



United States Department of Agriculture

Lassen National Forest Over-snow Vehicle Use Designation

Revised Final Environmental Impact Statement

**Volume I. Chapters 1 through Chapter 3
(Recreation through Cultural Resources)**



Forest Service

Lassen National Forest

May 2022

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Lassen National Forest Over-snow Vehicle Use Designation

Revised Final Environmental Impact Statement

Lassen National Forest

**Lassen, Shasta, Tehama, Butte, Plumas, Siskiyou, and Modoc Counties,
California**

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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 (NFS) snow trails and areas on NFS lands within the Lassen National Forest. The Forest Service would also identify snow trails where grooming for public OSV use would occur within the Lassen National Forest.

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

This Revised Final Environmental Impact Statement (RFEIS) discloses the comparative analysis of the options being considered in designating snow trails and areas of the Lassen National Forest for OSV use. We consider the environmental impacts of a proposed action, a no-action alternative, and three additional action alternatives developed in response to issues. A notice of intent to prepare an EIS was published in the *Federal Register* on January 20, 2015 (80 FR 2676). A final EIS and draft record of decision were released in August of 2016, and the “Legal Notice of Opportunity to Object” was published in the *Lassen County Times* on August 23, 2016. That legal notice signified the beginning of a 45-day objection period that began on August 24, 2016. After considering the objections received, the Forest Service determined it would be necessary to revise the analysis, starting with a Revised Draft Environmental Impact Statement (RDEIS).

After reviewing comments on the RDEIS, we prepared this Revised Final Environmental Impact Statement (RFEIS) and included further revisions. This RFEIS and the associated draft decision document (Record of Decision) were released on April 3, 2018, and were subject to the pre-decisional administrative review process (objection process) pursuant to 36 CFR Part 218, Subparts A and B.

Summary

Modified Proposed Action

The proposed action has been modified based on concerns expressed in the public comment period on the original Lassen National Forest Over-snow Vehicle Use Designation Draft Environmental Impact Statement (DEIS), the pre-decisional objection review period on the final environmental impact statement (FEIS) and Draft Record of Decision, and the public comment period on the Revised Draft Environmental Impact Statement (RDEIS). These modifications are described in chapter 2 of this analysis.

The Forest Service proposes to designate National Forest System (NFS) snow trails and areas on NFS land for public over-snow vehicle (OSV) use. These designations would occur on parts of administrative units or ranger districts of the Lassen National Forest where snowfall is adequate for that use to occur. These designations would be consistent with the requirements of Subpart C of the Forest Service's Travel Management Regulations at Title 36 of the Code of Federal Regulations, Part 212 (36 CFR 212). The Forest Service would also identify snow trails to be groomed for public OSV use under the Lassen National Forest OSV trail grooming program.

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

1. To designate areas and trails for OSV use.
2. To designate 8 discrete, specifically delineated areas for cross-country OSV use. There would be a total of 920,260 acres of NFS lands within the Lassen National Forest designated as areas where public, cross-country OSV use would be allowed. These areas would encompass approximately 80 percent of the NFS land on the Lassen National Forest. All existing OSV closures applying to areas and trails on the forest where public motorized use is not allowed would continue and these areas would not be designated.
3. To designate approximately 334 miles of NFS snow trails on NFS lands within the Lassen National Forest as trails where public OSV use would be allowed. All existing OSV closures applying to trails where public motorized use is not allowed would continue and these trails would not be designated.
4. To identify approximately 350 miles of snow trails that would be groomed for public OSV use by the Lassen National Forest Grooming Program. We would designate approximately 11.8 miles of snow trails for OSV use that would not be groomed. We would groom approximately 27.0 miles of snow trails for OSV use that would not be designated for OSV use because we do not have jurisdiction over these trails.
5. 2,509 miles of trails would be open to OSV use in areas designated for cross-country OSV use, but these trails would not be designated. These trails would overlie existing maintenance level 2, 3, and 4 NFS roads that are not plowed in winter.
6. To groom snow trails for OSV use according to the California State Parks' snow grooming standards when there is a minimum of 12 inches of snow on trails.
7. To implement forestwide snow depth requirements for public OSV use that would provide for public safety and natural and cultural resource protection by:

- a. Allowing public, cross-country OSV use in designated areas only when 12 or more inches of snow or ice cover the landscape, based on weather and observations by Forest Service personnel and the public, to minimize potential for impacts to surface and subsurface resources; and
 - b. Allowing public OSV use on designated snow trails when 6 or more inches of snow cover the trail. Except for approximately 0.1 mile of OSV trail (which would require a minimum of 12 or more inches of snow for OSV use),¹ all snow trails to be designated for public OSV use or identified for OSV grooming in all alternatives would overlie an existing paved, gravel, or native surface travel route. These travel routes are trails and roads used by wheeled, motorized vehicles when such use is allowed, or for non-motorized recreation.
8. To designate no areas for public cross-country OSV use that would be located within 500 feet of the Pacific Crest National Scenic Trail (PCT) on the Lassen National Forest.
9. To designate up to 28 OSV trails that would cross the PCT to provide connectivity to designated OSV areas without having to travel long distances to go around the PCT. Approximate locations of these trails have been identified to ensure greater safety in winter conditions and to facilitate the least difficult and most expedient access for OSV use between areas designated for OSV use. All of these trails would be located consistent with the guidelines in the Comprehensive Management Plan for the Pacific Crest National Scenic Trail (USDA Forest Service 1982). The PCT would be crossed by OSV trails no more frequently than ½-mile intervals.
10. In areas under NFS jurisdiction, the designated OSV trails crossing the PCT would occur in areas adjacent to and within 500 feet of the PCT that are not designated for cross-country OSV use. OSV use would be restricted only to the designated trail in these areas. All but 0.1 mile of these trails would overlie NFS roads or trails currently designated for wheeled motorized vehicle use in the Lassen National Forest's Motor Vehicle Use Map. All designated OSV trails would follow the most direct approach across the PCT. Assuming 28 of these trails would be designated, the total designated mileage of OSV trails crossing the PCT and the non-designated areas adjacent to it would be 8.1 miles.

The decision would only apply to the public use of OSVs as defined in the Forest Service's Travel Management Regulations (36 CFR §212.1).

¹ This 0.1 mile of designated OSV trail crosses an area not designated for cross-country OSV use along the Pacific Crest National Scenic Trail, and is the most direct way to cross the Pacific Crest National Scenic Trail while allowing OSVs to remain on National Forest System land.

