential for direct effects from OSVs or grooming equipment.

- The potential for OSV-related noise-based disturbance would overlap with only the early part of the March 1 to August 15 GGO breeding season.

Willow Flycatcher (*Empidonax traili*)

Regional Foresters Sensitive Species

Species Account

The willow flycatcher (*Empidonax trailii*) is a Forest Service Sensitive species. 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 2001). Three subspecies occur in California: *E. t. extimus* (southern California), *E. t. brewsteri* (north of Fresno County from the Pacific coast to the western slopes of the Sierra Nevada crest), and *E. t. adastus* (on the eastern slopes of the Sierra Nevada and Cascade ranges, including the Lake Tahoe basin – a watershed that drains to the east of the Sierra crest) (summarized in USDA 2000 and Greene et al. 2003). In the past three decades, willow flycatchers have undergone substantial population declines in California. Multiple factors likely contributed to the decline including poor quality of meadow habitat, shortened breeding-season length and stochastic weather events, the initial small population size, and low reproduction that influenced dispersal dynamics (Mathewson et al. 2011). Nest predation was the primary cause of nest failure at their study sites. Willow flycatchers currently occur and breed in areas (e.g. Upper Truckee River watershed) where they were thought to have “all but disappeared” (USDA 2001), though at very low densities and with limited reproductive success. 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.

Lassen National Forest has one of the largest concentrations of breeding willow flycatcher in the Sierra Nevada; most birds are located in Warner Valley Ecological Reserve, managed by California Department of Fish and Game (CDFG), situated upstream from Lake Almanor and near the southwest boundary of Lassen Volcanic National Park (Lassen National Forest 2010). Earliest arrival dates range from late May to early June in the southern Sierra Nevada to the first of June in the northern Sierra Nevada (Green et al. 2003).

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%, 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.). Shrubs in these preferred habitats are typically 6.5 to 13 feet in height, with the lower half comprised of dense woody stems. Live foliage density within the shrub layer is moderate to high and uniform from the ground to the shrub canopy (summarized in USDA 2001). Sites are “significantly more likely to support multiple willow flycatchers, and result in successful breeding efforts, as riparian shrub cover in meadows and willow flycatcher territories increases” (Bombay 1999 as cited in USDA 2001).

Degradation and alteration of willow flycatcher habitat (i.e., montane meadows) is a primary factor contributing to population declines (Green et al. 2003). Degradation could include, but is not limited to: (1) alterations to the hydrological patterns leading to meadow drying, (2) destruction of shrub vegetation resulting in loss of nesting sites and cover for predator avoidance, (3) increased predator access to meadow interior, (4) loss of foraging substrate and decreased insect abundance, and (5) potentially increased contact with brown-headed cowbirds (Green et al. 2003).

Direct and Indirect Effects

Green et al. (2003) identified meadow degradation, which results in meadow drying, loss of nesting and foraging substrates, increased predator access to meadow interiors, and potentially cowbird parasitism as among the key factors likely responsible for the decline of the willow flycatcher. The minimum cross-country snow depth of 12 inches under all of the action alternatives, including the existing condition, is expected to be adequate to protect vegetation from measurable impacts (McNamara 2015). 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 (USFS 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, including the existing condition, is expected to be adequate to protect aquatic and riparian habitats from measurable impacts to water quality (McNamara 2015).

Cumulative Effects

None; the Lassen National Forest Over-snow Vehicle Use Designation Project will not result in measurable direct or indirect impacts to willow flycatcher and, therefore, there will be no cumulative impacts to this species.

Determination Statement

None of the alternatives of the Lassen National Forest Over-snow Vehicle Use Designation Project will impact 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.
- Over-snow vehicle 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, including the existing condition, is expected to protect meadow and riparian habitats from measurable impacts to water quality or vegetation.

Greater Sandhill Crane (*Grus Canadensis tabida*)

Regional Foresters Sensitive Species

Species Account

Greater sandhill cranes, including breeding individuals, have been documented on the Lassen National Forest.

Habitat Status

The California breeding population of sandhill cranes winters chiefly in the Central Valley and peak breeding occurs between May and July [California Department of Fish and Wildlife (CDFW) 2015e].

High reproductive habitats for sandhill crane include fresh emergent wetland, irrigated hayfield and wet meadow (CDFW 2015e).

Much of the wetland acres on Lassen National Forest, which are important to waterfowl and sandhill crane, are ephemeral; flooding occurs from snow melt and staging and breeding occurs in spring and early summer (Lassen National Forest 2010). 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 and water diversions (Lassen National Forest 2010); predation; human disturbance of crane pairs during the nesting season; and the spread of invasive plants into greater sandhill crane habitats (U.S. Fish and Wildlife Service 2015e).

Direct and Indirect Effects

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 (USFS 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, including the existing condition, is expected to be adequate to protect aquatic and riparian habitats from measurable impacts to vegetation or water quality (McNamara 2015).

Cumulative Effects

None; the Lassen National Forest Over-Snow Vehicle Use Designation Project will not result in measurable direct or indirect impacts to greater sandhill crane and, therefore, there will be no cumulative impacts to this species.

Determination Statement

None of the alternatives of the Lassen National Forest Over-snow Vehicle Use Designation Project will impact 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.
- Over-snow vehicle 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, including the existing condition, 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.

Yellow Rail (*Coturnicops noveboracensis*)

Regional Foresters Sensitive Species

Species Account

Yellow rail has been documented year round in California, but in two primary seasonal roles: as a very local breeder in the northeastern interior (based on records from Mono County in Long Valley in 1922 and 1939 and in Bridgeport Valley in April and records in the late 19th century from Quincy, Plumas County indicating either birds at a former breeding site or passage of spring migrants through the northern Sierra Nevada) and as a winter visitor (early Oct to mid-Apr) on the coast and in the Suisun Marsh region (Shuford and Gardali 2008).

There is a single known observation of yellow rail on the Eagle Lake Ranger District of the Lassen National Forest.

Habitat Status

The length of the breeding season is poorly known in California, but on the basis of information from Oregon it probably extends from May through early September (Shuford and Gardali 2008). Yellow Rails prefer wet meadows, fens, boggy swales, floodplains, montane meadows, and emergent vegetation in fresh and brackish wetlands (Goldade et al. 2002).

Direct and Indirect Effects

California is outside of the continuous breeding range of the yellow rail and appears to be primarily a winter visitor to the coastal and central portion of the state as there are no recent records of reproduction in the state. The minimum cross-country snow depth of 12 inches under all of the action alternatives, including the existing condition, is expected to be adequate to protect grasslands, wet meadow and fresh emergent wetland habitats utilized by this species from measurable impacts to vegetation or water quality. Therefore, no direct or indirect impacts are expected from the actions.

Cumulative Effects

None; the Lassen National Forest Over-snow Vehicle Use Designation Project will not result in measurable direct or indirect impacts to yellow rail or its habitat and, therefore, there will be no cumulative impacts to this species.

Determination Statement

None of the alternatives of the Lassen National Forest Over-snow Vehicle Use Designation Project will impact yellow rail or its habitat based on the following:

- There are no recent records of reproduction within the state of California.
- Based upon available information, the species appears to be limited to a seasonal migrant within the project area so no direct impacts to the species would occur.
- The minimum cross-country snow depth of 12 inches under all of the action alternatives, including the existing condition, is expected to be adequate to protect grasslands, wet meadow and fresh emergent wetland habitats utilized by this species from measurable impacts to vegetation or water quality.

Western Pond Turtle (*Emys marmorata*)

Regional Foresters Sensitive Species

Species account

The western pond turtle (*Emys marmorata*) is found on the west coast of North America. Historically it was found from as far north as British Columbia, Canada to as far south as Baja California mostly west of the Cascade-Sierra crest (Lovich and Meyer 2002). Fossil fragments have been found east of the current range indicating that the species was once more widespread (Buskirk 2002). Disjunct populations have been documented in the Truckee, Humboldt and Carson Rivers in Nevada, Puget Sound in Washington, and the Columbia Gorge on the border of Oregon and Washington. It is currently unclear if these are relictual or introduced populations (Lovich and Meyer 2002). Modern distribution is limited to parts of Washington, Oregon, California and northern Baja California (Buskirk 2002). Western pond turtles are

the only native aquatic turtle in California and southern Oregon. With Region 5 of the U.S. Forest Service, this turtle can be found on all National Forests, except the Inyo and Lake Tahoe Basin.

Habitat Status

The western pond turtle inhabits a Mediterranean climate defined by mild, wet winters and long hot, dry summers. In the northern portion of its range winters are colder with more rainfall than in southern areas (Germano and Rathbun 2008). Aquatic habitats include lakes, natural ponds, rivers, oxbows, permanent streams, ephemeral streams, marshes, freshwater and brackish estuaries and vernal pools. Additionally, these turtles will utilize man-made waterways including drainage ditches, canals, reservoirs, mill ponds, ornamental ponds, stock ponds, abandoned gravel pits, and sewage treatment plants (Buskirk 2002). Terrestrial habitats are less well understood. In southern California animals spend only one to two months in terrestrial habitats while animals in the northern portions of the range can be terrestrial for up to eight months (Lovich and Meyer 2002). Animals have been documented to overwinter under litter or buried in soil in areas with dense understories consisting of vegetation such as blackberry, poison oak and stinging nettle which reduces the likelihood of predation (Davis 1998).

Western pond turtles are generalist omnivores and have been documented to eat a wide variety of prey. Prey items include larval insects, midges, beetles, filamentous green algae, tule and cattail roots, water lily pods, and alder catkins (Germano 2010). Filamentous algae are considered to be an important food source for females after egg laying (Buskirk 2002).

Turtles move upland at different times across the range of this species. Animals can move upland as early as September, but typically move following the first winter storm in November or December. Not all animals move upland, some move to nearby ponds for the winter (Davis 1998). Animals have been observed moving underneath ice in ponds and potentially congregate in shallow areas (Buskirk 2002). Upland animals remain somewhat active throughout the winter and can be observed basking on warm winter days (Davis 1998). Upland movements for both overwintering and reproduction typically occur in the afternoon and evenings. Walkabouts to scout for nest sites can be completed within one day or they can last up to four days (Crump 2001).

Local climatic and water level variations can alter the timing of nesting in this species (Crump 2001). The nesting season is from late April through mid-July at low elevation, and June through August at higher elevations (Scott et al. 2008).

Direct and Indirect Effects

Western pond turtles have been documented to overwinter under litter or buried in soil in areas with dense understories consisting of vegetation such as blackberry, poison oak and stinging nettle which reduces the likelihood of predation (Davis 1998). Since these areas would be under snow, there should not be a direct impact to the species unless individuals leave their hibernation burrows for brief periods of time in which case there would be a very low likelihood for trampling by OSVs or grooming equipment. There are no known areas of overwintering on the Lassen.

Indirect effects include the risk of oil, gas, or other vehicle fluids entering the waterway and modifying the prey/food base or water quality for breeding and basking. The potential for these risks is extremely low as no OSV is to occur on waterways.

Western pond turtles hibernate and, therefore, would be absent from the area of potential effect during the OSV season of use. Since they are known to either build a burrow or overwinter amongst shrubs, or other underground structures that will not be impacted by over-snow vehicles (OSVs) or underground. 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 (USFS National Core BMP Rec-7: Over-Snow Vehicle Use; please refer to the McNamara (2015) for additional information). All of the project alternatives will maintain a minimum snow depth of 12 inches in areas open to cross-country use which should provide sufficient depth to protect the ground surface.

Western pond turtles utilize riparian and/or aquatic environments during the breeding season. 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 (USFS 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, including the existing condition, is expected to be adequate to protect aquatic and riparian habitats from measurable impacts to vegetation or water quality (McNamara 2015).

Cumulative Effects

Past, present, and foreseeable future actions identified to have the potential to result in a cumulative impact to terrestrial wildlife species, when combined with alternatives 1, 2, 3 or 4, include the Castle DFPZ 2 vegetation management project, Dutch and Tamarack fire salvage projects, firewood cutting, Christmas tree cutting, non-motorized winter recreational activities, or use of roads by wheeled vehicles during the season of overlap between OSVs and wheeled vehicles. Firewood cutting, Christmas tree cutting, and non-motorized winter recreational activities are unlikely to directly impact western pond turtles that are hibernating under the snow. There is a small potential for an additive effect from 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 the prey/food base or water quality for breeding and basking. However, the risk for this impact is low because vehicle use does not occur in waterways and fluids would not normally reach waterways. The Castle DFPZ 2 is proposed on 39 acres. The Dutch and Tamarack Fire Salvage Projects would remove standing dead or dying trees across roughly 1,500 and 1,300 acres, respectively, of coniferous forest. Vegetation and fuels management activities in recent years have included primarily thinned, masticated, and/or burned vegetation to reduce the potential for catastrophic wildfires and include riparian area protections. Similar activities on state and private lands that make up about 20 percent of the area within the Forest boundary may have the similar potential for limited impacts to western pond turtles and their habitat.

Determination Statement

Alternatives 1, 2, 3, and 4 of the Lassen 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 western pond turtle based on the following:

- Proposed actions will not physically modify western pond turtle habitat.
- Proposed actions will occur when the species is hibernating under the snow and, therefore, will not result in noise impacts or impacts to foraging or breeding unless individuals leave their hibernation burrows for brief periods of time in which case there would be a very low likelihood for trampling by OSVs or grooming equipment.
- The low risk of modification of the prey/food base or water quality for breeding and basking from oil, gas, or other vehicle fluids entering waterways will be mitigated by the minimum cross-

country snow depth of 12 inches that will protect aquatic and riparian habitats from measurable impacts to vegetation or water quality.

Shasta Hesperian Snail (*Vespericola Shasta*)

Regional Foresters Sensitive Species

Species Account

Shasta Hesperian snail is endemic to the Klamath Province, primarily in the vicinity of Shasta Lake, up to 915 meters elevation (Bureau of Land Management 1999). The type locality was given as La Moine, Shasta County, California (Cordero and Miller 1995). Although Shasta Hesperian snail has been documented on the Lassen National Forest, the records are questionable based on its distance from the type locality and elevation.

Habitat Status

Shasta Hesperian snail has been found in moist bottom lands, such as riparian zones, springs, seeps, marshes, and in the mouths of caves (Bureau of Land Management 1999).

Direct and Indirect Effects

All observations were made in 2000, near the northeastern portion of the Forest in areas that would be expected to receive low OSV use. In the event the records are accurate, it would be expected to hibernate or be beneath the snow surface where no OSV-related impact would occur. In addition, the minimum cross-country snow depth of 12 inches under all of the action alternatives, including the existing condition, is expected to be adequate to protect moist bottomland habitats utilized by this species from measurable impacts to vegetation or water quality (McNamara 2015).

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 (USFS 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, including the existing condition, is expected to be adequate to protect aquatic and riparian habitats from measurable impacts to vegetation or water quality (McNamara 2015).

Cumulative Effects

None; the Lassen National Forest Over-Snow Vehicle Use Designation Project will not result in measurable direct or indirect impacts to Shasta Hesperian snail and, therefore, there will be no cumulative impacts to this species.

Determination Statement

None of the alternatives of the Lassen National Forest Over-Snow Vehicle Use Designation Project will impact Shasta Hesperian snail or its habitat because it based on the following:

- Proposed actions will occur when the species is hibernating under the snow and, therefore, will not result in noise impacts or impacts to foraging or breeding.
- The minimum cross-country snow depth of 12 inches under all of the action alternatives, including the existing condition, is expected to be adequate to protect moist bottomland habitats utilized by this species from measurable impacts to vegetation or water quality.

Terrestrial Invertebrates

Western Bumble Bee (*Bombus occidentalis*)

Regional Foresters Sensitive Species

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 currently 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).

There are 94 collection records for the western bumble bee on 11 national forests in Region 5 (Hatfield 2012). *B. occidentalis* has recently been documented on the Eagle Lake Ranger District of the Lassen National Forest.

Habitat Status

Bumble bees require habitats with rich supplies of floral resources with continuous blooming from spring to autumn. Landscape level habitat quality, indicating that isolated patches of habitat are not sufficient to fully support bumble bee populations. Bumblebee colonies are annual. Queens end the year by locating a sheltering burrow, where they may spend the winter months under cover. Where nesting habitat is scarce, bumble bee species having queens that emerge early (mid-March) in the season like *B. vosnesenskii* which co-occurs with the later emerging western bumble bee, may be able to monopolize available nest sites and reduce the chances of success for bumble bee species emerging later. 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. Based upon personal communication with Robbin Thorp (personal communication 2015), although little is known about queen habitat preferences for hibernation sites, extrapolations are made from the limited knowledge available for a few bumble bee species. Generally, observations suggest most Northern Hemisphere species prefer well drained slopes facing north which may prevent them from emerging too early. The only published record of a hibernaculum of *B. occidentalis* was based on an observation in a mating and hibernation cage. In this instance the female dug two inches into sandy soil of a steep west facing slope. The most detailed published observations for hibernating bumble bees were conducted in southern England. Two of the species are closely related to *B. occidentalis* and may serve as examples of what might be expected in *B. occidentalis*. Those two species showed a preference for digging the hibernaculum just below the litter and soil interface and most were under trees rather than on exposed slopes.