Significant Issues

Public participation and analysis identified the following significant issues and these issues were used to develop the action alternatives. The significant issues include the following:

Table S-1. Significant issues

Issue Topic	Cause and Effect
Availability of Motorized Over-snow Recreation Opportunities	<p>The decision could impact the opportunities for public access and use of NFS lands by OSV-equipped winter recreation enthusiasts seeking enjoyable and challenging motorized experiences. The designation of snow trails and areas for public OSV use could impact the opportunities these enthusiasts seek by:</p> <ul style="list-style-type: none"> a) Changing the location of and/or reducing the amount of high quality and desirable areas designated for public, cross-country OSV use on the forest; b) Designating an insufficient number of opportunities for public OSV use of snow trails on the forest; and c) Providing an insufficient number of opportunities for public OSV use of groomed snow trails on the forest. These opportunities are subject to an external constraint due to limits on the amount of funding from the State of California for grooming snow trails for public OSV use. Snow trail grooming for OSV use on NFS land is 100 percent State-funded. The State's financial support of snow trail grooming for OSV use is not expected to increase.
Availability of Non-motorized Winter Recreation Opportunities	<p>The decision could impact the opportunities for public access and use of NFS lands by non-motorized winter recreation enthusiasts seeking solitude and challenging physical experiences. The designation of snow trails and areas for public OSV use and grooming of snow trails for OSV use could impact the opportunities these enthusiasts seek by:</p> <ul style="list-style-type: none"> a) Displacing non-motorized winter recreation enthusiasts, or requiring them to travel longer distances through motorized snow trails and areas than they are physically able to traverse to access their desired quiet, non-motorized experiences; b) Consuming untracked powder desired by backcountry skiers; c) Making the snow surface difficult to ski on; d) Creating concerns for their safety when non-motorized winter recreationists share winter recreation trails and areas with OSVs; e) Creating noise impacts that intrude on the solitude these enthusiasts seek; f) Creating local air quality impacts that intrude on the unpolluted air and solitude these enthusiasts seek; and g) Creating visual impacts that intrude on the unaltered scenery these enthusiasts seek.

Alternatives Considered in Detail

The Forest Service developed five alternatives: No action, the modified proposed action, and three additional action alternatives were generated in response to the significant issues listed above. The no-action alternative and four action 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	<p>No-action alternative. There would be no change to the way the Forest Service currently manages public OSV use on the Lassen National Forest.</p> <ul style="list-style-type: none"> Approximately 964,030 acres are open to public OSV use, which is approximately 84 percent of the NFS land within the Lassen National Forest. All areas of the forest are open to OSV use except in areas where this use is specifically prohibited. Approximately 98.4 miles of the PCT are within 500 feet of areas open to public OSV use on the Lassen National Forest. No trails are identified for OSVs to cross the PCT. Currently, 2,933 miles of groomed, non-groomed (also referred to as “ungroomed” in this document), marked, and unmarked snow trail are open to public OSV and non-motorized use. Not all of these trails are shown on the 2005 Lassen National Forest Winter Recreation Guide (project record). These trails overlie roads and trails designated for wheeled vehicle use and are within areas currently open to OSV use. Approximately 406 miles of these trails are maintained for OSV use through signage, snow trail grooming, or both. There are 349 miles of snow trails groomed for public OSV use. This includes 27 miles of snow trail not under Forest Service jurisdiction. The minimum snow depth for snow trail grooming to occur is 12 inches.
2	<p>Modified proposed action.</p> <ul style="list-style-type: none"> Designate areas and trails for OSV use. Designate 8 discrete, specifically delineated areas for cross-country OSV use. These areas would encompass 920,260 acres, which is approximately 80 percent of the NFS land within the Lassen National Forest. Designate no areas within 500 feet of the PCT for public cross-country OSV use. Designate up to 28 OSV trails that would cross the PCT to provide connectivity to designated OSV areas without having to travel long distances to go around the PCT. Designate 334 miles of snow trails for public OSV use. 2,509 miles of trails would be open to OSV use in areas designated for cross-country OSV use, but these trails would not be designated. These trails would overlie existing maintenance level 2, 3, and 4 NFS roads that are not plowed in winter. Mechanically groom 350 miles of snow trails for public OSV use. This includes 27 miles of snow trail not under Forest Service jurisdiction. The minimum snow depth for snow trail grooming to occur would be 12 inches. The minimum snow depth for public OSV use on designated snow trails overlying roads and trails would be 6 inches. The minimum snow depth for public OSV use on designated snow trails not overlying roads and trails would be 12 inches. The minimum snow depth for OSV use in areas designated for public, cross-country OSV use would be 12 inches.

Alternative	Description of Alternative
3	<ul style="list-style-type: none"> • Designate areas and trails for OSV use. • Designate areas and trails for OSV use. • Designate 8 discrete, specifically delineated areas for cross-country OSV use. These areas would encompass 833,280 acres, which is approximately 73 percent of the NFS land within the Lassen National Forest. • Designate portions of 5 of the 8 areas designated for public OSV use that would be located within 500 feet of the PCT. <ul style="list-style-type: none"> ○ Approximately 85.4 miles of the PCT would be located within 500 feet of an area designated for public OSV use on the Lassen National Forest. • Designate up to 23 OSV trails that would cross the PCT to provide connectivity to designated OSV areas without having to travel long distances to go around the PCT. • Designate approximately 383 miles of snow trails for public OSV use. • 2,200 miles of trails would be open to OSV use in areas designated for cross-country OSV use, but these trails would not be designated. These trails would overlie existing maintenance level 2, 3, and 4 NFS roads that are not plowed in winter. • Mechanically groom 349 miles of snow trails for public OSV use. This includes 27 miles of snow trail not under Forest Service jurisdiction. • The minimum snow depth for snow trail grooming would be 18 inches. • The minimum snow depth for public OSV use on designated snow trails would be 6 inches. • The minimum snow depth for OSV use in areas designated for public cross-country OSV use would be 12 inches.
4	<ul style="list-style-type: none"> • Designate areas and trails for OSV use. • Designate 8 discrete, specifically delineated areas for cross-country OSV use. These areas would encompass 954,470 acres, which is approximately 83 percent of the NFS land within the Lassen National Forest. • Designate portions of 5 of the 8 areas designated for public OSV use that would be located within 500 feet of the PCT. • Approximately 97.7 miles of the PCT would be located within 500 feet of an area designated for public OSV use on the Lassen National Forest. • Designate up to 28 OSV trails that would cross the PCT to provide connectivity to designated OSV areas without having to travel long distances to go around the PCT. • Designate 380 miles of snow trails for public OSV use. • 2,534 miles of trails would be open to OSV use in areas designated for cross-country OSV use, but these trails would not be designated. These trails would overlie existing maintenance level 2, 3, and 4 NFS roads that are not plowed in winter. • Mechanically groom 349 miles of snow trails for public OSV use. This includes 27 miles of snow trail not under Forest Service jurisdiction. • The minimum snow depth for snow trail grooming would be 12 inches. • The minimum snow depth for public OSV use on designated snow trails would be the depth necessary to avoid underlying resource damage (defined in table 1 on page 2 of this document). • The minimum snow depth for OSV use in areas designated for public cross-country OSV use would be the depth necessary to avoid underlying resource damage.

Alternative	Description of Alternative
5	<ul style="list-style-type: none">• Designate areas and trails for OSV use.• Designate 6 discrete, specifically delineated areas for cross-country OSV use. These areas would encompass 632,400 acres, which is approximately 55 percent of the NFS land within the Lassen National Forest.• Designate no areas within 500 feet of the PCT for public cross-country OSV use.• Designate up to 12 OSV trails that would cross the PCT to provide connectivity to designated OSV areas without having to travel long distances to go around the PCT.• Designate 393 miles of snow trails for public OSV use.• 1,677 miles of trails would be open to OSV use in areas designated for cross-country OSV use, but these trails would not be designated. These trails would overlie existing maintenance level 2, 3, and 4 NFS roads that are not plowed in winter.• Mechanically groom 350 miles of snow trails for public OSV use. This includes 27 miles of snow trail not under Forest Service jurisdiction.• The minimum snow depth for snow trail grooming would be 12 inches.• The minimum snow depth for public OSV use on designated snow trails would be 12 inches.• The minimum snow depth for OSV use in areas designated for public cross-country OSV use would be 12 inches.• Designate areas and trails for OSV use.