Direct and Indirect Effects

Habitat loss and fragmentation may be playing a role in the decline of these bumble bee species. Habitat alterations which destroy, fragment, degrade, or reduce their food supplies, nest sites (e.g. abandoned rodent burrows or undisturbed grass), and hibernation sites for over-wintering queens all can harm these species (Evans et al. 2008). The minimum cross-country snow depth of 12 inches under all of the action alternatives, including the existing condition, is expected to be adequate to protect vegetation from measurable impacts (McNamara 2015).

Cumulative Effects

None; the Lassen National Forest Over-snow Vehicle Use Designation Project will not result in measurable direct or indirect impacts to western bumble bee and, therefore, there will be no cumulative impacts to this species.

Determination Statement

None of the alternatives of the Lassen National Forest Over-snow Vehicle Use Designation Project will impact 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 will not result in noise impacts or impacts to foraging or breeding.
- Known information suggests that 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 of 12 inches to be maintained under all of the alternatives.

Subnivean Species

(shrews, voles, deer mouse)

Table 85. Subnivean species resource indicators and measures for assessing effects

Resource Indicator and Effect	Measure	Alternatives 1 and 2	Alternative 3	Alternative 4
Potential for effects of snow compaction on subnivean species habitat	Percentage of habitat affected and percentage of habitat within high and moderate OSV use categories	98/31	90/24	98/30

Species Account

Subnivean species [shrews (*Sorex* spp.), voles (*Microtus* spp.), 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. 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 the northern goshawk and marten.

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 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 having 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 OSV 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, the potential for effects to subnivean species are greatest. The potential for snow compaction in marten habitat is addressed in the marten section above.

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 owing to 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 the northern goshawk (*Accipiter gentilis*) and marten (*Martes americana*).

Of the roughly 32,000 acres of wet and dry meadows below 6,350 feet in elevation, 98 percent would be open to OSV use under alternatives 1, 2, and 4, and 90 percent would be open to OSV use under alternative 3 (Table 86). Under alternatives 1, 2, and 4, 30 percent of meadow habitat falls within combined high and moderate OSV use assumptions where the potential for OSV-related compaction

effects to subnivean species would be more likely to occur. Slightly less (24 percent of meadow habitat) falls within combined high and moderate OSV use categories under alternative 3.

Table 86. Acres of subnivean habitat (wet and dry meadows ≤ 6,350 feet)) and percentages (%) with potential to be impacted by OSV use, by alternative and OSV use assumption

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Acres Closed to OSV Use	700 (2)	700 (2)	3,213 (10)	785 (2)
Acres (High OSV Use Assumption)	5,658 (18)	5,658 (18)	4,480 (14)	5,656 (17)
Acres (Low to No OSV Use Assumption)	15,827 (49)	15,827 (49)	15,725 (49)	15,818 (49)
Acres (Moderate OSV Use Assumption)	4,297 (13)	4,297 (13)	3,260 (10)	4,240 (13)
Acres (Areas Outside of Use Assumptions)	5,632 (18)	5,632 (18)	5,437 (17)	5,615 (17)
Total Acres Habitat Open to OSV Use	31,414 (98)	31,414 (98)	28,901 (90)	31,329 (98)
Total Acres Habitat Across the Lassen NF	32,114 (100)	32,114 (100)	32,114 (100)	32,114 (100)

Cumulative Effects

Past, present, and foreseeable future actions that could result in a cumulative snow compaction impact to subnivean species, when combined with alternatives 1, 2, 3 or 4, include the Castle DFPZ 2 vegetation management project, Dutch and Tamarack fire salvage projects, firewood cutting, non-motorized winter recreational activities, and Christmas tree cutting. The Castle DFPZ 2 is proposed on 39 acres and the Dutch and Tamarack Fire Salvage Projects would remove standing dead or dying trees across roughly 1,500 and 1,300 acres, respectively, of coniferous forest including some adjacent to suitable subnivean species habitat. Subnivean species habitat also overlaps with areas open to Christmas tree cutting and firewood cutting. However, wheeled motorized vehicles may not be used off of authorized Forest Service roads or motorized trails to scout for fuelwood or to harvest Christmas trees (USDA Forest Service 2014), there would be minimal overlap between the Christmas tree and firewood cutting season (annually between November 1and December 31) and OSV trail grooming season (beginning December 26), under alternatives 1, 2, and 3. Under alternative 4, in which trail grooming would begin at the discretion of the groomer, there is the potential for a somewhat larger degree of overlap during years in which heavy snowfall begins early. In general, most non-motorized winter recreation occurs along designated trails, so off-trail snow compaction would be minor. 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 potential for this type of disturbance is unknown; state and privately-held lands make up about 20 percent of the area within the forest boundary. In summary, ongoing and reasonably foreseeable actions may be additive locally to subnivean species, but are not expected to contribute significant impacts to those discussed for the project under any of the alternatives.

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 MIS section for mule deer population status and trend, habitat status and trend, and project-level habitat impacts.

Resource Indicators and Measures for Assessing Effects to Mule Deer on Winter Range

Table 87. Mule deer resource indicators and measures for assessing effects

Resource Indicator and Effect	Measure (Quantify if possible)	Alternative 1	Alternative 2	Alternative 3	Alternative 4
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)	Percentage of winter range affected and percentage of habitat within high and moderate OSV use categories	50/0	37/0	38/0	50/0

Species Account

Mule deer range and habitat includes coniferous forest, foothill woodland, shrubland, grassland, agricultural fields, and suburban environments (CDFG 2015). 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 (CDFG 1998).

Mule Deer Habitat Status

Lassen National Forest contains 119,333 acres of mule deer winter range.

Direct and Indirect Effects

The cumulative effects of roads and recreation trails on mule deer and elk should be assessed during winter when disturbance has the potential to be the most detrimental (Canfield et al. 1999). This means evaluating the effects of roads, ski trails, and OSV routes on the winter ranges for these species.

Wintering deer are sensitive to disturbances of all kinds. Both OSVs and cross-country skiers are known to cause wintering ungulates to flee (Freddy et al. 1986). Dorrance et al. (1975) found that OSV traffic resulted in increased home range size, increased movement, and displacement of deer from areas along trails. Direct environmental impacts of OSVs include collisions causing mortality and harassment that increased metabolic rates and stress responses (Canfield et al. 1999). 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).

OSV 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; physiological response to disturbance, resulting in changes in heart rate or level of stress hormones; and 3) potential for injury or mortality to individuals from vehicle collision. Potential indirect effects include altered or dispersed movement as caused by a route or human activities on or near a route.

Table 88 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.

Groomed and ungroomed trails in the project area do not cross deer winter range under any of the alternatives. However, 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), 59,453 acres (roughly 50 percent) of mule deer winter range is closed to OSV use. Therefore, deer utilizing that portion of winter range would not be impacted by authorized OSV use. Roughly 34,000 acres (34,283, 29 percent) are open, but receive low to no use under the OSV use assumptions, and 25,601 acres (21 percent) did not meet the criteria for high, moderate, or low OSV use assumptions. None of mule deer winter range falls within the moderate- high use OSV areas. Acres of mule deer winter range closed and open to OSV use would be about the same under alternative 4. Therefore, under alternatives 1 and 4, mule deer would have the potential to be subject to disturbance, mortality, injury, or altered movement from low to no OSV use across 50 percent of their winter range.

Mule deer winter range closed and open to OSV use would roughly be the same under alternatives 2 and 3: 63 percent closed to OSV use, 16 percent open and low to no use, and 21 percent open and not meeting criteria for high, moderate, or low OSV use. Therefore, under alternatives 2 and 3, mule deer would have the potential to be subject to disturbance, mortality, injury, or altered movement from low to no OSV use across 37 percent of their winter range.

Table 88. Acres of mule deer winter range and percentages (%) with potential for disturbance, mortality or injury, or displacement of mule deer by OSV use, by alternative

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Acres closed to OSV use	59,453 (50)	74,719 (63)	74,686 (63)	59,453 (50)
Acres open to OSV use (low to no OSV use assumptions)	34,283 (29)	19,018 (16)	19,046 (16)	34,279 (29)
Acres open to OSV use (outside of OSV use assumptions)	25,601 (21)	25,600 (21)	25,601 (21)	25,601 (21)
Subtotal: Acres open to OSV use	59,884 (50)	44,618 (37)	44,647 (38)	59,880 (50)
Total Acres	119,337 (100)	119,337 (100)	119,333 (100)	119,333 (100)

Cumulative Effects

Past, present, and foreseeable future actions that could result in a cumulative impact to mule deer, when combined with alternatives 1, 2, 3 or 4, include firewood cutting, Christmas tree cutting, non-motorized winter recreational activities, or use of roads by wheeled vehicles during the season of overlap between OSVs and wheeled vehicles. Mule deer habitat overlaps with areas open to Christmas tree cutting and firewood cutting. However, wheeled motorized vehicles may not be used off of authorized Forest Service roads or motorized trails to scout for fuelwood or to harvest Christmas trees (USDA Forest Service 2014), and 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) under alternatives 1, 2, and 3. Under alternative 4, in which trail grooming would begin at the discretion of the groomer, there is the potential for a somewhat larger degree of overlap during years in which heavy snowfall begins early. Use of roads within mule deer winter range after the March 31 termination date of the Forest Order closing roads for exclusive OSV use can contribute additional disturbance. In general, most non-motorized winter recreation occurs along designated trails that deer would avoid if disturbance were too great a factor. Similar activities on state and private lands within the Forest boundary may impact mule deer winter range outside of National Forest System lands and may increase disturbance locally. However, the potential for this type of disturbance is unknown; land ownership within mule deer winter range overlapping the forest/analysis area boundary is highly variable. In summary, ongoing and reasonably foreseeable actions may locally increase the potential for disturbance to or displacement of

individual mule deer on winter range, but are not expected to contribute substantially to impacts disclosed for the project under any of the alternatives.

Table 89.Summary comparison of how the alternatives address the key issues and environmental effects for Forest Service Sensitive Species and species of public interest

Resource Indicator and Effect	Measure	Alternatives 1 and 2	Alternative 3	Alternative 4[27]
Potential for disturbance to individuals from OSV use and increased human presence, or injury or mortality of individuals	Percentage of California spotted owl (CSO) high-reproduction habitat and PACs affected and percentage of habitat within high and moderate OSV use categories	88/34	79/28	88/37
	Percentage of northern goshawk (NGO) high-reproduction habitat and PACs affected and percentage of habitat within high and moderate OSV use categories	87/36	79/30	87/35
	Percentage of wolverine habitat affected and percentage of habitat within high and moderate OSV use categories	81/ 27	74/31	81/27
Potential for disturbance to individuals from OSV use and increased human presence, or injury or mortality of individuals	Percentage of CSO PACs affected and percentage of PACs within high and moderate OSV use categories	96/45	90/41	91/42
	Percentage of NGO PACs affected and percentage of PACs within high and moderate OSV use categories	70/31	63/26	68/29
Potential for disturbance to individuals from OSV use and increased human presence, or injury or mortality of individuals	Percentage of known CSO PACs within 0.25 mile of groomed or ungroomed routes	23	23	23
	Percentage of known NGO PACs and nest sites within 0.25 mile of groomed or ungroomed routes	13/1	11/1	13/1

[27] The potential for direct and indirect effects to CSO and NGO PACs and activity centers and all habitats within 0.25 miles of trails, is expected to decrease after March 31st, under alternatives 1-3, because trail grooming would end and it is estimated that use of groomed trails would be reduced by 50%. This would not apply to alternative 4 in which grooming could continue at the discretion of the groomer, providing adequate snow remains on the ground. In addition, under Alternative 4, the snow grooming season would extend beyond the recommendations in the Lassen National Forest monitoring report in California Department of Parks and Recreation (FEIR): Based on the overlap with the breeding seasons for both NGO and CSO, it was recommended that snow grooming activities should not be allowed to extend beyond the Forest Order expiration date of March 31.

Resource Indicator and Effect	Measure	Alternatives 1 and 2	Alternative 3	Alternative 4[27]
Potential for disturbance to individuals from OSV use 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	Percentage of marten high reproductive habitat[28] affected and percentage of habitat within high and moderate OSV use categories	91/41	81/34	89/39
Potential for disturbance to individuals from OSV use and increased human presence, injury or mortality of individuals, habitat modification near denning sites	Percentage of Sierra Nevada red fox high reproductive habitat [29]affected and percentage of habitat within high and moderate OSV use categories	66/34	59/32	63/33
Potential for disturbance to individuals from OSV use and increased human presence, or injury or mortality of individuals	Percentage of wolverine habitat affected and percentage of habitat within high and moderate OSV use categories	81/ 27	74/31	81/27
Potential for disturbance to individuals from OSV use and increased human presence or injury or mortality of individuals	Percentage of bald eagle habitat affected and percentage of habitat within high and moderate OSV use categories	85/40	78/35	84/39
	Percentage of great gray owl habitat affected and percentage of habitat within high and moderate OSV use categories	91/31	85/25	90/30
Potential for disturbance to individuals from OSV use and increased human presence or injury or mortality of individuals	Percentage of known bald eagle nest sites within 660 feet of groomed or ungroomed trails	0	0	0
Potential for effects of snow compaction on subnivean species habitat	Percentage of habitat affected and percentage of habitat within high and moderate OSV use categories	98/31	90/24	98/30
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)	Percentage of mule deer winter range affected and percentage of habitat within high and moderate OSV use categories	Alternative 1 = 50/0 Alternative 2 = 37/0	38/0	50/0

[28] These numbers are based on coarse habitat filters that do not take the finer elements of marten denning habitat (rock crevices, snags, red squirrel middens, and logs) into account. In addition, martens tend to avoid open areas preferred by OSV users, decreasing the potential for disturbance or collision.

[29] These numbers are based on coarse habitat filters that do not take the finer elements of Sierra Nevada red fox denning habitat (natural openings in rock piles at the base of cliffs and slopes) into account and, therefore, overestimate the amount of available habitat.

Table 90. Summary comparison of how the alternatives address the key issues and environmental effects for federally listed or proposed species

Species	Resource Element	Resource Indicator	Measure	All Alternatives
Northern Spotted Owl	Habitat Quality	Habitat Removal or Degradation	Acres of Habitat Removed or Degraded	0
	Species Use of Available Habitats	Disturbance and/or Displacement from All or Portions of a Species Home Range	Overlap of acres of disturbing or potentially displacing activity within species' disturbance distance thresholds	4,519
	Injury or Mortality	Potential for Injury or Mortality of Individuals	Risk Level of Potential for Injury or Mortality	Very Low
Fisher	Habitat Quality	Habitat Removal or Degradation	Acres and percentage of Habitat Removed or Degraded	0
	Species Use of Available Habitats	Disturbance and/or Displacement from All or Portions of a Species Home Range	Overlap of acres of disturbing or potentially displacing activity within species' disturbance distance thresholds	See analysis
	Injury or Mortality	Potential for Injury or Mortality of Individuals	Risk Level of Potential for Injury or Mortality	Very Low
Gray Wolf	Habitat Quality	Habitat Removal or Degradation	Acres and percentage of Habitat Removed or Degraded	0
	Species Use of Available Habitats	Disturbance and/or Displacement from All or Portions of a Species Home Range	Overlap of acres of disturbing or potentially displacing activity within species' disturbance distance thresholds	See analysis
	Injury or Mortality	Potential for Injury or Mortality of Individuals	Risk Level of Potential for Injury or Mortality	Very Low
Bats	Species use of Available Habitats	Disturbance to individuals from OSV use and increased human presence	Risk Level for Disturbance	Very Low
Western Pond Turtle	Injury or Mortality	Potential for Injury or Mortality of Individuals	Risk Level of Potential for Injury or Mortality	Very Low
Willow Flycatcher, Western Pond Turtle, Shasta Hesperian Snail, Western Bumble Bee, Bats	Habitat Quality	Habitat Removal or Degradation	Risk Level of Potential for Habitat Degradation	No measurable impact

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

Table 91. Compliance with LRMP and other relevant laws, regulations, policies, and plans

Type	Direction	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Lassen National Forest LRMP					
Desired Future Condition	Biological diversity remains high with viable populations of all native wildlife and plant species maintained.	Meets for all species	Would meet for all species	Would meet for all species	Would meet for all species
Forest Goals	Manage habitat for Sensitive wildlife species to insure that these species do not become Threatened or Endangered due to Forest Service actions.	Meets for all species	Would meet for all species	Would meet for all species	Would meet for all species
Forest Standards and Guidelines	Manage habitat for Sensitive wildlife species to insure that these species do not become Threatened or Endangered due to Forest Service actions (1) Management activities within habitat occupied by Sensitive species, or where potential habitat exists, will not be permitted unless supported by a biological evaluation	Meets for all species	Would meet for all species	Would meet for all species	Would meet for all species
Appendix T: Furbearer Management	Using the Appendix T methodology, marten and fisher habitat is managed under a no scheduled harvest prescription.	NA: Applies to timber; however, alternative 1 maintains fisher and marten habitat connectivity	NA: Applies to timber; however, alternative 2 would maintain fisher and marten habitat connectivity	NA: Applies to timber; however, alternative 3 would maintain fisher and marten habitat connectivity	NA: Applies to timber; however, alternative 4 would maintain fisher and marten habitat connectivity

Type	Direction	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Sierra Nevada Forest Plan Amendment					
Management Goals and Strategies	Goals: The broad goals of the old forest and associated species conservation strategy are to: 1) Protect, increase, and perpetuate desired conditions of old forest ecosystems and conserve species associated with these ecosystems while meeting people's needs for commodities and outdoor recreation activities; 2) Increase the frequency of large trees, increase structural diversity of vegetation, and improve the continuity and distribution of old forests across the landscape; and 3) Restore forest species composition and structure following large scale, stand-replacing disturbance events.	Meets old forest ecosystem species habitat needs with respect to habitat composition and structure	Would meet old forest ecosystem species habitat needs with respect to habitat composition and structure	Would meet old forest ecosystem species habitat needs with respect to habitat composition and structure	Would meet old forest ecosystem species habitat needs with respect to habitat composition and structure
Strategy: The old forest ecosystem strategy	Strategy: The old forest ecosystem strategy has the following key elements: A network of land allocations, including CSO and NGO PACs, CSO HRCAs, forest carnivore den sites, and the southern Sierra fisher conservation area, with management direction specifically aimed at sustaining viable populations of at-risk species associated with old forest ecosystems well distributed across Sierra Nevada national forests; A network of old forest emphasis areas managed to maintain or develop old forest habitat in areas containing the best remaining large blocks or landscape concentrations of old forest and areas that provide old forest functions such as connectivity of habitat; Direction for restoring ecosystems across all land allocations following large-scale catastrophic disturbance events; and	Meets old forest ecosystem species habitat needs with respect to habitat composition and structure	Would meet old forest ecosystem species habitat needs with respect to habitat composition and structure	Would meet old forest ecosystem species habitat needs with respect to habitat composition and structure	Would meet old forest ecosystem species habitat needs with respect to habitat composition and structure

Type	Direction	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	A proactive approach for improving forest health with management objectives to reduce susceptibility of forest stands to insect and drought-related tree mortality by managing stand density levels.				
Land Allocations and Desired Conditions	California Spotted Owl PACs	Meets designation, desired condition and intent for habitat conditions	Would meet designation, desired condition and intent for habitat conditions	Would meet designation, desired condition and intent for habitat conditions	Would meet designation, desired condition and intent for habitat conditions
	Northern Goshawk PACs	Meets designation, desired condition and intent for habitat conditions	Would meet designation, desired condition and intent for habitat conditions	Would meet designation, desired condition and intent for habitat conditions	Would meet designation, desired condition and intent for habitat conditions
	Great Gray Owl PACs	NA: Currently no verified great gray owl observations on Forest	NA: Currently no verified great gray owl observations on Forest	NA: Currently no verified great gray owl observations on Forest	NA: Currently no verified great gray owl observations on Forest
	Forest Carnivore Den Site Buffers	NA: Currently no known fisher or marten den sites on Forest	NA: Currently no known fisher or marten den sites on Forest	NA: Currently no known fisher or marten den sites on Forest	NA: Currently no known fisher or marten den sites on Forest
	California Spotted Owl HRCAs	Meets designation and desired condition for habitat conditions	Meets designation and desired condition for habitat conditions	Meets designation and desired condition for habitat conditions	Meets designation and desired condition for habitat conditions
Forest-wide Standards and Guidelines	27. Minimize old forest habitat fragmentation. Assess potential impacts of fragmentation on old forest associated species (marten) in biological evaluations.	Meets: alternative 1 maintains forest structure	Meets: alternative 2 would maintain forest structure	Meets: alternative 3 would maintain forest structure	Meets: alternative 4 would maintain forest structure
	28. Assess the potential impact of projects on the connectivity of habitat for old forest associated species.	Meets: alternative 1 maintains forest structure habitat connectivity	Meets: alternative 2 would maintain forest structure and habitat connectivity	Meets: alternative 3 would maintain forest structure and habitat connectivity	Meets: alternative 4 would maintain forest structure and habitat connectivity
	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.	Meets/would meet for all alternatives: No vegetation management is proposed under any of the alternatives.	Meets/would meet for all alternatives: No vegetation management is proposed under any of the alternatives.	Meets/would meet for all alternatives: No vegetation management is proposed under any of the alternatives.	Meets/would meet for all alternatives: No vegetation management is proposed under any of the alternatives.

Type	Direction	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Forest-wide Standards and Guidelines (continued)	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.	Meets/would meet for all alternatives: No vegetation management is proposed under any of the alternatives.	Meets/would meet for all alternatives: No vegetation management is proposed under any of the alternatives.	Meets/would meet for all alternatives: No vegetation management is proposed under any of the alternatives.	Meets/would meet for all alternatives: No vegetation management is proposed under any of the alternatives.
	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 (LOP) for old forest dependent species apply only to vegetation management activities.	Meets/would meet for all alternatives: No current wolverine detections on Lassen National Forest. OSV activities with respect to SN red fox were analyzed in 2010 and 2011; LOPs were not determined to be necessary.	Meets/would meet for all alternatives: No current wolverine detections on Lassen National Forest. OSV activities with respect to SN red fox were analyzed in 2010 and 2011; LOPs were not determined to be necessary.	Meets/would meet for all alternatives: No current wolverine detections on Lassen National Forest. OSV activities with respect to SN red fox were analyzed in 2010 and 2011; LOPs were not determined to be necessary.	Meets/would meet for all alternatives: No current wolverine detections on Lassen National Forest. OSV activities with respect to SN red fox were analyzed in 2010 and 2011; LOPs were not determined to be necessary.
	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.	Meets	Would meet	Would meet	Would meet
	75. For California spotted owl PACs: Maintain a limited operating period (LOP), 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.	Meets/would meet for all alternatives: No vegetation management is proposed under any of the alternatives	Meets/would meet for all alternatives: No vegetation management is proposed under any of the alternatives	Meets/would meet for all alternatives: No vegetation management is proposed under any of the alternatives	Meets/would meet for all alternatives: No vegetation management is proposed under any of the alternatives

Type	Direction	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Forest-wide Standards and Guidelines (continued)	76. For northern goshawk PACs: Maintain a limited operating period (LOP), 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.	Meets/would meet for all alternatives: No vegetation management is proposed under any of the alternatives	Meets/would meet for all alternatives: No vegetation management is proposed under any of the alternatives	Meets/would meet for all alternatives: No vegetation management is proposed under any of the alternatives	Meets/would meet for all alternatives: No vegetation management is proposed under any of the alternatives
	77. The [CSO or NGO] LOP 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.	NA	NA	NA	NA
	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.	Meets: Biologists on Lassen NF monitored CSO and NGO PACs relative to their proximity, or sensitivity to designated OSV routes. No relationship was apparent between a PAC's distance from a snow park and whether it has been recently occupied.	Would meet: See alternative 1	Would meet: See alternative 1	Would meet: See alternative 1
	83. Apply a limited operating period, prohibiting vegetation treatments and road construction within ¼ mile of an active great gray owl (GGO) nest stand, during the nesting period (typically March 1 to August 15).	Meets/would meet for all alternatives: No known GGO nests and no vegetation management is proposed under any of the alternatives	Meets/would meet for all alternatives: No known GGO nests and no vegetation management is proposed under any of the alternatives	Meets/would meet for all alternatives: No known GGO nests and no vegetation management is proposed under any of the alternatives	Meets/would meet for all alternatives: No known GGO nests and no vegetation management is proposed under any of the alternatives

Type	Direction	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Forest-wide Standards and Guidelines (continued)	85. Protect fisher den site buffers from disturbance with a limited operating period (LOP) from March 1 through June 30 for vegetation treatments 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.	Meets/would meet for all alternatives: No known fisher den sites and no vegetation management is proposed under any of the alternatives	Meets/would meet for all alternatives: No known fisher den sites and no vegetation management is proposed under any of the alternatives	Meets/would meet for all alternatives: No known fisher den sites and no vegetation management is proposed under any of the alternatives	Meets/would meet for all alternatives: No known fisher den sites and no vegetation management is proposed under any of the alternatives
	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.	Meets/would meet for all alternatives: No known fisher or marten den sites	Meets/would meet for all alternatives: No known fisher or marten den sites	Meets/would meet for all alternatives: No known fisher or marten den sites	Meets/would meet for all alternatives: No known fisher or marten 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.	Meets/would meet for all alternatives: No known marten den sites and no vegetation management is proposed under any of the alternatives	Meets/would meet for all alternatives: No known marten den sites and no vegetation management is proposed under any of the alternatives	Meets/would meet for all alternatives: No known marten den sites and no vegetation management is proposed under any of the alternatives	Meets/would meet for all alternatives: No known marten den sites and no vegetation management is proposed under any of the alternatives

Type	Direction	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Federal Law					
Endangered Species Act	It is Forest Service policy to analyze impacts to threatened and endangered (TE) species to ensure management activities are not be likely to jeopardize the continued existence of a TE species, or result in the destruction or adverse modification of critical habitat for these species.	Meets	Would meet	Would meet	Would meet
Bald Eagle Protection Act	Prohibits, except under certain specified conditions, the taking (pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb[30]), possession and commerce of such birds	Meets: Is not resulting in the taking of bald eagles	Would Meet: Would not result in the taking of bald eagles	Would Meet: Would not result in the taking of bald eagles	Would Meet: Would not result in the taking of bald eagles
Forest Service Manual (2670)					
	2670.22 – Objectives for Sensitive Species: 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.	Meets for all species	Would meet for all species	Would meet for all species	Would meet for all species
	2670.32 – Policy for Sensitive Species: Review programs and activities as part of the National Environmental Policy Act of 1969 process through a biological evaluation, to determine their potential effect on sensitive species. Avoid or minimize impacts to species whose viability has been identified as a concern. Analyze, if impacts cannot be avoided, the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole.	Meets for all species	Meets for all species	Meets for all species	Meets for all species

[30] 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.

Type	Direction	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	2672.4 – Biological Evaluations: Review all Forest Service planned, funded, executed, or permitted programs and activities for possible effects on endangered, threatened, proposed, or sensitive species. The biological evaluation is the means of conducting the review and of documenting the findings. Document the findings of the biological evaluation in the decision notice.	Meets	Meets	Meets	Meets
	2672.41 – Objectives of the Biological Evaluation:	Meets	Meets	Meets	Meets
	2672.42 – Standards for Biological Evaluations	Meets	Meets	Meets	Meets

Table 92. Summary of determinations[31] for federally listed threatened, endangered, proposed, and candidate species and designated or proposed critical habitats (Biological Assessment), by alternative

Species Name	TEPC Status[32]	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Fisher (*Pekania pennanti*)	FP/FSS	WNJ	WNJ	WNJ	WNJ
Giant garter snake (*Thamnophis gigas*)	FT	NE	NE	NE	NE
Sierra Nevada red fox (*Vulpes vulpes necator*)	FC/FSS	NLAA	NLAA	NLAA	NLAA
Gray wolf (*Canis lupus*)	FE	NLAA	NLAA	NLAA	NLAA
Greater sage-grouse (*Centrocercus urophasianus*)	FC	NE	NE	NE	NE
Northern spotted owl (*Strix occidentalis caurina*)	FT	NLAA	NLAA	NLAA	NLAA
Northern spotted owl designated critical habitat	NA	NE	NE	NE	NE
Valley elderberry long-horned beetle (*Desmocerus californicus dimorphus*)	FT	NE	NE	NE	NE
Valley elderberry longhorn beetle critical habitat	NA	NE	NE	NE	NE
Yellow-billed cuckoo (*Coccyzus americanus*)	FSS	NE	NE	NE	NE
Yellow-billed cuckoo proposed critical habitat	NA	NE	NE	NE	NE

[31] NE = will not affect; NLAA = not likely to adversely affect; WNJ = will not jeopardize the continued existence of the species
[32] FE = federally endangered; FT = federally listed as threatened; FC = Federal proposed for listing; FC = Federal candidate for listing; FSS = Forest Service sensitive.

Table 93. Summary of determinations[33] for Forest Service Sensitive Species (Biological Evaluation), by alternative

Species Name	Alternative 1	Alternative 2	Alternative 3	Alternative 4
American marten (*Martes caurina*)	MINL	MINL	MINL	MINL
California wolverine (*Gulo gulo luteus*)	MINL	MINL	MINL	MINL
Fringed myotis (*Myotis thysanodes*)	MINL	MINL	MINL	MINL
Pallid bat (*Antrozous pallidus*)	MINL	MINL	MINL	MINL
Townsend's big-eared bat (*Corynorhinus townsendii*)	MINL	MINL	MINL	MINL
Bald eagle (*Haliaeetus leucocephalus*)	MINL	MINL	MINL	MINL
California spotted owl (*Strix occidentalis occidentalis*)	MINL	MINL	MINL	MINL
Great gray owl (*Strix nebulosa*)	MINL	MINL	MINL	MINL
Greater Sandhill crane (*Grus canadensis tabida*)	NI	NI	NI	NI
Northern goshawk (*Accipiter gentilis*)	MINL	MINL	MINL	MINL
Willow flycatcher (*Empidonax traillii*)	NI	NI	NI	NI
Yellow rail (*Coturnicops noveboracensis*)	NI	NI	NI	NI
Western pond turtle (*Emys marmorata*)	MINL	MINL	MINL	MINL
Shasta Hesperian snail (*Vespericola shasta*)	NI	NI	NI	NI
Western bumble bee (*Bombus occidentalis*)	NI	NI	NI	NI

[33] NI = Will not impact; MINL = may impact individuals, but is not likely to lead to a trend toward Federal listing or loss of viability for the species; MIL = may impact individuals and is likely to lead to a trend toward Federal listing or loss of viability for the species.

Management Indicator Species

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 Lassen National Forest's 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 Lassen National Forest LRMP as amended.

Selection of Project level MIS

Management indicator species (MIS) for the Lassen National Forest are listed in the 2007 Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment (USDA Forest Service 2007). The habitats and ecosystem components and associated MIS analyzed for the project were selected from this list of MIS, as indicated in the table below. The table discloses the habitat or ecosystem components (1st column), the California Wildlife Habitat Relationships (CWHR) type(s) defining each habitat/ecosystem component (2nd column), the associated MIS (3rd column), and whether or not the habitat of the MIS is potentially affected by the Lassen OSV Project (4th column). The MIS whose habitat would be either directly or indirectly affected by the Lassen OSV Project, identified as Category 3 in the table, are carried forward in this analysis, which will evaluate the effects of the proposed action and alternatives on the habitat of these MIS. The MIS selected for project-level MIS analysis for the Lassen OSV Project are: mule deer, mountain quail, sooty (blue) grouse, California spotted owl, Pacific marten, and northern flying squirrel.

Table 94. Selection of MIS for the Lassen OSV Project

Habitat or Ecosystem Component	CWHR Type(s) defining the habitat or ecosystem component[34]	Sierra Nevada Forests Management Indicator Species *Scientific Name*	Category for Project Analysis[35]
Riverine & Lacustrine	lacustrine (LAC) and riverine (RIV)	aquatic macroinvertebrates	2. Won't exceed any critical thresholds. See aquatics and hydrology report.
Shrubland (west-slope chaparral types)	montane chaparral (MCP), mixed chaparral (MCH), chamise-redshank chaparral (CRC)	fox sparrow *Passerella iliaca*	2

[34] 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)(≥24" DBH); 6 (Multi-layered Tree) [In PPN and SMC] (Mayer and Laudenslayer 1988).

[35] **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.

Habitat or Ecosystem Component	CWHR Type(s) defining the habitat or ecosystem component[34]	Sierra Nevada Forests Management Indicator Species *Scientific Name*	Category for Project Analysis[35]
Oak-associated Hardwood & Hardwood/conifer	montane hardwood (MHW), montane hardwood-conifer (MHC)	mule deer *Odocoileus hemionus*	3
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. Won't exceed any critical thresholds. See Aquatics and hydrology report.
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*	3
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*	3
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*	3
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*	3
		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

Shrublands and fox sparrow will not be discussed in further detail because the Lassen OSV Project alternatives would not change acres of shrub habitat, ground shrub cover class, or shrub size class. The project alternatives focus on designation of trails where deep snow is persistent and during the winter months when fox sparrow are generally not present or breeding.

Hardwood habitats including oak and oak-conifer stands are lower elevation and may be important to mule deer as winter range foraging and cover habitat. Effects to these habitats will be analyzed in particular where mule deer winter range is present in designated OSV use areas.

Riparian and yellow warbler will not be discussed in further detail because the Lassen OSV Project alternatives would not change riparian habitat acres, deciduous canopy cover, total canopy cover, or CWHR size class within montane riparian habitats.

Acres of early, mid seral, and late seral open canopy coniferous forest habitat are widespread across the Forest. The Lassen OSV Project would designate OSV use in these areas, which could affect habitat for mountain quail and blue grouse. Therefore, late seral open canopy coniferous forest habitat will be further addressed.

Late seral closed canopy coniferous forest exists in certain locales across the Forest. The Lassen OSV Project would designate OSV use in these areas, which could affect habitat for California spotted owl, Pacific marten, and northern flying squirrel. They will be discussed further in this section.

There is no vegetation management associated with this project. Snags in green forest or burned forest will not be modified by the project design. Occasional trees that fall across trails or pose an immediate safety risk may be felled, bucked and left in place, but the operations are part of routine forest maintenance and public safety. They are not a part of specific project design. Therefore, snags in green forest and snags in burned forest will not be addressed further in this MIS analysis.

Comparison of Habitat Changes between Alternatives

The proposed activities and their variation between alternatives can be summarized by examining the different categories listed below. They include

1. Total OSV Acres Being Used.
2. OSV Use Restriction to Designated Trails
3. OSV Use Prohibited Areas
4. OSV Use Below 3,500 Feet
5. Total OSV Prohibitions %, including elevation limits
6. Snow Depth for Grooming
7. Mileage of Grooming
8. Grooming Season

The following table shows a comparison of the activities (shown in each column) as they relate to each alternative (row).