Summary of Environmental Impacts

Table S-3. Summary of environmental impacts

Recreation						
Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Motorized Recreation Opportunities – Cross-country	Opportunities for motorized winter uses/total area (acres) and minimum snow depth	964,030 acres currently open to public, cross-country OSV use. No minimum snow depth requirement	920,260 acres designated for public cross-country OSV use. Minimum 12 inch snow depth requirement	833,280 acres designated for public cross-country OSV use. Minimum 12 inch snow depth requirement	955,470 acres designated for public cross-country OSV use. Minimum Depth necessary to avoid resource damage	632,400 acres designated for public cross-country OSV use. Minimum 12 inch snow depth requirement
Motorized Recreation Opportunities – Designated Snow Trails	OSV trail designations, length of trails (miles) and minimum snow depth	406 miles of groomed, non-groomed, marked and unmarked OSV trails currently open for OSV use, subject to snow depth restrictions. No minimum snow depth requirement	334 miles of designated OSV snow trails, subject to snow depth restrictions. Minimum 6 inch or more snow depth on snow trails overlying roads and trails	383 miles of designated OSV snow trails, subject to snow depth restrictions. Minimum 6 inches where site review determines there would be no damage to underlying resources	380 miles of designated OSV snow trails, subject to snow depth restrictions. Minimum snow depth necessary to avoid resource damage	390 miles of OSV snow trails, subject to snow depth restrictions. Minimum 12 inch snow depth requirement
Motorized Recreation Opportunities – Groomed Snow Trails	OSV trail grooming, length of trails (miles), and minimum snow depth	349 miles 12 inch snow depth requirement for grooming	349 miles, no change 12 inch snow depth requirement for grooming	349 miles, no change 18 inch snow depth requirement for grooming	349 miles, no change 12 inch snow depth requirement for grooming	349 miles, no change 12 inch snow depth requirement for grooming

Recreation						
Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Non-motorized Recreation Opportunities - Displacement	<p>Access to desired non-motorized recreation settings and opportunities</p> <p>Total area (acres) and length of trails (miles) available to non-motorized recreation enthusiasts within 5 miles of plowed trailheads</p>	<p>Six plowed trailheads provide access for all winter uses.</p> <p>10,346 acres available for non-motorized recreation within 5 miles of plowed trailheads</p> <p>18.3 miles of cross-country ski trails and 15.6 miles of the PCT available for non-motorized recreation within 5 miles of plowed trailheads</p>	<p>Six plowed trailheads provide access for all winter uses.</p> <p>12,164 acres available for non-motorized recreation within 5 miles of plowed trailheads.</p> <p>18.3 miles of cross-country ski trails and 15.6 miles of the PCT available within 5 miles of plowed trailheads</p>	<p>Six plowed trailheads provide access for all winter uses.</p> <p>39,317 acres available for non-motorized recreation within 5 miles of plowed trailheads.</p> <p>18.3 miles of cross-country ski trails and 15.6 miles of the PCT available within 5 miles of plowed trailheads</p>	<p>Six plowed trailheads provide access for all winter uses.</p> <p>15,082 acres available for non-motorized recreation within 5 miles of plowed trailheads.</p> <p>18.3 miles of cross-country ski trails and 15.6 miles of the PCT available within 5 miles of plowed trailheads</p>	<p>Six plowed trailheads provide access for all winter uses.</p> <p>52,454 acres available for non-motorized recreation within 5 miles of plowed trailheads.</p> <p>18.3 miles of cross-country ski trails and 15.6 miles of the PCT available within 5 miles of plowed trailheads</p>
Recreation Opportunity Spectrum	Consistency with ROS class	Consistent	Consistent	Consistent	Consistent	Consistent
Non-motorized Recreation Conflicts - Public Safety	Total area (acres) and length of trails (miles) available to non-motorized recreation enthusiasts for quality non-motorized recreation experiences	185,990 acres not designated for OSV use, a total of 148 miles of trail for non-motorized use.	229,760 acres, a 23.5 percent increase/ six non-motorized trails with a total of 148 miles of trail for non-motorized use.	316,740 acres, a 41.2 percent increase/ six non-motorized trails with a total of 148 miles of trail for non-motorized use.	194,550 acres, 4.6 percent increase/ six non-motorized trails with a total of 148 miles of trail for non-motorized use.	517,620 acres, 178 percent increase/ six non-motorized trails with a total of 148 miles of trail for non-motorized use.
Non-motorized recreation conflicts – potential due to overlap	<p>Total area (acres) accessible to non-motorized winter enthusiasts (within 5-miles of plowed trailheads) that are designated for OSV use.</p> <p>Percent change from existing conditions</p>	169,951 acres	<p>168,133 acres</p> <p>1 percent decrease in overlap</p>	<p>140,980 acres</p> <p>17 percent decrease in overlap</p>	<p>153,455 acres</p> <p>10 percent decrease in overlap</p>	<p>127,851 acres</p> <p>25 percent decrease in overlap</p>

Recreation						
Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Non-motorized Areas	Proximity and frequency of OSV designations in relation to non-motorized areas Distance of groomed public OSV snow trails from non-motorized areas under existing law or policy, or number of designated trails across non-motorized linear areas under existing law or policy	A total of approximately 9 miles of groomed OSV trails within 1/2 mile of Wilderness and proposed wilderness boundaries Lassen Volcanic National Park: Groomed OSV trails ¾ mile east of the park's southeast corner, and 1 1/2 miles north of the park's northwest corner. No designated OSV trails across the PCT. 98.42 miles of the PCT are within 500 feet of an area designated for OSV use.	A total of approximately 9 miles of groomed OSV trails within 1/2 mile of Wilderness and proposed wilderness boundaries Lassen Volcanic National Park: Groomed OSV trails ¾ mile east of the park's southeast corner, and 1 1/2 miles north of the park's northwest corner. Up to 28 designated OSV trails across the PCT. No areas designated for cross-country OSV use within 500 feet of the PCT.	A total of approximately 9 miles of groomed OSV trails within 1/2 mile of Wilderness and proposed wilderness boundaries Lassen Volcanic National Park: Groomed OSV trails ¾ mile east of the park's southeast corner, and 1 1/2 miles north of the park's northwest corner. Up to 23 designated OSV trails across the PCT. 85.4 miles of the PCT are within 500 feet of an area designated for OSV use.	A total of approximately 9 miles of groomed OSV trails within 1/2 mile of Wilderness and proposed wilderness boundaries Lassen Volcanic National Park: Groomed OSV trails ¾ mile east of the park's southeast corner, and 1 1/2 miles north of the park's northwest corner. Up to 28 designated OSV trails across the PCT. 97.7 miles of the PCT are within 500 feet of an area designated for OSV use.	A total of approximately 9 miles of groomed OSV trails within 1/2 mile of Wilderness and proposed wilderness boundaries Lassen Volcanic National Park: Groomed OSV trails ¾ mile east of the park's southeast corner, and 1 1/2 miles north of the park's northwest corner. Up to 12 designated OSV trails across the PCT. No areas designated for cross-country OSV use within 500 feet of the PCT.
Noise	Total area (acres) potentially affected by noise/total area (acres) closed to winter motorized use	964,030 acres currently open to OSV use, potentially affected by noise.	920,260 acres designated for OSV use, potentially affected by noise.	833,280 acres designated for OSV use, potentially affected by noise.	955,470 acres designated for OSV use, potentially affected by noise.	632,400 acres designated for OSV use, potentially affected by noise.