Table 95. OSV activity comparison for each alternative

Alternative	Total OSV Use Acres	OSV Use Restricted to Designated Trails Only	OSV Use Prohibited Areas (w/o elevation factor)	Use allowed below 3,500 feet?	Total OSV Prohibitions %, including elevation limits	Snow[1] Depth for grooming	Total mileage of groomed trails	Grooming Season
1 – Current condition	976,760 acres	None	148 miles of non - motorized trail	Yes	173,260 Acres	18 Inches	324	12/26-3/31
2 – Modified Proposed Action	Minus 3%	None	RNA + 148 miles of non - motorized trail	No (amounts to an additional 3% prohibition)	+17.1%	12 inches	324	12/26-3/31
3 – Non Motorized Emphasis	Minus 10%	35 Miles	RNA +Multiple Areas, + 148 miles of non - motorized trail	No (amounts to an additional 3% prohibition)	+56.6%	18 Inches	324	12/26-3/31
4 – Motorized Emphasis	Minus 1.1%	2 Miles	RNA + 1 area + Open 2 Miles of existing non-motorized trails (ungroomed). The remaining 146 would be non-motorized.	Yes	+6%	12 inches	324	Groomer discretion

In this MIS analysis, the biologist found that the best measure to evaluate and compare the potential effects for each MIS species was the activity displayed in the category “Total OSV Prohibitions, including elevation limits” where the activity overlaps the Habitat Component (CWHR Types) for the given MIS. For the other categories, their figures are either (a) already reflected in the category being displayed (i.e., Total OSV Use Acres, or OSV Use Restriction to Designated Trails) or (b) the activity does not correlate to any meaningful differences between alternatives considering that base resources and available habitat is not expected to be modified in either alternative (i.e., snow depth for grooming, grooming season).

Effects on Oak associated Hardwood and Hardwood/Conifer (Mule Deer)

Mule deer was selected as the MIS for the ecosystem component oak associated hardwood and hardwood/conifer. Mule deer range and habitat includes coniferous forest, foothill woodland, shrubland, grassland, agricultural fields, and suburban environments. Suitable habitat is composed of four distinctly different elements: fawning, foraging, cover, and winter range. Hiding and thermal cover is typically close to the ground and thick enough to camouflage the outline of the deer, without being so dense as to obscure the approach of potential predators. Thermal cover is similar and generally thought to be denser, with the additional property of sheltering deer from the elements. Winter range tends to be lower elevation habitats that meet the requirements for forage, hiding, and thermal cover described above. Mule deer migrate seasonally between higher elevation summer range and low elevation winter range.

Habitat Factor(s) for the Analysis:

(1) Oak associated hardwood (code MHW - all sizes) and (2) montane hardwood-conifer (MHC – all sizes).

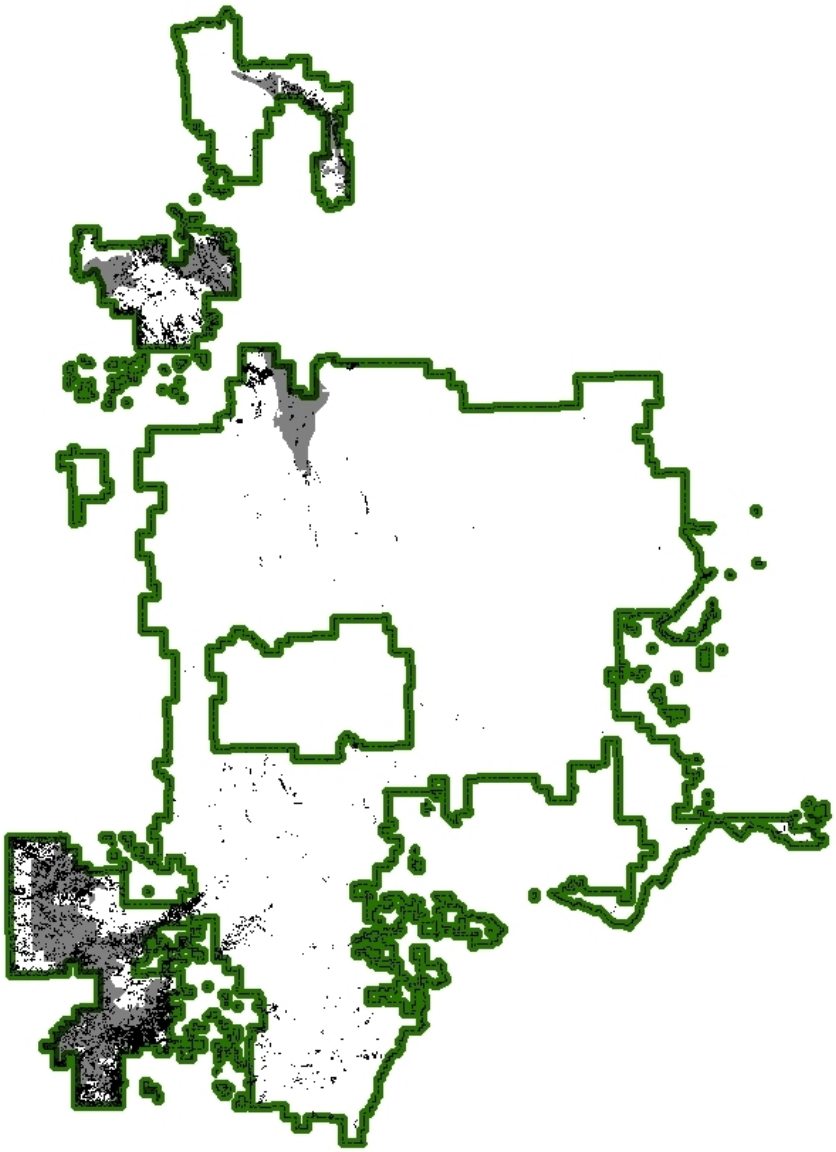

Figure 6. Mule deer winter range (gray) and MIS habitat (black) on Lassen National Forest

Direct and Indirect Effects

In the current condition (alternative 1), the amount of the montane hardwood/conifer ecosystem component that represents mule deer as an MIS species is approximately 72,991 acres. MIS habitat in the project area is estimated to be stable, and adequate to continue to support a stable population. 37.7 percent of this habitat is within areas where OSV use is already prohibited. Alternatives 2 and 3 would prohibit OSV use in an additional 9.7 percent and 9.9 percent of the habitat respectively, with most of these benefits a result that off-trail OSV use would no longer occur below 3,500 feet in elevation. Alternative 4 is nearly identical to the current condition regarding effects to mule deer and associated habitat.

Table 96. Effects to MIS habitat for mule deer

Existing MIS Habitat	Alt 1 - MIS Habitat in OSV Prohibited areas	Alt 2- MIS Habitat in OSV Prohibited areas	Alt 3- MIS Habitat in OSV Prohibited areas	Alt 4- MIS Habitat in OSV Prohibited areas	Comment
Mule Deer Oak montane hardwood (MHW), montane hardwood-conifer (MHC) Total Available 72,991 acres	27,538 acres 37.7%	34,619 47.4%	34,718 47.6%	27,628 37.9%	Closing OSV use in low elevation areas results in an approximate 10% improvement for Alts. 2 and 3 compared to alternatives 1 and 4.

Summary of Mule Deer Status and Trend at the Bioregional Scale

This section summarizes the habitat and distribution population status and trend data for the mule deer as of 2014. This information is drawn from the California Department of Fish and Wildlife (CDFW) assessment of herd condition as described in the CDFW Deer Management Program 2014.

The deer herds at the Sierra Nevada bioregional scale include California Zones X3b, X3a, X1, X2, C4, D3, X7a, X7b, X9a, D4, D5, and D6. Deer populations in these zones are considered stable to slightly declining, yet considerably below levels seen in the late 1960s and 1970s.

As with most deer herds in California and other western states, the long-term population trend of mule deer is currently steady, but declined from the 1960s and 1970s. These long-term declines have been due to land management practices that have precluded fire, resulting in changes toward more mature and less diverse habitats, and reduced quality and quantity of deer habitats. Short-term fluctuations in deer populations are usually attributed to weather events that affect forage production.

Relationship of Project-Level Effects to Bioregional-Scale Trend

The project alternatives would cause minimal change in mule deer populations, trends, or the montane hardwood/conifer habitat associated with mule deer. The proposed project amounts to a maximum of nearly 10 percent improvement within the Lassen OSV Project Area (alternatives 2 and 3) by prohibiting off-trail OSV use in areas below 3,500 feet. Given the ubiquity of mule deer MIS habitat across the bioregion, this small change at the project level would not alter the bioregional trend in the habitat, nor would it lead to a change in the population or distribution of mule deer across the Sierra Nevada bioregion.

Effects on Early Seral and Mid-Seral Coniferous Forest (Mountain Quail)

The mountain quail (*Oreortyx pictus*) is the management indicator species (MIS) for early and mid-seral coniferous forest habitat on the 10 Sierra Nevada National Forests (Eldorado, Inyo, Lassen, Modoc, Plumas, Sequoia, Sierra, Stanislaus, and Tahoe National Forests and the Lake Tahoe Basin Management Unit). In California, mountain quail is a common to uncommon resident, found typically in most major montane habitats of the state (CDFG 2005). It is a hunted species in California. Typical causes of mortality include predation by accipiters, great horned owl, coyote, bobcat, gray fox, long-tailed weasel, and rattlesnake; accidents, including nests disturbed or trampled by cattle, sheep, and deer, and nests lost to logging activities, and drowning in livestock watering devices without escape ramps and reservoirs too large for quail to fly across; fire; drought; snow and cold; and competition with other species (Gutierrez and Delehanty 1999).

Habitat Factor(s) for the Analysis

The following parameters were used to estimate the amount of early seral and mid-seral conifer MIS habitat component:

Early Seral = 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.

Mid-seral = ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 4, all canopy closures

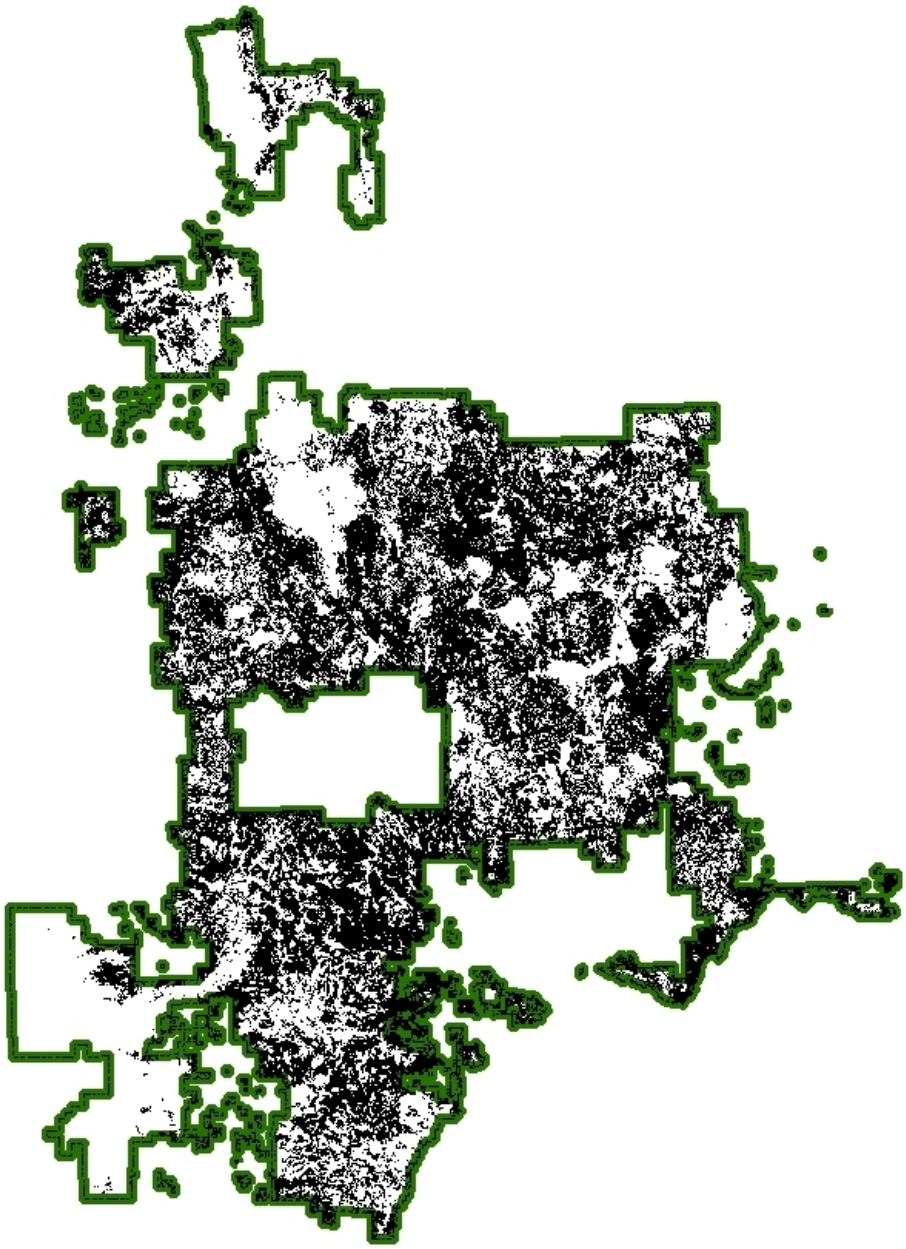

Figure 7. Mountain quail habitat on the Lassen National Forest

Direct and Indirect Effects

The total available habitat within this ecosystem component is 164,492 acres of early seral coniferous forest and 729,532 acres of mid-seral coniferous forest. Mountain quail populations on the Lassen National Forest are considered to be stable with habitat common and well distributed across the Forest. Direct effects to mountain quail are temporary disturbances where motorized use overlaps an area in place and time occupied by quail. However, that disturbance is not expected to modify the availability of habitat or occupancy by the birds. Current OSV use has maintained stable population trends and occupancy. Considering that motorized disturbances are the primary effect, the measure best able to compare the effects to this species and ecosystem component between alternatives is the change in the amount of habitat where OSV use is prohibited. In the current condition (alternative 1), OSV use is prohibited on approximately 17,676 acres (10.7 percent) of the early seral habitat component and 38,155 acres (5.2 percent) of the mid-seral habitat component. All alternatives are similar in that OSV use is prohibited in a relatively small portion of the habitat which is abundant across the landscape. Alternative 3 represents the alternative with the most positive effect on quail because OSV use is prohibited in approximately 13 percent of early seral habitat (2.3 percent improvement over the existing condition) and approximately 12 percent of mid-seral habitat (6.8 percent improvement) over the existing condition.

Table 97. Effects to MIS habitat for mountain quail

Existing MIS Habitat	Alt 1 - MIS Habitat in OSV Prohibited areas	Alt 2- MIS Habitat in OSV Prohibited areas	Alt 3- MIS Habitat in OSV Prohibited areas	Alt 4- MIS Habitat in OSV Prohibited areas	Comment
Mountain Quail - Early Seral Coniferous Forest 164,492 acres	17,676 acres 10.7%	20,617 12.5%	21,443 13%	18,442 11.2%	All alternatives are similar in that OSV use is prohibited in a relatively small portion of the habitat across the landscape. Alternative 3 represents the alternative with the most positive effect on quail because OSV use is prohibited in approximately 13% of early seral habitat compared to 10.7 % in the existing condition.

Existing MIS Habitat	Alt 1 - MIS Habitat in OSV Prohibited areas	Alt 2- MIS Habitat in OSV Prohibited areas	Alt 3- MIS Habitat in OSV Prohibited areas	Alt 4- MIS Habitat in OSV Prohibited areas	Comment
Quail - Mid Seral Coniferous Forest 729,532 acres	38,155 Acres 5.2%	40,510 5.6%	87,613 12%	46,070 6.3%	All alternatives are similar in that OSV use is prohibited in a relatively small portion of the habitat across the landscape. Alternative 3 represents the alternative with the most positive effect on quail because OSV use is prohibited in approximately 12% of mid- seral habitat compared to 5.2 % in the existing condition.

Summary of Mountain Quail Status and Trend at the Bioregional Scale

Current data indicates that the distribution of mountain quail populations in the Sierra Nevada is stable (Roberts et al. 2015).

Relationship of Project-Level Effects to Bioregional-Scale Trend

As a result of the action alternatives, there would minimal expected change in trends for mountain quail or the early seral and mid-seral conifer habitat component. The project level changes between alternatives represent an improvement by increasing the areas where OSV use is prohibited within the ecosystem component. However, those improvements are small (up to 2.7 percent improvement within early seral habitat and up to 6.8 percent improvement within mid-seral habitat) when compared to the existing condition (alternative 1). Given the ubiquity of this ecosystem component across the bioregion, this small change at the project level would not alter the stable bioregional trend in the habitat component, nor would it lead to a change in the population or distribution of mountain quail across the Sierra Nevada bioregion.

Effects on Late Seral Open Canopy Coniferous Forest (Sooty (blue) Grouse)

The sooty grouse, which used to be known as the blue grouse, is the management indicator species (MIS) for late seral open canopy coniferous forest habitat on the ten Sierra Nevada National Forests. It is a hunted species. In California, the sooty grouse is an uncommon to common permanent resident at middle to high elevations within the North Coast Ranges in northwestern California, and the Klamath, Sierra Nevada, and portions of the Warner, White, and Tehachapi Mountains (CDFG 2005). Sooty grouse occurs in open, medium to mature-aged stands of fir, Douglas-fir, and other conifer habitats, interspersed with medium-to-large openings and available water. Sooty grouse pluck on shrubs, grasses and plants for seeds and insects from the ground and in the tree canopy; their winter diet largely includes needles, buds, cones, and twigs in conifer stands, and their summer diet also includes insects, land snails, grasshoppers, and spiders. Sooty grouse breed from early April to late August, with 6 to 8 eggs hatching from a ground nest (built under logs, stumps, and snags) in late May to mid-June. Primary risks and management concerns discussed by the California Department of Fish and Wildlife include heavy grazing, newly cut forests for timber, stands being treated for fuels reduction, and repeated long-term burning (CDFG 2005).

Habitat Factor(s) for the Analysis

The following parameters were used to estimate the amount of late seral open canopy habitat component:

> Ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 5, canopy closures S and P.

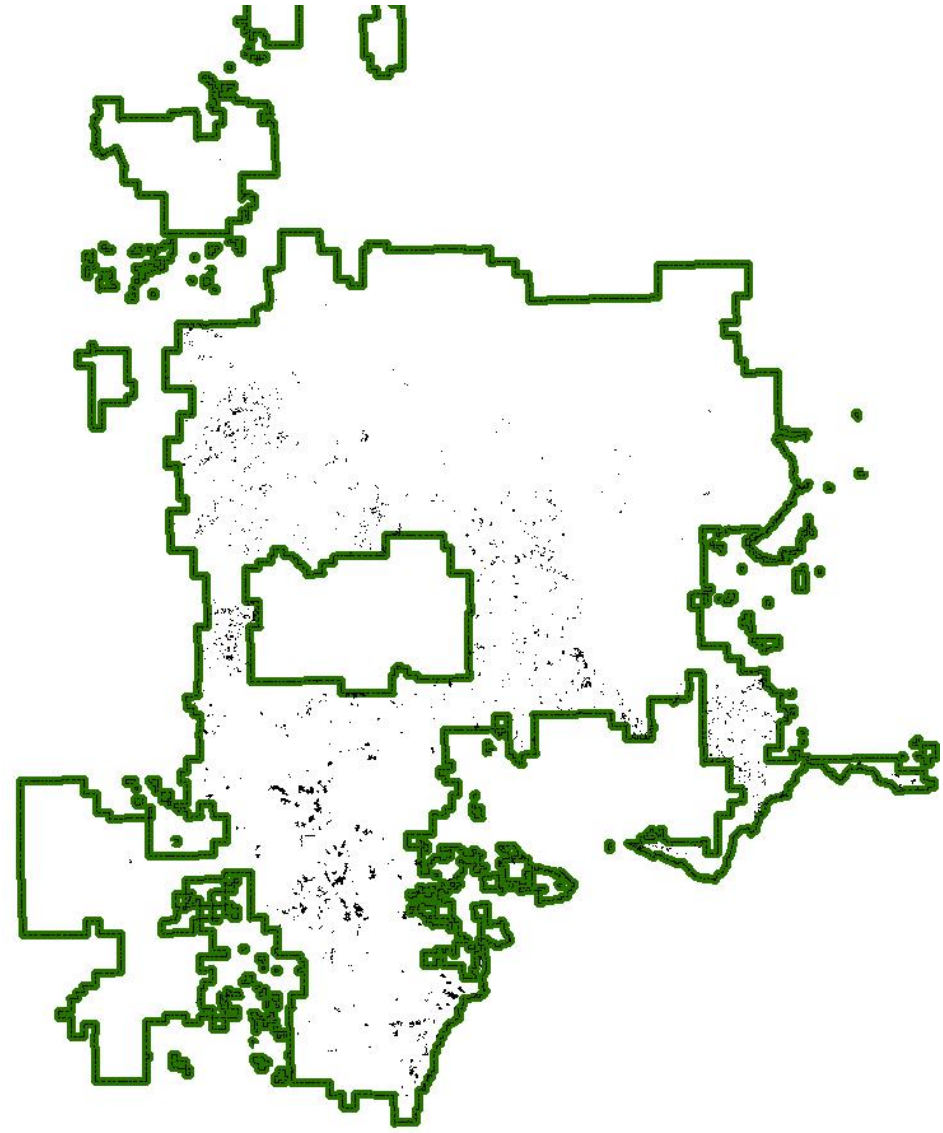

Figure 8. Sooty grouse MIS habitat on the Lassen National Forest

Direct and Indirect Effects

The total available habitat within this ecosystem component is 19,239 acres of late seral open coniferous forest. Sooty grouse populations on the Lassen National Forest are considered to be stable with habitat widely distributed in small parcels across the Forest. Direct effects to sooty grouse are temporary disturbances where motorized use overlaps an area in place and time occupied by grouse. However, that disturbance is not expected to modify the availability of habitat or occupancy by the birds. Current use has maintained stable population trends and occupancy. Considering that motorized disturbances are the primary effect, the measure best able to compare the effects to this species and ecosystem component between alternatives is the change in the amount of habitat where OSV use is prohibited. The current

condition (alternative 1) and alternative 2 include approximately 3,668 acres (19.1 percent of late seral open ecosystem component) where OSV use is prohibited. Alternative 3 shows a moderate increase in areas where prohibited OSV use overlaps grouse habitat totaling 3,781 acres (27.8 percent) which is an 8.7 percent improvement over current condition. Alternative 4 is nearly the same as the existing condition.

Table 98. Effects to MIS habitat for sooty grouse

Existing MIS Habitat	Alt 1 - MIS Habitat in OSV Prohibited areas	Alt 2- MIS Habitat in OSV Prohibited areas	Alt 3- MIS Habitat in OSV Prohibited areas	Alt 4- MIS Habitat in OSV Prohibited areas	Comment
Sooty Grouse - Late Seral Open Canopy Coniferous Forest 19,239 acres	3,668 acres 19.1%	3,668 19.1%	5,348 27.8%	3,781 19.7%	Sooty grouse - Alts. 1,2, 4 protect 19 to 20% while Alt. 3 protects nearly 28%

Summary of Status and Trend at the Bioregional Scale

The sooty grouse has been monitored in the Sierra Nevada at various sample locations by hunter survey, modeling, point counts, breeding bird survey protocols:

- California Department of Fish and Wildlife Blue (Sooty) Grouse Surveys (Bland 1993, 1997, 2002, 2006, 2013).
- California Department of Fish and Wildlife hunter survey, modeling, and hunting regulations assessment (CDFG 2004a, CDFG 2004b, 2015)
- Multi-species inventory and monitoring on the Lake Tahoe Basin Management Unit (USDA Forest Service 2007b).
- 1968 to present – BBS routes throughout the Sierra Nevada (Sauer et al. 2014).

These data indicate that sooty grouse continue to be present across the Sierra Nevada. Sooty grouse continue to be detected and bagged through hunting across the Sierra Nevada (CDFW 2015). In addition, modeling based on game take survey and habitat acres indicates that the spring breeding population can more than sustain the total annual mortality, including hunting mortality (CDFW 2004a). Sooty grouse have continued to be detected on BBS routes in the Sierra Nevada showing a stable trend over time. (Sauer et al. 2014).

Relationship of Project-Level Effects to Bioregional-Scale Trend

As a result of the action alternatives, there would be minimal expected change in populations or population trends for sooty grouse, nor to the late-seral open canopy ecosystem component with which they are associated. The current condition in the project area indicates that OSV use may be occurring in approximately 80.9 percent of the ecosystem component. In comparison to the current condition (alternative 1), alternative 2 represents no change in OSV use as it relates to this MIS. Alternatives 3 and 4 indicate a small improvement ranging between 0.6 percent (alternative 4) and 8.7 percent (alternative 3) over the current condition by increasing the acreage where OSV use is prohibited. Given the ubiquity of this ecosystem component across the bioregion, the small effects at the project level would not alter the

bioregional trend in the ecosystem component, nor would it lead to a change in the distribution or population of sooty grouse across the project area or the Sierra Nevada bioregion.

Late Seral Closed Canopy Coniferous Forest (California spotted owl, Pacific marten, northern flying squirrel)

There are three species associated with this habitat component. They include the California spotted owl, Pacific marten, and the northern flying squirrel. The spotted owl and the marten are analyzed in more depth in the Biological Evaluation (BE) for the Lassen OSV project, and those results have been considered in this MIS section.

The California spotted owl occurs only in California, on the western side of the Sierra Nevada (and very locally on the eastern slope). The California spotted owl is strongly associated with forests that have a complex multi-layered structure, large-diameter trees, and high canopy closure (CDFG 2005, USFWS 2006). It uses dense, multi-layered canopy cover for roost seclusion; roost selection appears to be related closely to thermoregulatory needs, and the species appears to be intolerant of high temperatures (CDFG 2005). Mature, multi-layered forest stands are required for breeding (Ibid). The mixed-conifer forest type is the predominant type used by spotted owls in the Sierra Nevada: about 80 percent of known sites are found in mixed-conifer forest, with 10 percent in red fir forest (USDA Forest Service 2001). The following factors are the primary types of activities that negatively affect the California spotted owl (USFWS 2006): destruction or modification of habitat by wildfire, fuels-reduction activities, timber harvest, tree mortality, and land development.

The Pacific marten (formerly American marten) occurs from the southern Rockies in New Mexico northward to the tree-line in Canada and Alaska, and from the southern Sierra Nevada eastward to Newfoundland in Canada; in Canada and Alaska, martens have a vast and continuous distribution, but in the contiguous western United States, martens are limited to mountain ranges within a narrow band of coniferous forest habitats. Optimal habitats in California are various mixed evergreen forests with more than 40 percent crown closure, with large trees and snags, especially within red fir, lodgepole pine, subalpine conifer, mixed conifer, Jeffrey pine, and eastside pine (CDFG 2005). Martens prefer coniferous forest habitat with large diameter trees and snags, large down logs, moderate-to-high canopy closure, and an interspersion of riparian areas and meadows. Important habitat attributes are: vegetative diversity, with predominately mature forest; snags; dispersal cover; and large woody debris. Marten are trapped easily (CDFG 2005). Decreases in habitat quality and quantity can occur from activities that cause the removal of overhead forest cover, removal of large-diameter trees and coarse woody debris, and the conversion of mesic to xeric sites with associated changes in prey communities (CDFG 2005). Three factors make martens vulnerable to local extirpation and extinction: (1) low reproductive potential; (2) an affinity for overhead cover and avoidance of extensive open areas, especially in winter; and (3) very large home ranges (USDA Forest Service 2001).

The northern flying squirrel, in California, is a locally common, yearlong resident of coniferous forests from 1,500 to 2,450 meters elevation (5,000 to 8,000 feet) of the North Coast, Klamath, Cascade, Sierra Nevada Ranges, and the Warner Mountains (CDFG 2005). The northern flying squirrel occurs primarily in mature, dense conifer habitats intermixed with various riparian habitats, using cavities in mature trees, snags, or logs for cover (CDFG 2005). Management concerns include loss of habitat, including snags, and predation by large owls, especially spotted owls, domestic cats, martens, fishers, bobcats, and long tailed weasels (CDFG 2005).

Habitat Factor(s) for the Analysis

The following parameters were used to estimate the amount of late seral closed canopy ecosystem component:

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.

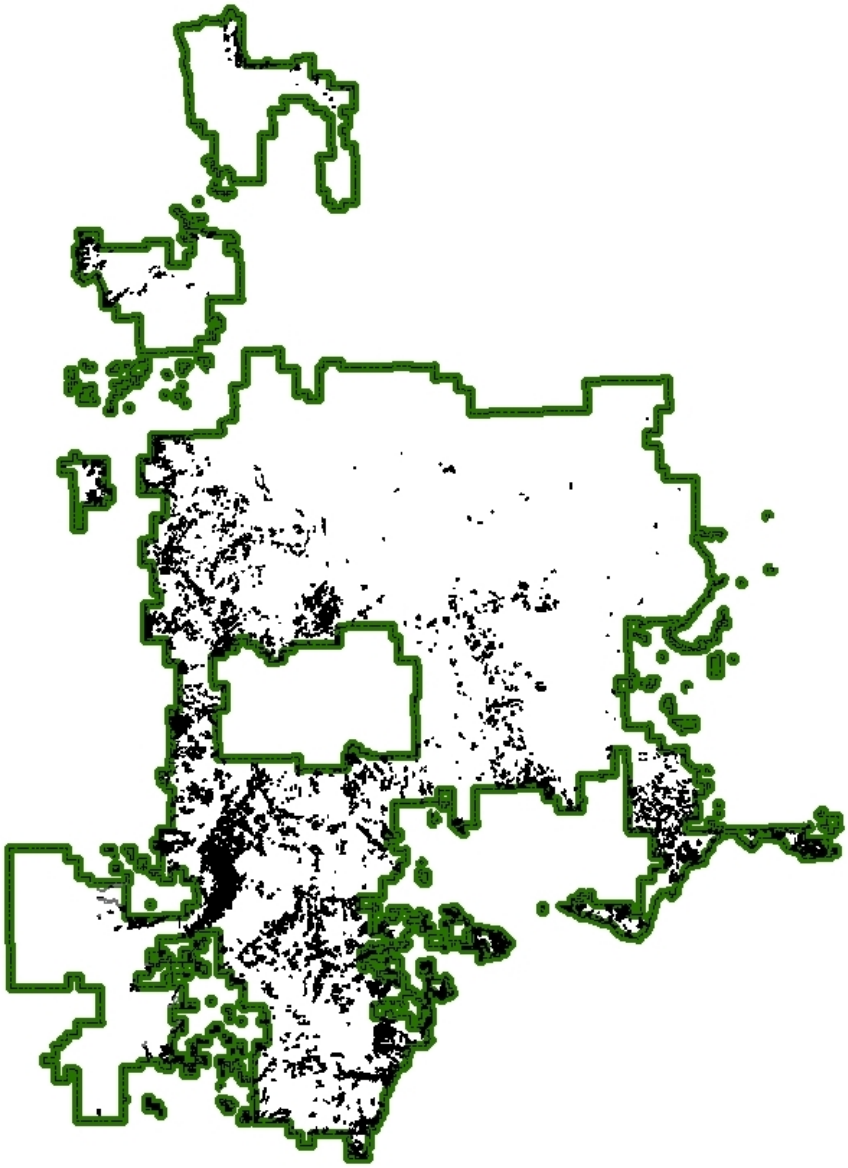

Figure 9. Late seral closed canopy MIS habitat on the Lassen National Forest

Direct and Indirect Effects

The total available habitat within this ecosystem component is 92,394 acres of late seral closed canopy coniferous forest. Populations of all three MIS species are considered to be stable on the Forest considering that distribution population monitoring indicates the species remains present in all previously known locations and the complex structure of this habitat type would not be modified in the project proposal. Direct effects are temporary disturbances where motorized use overlaps occupied habitat and could cause local and temporary changes in behavior of individuals in an effort to avoid encountering motorized OSVs. A more detailed description and analysis of effects for California spotted owl and Pacific marten is included in the Biological Evaluation, which determined that all alternatives of the Lassen OSV Project “may affect individuals, but are not likely to lead to a loss of viability or a trend

toward federal listing." Effects to northern flying squirrels are the same as analyzed for the other MIS species that depend on this habitat type. Considering that motorized disturbances are the primary effect from this project to individuals of all three species, the measure best able to compare the effects to these species and habitat component between alternatives is the change in the amount of habitat where OSV use is prohibited. The current condition (alternative 1), alternative 2, and alternative 4 are similar in that the areas closed to OSV use make up 11,254 acres (12.2 percent), 11,699 acres (12.7 percent) and 12,894 acres (14 percent) respectively, of the total available habitat component. Alternative 3 shows a moderate increase in areas where prohibited OSV use overlaps the habitat component totaling 17,523 acres (19 percent), which is a 6.8 percent improvement.

Table 99. Effects to MIS habitat for California spotted owl, Pacific marten, and northern flying squirrel

Existing MIS Habitat	Alt 1 - MIS Habitat in OSV Prohibited areas	Alt 2- MIS Habitat in OSV Prohibited areas	Alt 3- MIS Habitat in OSV Prohibited areas	Alt 4- MIS Habitat in OSV Prohibited areas	Comment
Late Seral Closed Canopy Coniferous Forest (Ca. Spotted Owl, Marten, flying squirrel) 92,394	11,254 acres 12.2%	11,699 12.7%	17,523 19%	12,894 14%	Late Seral Dense Canopy varies between 12 to 14% for alts 1, 2, and 4, with 19% for alt. 3.