Recreation						
Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Non-motorized Areas	Air Quality Qualitative/narrative description of potential impacts (with reference to air quality analysis)	Potential short-term impacts to the experience of recreational visitors in the vicinity of OSV and grooming equipment due to the smell of exhaust emissions (see air quality report (project record)).	Potential short-term impacts to the experience of recreational visitors in the vicinity of OSV and grooming equipment due to the smell of exhaust emissions.	Potential short-term impacts to the experience of recreational visitors in the vicinity of OSV and grooming equipment due to the smell of exhaust emissions.	Potential short-term impacts to the experience of recreational visitors in the vicinity of OSV and grooming equipment due to the smell of exhaust emissions.	Potential short-term impacts to the experience of recreational visitors in the vicinity of OSV and grooming equipment due to the smell of exhaust emissions.
Scenery	Qualitative/ narrative description of potential visual impacts	Cross-country OSV use creates temporary tracks in the snow that crisscross the landscape. The visual evidence of OSV use decreases as fresh snow covers the tracks and/or when the snow melts at the end of the season.	Fewer acres designated for cross-country OSV use, and associated visual impacts than in existing conditions	Fewer acres designated for cross-country OSV use, and associated visual impacts than in existing conditions.	Slightly fewer acres designated for cross-country OSV use, and associated visual impacts than in existing conditions.	Substantially fewer acres designated for cross-country OSV use, and associated visual impacts than in existing conditions.
Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Non-motorized Areas	Wilderness Attributes Total area (acres) affected and duration of impact. Qualitative description for Wilderness attributes	27,108 acres currently open to OSV use within ½ mile of designated and proposed wilderness boundaries.	21,266 acres designated for OSV use within ½ mile of designated and proposed wilderness boundaries.	19,173 acres designated for OSV use within ½ mile of designated and proposed wilderness boundaries.	25,575 acres designated for OSV use within ½ mile of designated and proposed wilderness boundaries.	17,257 acres designated for OSV use within ½ mile of designated and proposed wilderness boundaries.
Roadless Characteristics	Total inventoried roadless area (acres) designated for OSV Use	72,969	59,746	58,291	72,681	28,609

Transportation and Engineering						
Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Safety	Public Safety & Traffic	A reasonable level of public safety and avoidance of traffic conflicts	A reasonable level of public safety and avoidance of traffic conflicts	A reasonable level of public safety and avoidance of traffic conflicts	A reasonable level of public safety and avoidance of traffic conflicts	A reasonable level of public safety and avoidance of traffic conflicts
Cost	Affordability	Minor effects.	Minor effects.	Minor effects.	Minor effects.	Minor effects.
Transportation Property	Effects to Underlying NFS Roads and Trails	Minimum operating snow depths provide adequate protection of underlying roads and trails.	Minimum operating snow depths provide adequate protection of underlying roads and trails.	Minimum operating snow depths provide adequate protection of underlying roads and trails.	Minimum operating snow depths provide adequate protection of underlying roads and trails.	Minimum operating snow depths provide adequate protection of underlying roads and trails.

Noise						
Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Opportunities for Motorized Winter Uses	Size of areas (acres) open to/designated for public, cross-country OSV use; percentage change compared to current management	964,030 acres open to OSV use	920,260 acres designated for OSV use and potentially affected by noise, a 4.5 percent decrease from existing conditions.	833,280 acres designated for OSV use and potentially affected by noise, a 13.5 percent decrease from existing conditions.	955,470 acres designated for OSV use and potentially affected by noise, a 0.8 percent decrease from existing conditions.	632,400 acres designated for public cross-country OSV use, subject to snow depth restrictions, a 34 percent decrease from existing conditions.
OSV Trail Designations	Length of snow trails (miles), groomed and ungroomed, open/designated for public OSV use	405 miles open /349 miles groomed	334 miles designated /349 miles groomed	383 miles designated /349 miles groomed	380 miles designated /349 miles groomed	390 miles designated/ 349 miles groomed

Soil Resources						
Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Soil Productivity and Soil Stability	Acres designated for cross-country OSV travel on sensitive soils (including wet meadows, areas with potential low stability, and areas with potential erosion hazards).	53,902	52,964	40,590	53,507	33,221
Soil Stability	Minimum snow depths on trails (inches)	No enforced minimum snow depth prior to any OSV travel over existing roads and trails.	6 inches on snow trails overlying roads	6 inches on snow trails overlying roads	The depth necessary to avoid underlying resource damage	12
Soil Productivity	Minimum snow depths for cross-country travel (inches)	No minimum	12	12	The depth necessary to avoid underlying resource damage	12
Soil Productivity	Total Acres Designated for OSV Use	964,030	920,260	833,280	955,470	632,400
Air Quality						
Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Air Quality	Potential to create adverse impacts to air quality based on miles of trail designated for OSV use	405 miles open to OSV use.	17 percent reduction in miles as compared to the existing condition.	5 percent reduction in miles as compared to the existing condition.	6 percent reduction in miles as compared to the existing condition.	3 percent reduction in miles as compared to the existing condition.
	Potential to create adverse impacts based on acres designated for OSV use.	964,030 acres open to OSV use.	5 percent reduction in acres from current management.	14 percent reduction from current management.	<1 percent reduction from current management.	3 percent reduction from current management.

Air Quality						
Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
	Potential effects of OSV emissions to create adverse impacts (Class I and II areas).	Groomed OSV trails are in close proximity to Wilderness, and the boundary of Lassen Volcanic National Park.	Groomed OSV trails are in close proximity to Wilderness, and the boundary of Lassen Volcanic National Park.	Groomed OSV trails are in close proximity to Wilderness, and the boundary of Lassen Volcanic National Park.	Groomed OSV trails are in close proximity to Wilderness, and the boundary of Lassen Volcanic National Park.	Groomed OSV trails are in close proximity to Wilderness, and the boundary of Lassen Volcanic National Park.
Socioeconomic Conditions						
Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Economic Activity	Employment, Income, Tax Revenue	No change	No change	No change	No change	No change
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	No change due to management; visitor use expected to increase over time
Quality of Life	Values, Beliefs, and Attitudes	No net change	Benefit to quality of life of non-motorized winter recreation enthusiasts and may adversely affect quality of life for OSV enthusiasts	Benefit to quality of life of non-motorized winter recreation enthusiasts and may adversely affect quality of life for OSV enthusiasts	No net change in quality of life; use conflict may increase	Benefit quality of life of non-motorized winter recreation enthusiasts and may adversely affect OSV enthusiasts
Environmental Justice	Low-income and Minority Populations	No change	Minor change	Potential increase in travel costs	Minor change	Potential increase in travel costs
Water Resources						
Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Riparian Conservation Objectives 1, 2, 4, 5, and 6	Consistency	Consistent	Consistent	Consistent	Consistent	Consistent