Summary of Status and Trend at the Bioregional Scale

California Spotted Owls

California spotted owl has been monitored in California and throughout the Sierra Nevada through general surveys, monitoring of nests and territorial birds, and on-going demography studies. Four demographic studies of California spotted owl (CSO) have been ongoing for a number of years within the Sierra Nevada: (1) Eldorado National Forest (since 1986); (2) Lassen National Forest (since 1990); (3) Sierra National Forest (since 1990); and (4) Sequoia-Kings Canyon National Park (since 1990). Managers typically view a population as stable if the 95 percent confidence interval of λ (the number of owls present in a given year divided by the number of owls present the year before) overlaps a value of 1. A value less than 1 indicates the population is decreasing and greater than 1 indicates an increasing population. For the California spotted owl demographic studies, recent analysis (Blakesley et al. 2010), using data collected between 1990 and 2005, provided the following estimate of mean λ for the Lassen study area: 0.973, with a 95 percent CI ranging from 0.946 to 1.001, which indicates a stable population. Additional clarification can be found in the Biological Evaluation for this project, which contains more detailed information regarding California spotted owls.

Pacific Marten

American marten has been monitored throughout the Sierra Nevada as part of general surveys and studies from 1996 to 2002 (Zielinski et al. 2005). Since 2002, the American marten has been monitored on the Sierra Nevada forests as part of the Sierra Nevada Forest Plan Amendment (SNFPA) monitoring plan. Data at the rangewide, California, and Sierra Nevada scales indicate that marten appear to be distributed throughout their historic range, and their distribution has become fragmented in some areas of the southern Cascades and northern Sierra Nevada, particularly in Plumas County (USDA Forest Service, 2010). The primary concern regarding marten is maintaining the continuity and character of complex forests (dense canopy, multi-storied, snags, coarse woody debris). Moriarty (2014) found that marten concentrated use in complex patches of forest for foraging and acquisition of resources, while less

complex patches were used infrequently for foraging bouts, and openings were used infrequently or avoided. Distribution appears to be continuous across high-elevation forests from Placer County south through the southern end of the Sierra Nevada, although detection rates have decreased in some localized areas (e.g., Sagehen basin area of Nevada County) (USDA Forest Service 2010).

Northern Flying Squirrel

The northern flying squirrel has been monitored and surveyed in the Sierra Nevada at various sample locations by live-trapping, ear-tagging, radio-telemetry, camera surveys, and snap-trapping:

- 2002 to present - Plumas and Lassen National Forests (Sierra Nevada Research Center 2007, 2008, 2009, 2010).
- 1958 to 2004 - Monitoring and study efforts throughout the Sierra Nevada.

These data indicate that northern flying squirrels continue to be present at these samples sites and that the distribution of northern flying squirrel populations in the Sierra Nevada is stable (USDA Forest Service, 2010).

Relationship of Project-Level Effects to Bioregional-Scale Trend

As a result of the action alternatives, there would be minimal expected change in populations or population trends for California spotted owls, Pacific marten, or northern flying squirrels, nor to the late-seral closed canopy habitat component with which they are associated. The current condition in the project area indicates that OSV use may be occurring in approximately 87.8 percent of the habitat component. However, due to the dense forested stands that make up this habitat component, most areas are expected to experience low OSV use except along existing roads and trails. Considering that vegetation management (tree removal or forest management) is not a part of the proposal, the complex nature of this habitat type is expected to remain intact and unaffected. Alternatives 2, 3, and 4 indicate an improvement over the current condition ranging between 0.5 percent (alternative 2) to 6.8 percent (alternative 3) by increasing the acreage where OSV use is prohibited. Given the small effects at the project level, the project would not alter the bioregional trend in the habitat component, nor would it lead to a change in the distribution of California spotted owls, Pacific marten, or northern flying squirrels across the Sierra Nevada bioregion.

Migratory Landbird Conservation

Under the National Forest Management Act (NFMA), 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, in addition to the Partners in Flight (PIF) specific habitat Conservation Plans for birds and the January 2004 PIF 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 US 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 (BA), Biological Evaluation (BE) and the Management Indicator Species (MIS) reports for the Lassen OSV 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 and March 31, which avoids overlap with the active breeding season for most migratory bird species. The BA, BE, and MIS reports found that the Lassen OSV Project would not cause adverse effects (BA), would not cause a trend towards a loss of viability (BE), nor would it degrade various MIS habitats to a level that affects trends in the Sierra Nevada bioregion. Also, potential impacts to migratory species are minimized through the adherence of LRMP Standards and Guidelines for snags/down woody debris, avoidance of streamside management zones, and no degradation in riparian areas and wetlands.

The wildlife biologist's determination is that the Lassen OSV 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 BA, BE, and MIS reports, and that adherence to LRMP standards are incorporated into project design which in turn will maintain habitat diversity The project meets the intent of the Migratory Landbird MOU.

Fisheries and Aquatic Resources

This analysis will consider and disclose potential effects to aquatic resources that could result from the following proposed actions:

- Designating roads, trails and areas for over-snow vehicle (OSV) use
- Identification of snow trails for grooming for OSV use

OSV use has the potential to impact aquatic species and their habitat through chemical contamination, ground surface disturbance, runoff timing, or through altering stream side vegetation.

This section will describe the area affected by the alternatives and existing resource conditions within watersheds where aquatic species and their habitat overlap with OSV use. The analysis includes all aquatic resources that could be affected by OSVs. This includes perennial and seasonal streams, lakes, ponds, meadows, and springs.

Aquatic Species Biological Evaluation/Biological Assessment

Because OSV use and snow trail grooming has the potential to affect some aquatic species and their habitat, this analysis will evaluate the direct, indirect, and cumulative effects of the alternatives on aquatics species and aquatic resources, including Threatened, Endangered, Proposed or Sensitive species (TEPS) that could result from the proposed actions.

The main body of this section contains a Biological Evaluation/Biological Assessment to evaluate and disclose effects of the proposed action and alternatives on Federal threatened, endangered, proposed, or candidate aquatic species, and Forest Service Region 5 sensitive species. Collectively, these aquatic species are referred to as TEPS.

Relevant Laws, Regulations, and Policy

Regulatory Framework

Land and Resource Management Plan

The Lassen National Forest Land and Resource Management Plan (LRMP 1993) 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 Lassen LRMP as well as in the Northwest Forest Plan (NWFP) and Sierra Nevada Forest Plan Amendment (SNFPA), both of which include aquatic conservation strategies (including a long-term strategy in the SNFPA for management of anadromous fishes on the Lassen National Forest). Aquatic Conservation Strategies are found in their entirety in each of the aforementioned amendments to the LRMP.

Endangered Species Act (ESA)

The Endangered Species Act of 1973 (16 USC 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 (TE) species, or result in the destruction or adverse modification of critical habitat for these species. Section 7 of the ESA, as amended, requires the responsible Federal agency to consult the USFWS and the National Marine Fisheries Service concerning TE species under their jurisdiction. It is Forest Service policy to analyze impacts to TE species to ensure management activities are not be likely to jeopardize the continued existence of a TE species, or result in the destruction or adverse modification of critical habitat for these species. This assessment is documented in a Biological Assessment (BA).

Magnuson–Stevens Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a federal fisheries management plan. The MSA requires federal agencies to consult with NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (MSA '305(b)(2)).

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA '3). For the purpose of interpreting this definition of EFH: Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species = contribution to a healthy ecosystem; and spawning, breeding, feeding, or growth to maturity covers a species' full life cycle (CFR 600.110). Adverse effect means any impact that reduces quality and/or quantity of EFH, and may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

EFH for the Pacific coast salmon fishery means those waters and substrate necessary for salmon production needed to support a long-term sustainable salmon fishery and salmon contributions to a healthy ecosystem. To achieve that level of production, EFH must include all those streams, lakes, ponds, wetlands, and other currently viable water bodies and most of the habitat historically accessible to salmon in Washington, Oregon, Idaho, and California. In the estuarine and marine areas, salmon EFH extends from the near shore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (370.4 km) offshore of Washington, Oregon, and California north of Point Conception Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC),and longstanding, naturally-impassable barriers (i.e., natural waterfalls in existence for several hundred years

Essential fish habitat determinations are either “May Adversely Affect” (MAA) or “Not Adversely Affect (NAA). EFH is the same area as Designated Critical Habitat for species discussed in the aquatics report and is used interchangeably in the analysis.

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 (BE).

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.

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 Species of Interest or watch list species.

Sierra Nevada Forest Plan Amendment (SNFPA)

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 (AMS) for the Sierra Nevada. The fundamental principle of the AMS is to retain, restore, and protect the processes and landforms that provide habitat for aquatic and riparian-dependent organisms. Accomplishment of these objectives is achieved through a combination of tactics such as Standards and Guidelines (S&Gs) 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 (RCA): Activity-Related Standards and Guidelines

Where a proposed project encompasses an RCA or a Critical Aquatic Refuge (CAR), conduct a site-specific project area analysis to determine the appropriate level of management within the RCA (or CAR). Determine the type and level of allowable management activities by assessing how proposed activities measure against the Riparian Conservation Objectives (RCO) and their associated standards and guidelines. Areas included in RCAs 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.

Topics and Issues Addressed in This Analysis

Issues

Designating roads, trails and areas for OSV use have the potential to impact aquatic wildlife through direct/indirect or cumulative disturbance to individuals and direct/indirect or cumulative disturbance or impacts to aquatic wildlife habitats.

OSV use also has the potential for releasing 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 operated cross-country instead of on designated trails, have the potential for more widespread impacts due to the potential for ground disturbance (similar in nature to summer motorized use if there is inadequate snow cover). These potential effects are highly dependent on location, particularly areas of thin snow cover, and the amount and timing of use. Wet meadows, springs, seeps, fens, and bogs are particularly sensitive to disruption.

Resource Indicators and Measures

Table 100. Aquatic species resource indicators and measures for assessing effects

Resource Element	Resource Indicator	Measure
Aquatic species	Species presence	Occurrence of TEPS species within open OSV use areas. Occurrence of TEPS species in proximity to designated OSV routes.
	Minimum Snow Depth for OSV Use on Designated Trails	Minimum snow depths on trails can be evaluated for effectiveness for protecting the trail surface and potential for sediment delivery to waterways
Aquatic habitat	Minimum Snow Depth for Cross-country OSV Use	Minimum snow depths for cross-country travel can be evaluated for effectiveness for protecting aquatic habitats
Aquatic habitat	*Consistency with Riparian Conservation Objectives 1, 2, 4, 5, and 6 (Analyzed in the hydrology report)	Evaluation of the effects to RCAs, water quality and beneficial uses of water

*Note: The Sierra Nevada Forest Plan Amendment requires that Riparian Conservation Objectives (RCO) analyses be conducted during environmental analyses for new proposed management activities within critical aquatic refuges (CARs) and RCAs (Standard and Guideline 92). There are no additional routes proposed for addition to the National Forest Transportation System(NFTS) within CARs in the analysis area. Consequently, consistency with the RCOs is an indicator to ensure that goals of Aquatic Management Strategy are met (USDA FS PSW Region 2004: 32). The RCO Analysis is in Appendix F of the hydrology specialist report.

Environmental Consequences

Methodology and Information Sources

This analysis uses relevant Geographic Information System (GIS) data layers from the Lassen National Forest. The GIS layers of proposed OSV designations and groomed trails were overlain with the aquatic resource layers to identify areas of potential effects.

This biological evaluation/biological assessment reviews the proposed action and alternatives in sufficient detail to determine the level of effect that would occur to federally listed aquatic and Region 5 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 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 adversely impact 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

Incomplete and Unavailable Information

There is little research and information available regarding the responses of each aquatic species from OSV uses, including indirect effects from snow compaction and vehicle emissions during the winter.

No field observations or site-specific aquatic surveys or monitoring related to OSV use and their potential effects to aquatic species were done to support this analysis. Lassen recreation staff monitor OSV and other winter recreation use on the forest, but no water quality sampling or assessments on effects of OSV use on aquatic species have been made. Assessments of impacts of OSVs were primarily based on current scientific literature and professional judgement.

Spatial and Temporal Context for Effects Analysis

The project area boundary serves as the analysis boundary for direct, indirect, and cumulative effects. 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 2 years are considered long-term effects. Long-term effects beyond 2 years become increasingly difficult to predict due to unknown interactions and the many environmental variables with numerous possible outcomes.

Direct/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.

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 Lassen National Forest.

Assumptions specific to the aquatic resources analysis

- Aquatic species are unlikely to be directly affected by authorized OSV use (with the specified snow depth requirements).
- 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 is reasonably foreseeable to be affected by snow compaction, emissions, or other contamination. Areas open to 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.

Affected Environment

Existing Condition

Threatened, Endangered, and Proposed Aquatics Species

Official species lists for this project were obtained on September 29, 2015, from the Klamath Falls, Sacramento, Yreka, and Nevada Field Offices of the United States Department of the Interior, Fish and Wildlife Service (USDI FWS 2015a, USDI FWS 2015b, USDI FWS 2015c, USDI FWS 2015d). The lists identify aquatic species to consider because they may be present within the general area of the Lassen National Forest:

Species Considered in the Analysis

Species or critical habitat that may occur in the action area or be affected by activities associated with the proposed action and alternatives were reviewed. The species and critical habitat in Table 101 were evaluated for potential presence in the action area. Species which are not known or suspected to occur in areas that may be open to OSV use are not carried forward into the effects analysis.

Table 101. TEPS aquatic species considered

Species	Status	Known or Potential Occurrence	Finding/Rationale
Amphibians			
California red-legged frog (*Rana draytonii*)	Threatened	No Potential Occurrence	No Effect. No Designated Critical Habitat on Lassen NF
Oregon spotted frog (*Rana pretiosa*)	Threatened	No Potential Occurrence	No Effect. Species is not suspected to occur on Lassen NF. Historically, in California this species ranged in extreme northeastern California, where it was known from only a few scattered localities including Pine Creek, S. Fork Pitt River near Alturas, Warner Mtns., and the southwest side of Lower Klamath Lake.
Sierra Nevada yellow-legged frog (*Rana sierrae*)	Endangered	Potential Occurrence	Historical occurrence but no known extant populations on the Lassen NF. Currently classified under 'utilization unknown' FWS suitable habitat category, therefore presence is assumed.
Fishes			
Chinook salmon (*Oncorhynchus tshawytscha*) Central Valley Spring Run ESU	Threatened	Potential Occurrence	Habitat currently located in the southwestern portion within Lassen NF administrative boundaries.
Coho salmon (*Oncorhynchus (=salmo) kisutch*)	Threatened	No Potential Occurrence	No Effect. Species and habitat do not exist on Lassen National Forest.
Delta smelt (*Hypomesus transpacificus*)	Threatened	No Potential Occurrence	No Effect. The geographic range of the Delta smelt (USDI FWS 1993) is outside the project area.[1]
Longfin, San Francisco Bay Delta Population smelt (*Spirinchus thaleichthys*)	Candidate	No Potential Occurrence	No Effect. Species and habitat do not exist on Lassen National Forest.

Species	Status	Known or Potential Occurrence	Finding/Rationale
Central Valley Steelhead (*Oncorhynchus (=salmo) mykiss*)	Threatened	Potential Occurrence	Habitat currently located in the southwestern portion within Lassen NF administrative boundaries.
Aquatic Invertebrates			
Conservancy fairy shrimp (*Branchinecta conservatio*)	Endangered	No Potential Occurrence	No Effect. Forest is outside the elevational range of this species, and specific habitat (Central Valley vernal pools) does not exist within its boundaries. [2]
Shasta crayfish (*Pacifastacus fortis*)	Endangered	Potential Occurrence	[3]
Vernal pool fairy shrimp (*Branchinecta lynchi*)	Threatened	No Potential Occurrence	No Effect. Forest is outside the elevational range of this species, and specific habitat (Central Valley vernal pools) does not exist within its boundaries.[4]
Vernal pool tadpole shrimp (*Lepidurus packardi*)	Endangered	No Potential Occurrence	No Effect. Forest is outside the elevational range of this species, and specific habitat (Central Valley vernal pools) does not exist within its boundaries. [5]
CRITICAL HABITATS WITHIN THE PROJECT AREA			
Sierra Nevada yellow-legged frog (*Rana sierrae*)	Proposed Critical Habitat	Known Occurrence	Yes, PCH
Chinook salmon (*Oncorhynchus tshawytscha*) Central Valley Spring Run	Final Designated	Known Occurrence	Yes. There is Critical Habitat (CH) for this species or Essential Fish Habitat (EFH) located in the southwestern corner of the Lassen NF. [6]
Steelhead (*Oncorhynchus (=salmo) mykiss*)	Final Designated	Known Occurrence	Yes. There is CH located in the southwestern corner of the Lassen NF.
Forest Sensitive Species			
Cascades frog *(Rana cascadae)*	Sensitive	Known Occurrence	Known presence; considered in analysis
Black Juga *(Juga nigrina)*	Sensitive	Likely Occurrence	Present within stream located within project boundaries; considered in analysis

[1] Department of the Interior, Fish and Wildlife Service [USDI FWS]. 1993. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Delta Smelt. Division of Endangered Species. Adapted from the Federal Register for Friday, March 5, 1993.

[2] USDI Fish and Wildlife Service. 2007. Conservancy Fairy Shrimp (*Branchinecta conservatio*) Five-year Review: Summary and Evaluation. Sacramento Fish and Wildlife Office, Sacramento, CA. 32 p.

[3] U.S. Department of Agriculture, Forest Service**,** Lassen National Forest. 2010. Existing Environment for Federally-listed (non-anadromous) and Forest Service Sensitive Aquatic Species, Part D: Federally-listed (non-anadromous) Aquatic Species**.** Unpublished internal document. (Version 4.29.10).

[4] USDI Fish and Wildlife Service. 2007 Vernal Pool Fairy Shrimp (*Branchinecta lynchi*) Five-year Review: Summary and Evaluation. Sacramento Fish and Wildlife Office, Sacramento, CA. 76 p.

[5] USDI Fish and Wildlife Service. 2007. Vernal Pool Tadpole Fairy Shrimp (*Lepidurus packardi*) Five-year Review: Summary and Evaluation. Sacramento Fish and Wildlife Office, Sacramento, CA. 50 p.

[6] http://www.westcoast.fisheries.noaa.gov/publications/gis_maps/maps/salmon_steelhead/critical_habitat/chin/chinook_cvsr.pdf

Because they are not present and not suspected of occurring within areas currently or proposed for OSV use, the following species would not be affected and are not carried forward into the effects analysis:

Threatened or Endangered

- California red-legged frog (*Rana draytonii*)
- Oregon spotted frog (*Rana pretiosa*)
- Sierra Nevada yellow-legged frog (*Rana sierrae*)
- Coho salmon (*Oncorhynchus kisutch*)
- Delta smelt (*Hypomesus transpacificus*)
- Longfin, San Francisco Bay Delta Population smelt (*Spirinchus thaleichthys*)

Sensitive

- Foothill yellow-legged frog (*Rana boylii*)
- California floater (*Anodonta californiensis*)
- Great Basin Rams-horn (*Helisoma newberryi newberryi*)
- Scalloped Juga (*Juga (Calibasis) acutifilosa*)
- Topaz Juga (*Juga (Calibasis) occata*)
- Montane Peaclam (*Pisidium (Cyclocalyx) ultramontanum*)
- Nugget pebblesnail (*Fluminicola seminalis*)
- Kneecap lanx (*Lanx patelloides*)
- Eagle Lake rainbow trout (*Oncorhynchus mykiss aquilarum*)
- Goose Lake redband trout (*Oncorhynchus mykiss pop. 6*)
- Hardhead (*Mylopharodon conocephalus*)

Listed Species and Critical Habitat Information

Chinook salmon (*Oncorhynchus tshawytscha*) Central Valley Spring Run ESU and Central Valley Steelhead (*Oncorhynchus (=salmo) mykiss*)

Affected Environment

In 1999, NMFS listed the Central Valley spring-run Chinook salmon evolutionarily significant unit (ESU) as threatened under the federal Endangered Species Act (ESA) (NMFS 1999). The Central Valley ESU includes all naturally spawned populations in the Sacramento River, tributaries of the Sacramento River, and the Feather River (DWR 2007). In 2005, NMFS published a final listing determination for Central Valley spring-run that added Feather River Hatchery spring-run to the designation (DWR 2007). In 2005, NMFS published the final designation of critical habitat, which includes the Sacramento, lower Feather, and Yuba Rivers; and Beegum, Battle, Clear, Cottonwood, Antelope, Mill, Deer, Butte, and Big Chico Creeks (DWR 2007).

Of five 4th field sub-basins occupied by these two federally listed species, only two are occupied by the species within the Lassen National Forest boundary: Sacramento-Thomes-Elder-Mill (containing Mill and Antelope Creeks) and Sacramento-Deer (containing Deer Creek).

Designated Critical Habitat for both species is identified within the Lassen National Forest boundary in Antelope, Mill, and Deer Creeks. In the Panther Creek drainage (Upper South Fork Battle Creek subwatershed), critical habitat has also been designated for steelhead. The latter DCH within the project area is associate d with a small, headwater stream/shallow intermittent lake (Panther Creek/Dry Lake) which lacks suitable habitat for steelhead. Specifically, and Dry Lake in particular, there is no stream habitat that provides any of the following three primary constituent elements of DCH: spawning, rearing, or migration habitat. Additionally, the species is not in close proximity to the Lassen National Forest boundary; the upper extent of habitat known to be currently occupied by steelhead is more than 10 miles downstream of the Lassen National Forest boundary in the South Fork of Battle Creek.

Therefore, due to the lack of primary constituent habitat elements in the Panther Creek drainage DCH, and the lack of proximity to this DCH, the primary area of analysis for the two listed anadromous fish considers the aquatic features (perennial streams) designated as critical habitat that are occupied by the species and, their associated RCHAs on Lassen National Forest lands within the project area in the Antelope, Mill and Deer Creek DCHs.

Sierra Nevada yellow-legged frog (*Rana sierrae*)

Affected Environment

The project area supports potential suitable habitat for the Sierra Nevada yellow-legged frog (*Rana sierrae*), a species federally listed as endangered on April 29, 2014, under the Endangered Species Act of 1973, as amended (USFWS 2014). The Sierra Nevada yellow-legged frog (SNYLF) is endemic to the northern and central Sierra Nevada and adjacent Nevada ranging from north of the Feather River (including the Plumas and southern edge of the Lassen National Forests) south to the Monarch Divide on the west side of the Sierra Nevada crest (Sierra National Forest) and near Independence Creek on the east side of the Sierra Nevada crest (Inyo National Forest).

Suitable habitat typically occurs above 4,500 feet in elevation, but in some areas, including the west side of the Plumas National Forest, it is thought to occur as low as 3,500 feet in elevation. Suitable habitat includes permanent water bodies or those hydrologically connected with permanent water such as wet meadows, lakes, streams, rivers, tarns, perennial creeks, permanent plunge pools within intermittent creeks, and pools, such as a body of impounded water contained above a natural dam. Suitable habitat includes adjacent areas, up to a distance of 82 feet. When water bodies occur within 984 feet of one another, as is typical of some high mountain lake habitat, suitable habitat for dispersal and movement includes the overland areas between lake shorelines. In mesic areas such as lake and meadow systems, the entire contiguous or proximate areas are suitable habitat for dispersal and foraging.

R. sierrae inhabits a variety of habitats including lakes, ponds, tarns, wet meadows, and streams from near 4,500 feet to 12,000 feet (CDFW 2014; Zweifel 1955; Stebbins 1985; Vredenburg et al. 2005). At lower elevations, particularly in the northern part of their historic range, SNYLF are known to be associated with rocky streambed and wet meadows surrounded by coniferous forest (Vredenburg et al. 2005; Zweifel 1955; Zeiner et al. 1988). *R. sierrae* utilize a variety of different habitats throughout the year for breeding, feeding, and overwintering sites (Matthews and Preisler 2010).

Breeding occurs in the spring, from April to July depending on elevation, as soon as the ice on the lakes, ponds, and streams recedes. Females deposit eggs in clusters attached to vegetation, granite, and under undercut banks (Pope 1999, Vredenburg et al. 2004, Zweifel 1955). Females lay 40 to 300 eggs in a compact cluster. Emergence from the egg occurs after approximately 2 to 3 weeks. Tadpoles often congregate in the warm shallows near shore where they feed on algae. *R. sierrae* tadpoles may overwinter 2 to 3 times before metamorphosing (Zweifel 1955; Vredenburg et al. 2005). Due to their long larval life

stage, breeding sites must remain a permanent water source year round. After metamorphosis, *R. sierrae* can remain juveniles for up to 4 years before reaching sexual maturity. *R. sierrae* are long-lived with a maximum recorded estimated age of 14 years (Matthews and Miaud 2007).

After breeding, adults may disperse into a larger variety of aquatic habitats (Pope and Matthews 2001). *R. sierrae* often move hundreds of meters between breeding, feeding, and overwintering habitats (Pope and Matthews 2001). They appear to use a restricted set of lakes that provide suitable microhabitats for breeding and overwintering, then disperse into a greater number of sites during the summer months for feeding (Matthews and Pope 1999, Matthews and Preisler 2010, Pope and Matthews 2001). Frogs can be found along shallow, rocky shorelines often interspersed with vegetation (Mullally and Cunningham 1956). *R. sierrae* use a variety of cover including vegetation, logs, and partially submerged trees. Similar to tadpoles, adults and subadults seek areas with warmer water (Bradford 1984). In high elevation habitats, SNYLF may spend up to 9 months overwintering under ice in lakes and streams. Frogs have been found overwintering in the bottoms of lakes and in protected nearshore microhabitats including deep underwater rock crevices under banks and under ledges (Bradford 1983, Matthews and Pope 1999).

Genetic analyses of the *R. sierrae* indicate that the species is divided into three distinct subpopulations called “clades” (Vredenburg et al. 2007). Clade 1 is in the northwestern portion of *R. sierrae* range and occurs on the Lassen and Plumas National Forests. This region is relatively low elevation and contains some of the lowest known *R. sierrae* populations. Environments in this clade are relatively unique for this species because they are predominantly forested. The species commonly inhabits streams in this area, likely because lakes are scarce. Little is known about the ecology of the species in this region including its historic distribution and abundance, where it breeds, and how it uses stream habitats. Only 5 to 6 known populations exist within this clade and all are on the Plumas National Forest.

The Lassen National Forest is the northernmost forest in the Sierra Nevada with documented distribution of *R. sierrae*. Based on historic records from museum collections (Museum of Vertebrate Zoology, University of California at Berkeley; California State University, Chico; California Academy of Sciences, San Francisco) the range of the species has been determined to be limited to certain watersheds on the Almanor Ranger District of the Lassen (USDA, FS, LNF. 2010). Considering historic records (HR), recent positive detections (RPD) and/or potential suitable habitat (PSH), there are five 5th field watersheds considered to represent the range of the species on the Lassen; Butt Creek (HR), Yellow Creek (PSH), Upper Butte Creek (HR), West Branch Feather River (HR) and Middle North Fork Feather River (RPD).

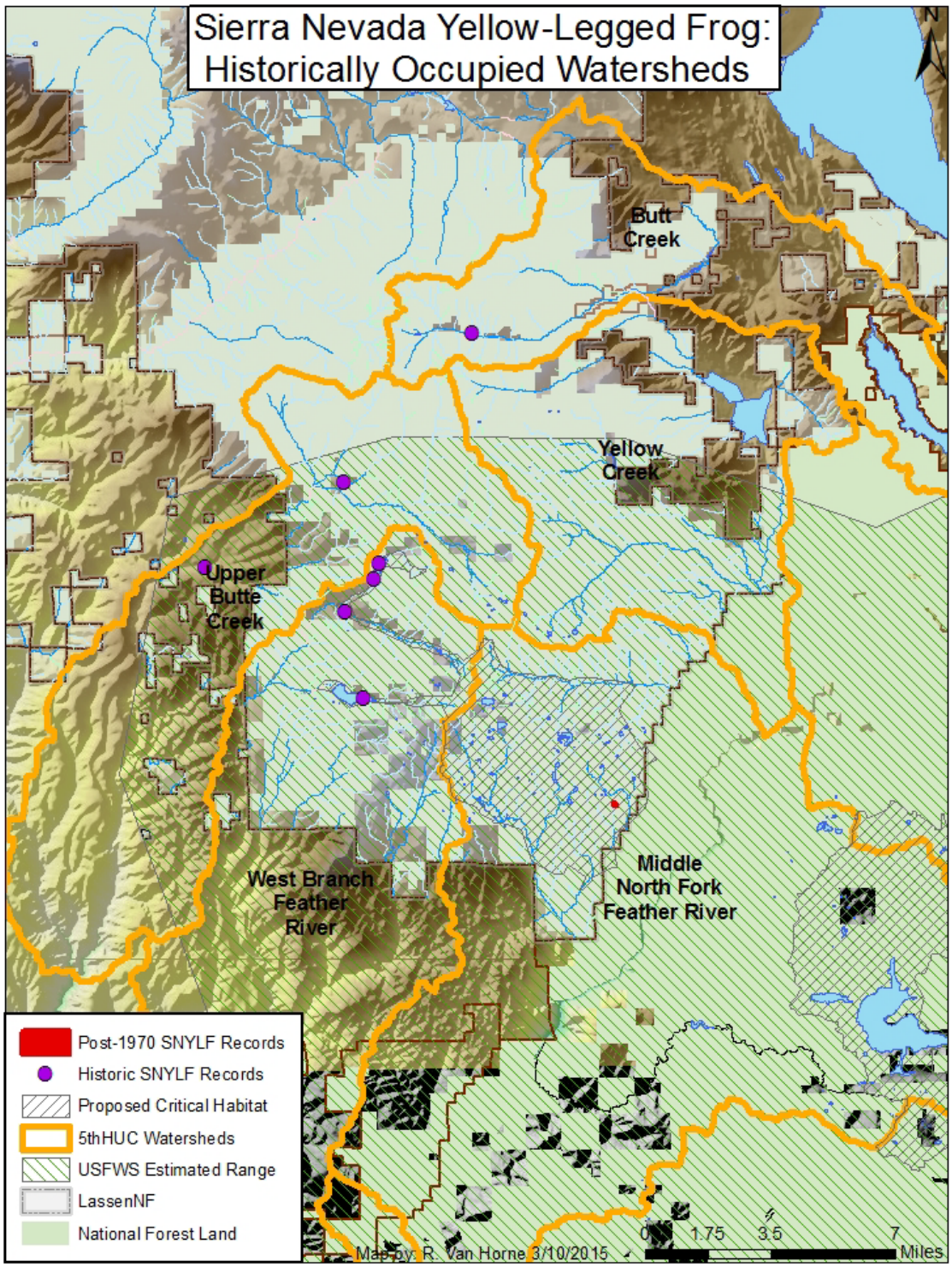

Figure 10. Sierra Nevada yellow-legged frog historically occupied watersheds

No extant populations of *R. sierrae* are currently known to exist on the Lassen. The only (remnant) population of the species last discovered on the Lassen National Forest was in a remote lake (Oliver) and associated pond in 2005, in the Mill Ranch Creek 6th field subwatershed. Three subsequent surveys

conducted by the California Department of Fish and Wildlife had no positive detections, thus the population is believed to be extirpated.

Cross-country OSV use has the potential to occur over perennial streams that have the habitat characteristics that could support *R. sierra*.

Some areas contain overlap between critical habitat and the project actions. These areas, therefore, fall within the FWS designated '**utilization unknown**' suitable habitat category because, while the species has not been observed, it does not meet the FWS criteria for 'unutilized potential,' meaning three negative detection surveys have not been conducted in the last 10 calendar years where at least one of those surveys occurred during and 80 percent or greater snowpack year.

Cascades frog (*Rana cascadae*) Forest Sensitive

Affected Environment

The Cascades frog is known (historically and/or currently) to utilize habitat above approximately 4,500 feet in elevation in the following 16 6th field subwatersheds that encompass, in whole or in part, Lassen NF: Headwaters of Hat Creek, Upper Old Cow Creek, Upper SF Battle Creek, Bailey Creek (within Battle Creek system), Upper NF Battle Creek, Upper Mill Creek, Sacramento-Deer, Butte Creek, Bailey Creek (within Feather River system), Louse Creek, Rice Creek, Butt Valley Reservoir, Juniper Lake, Big Kimshew Creek, Upper West Branch Feather River, and Lower Yellow Creek (refer to Maps in the FEIS for general location of all these subwatersheds).

For subwatersheds where historic information is available (e.g., via voucher specimens), almost all collections have enough information to indicate which 6th field subwatershed the specimens were associated with. In only one or two subwatersheds is there some uncertainty of the specific collection location; in these circumstances, nearby subwatersheds with potential suitable habitat were included in the analysis (e.g., Coyote Flat). In the Upper Yellow Creek subwatershed, 4,250 feet is presumed to be the approximate lower elevation for this species, based on existing habitat conditions. In the Screwdriver Creek subwatershed, the Cascades frog is known (presently) above approximately 2,500 feet in elevation (EA Engineering 1995; Fellers 1998).

Present occupancy (defined here as more than one individual observed at one time since the 1990s and, with one or more individuals still present) is only known within five 6th field subwatersheds: Upper Old Cow Creek, Sacramento-Deer, Butte Creek, Juniper Lake, and Screwdriver Creek (Pope 2008, 2013). Only two incidental observations of individual Cascades frogs have been made outside known breeding populations; one adult frog was observed in the Sacramento-Deer subwatershed in Alder Creek in 2002 (Roby 2002) and one adult was observed in the Shanghai Creek subwatershed on Butt Creek in 1996 (Brown 2000). Within the Rice Creek subwatershed, two Cascade frogs were also found in Crumbaugh Creek (in Lassen Volcanic National Park) in the early 1990s, but this species has not been found there since 1994 (Fellers et. al. 2008).

Three 6th field subwatersheds (Shanghai, Coyote Flat and Upper Yellow Creek) are not known historically to have contained the Cascades frog but, for purposes of this analysis, are considered as having potential suitable habitat based on existing habitat, their proximity to adjacent subwatersheds with historical occupancy and/or an incidental observation.

From extensive amphibian surveys conducted on Lassen National Forest (Fellers et al. 2008) it is probable that this species is no longer present in the remaining 10 subwatersheds where it historically occurred (e.g., pre-1970s), as documented from available sources of historical accounts including, but not limited to, Zweifel (1955), Grinnell et al. (1930), various museums (e.g., California State University

Chico, Museum of Vertebrate Zoology), Fellers and Drost (1993) and Koo et al. (2004)). According to Fellers et al. (2008), there could be a few populations that went undetected in the surveys conducted, but "it is unlikely that any large *R. cascadae* populations exist in the Lassen area" (the Lassen area referred to is defined as lands within a 50-kilometer radius of Lassen Peak, so this excludes the northern area with existing populations within Screwdriver Creek subwatershed). Fellers (ibid) concluded "the small size of, and lack of connectivity between, the current populations of *R. cascadae* in the Lassen area greatly reduces their long-term viability, potentially leading to a genetic bottleneck" (Young and Clarke 2000). The existing Cow Creek population (represented by a minimum of two breeding sites) on private lands off Lassen National Forest, however, "…may represent the largest extant population of *R. cascadae* in the Lassen region…" (Stead and Pope 2007).