Botanical Resources						
Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Threatened and Endangered plants and Designated Critical Habitat	Species Presence and effects to Primary Constituent Elements	No Effect	No Effect	No Effect	No Effect	No Effect
Sensitive Plants	Trees, Shrubs, Sub-shrubs Aquatic Plants	May Affect, no trend toward Federal listing	May Affect, no trend toward Federal listing	May Affect, no trend toward Federal listing	May Affect, no trend toward Federal listing	May Affect, no trend toward Federal listing
Sensitive Plants	Perennial Herbaceous	No Impacts or May Affect, no trend toward Federal listing	No Impacts or May Affect, no trend toward Federal listing	No Impacts or May Affect, no trend toward Federal listing	No Impacts or May Affect, no trend toward Federal listing	No Impacts or May Affect, no trend toward Federal listing
Sensitive Plants	Annual Plants	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts
Survey and Manage Plants and Fungi		No Impacts	No Impacts	No Impacts	No Impacts	No Impacts
Special Interest Plants	Trees, Shrubs, and Sub-shrubs Perennial Herbaceous Annual Plants	Not affected or May be affected, not contributing to a downward trend	Not affected or May be affected, not contributing to a downward trend	Not affected or May be affected, not contributing to a downward trend	Not affected or May be affected, not contributing to a downward trend	Not affected or May be affected, not contributing to a downward trend
Special Interest Plants	Aquatic Plants	Not affected	Not affected	Not affected	Not affected	Not affected
Invasive Plant Species		Very low risk	Very low risk	Very low risk	Very low risk	Very low risk
Botanical Special Interest Areas		Not affected	Not affected	Not affected	Not affected	Not affected
Research Natural Areas		Not affected	Not affected	Not affected	Not affected	Not affected

Cultural Resources						
Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Cultural Resources	Effects to cultural resources	No adverse effect	No adverse effect	No adverse effect	Adverse effect to cultural resources	No adverse effect

Terrestrial Wildlife²						
Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Listed Wildlife Species	Northern spotted owl Gray wolf	NLAA	NLAA	NLAA	NLAA	NLAA-B
Listed Wildlife Species	Northern spotted owl Designated Critical Habitat	NE	NE	NE	NE	NE
Proposed Threatened and Sensitive Wildlife Species	North American wolverine	NJ	NJ	NJ	NJ	NJ
Sensitive Wildlife Species	Mammals, Reptiles and Birds (except as disclosed below)	MII	MII	MII	MII	MII
Sensitive Wildlife Species	Birds <ul style="list-style-type: none"> Willow flycatcher Greater Sandhill crane Yellow rail Mollusks and Invertebrates	NI	NI	NI	NI	NI
Migratory Birds		Potential Impacts Minimized	Potential Impacts Minimized	Potential Impacts Minimized	Potential Impacts Minimized	Potential Impacts Minimized

² NE=No Effect; NLAA=May affect, not likely to adversely affect; NLAA-B= May affect, not likely to adversely affect, Beneficial effect; NJ=Will not jeopardize; MII=May impact individuals, but not likely to lead to a loss of viability or a trend toward Federal listing; NI=No Impact

Terrestrial Wildlife²						
Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Management Indicator Species	Habitat Structural Components	No Alteration	No Alteration	No Alteration	No Alteration	No Alteration
Management Indicator Species	Habitat Quantity	Would Not Affect	Would Not Affect	Would Not Affect	Would Not Affect	Would Not Affect
Survey and Manage Species	Habitat Structure and Composition	No Modification	No Modification	No Modification	No Modification	No Modification
Fish and Aquatic Species³						
Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Listed Fish and Aquatic Species and Critical Habitat	Central Valley spring-run Chinook salmon Central Valley steelhead Sierra Nevada yellow-legged frog	NLAA	NLAA	NLAA	NLAA	NLAA
Sensitive Species	Cascades frog Black juga	MII	MII	MII	MII	MII

³ NE=No Effect; NLAA=May affect, not likely to adversely affect; NLAA-B= May affect, not likely to adversely affect, Beneficial effect; NJ=Will not jeopardize; MII=May impact individuals, but not likely to lead to a loss of viability or a trend toward Federal listing; NI=No Impact

**Lassen National Forest
Over-snow Vehicle Use Designation**

Revised Final Environmental Impact Statement

**Volume I. Chapter 1 through first part of chapter 3
(Recreation through Cultural Resources)**

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Acronyms

BAT	Best available technology
BMP	Best management practice
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CARB	California Air Resources Board
CFR	Code of Federal Regulations
CVC	California Vehicle Code
CWA	Clean Water Act
DEM	Digital Elevation Model
FSH	Forest Service Handbook
GIS	Geographic Information System
IRA	Inventoried roadless area
LRMP	Land and resource management plan (forest plan)
LVNP	Lassen Volcanic National Park
MVUM	Motor vehicle use map
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NFS	National Forest System
NVUM	National Visitor Use Monitoring
NWFP	Northwest Forest Plan
OHMVR	Off-Highway Motor Vehicle Recreation Division
OHV	Off-highway vehicle
OSV	Over-snow vehicle
OSVUM	Over-snow Vehicle Use Map
PCT	Pacific Crest National Scenic Trail
RCA	Riparian conservation area
RNA	Research natural area
RCO	Riparian conservation objectives
RDEIS	Revised draft environmental impact statement
RFEIS	Revised final environmental impact statement
RFA	Recreation Facility Analysis
ROD	Record of decision
ROS	Recreation opportunity spectrum
SDWA	Safe Drinking Water Act

Chapter 1. Purpose of and Need for Action

Document Structure

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

- **Chapter 1. Purpose and Need for Action:** This chapter briefly describes the modified proposed action, the need for that action, and other purposes to be achieved by the proposal. This section also details how the Forest Service informed the public of the modified proposed action and how the public responded.
- **Chapter 2. Alternatives, including the Modified Proposed Action:** This chapter provides a detailed description of the agency's modified proposed action as well as alternative actions that were developed in response to comments and objections raised by the public. The end of the chapter includes a summary table comparing the modified 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 modified proposed action and alternatives.
- **Chapter 4. Consultation and Coordination:** This chapter provides a list of preparers and agencies consulted during the development of the EIS.
- **Appendices:** The appendices provide more detailed information to support the analyses presented in the EIS.

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.

This document incorporates by reference the 2010 Over Snow Vehicle Program Final Environmental Impact Report, Program Years 2010 – 2020, by the State of California Department of Parks and Recreation, Off-Highway Motor Vehicle Recreation (OHMVR) Division (California Department of Parks and Recreation, Off Highway Motor Vehicle Recreation Division 2010) (California OSV Program Final EIR (2010)).

Glossary

Route categories and travel planning definitions applicable to this project (table 1) are based on the definitions in Title 36 of the Code of Federal Regulations (36 CFR) Part 212 – Travel Management.

Table 1. Road and trail terminology - definitions

Term	Definition
Administrative use	Motorized vehicle use associated with management activities or projects on National Forest System land administered by the Forest Service or under authorization of the Forest Service. Management activities include but are not limited to: law enforcement, timber harvest, reforestation, cultural treatments, prescribed fire, watershed restoration, wildlife and fish habitat improvement, private land access, allotment management activities, and mineral exploration.
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 (36 CFR §212.1).
Cross-country over-snow vehicle use	Public OSV use that occurs off of snow trails designated for OSV use, but within areas designated for public OSV use.
Designated over-snow vehicle trail or area	A National Forest System road, National Forest System trail, or an area on National Forest System lands that is designated for public OSV use pursuant to 36 CFR §212.51 on an OSV use map.*
Designation for 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 public OSV use is allowed pursuant to 36 CFR §212.81.*
Forest road or trail (or National Forest System (NFS) road or trail)	A road or trail wholly or partly within or adjacent to and serving the National Forest System that the Forest Service determines is necessary for the protection, administration, and utilization of the National Forest System 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, skiing, riding horses, or mountain biking. Not all of these examples are allowed in all non-motorized areas or trails.
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 (OSVUM)	A map reflecting roads, trails, and areas designated for OSV use on the Lassen National Forest (see 36 CFR §212.1).*
Resource damage	A negative effect to a natural or cultural resource that leads to a permanent or long-term decline of that resource.
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).