The area of effect for the Cascades frog conservatively considers all of the following aquatic features; springs, perennial streams, lakes, ponds, wetlands and fens, and their associated RCAs on Lassen National Forest lands above the elevational range for all 18 subwatersheds listed previously within the project area. Additionally, within the Sacramento-Deer and Butte Creek 6th field subwatersheds, Carter and Colby/Willow Critical Aquatic Refuges (CARs) are designated for the Cascades frog (USDA FS PSW Region 2004). Populations are present in both the Carter and Colby/Willow CARs.

Black Juga (*Juga nigrina*)

Affected Environment

The black juga is an aquatic mollusk occupying perennial stream and spring habitat in the Lassen, Tahoe, and perhaps Shasta-Trinity National Forests. This species occurs in the upper Sacramento, McCloud, and Pit River systems (Frest and Johannes 1995). Brim Box (2005) reported finding 575 individuals at 22 of 113 survey sites on the Lassen National Forest. In general, this species is located within large tributaries and some springs of Hat Creek, Lost Creek, Deer Creek, Domingo Creek, Davis Spring, Soldier Creek, Beaver Creek, Antelope Creek, North Fork Feather River, Gurnsey Creek, and the Pit River. Brim Box (2005) noted that this species is not restricted to a particular area on the Lassen National Forest. Additionally, this species is fairly common within the region where populations currently exist; however, it appears that the species has been extirpated from many historic locations within tributaries to the upper Sacramento River.

Suitable habitat for this species has been identified as perennial streams and springs with prominent channel substrate being comprised of boulders/cobble, gravel, sand, and in some cases mud (Brim Box 2002). Black juga habitat is threatened by excessive sedimentation resulting from various land management activities, including mining, logging, road and railroad grade construction, and grazing. Increased sedimentation may result in smothering of suitable channel substrate, increased stress and mortality, and impairment of egg-laying or survival of eggs and young. Livestock utilization in close proximity to suitable habitat may result in reduced dissolved oxygen levels, and elevated water temperature if removal of riparian vegetation and/or increases in channel width-to-depth ratios occur. Additionally, water diversions can result in reduced spring/stream flow, elevated water temperature, increased sedimentation, and lower dissolved oxygen.

Environmental Consequences

Project Design Features

In addition to the soil and water resources project design features, the following project design features related to aquatic resources are common to all action alternatives:

- If OSV use is found to be causing damage to TEPS species or habitats, corrective actions will be required, including, but not limited to, area closures and signage to protect the sensitive resources.
- Prohibit OSV use on unfrozen lakes, reservoirs, ponds and any open surface water.

Required Monitoring

Once a decision is made on OSV use designation via the record of decision, the implementation phase would begin. We anticipate that an implementation plan, with a monitoring component, would be developed at that time.

The Forest Service has an obligation to monitor the effects of OSV use as required by Subpart C of the Travel Management Regulations. Furthermore, as an ongoing part of our State-funded OSV program, California State Parks provides funding to the Forest Service to monitor our trail systems for evidence of OSV trespass into closed areas, OSV use near or damage of sensitive plant and wildlife sites, and low-snow areas subject to erosion concerns.

The highest priority for monitoring will ensure that:

1. Resource damage is not occurring when there is less than the prescribed minimum snow depth (depending on alternative) with certain exceptions as described in the alternative descriptions above. Snow depths measurement locations and techniques would be developed using an interdisciplinary team approach and would consider terrain, season, proximity to sensitive areas, and resource damage criteria.
2. Where resource damage is suspected due to OSV use in areas with less than the prescribed minimum snow depth, monitoring would occur to help inform the line officer if damage is occurring, the extent of the damage, and what steps need to be taken to address the issue.
3. OSV use is not damaging sensitive resource locations, in consultation with forest biologists. In particular:
   - Monitor OSV use in the white bark pine stand on Burney Mountain to determine if damage is occurring. If adverse impacts are observed, changes in management of OSV use would be considered, or other appropriate protective measures taken, in consultation with a forest botanist. Considerations will include prohibiting cross-country OSV use in this area.
   - Monitor OSV use in designated Forest Plan botanical Special Interest Areas to determine if damage is occurring. If adverse impacts are observed and it is determined that OSV use in these areas is not compatible with the intended focus of these areas, per each special area's management plan, changes in management of OSV use would be considered, or other appropriate protective measures taken, in consultation with a forest botanist. Considerations will include prohibiting cross-country OSV use in these Special Interest Areas or restricting OSV use to designated routes only.
   - Monitor OSV use in sensitive wildlife habitats, in consultation with the forest biologist, to determine if adverse impacts are occurring. If adverse impacts are observed, changes in management would be considered in consultation with the forest biologist.
   - Monitor water quality in spring snowmelt periodically at specified locations, in consultation with the forest hydrologist and aquatic biologist, to determine potential impacts of OSV exhaust on water quality. If adverse impacts are observed, changes in management of OSV use would be considered, or other appropriate protective measures taken, in consultation with a forest botanist.
4. OSV use is not occurring in prohibited areas.
5. OSV use restricted to designated routes is not encroaching outside the trail corridor.

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 will result in mostly small differences in degree of potential effects. Therefore, each alternative's effects will mainly summarize the extent of aquatic 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.

Direct Effects Introduction

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 FS 2014).

Direct impacts to fish and amphibians would be extremely rare as amphibians hibernate during the winter, and OSVs would have to travel through water to collide with fish. Due to the rarity of this occurring, the direct impacts to fish and amphibians are considered **less than significant**.

Indirect Effects Introduction

Indirect effects are caused by the action and occur later in time or are farther removed in distance, but are still reasonably foreseeable. Potential indirect impacts include snow compaction and bending and breaking of riparian plants, and impaired water quality or pollutants entering waterways. Potential indirect effects are described below.

Snow Compaction

Snow compaction could indirectly affect aquatic species through delayed snowmelt, affecting the hydrologic regime, and alteration of habitat or riparian vegetation potentially 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 OSVs 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 2015).

Riparian vegetation important to aquatic species could potentially be affected by snow compaction. 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 Lassen 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 2015).

Cross-country OSV use has the potential to 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 2015) and botany report (Davidson 2015) concluded that vegetation trampling from OSVs and potential impacts to riparian resources from OSV use would be considered negligible 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 2015). On the Lassen 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 less than 12 inches snow depth, the Lassen National Forest minimizes the possibility of direct damage to soils and ground vegetation.

Similarly, the hydrology analysis (McNamara 2015) found that with adequate snow depth, cross-country use of OSVs would have a negligible effect on ground disturbance that could lead to erosion and sedimentation in streams or other water bodies, and a negligible effect on vegetation, especially along streams and other water bodies.

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 water bodies by introducing sediment in water runoff."

These conclusions are generally attributed to the fact that OSV use on the Lassen 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). The estimated seasonal day use of OSV Program trails across the Lassen National Forest is around 10,000 OSVs. 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 Lassen 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 in the Project Area from this Plan would not adversely affect water quality of snowmelt.

Snow Compaction Effects Summary

There are no 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.

Pollutants

Emissions from OSVs, 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 snow melt, 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 OSV 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 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 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 under water and airborne compounds would be less likely to be taken up by these 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 Lassen National Forest (considerably less than those observed in Yellowstone National Park) are not expected to impair water quality (McNamara 2015).

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 reasonably foreseeable 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 Lassen 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 2015).

There are few studies regarding effects of OSVs on aquatic biota but, Adams, 1975 addressed the effects of high levels of lead and hydrocarbons from snowmachine exhaust on brown 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 negligible effects to water quality and fish because snowmachine use on the Lassen 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 Adams 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 Lassen 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, negative impacts to special-status fish and amphibians due to impaired water quality are considered 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.

Effects to Aquatic Species

Threatened and Endangered

Direct and Indirect Effects

There are a total of 75.5 miles of steelhead critical habitat and 64.7 miles of Chinook critical habitat within the Lassen National Forest administrative boundary.

Under the no action alternative, there are a total of 25.6 mi and 31.87 mi of critical habitat within areas open to cross country OSV use for Chinook salmon and steelhead respectively (Table 106).

For alternative 2, 3, and 4 the total number of miles of critical habitat within areas open to cross country OSV use is the same (Table 106).

There are no crossings of Chinook critical habitat with designated OSV roads or trails for any of the alternatives.

Two crossings exist under all of the alternatives where steelhead critical habitat intersects with designated OSV roads or trails (Table 106).

OSV use during the winter is not expected to result in habitat disturbance because the minimum snow depth of 12 inches is likely sufficient to prevent contact between OSVs and the soil surface. Based upon these factors discussed in the effects common to all alternatives section, no soil disturbance would occur that would contribute to instream sediment increases.

The Lassen OSV Designation project does not involve the 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 2015).

SNYLF Critical Habitat

Direct and Indirect Effects

Of the total 1,104,579 acres of *R. sierrae* PCH, approximately 17,853 acres are within the Lassen National Forest. Of the area of PCH within the Lassen National Forest, a total of approximately 9,731 acres lay within areas open to cross-country OSV use under all the alternatives. No difference exists between alternatives because *R. sierrae* PCH is outside the areas proposed to be changed under each alternative.

There are no designated OSV roads or trails that cross or overlap with *R. sierrae* PCH for any of the alternatives.

Based upon factors described in the effects section, soil disturbance is not expected to occur that would contribute to instream sediment increases.

The Lassen OSV Designation project does 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 (McNamara 2015).

OSV use during the winter is not expected to result in habitat disturbance because the minimum snow depth of 12 inches is likely sufficient to prevent contact between OSVs and the soil surface. However, there is currently a lack of direct studies examining snow depth and OSV use in relation to the potential effects to aquatic species or their habitat.

Sensitive Species

Cascades frog (Rana cascadae)

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 Cascades frog, 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 Cascades frog breeding. The effects of snow compaction and OSV emissions are concentrated in areas of heavy use, such as along designated OSV trails. No Cascades frog 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.

Black Juga (Juga nigrina)

Direct and Indirect Effects

Black juga would not be directly affected by current or proposed OSV uses because OSVs are not authorized to operate over unfrozen open water 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 are 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

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Snow plowing at the established OSV trailheads is an ancillary activity associated with the Lassen National Forest OSV Designation project, and is not analyzed as a part of the proposal. Snow plowing is not expected to affect aquatic resources. Other ongoing and foreseeable future actions include livestock grazing, recreation, timber harvest, fuels reduction, woodcutting activities, wildfire suppression, and other activities.

Threatened and Endangered and Sensitive Species

The effects of present and future projects on TESP species would likely be minimal since all projects are analyzed and mitigation measures are designed for those species for which viability is a concern, on a project-by-project basis.

Alternatives Comparison

For all alternatives, including the no-action alternative, OSV use is allowed in the plan area. A comparison of alternatives based on trails and areas open to OSV use, and minimum snow depth for OSV use on trails and cross-country are shown in Table 102. Effects common to all alternatives from OSV uses are outlined in the previous section of this document and include effects to aquatic species and their habitat from OSV exhaust and lubricants, and snow compaction and trampling of vegetation from OSV tracks.

Table 102. Alternatives comparison

OSV Management	Alternative 1 (no action)	Alternative 2 (Proposed Action)	Alternative 3	Alternative 4
National Forest System (NFS) Lands within the Lassen National Forest (Acres)	1,150,020	1,150,020	1,150,020	1,150,020
OSV Use Allowed:				
• Designated OSV Areas (Acres)	976,760	947,120	878,690	879,690
• Designated OSV Trails (Miles)	406	406	406	408
Minimum Snow Depth for OSV Use on Designated Trails (Inches)	12	6 on a limited basis	6 on a limited basis	Dependent on snow conditions. No restriction with 6 or more inches trails identified for grooming.
Minimum Snow Depth for Cross-country OSV Use (Inches)	12	12	12	12
Elevation, areas, and grooming restrictions	18” min snow depth for trail grooming. Allows OSV use below 3,500’ as long as there is a min 12” snow depth	12” min snow depth for trail grooming. prohibit OSV use in any area below 3,500’	18” min snow depth for trail grooming. prohibit OSV use in any area below 3,500’ Prohibited use in additional areas (includes some lakes)	12” min snow depth for trail grooming. Allows OSV use below 3,500’ as long as there is a min 12” snow depth

Table 103. Alternatives comparison of potential effects to Sierra Nevada yellow-legged frog PCH

SNYLF	Alternative 1 (no action)	Alternative 2 (Proposed Action)	Alternative 3	Alternative 4
OSV roads or trails crossing SNYLF PCH	0	0	0	0
PCH within areas open to cross-country OSV use (acres)	9,731	9,731	9,731	9,731

Table 104. Alternatives comparison of potential effects to Central Valley steelhead and Central Valley spring-run Chinook CH

Chinook CH	Alternative 1 (no action)	Alternative 2 (Proposed Action)	Alternative 3	Alternative 4	Notes
Critical habitat within areas open to cross-country OSV use (miles)	25.6	23.64	23.64	23.64	A total of 64.7 miles of critical habitat are within the Lassen NF
Number of crossings with a designated OSV road or trail	0	0	0	0	
Steelhead CH					
Critical habitat within areas open to cross-country OSV use (miles)	31.87	29.91	29.91	29.91	A total of 75.5 miles of critical habitat are within the Lassen NF
Number of crossings with a designated OSV road or trail	2	2	2	2	First crossing located at intersection of road 29N48 with Rock Gulch Cr. Second crossing located at intersection road 31N17 with Panther Cr. below Dry Lake.

Alternative 1 Effects to Aquatic Resources

There are no additional effects to aquatic resources beyond those described in Effect Common to All Alternatives that are specific to alternative 1. This alternative would generally have the greatest potential for direct effects to aquatic resources due to larger areas of open OSV use.

Threatened and Endangered Species

As described above in Effects Common to All Alternatives, there would be less than significant direct and indirect effects to *O. tshawytscha*, *O. mykiss*, and *Rana sierrae* or their critical habitats.

Alternative 2, 3, and 4 Effects to Aquatic Resources

The effects of alternative 2, 3, and 4 are similar to alternative 1, except for slightly lower number of acres open to OSVs, and the snow depth requirement for use of OSV trails. Under these alternatives about 30,000 acres, 98,000 acres, and 97,000 acres less National Forest System land (Table 102) is open to OSV use for alternatives 2, 3, and 4, respectively. Because direct and indirect effects of this alternative are negligible, having less acreage open to OSVs will lead to a minimal increase in direct or indirect effects on aquatic species or their habitat.

Summary of Environmental Effects

Table 105. Summary comparison of environmental effects to aquatic resources

Resource Element	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Threatened and Endangered Aquatic Species	Greater potential for effects (issue sufficiently addressed – minor potential effects)	Alternatives 2, 3, and 4 equal	Alternatives 2, 3, and 4 equal	Alternatives 2, 3, and 4 equal
Sensitive Species	Greater potential for effects	Alternatives 2, 3, and 4 equal	Alternatives 2, 3, and 4 equal	Alternatives 2, 3, and 4 equal

Threatened and Endangered Aquatic Species Determinations

Central Valley spring-run Chinook and Central Valley steelhead

Although occurrences and critical habitat for *O. tshawytscha*, *O. mykiss* and critical habitat for *Rana sierra* are located within the Lassen National Forest OSV Designation project, proposed activities are not expected to affect the critical habitats or occurrences of any listed species because authorized activities would occur at a time of year when the amphibians are hibernating, occurrences are located in water or open water areas that are prohibited from OSV use, and OSV use on the required minimum snow depths is not expected to result in any changes to soils, vegetation, or hydrology of their aquatic habitats. Therefore, the fisheries biologist's determination is that the Lassen National Forest OSV Designation project **may affect, not likely to adversely affect** on *O. tshawytscha* and *O. mykiss* and their habitat.

Sierra Nevada Yellow Legged Frog

The fisheries biologist's determination is that the OSV project is **may affect, likely to adversely affect** suitable habitat of *R. sierrae*. This conclusion is based upon an inability to guarantee that no take to the species or their habitat would occur and due to the lack of surveys meeting FWS standards (the project area locations fall within the 'utilization unknown' category of suitable habitat). Therefore, a conservative approach was to conclude these actions are likely to adversely affect the species or their habitat.

Sensitive Species Determinations

The Lassen OSV Designation project does 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.

Cascades Frog

Because *Rana cascadae* are not active and/or present during the period of OSV use, *Rana cascadae* would not be directly affected. Potential indirect effects are expected to be minor, and all effects would be minimized by the required minimum snow depths proposed. OSV use is not expected to result in a trend toward Federal listing or loss of viability for *Rana cascadae*. Therefore, the fisheries biologist's determination is that the Lassen 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

Direct impacts to *Juga 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 less than significant. Potential indirect effects are undetectable and unlikely to affect the species or alter its

habitat, as described above. With slight direct or indirect effects expected, there would be no cumulative effects to this species. It is the fisheries biologist's determination is that the Lassen 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.**

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

With this Biological Evaluation/Biological Assessment, the proposed project effects on TESP 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 Lassen National Forest Land and Resource Management Plan (LRMP) and the Sierra Nevada Forest Plan Amendment because sensitive aquatic species populations would remain viable and their habitats would be maintained.