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

Background

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

A final EIS and draft record of decision were released in August of 2016 and “Legal Notice of Opportunity to Object” was published in the *Lassen County Times* on August 23, 2016. That legal notice signified the beginning of a 45-day objection period which began on August 24, 2016. After considering the objections received, the Forest Service determined it would be necessary to revise the analysis, starting with a Revised Draft Environmental Impact Statement (RDEIS).

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

- Approximately 964,030 acres of NFS lands are open to public, cross-country OSV use;
- Approximately 185,980 acres of NFS lands are closed to public OSV use;
- Approximately 98.4 miles of the Pacific Crest National Scenic Trail (PCT) are within 500 feet of areas open to public cross-country OSV use on the Lassen National Forest. There are no identified trails for OSVs to cross the PCT;
- Currently, there are 2,933 miles of groomed, non-groomed, marked, and unmarked snow trail open to public OSV and non-motorized use. Not all of these trails are shown on the 2005 Lassen National Forest Winter Recreation Guide (project record). However, all of these trails overlie roads and trails designated for wheeled vehicle use and are within areas currently open to OSV use. Approximately 406 miles of these trails are maintained for OSV use through signage, snow trail grooming, or both;
- The Forest Service grooms approximately 349 miles of snow trails for public OSV use. Approximately 27 miles of these groomed trails are not under Forest Service jurisdiction;
- Snow trail grooming is allowed when there are 12 or more inches of snow.

The 2005 Winter Recreation Guide includes a map that identifies six OSV areas on the forest:

- Fredonyer and Bogard on the Eagle Lake Ranger District;
- Morgan Summit, Jonesville, and Swain Mountain on the Almanor Ranger District; and
- Ashpan on the Hat Creek Ranger District.

The Winter Recreation Guide allows recreation enthusiasts to identify OSV trailheads, groomed trails, non-groomed trails recommended for touring, and areas open to cross-country OSV use. Several areas are closed protect unique resources and to comply with Wilderness and forest plan designations.

The Swain Mountain, Jonesville, Morgan Summit, Fredonyer, and Ashpan OSV areas are the most popular. Use of OSVs is concentrated near the groomed trails in the Morgan Summit area. The most popular parts of the Swain Mountain area are near the groomed trails and the area north of the Caribou Wilderness and Lassen Volcanic National Park. The areas near Diamond Mountain receive the most OSV use in the Fredonyer Area.

As currently managed, the Lassen National Forest is largely open for OSV use anywhere there is sufficient snow (a term that current management has not defined) to allow OSV travel. Approximately 400 miles of snow trails are groomed annually for OSV use using funds from the California Off-highway Motor Vehicle Division to pay for groomer maintenance, gas, and volunteer travel.

A deficiency of the 2005 Winter Recreation Guide is that it does not identify the PCT. As a result, OSV enthusiasts are not directed to avoid using the PCT, nor are they limited to particular places where they should cross the trail with OSVs.

Scope of this Action

This action would manage the use of OSVs on NFS land. 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, see the definitions on page 2).

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 trails and areas for the public use of OSVs on NFS lands within the Lassen National Forest.

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

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

Not all existing NFS OSV trails and areas on these NFS lands would be designated for public OSV use. With certain limited exceptions, the agency recognizes no need to designate OSV trails in areas that would be designated for cross-country OSV use. It would not be necessary to designate an OSV trail where OSV use would not need to be confined to a designated trail.

The undesignated roads and trails appear on the maps in the EIS to provide context. All of these undesignated routes are located within the boundaries of areas that would be designated for cross-country OSV use and are available for OSV use if the OSV enthusiast desires to use them. For comparison purposes in our analysis, we wanted to disclose all of the routes available for OSV use for each alternative, even though we had determined that (1) it would not be necessary to designate all of these routes as OSV trails, (2) it would not be necessary to restrict OSV use only to the trails in these areas, and (3) it would be impossible to predict whether OSV enthusiasts would ride only on the trails located within these designated OSV areas in which thousands of acres are available for cross-country OSV riding.

Although these non-designated routes will not be shown on the Over-snow Vehicle Use Map that would implement the selected alternative, we acknowledge these routes would still be available for OSV use after these OSV areas are designated if the OSV enthusiast desires to ride on them, because they are located within the boundaries of designated OSV areas.

With respect to the identification of snow trails groomed for OSV use, 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 Service's current snow trail grooming program on the Lassen National Forest is funded by the State of California Department of Parks and Recreation, Off-Highway Motor Vehicle Recreation (OHMVR) Division. Current funding allows the Forest Service to mechanically groom 349 miles of snow trail in its OSV trail grooming program for the Lassen National Forest. If more funding becomes available, we will consider additional grooming activities.

Additionally, the Forest Service does not have legal jurisdiction over some of the trails that we groom. Although the agency does not have jurisdiction over such trails, we groom these trails for public use under authorizations from non-Federal landowners. In these cases, OSV trails where we have authorization to groom still cannot be designated for public OSV use under Subpart C of the Forest Service's Travel Regulations, because these designations cannot be enforced. Therefore, these non-jurisdictional trails regularly groomed by the Forest Service for OSV use will be shown on the OSVUM for public convenience and the grooming of these trails will be analyzed to satisfy the settlement agreement with Snowlands Network et al.

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

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 public 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 trails and areas (36 CFR §212.55);
4. Identification of designated uses on a publicly available use map of trails and areas (36 CFR §212.56); and
5. Monitoring of effects (36 CFR §212.57).

The trail and area designations made as a result of this analysis would be effective immediately upon the issuance of the signed record of decision, which is expected in September 2019. The Forest Service would produce an OSV use map (OSVUM) that would be formatted similar to the existing motor vehicle use map (MVUM) for wheeled vehicles on the Lassen National Forest. This map would allow OSV enthusiasts to identify the trails and areas designated for public OSV use on the Lassen National Forest.

Travel Management Regulations – Subpart C: “Use by Over-snow Vehicles”

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

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

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

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

Designation Criteria

Background

The Travel Management Regulations set forth designation criteria to guide the responsible official’s designation of trails and areas for OSV use (see 36 CFR §212.55(a)-(e)).⁴ These criteria delineate certain elements and resources, the effects on which the responsible official must consider. The Travel Management Regulations at 36 CFR §212.55(a) and (b) require consideration of enumerated “general” and “specific” designation criteria,⁵ whereas 36 CFR §212.55(d) and (e) require the responsible official to consider rights of access and Wilderness areas and primitive areas in designating trails and areas for OSV use.

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

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

⁴ Subpart C of the Travel Management Regulations incorporates the designation criteria found at 36 CFR §212.55 along with certain other requirements found in Subpart B. Specifically, 36 CFR §212.81(d) provides that: “the requirements governing designation of National Forest System roads, National Forest System trails, and areas on National Forest System lands in §§212.52 (public involvement), 212.53 (coordination), 212.54 (revision), 212.55 (designation criteria (including minimization)), and 212.57 (monitoring), shall apply to decisions made under [Subpart C].”

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

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

In addition to the criteria in paragraph (a) of this section, in designating National Forest System trails and areas on National Forest System lands, the responsible official shall consider effects on the following, with the objective of minimizing:

- 1) Damage to soil, watershed, vegetation, and other forest resources;
- 2) Harassment of wildlife and significant disruption of wildlife habitats;
- 3) Conflicts between motor vehicle use and existing or proposed recreational uses of National Forest System lands or neighboring Federal lands; and
- 4) Conflicts among different classes of motor vehicle uses of National Forest System lands or neighboring Federal lands.

In addition, the responsible official shall consider:

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

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

Minimization Criteria

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

The minimization criteria are to be applied with a high degree of site-specificity.⁶ The Travel Management Regulations implement Executive Order (E.O.) 11644, as amended by E.O. 11989, from which the minimization criteria originate. E.O. 11644 states that “each respective agency head shall develop and issue regulations and administrative instructions... to provide for administrative designation of the *specific areas and trails* on public lands on which the use of off-road vehicles may be permitted....” (emphasis added). This supports the application of the minimization criteria to each specific area and trail. The Ninth Circuit Court of Appeals has further clarified this point:

“[T]he TMR requires the Forest Service to apply the minimization criteria to *each area* it designated for snowmobile use.... The TMR is concerned with the effects of each particularized area and trail designation. The minimization criteria must be applied accordingly.” *WildEarth Guardians v. USFS*, No. 12-35434, D.C. No. 9:10-cv-00104-DWM, 9th Circuit Court of Appeals, June 22, 2015, pp. 23 and 27 (emphasis in original).

Accordingly, in developing the proposed action and alternatives, the Forest Service applied the minimization criteria (indeed, all the specific criteria) on a site-specific basis, considering each area and

⁶ The term, “granular” is used by plaintiffs to describe the site-specific use of minimization criteria. See United States Court of Appeals, Ninth Circuit Court, *Wild Earth Guardians v. US Forest Service*, 2015, No. 12-35434, D.C. No. 9:10-cv-00104-DWM, page 3 of 30.

each trail against each of the specific minimization criteria. We developed eight discrete, specifically delineated areas on the forest for which the minimization criteria were applied by screening the areas against the specific criteria (Volume III, Appendices C and D) developed with the objective of minimizing the impacts to resources.

The forest was subdivided into areas to address the relationship between OSV use, resource protection, and socioeconomic factors at a smaller scale. Generally, most of these areas encompass major components of the groomed trail system and affected communities that rely on the activity for economic benefit. Other areas occur in regions of the forest that, while located adjacent to communities, historically exhibit adequate snowfall opportunities for OSV recreation.

Minimization criteria were applied individually to each area to determine the need for designating or not designating OSV recreation trails and areas. These criteria allowed the forest to weigh socioeconomic concerns against resource protection issues for each area and trail independently, and develop areas and trails for designation. The minimization criteria are applied to differing degrees across the alternatives to options for OSV access on NFS lands, with alternative 5 applying the minimization criteria to the greatest degree.

Table 2 captures the potential effects indicators developed to shape the areas and trails to be analyzed for designation. Appendices C and D (Volume III) document how the minimization criteria were applied for areas and snow trails on the Lassen National Forest.

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

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

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

1 Minimize damage to soil, watershed, vegetation and other forest resources	2 Minimize harassment of wildlife and significant disruption of wildlife habitats	3 Minimize conflicts between motor vehicle use and existing or proposed recreational uses of NFS lands or neighboring Federal lands	4 Minimize conflicts among different classes of motor vehicle uses on NFS lands or neighboring Federal lands	5 Consider compatibility of motor vehicle use with existing conditions in populated areas*
<ul style="list-style-type: none"> • Would the area (or trail) be located in a watershed that is of concern? • Would the area (or trail) contain sensitive riparian areas, for example wet meadows, bogs, fens, etc.? • Would the area (or trail) drain into a 303(d)-listed waterbody? • Would TES plants be known to occur in this area, particularly those that are near, at, or above the surface of the snow? • Would the area (or trail) include designated botanical areas (SIA, RNA)? • Would the area contain cultural, tribal, or historic sites? • Would OSV use cause adverse impacts to these resources? 	<ul style="list-style-type: none"> • Would the area (or trail) encompass great gray owl, Northern spotted owl, California spotted owl, and/or goshawk PACs? (Question varies by forest, depending on species likely to exist.) • Would the area (or trail) encompass known bald eagle nest sites? • Would the area contain key deer winter range? • Would Sierra Nevada yellow-legged frog habitat be located in the area? • Would the area contain habitat for marten, wolverine, or other sensitive forest carnivores? • Would OSV use cause harassment or disruption of these resources? 	<ul style="list-style-type: none"> • Would OSV use in this area cause conflicts with non-motorized visitors' desire for solitude and quiet recreation (for example, near popular quiet areas or high value areas for backcountry skiing?) • Would the area encompass areas valued for non-motorized use, including: PCT, Wilderness, Wild & Scenic Rivers, ski areas (cross-country, downhill), and/or IRAs? • Would the area abut a Wilderness area or National Park managed by other agencies? • Would the designated area or trail abut a developed recreation site? • Would conflicts between motor vehicles and other recreational uses exist? 	<ul style="list-style-type: none"> • Would wheeled vehicle use over snow be allowed in (on) this area (or trail)? • If so, does this affect safety and winter management of this area (or trail)? • Would OSV use of this area (or trail) conflict with plowed roads allowing vehicle use? • Are OSVs allowed to cross roads open to wheeled vehicles in winter? • Are there conflicts among these different classes of motor vehicles? 	<ul style="list-style-type: none"> • Would the area (or trail) be located adjacent to neighborhoods and communities? • Would OSV use of this area (or trail) be compatible with distinct characteristics of the community? • Would the OSV area (or trail) be located adjacent Federal or State lands designated for OSV use? • Would the sounds and emissions from OSV use of this area (or trail) be compatible with nearby populated areas? • Is OSV use incompatible with adjacent populated areas?

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

Applying the General Designation Criteria

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

Applying the Minimization Criteria and Other Specific Designation Criteria

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

We considered the minimization criteria during the development of the Draft EIS. As a result of the objections process, the Forest revised the draft, refined the minimization criteria, and applied that refined criteria to the areas and trails proposed for designation. Furthermore, a new alternative (alternative 5) was developed during the revision that further minimized impacts and reduced the size of the areas to be designated (see volume III of this EIS, appendices C and D). For all specific criteria, forest resource specialists developed potential effect indicators, which are triggers for determining when effects to the given resources and uses set forth in 36 CFR §212.55(b)(1)-(5) may warrant mitigation.

If the specialists found that the potential effect indicators were not triggered for a particular area or trail designation, then the designation could proceed without additional mitigation. However, if the specialists found that a designation would trigger one or more potential effect indicators, then the table asks the specialists to identify specific mitigations that would address the concern. Designations of these areas and trails could proceed under the proposed action or an alternative if the mitigations were to be implemented. Some trails and areas were removed from further consideration based on application of the specific criteria where effects triggered one or more potential effect indicators and mitigation was not effective.

Applying the Area Size Criteria

This analysis identifies eight discrete, specifically delineated areas on the Lassen National Forest that are smaller than a ranger district. These areas have been identified so we can consider whether OSV use would be appropriate in each one. Table 3 and table 4 show the sizes of the ranger districts on the Lassen National Forest, the largest size OSV areas proposed for designation, and the action alternatives in which they would be designated. When ranger districts are measured by the amount of land (regardless of ownership) within their administrative boundaries, the largest designated OSV area is smaller than a ranger district.

Table 3. Size of ranger districts on the Lassen National Forest (acres)

Ranger District	All Land Within District	NFS Land Within District
Almanor	548,250	407,860
Eagle Lake	396,530	316,430
Hat Creek	541,540	426,200

Table 4. Largest size of designated OSV areas and the action alternatives in which they would be designated at that size

Designated OSV Area	Largest Size (acres)	Alternative(s) Designated
Ashpan	82,910	2, 5
Bogard	330,180	4
Fall River	42,440	4
Fredonyer	30,030	2, 4
Jonesville	121,750	4
Morgan Summit	119,130	4
Shasta	56,820	2, 4
Swain Mountain	172,210	4

The areas are primarily bounded by major highways and roads or other physiographic features that allow each area to be readily distinguished. They are also defined by their proximity to access points and communities that are socially and economically tied to OSV and other types of winter recreation. All but two of these areas also encompass key segments of the groomed OSV trail system. Not all of these eight potential OSV areas would be designated in all action alternatives. Furthermore, the sizes of each OSV area and the total mileage of OSV trails within each area may vary for some areas, by alternative. These areas are named and described as follows:

Ashpan OSV Area – The size of this area ranges from a minimum of 82,380 acres to a maximum of 82,910 acres of the Lassen National Forest, depending on the alternative. It consists of that portion of the Lassen National Forest that lies west and north of Highways 44/89 and south of Highway 299. The community of Old Station is located within this OSV area.

This is a popular area for OSV trail riding and includes approximately 57 miles of groomed OSV trails accessed through the Ashpan OSV trailhead on Highways 44/89. Approximately 16 miles of these OSV trails are under Forest Service jurisdiction. The groomed trail system connects to the adjacent Latour State Forest, offering further opportunity for OSV recreation. Although it lacks jurisdiction to designate snow trails for OSV use on land that is not part of the National Forest System, the Forest Service still grooms the OSV trails in the Latour State Forest.

Bogard OSV Area – The size of this area ranges from a minimum of 243,620 acres to a maximum of 330,180 acres, depending on the alternative. It is bounded by Highway 44 to the south and west and by the forest boundary to the north and east in the northeastern part of the forest. This OSV area is accessible from the communities of Burney, Fall River, Old Station, and Susanville, and from the Bogard Trailhead on Highway 44.

Fall River OSV Area – The size of this area ranges from non-designated (zero acres) to a maximum of 42,440 acres, depending on the alternative. It is not shown on the 2005 Winter Recreation Guide for the Lassen National Forest, but is currently open to OSV use. It is located in the vicinity of Lake Britton and MacArthur-Burney State Park. This area is also isolated from the remainder of Lassen National Forest and includes areas of the Shasta-Trinity National Forest administered by the Lassen National Forest. Nearby communities include Burney and Fall River. This area is within a zone of historically minimal snowfall and, combined with the state park, tends to serve more as a focal point for non-motorized recreation. Although designated for OSV use, OSV opportunities are irregular throughout this area because there may not be sufficient snow in all parts of this area every year. No marked OSV trails currently exist in this area.

Fredonyer OSV Area – The size of this area ranges from a minimum of 22,570 acres to a maximum of 30,030 acres, depending on the alternative. It is bounded by Highway 36 to the north and forest boundaries to the west, south, and east in the extreme southeastern portion of the forest. This area is a popular OSV destination for the community of Susanville.

Jonesville OSV Area – The size of this area ranges from a minimum of 97,840 acres to a maximum of 119,940 acres, depending on the alternative. It is isolated by private land and the Plumas National Forest in the southern part of the forest. It is bounded by Highway 36 to the north, Lake Almanor to the east, and the forest boundary to the south and west. The Jonesville area is a popular OSV destination, especially for the communities of Chester and Lake Almanor.

Morgan Summit OSV Area – The size of this area ranges from a minimum of 84,930 acres to a maximum of 119,920 acres, depending on the alternative. It lies on the west end of the forest and is bordered by Highway 32 and portions of Highway 36 to the south, Highway 44 to the north, Lassen Volcanic National Park to the east and the western borders of the forest. This area is largely centered around the communities of Mineral and Chester, and winter recreation activities—predominately OSV use—contribute significantly to the social and economic health of the area.

Shasta OSV Area – The size of this area ranges from non-designated (zero acres) to a maximum of 119,820 acres, depending on the alternative. It is not shown on the 2005 Winter Recreation Guide for the Lassen National Forest, but is currently open to OSV use. It is located in the extreme northern portion of the forest and is isolated from the remaining forest by private, state, and other agency lands. It includes areas of the Shasta-Trinity National Forest that are administered by the Lassen National Forest. The community of Day is located within this area. The area is largely composed of rough lava debris and historically has limited snowfall. Although designated for OSV use, OSV opportunities are irregular throughout this area because there may not be sufficient snow in all parts of this area every year. No marked OSV trails currently exist in this area.

Swain Mountain OSV Area – The size of this area ranges from a minimum of 108,140 acres to a maximum of 172,210 acres, depending on the alternative. It is located east and south of Highway 44 and north of Highway 36, with the remaining boundaries formed by Lassen Volcanic National Park and the Caribou Wilderness. This area is extremely popular with OSV enthusiasts, especially in the eastern and southeastern portions of the area.

The area also includes the Bizz Johnson ski trail, parts of which would not be designated for OSV use. A short segment of trail at its west end would be a designated OSV trail in all alternatives. The Swain Mountain OSV area is directly accessible from the communities of Old Station, Chester and Susanville.

Applying the Rights of Access Designation Criteria

Effects to rights of access to private lands or for other uses are analyzed in chapter 3. Policy provides direction to provide reasonable access to private property and other rights of access are authorized through special uses. The decision to designate areas and trails for OSV use and to identify snow trails for grooming would have no effect on existing rights of access that is specifically authorized under a written authorization issued under Federal law or regulations. Examples of such authorizations are those issued for managing permitted livestock or for access under a special use permit (36 CFR §212.81(a)).

Applying the Wilderness Areas and Primitive Areas Designation Criteria

No trails or areas would be designated for OSV use in Wilderness and Primitive Areas. Motorized use is prohibited in Wilderness Areas by the Wilderness Act, and thus, these areas are not designated for OSV

use. The forest plan provides direction to manage primitive areas as non-motorized, and thus, primitive areas are not proposed for OSV designation.

Snow Trail Grooming Program

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 Intervenors 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 Intervenors provide the Forest Service with a detailed description of that alternative during the scoping period for the NEPA analysis.

Ancillary activities such as the plowing of related parking lots and trailheads are considered in terms of how their effects would accumulate with the effects of the proposed action and alternatives.

Project Location

This proposal would be implemented on the Lassen National Forest in northeastern California in the counties of Lassen, Shasta, Tehama, Butte, Plumas, Siskiyou, and Modoc (figure 1).

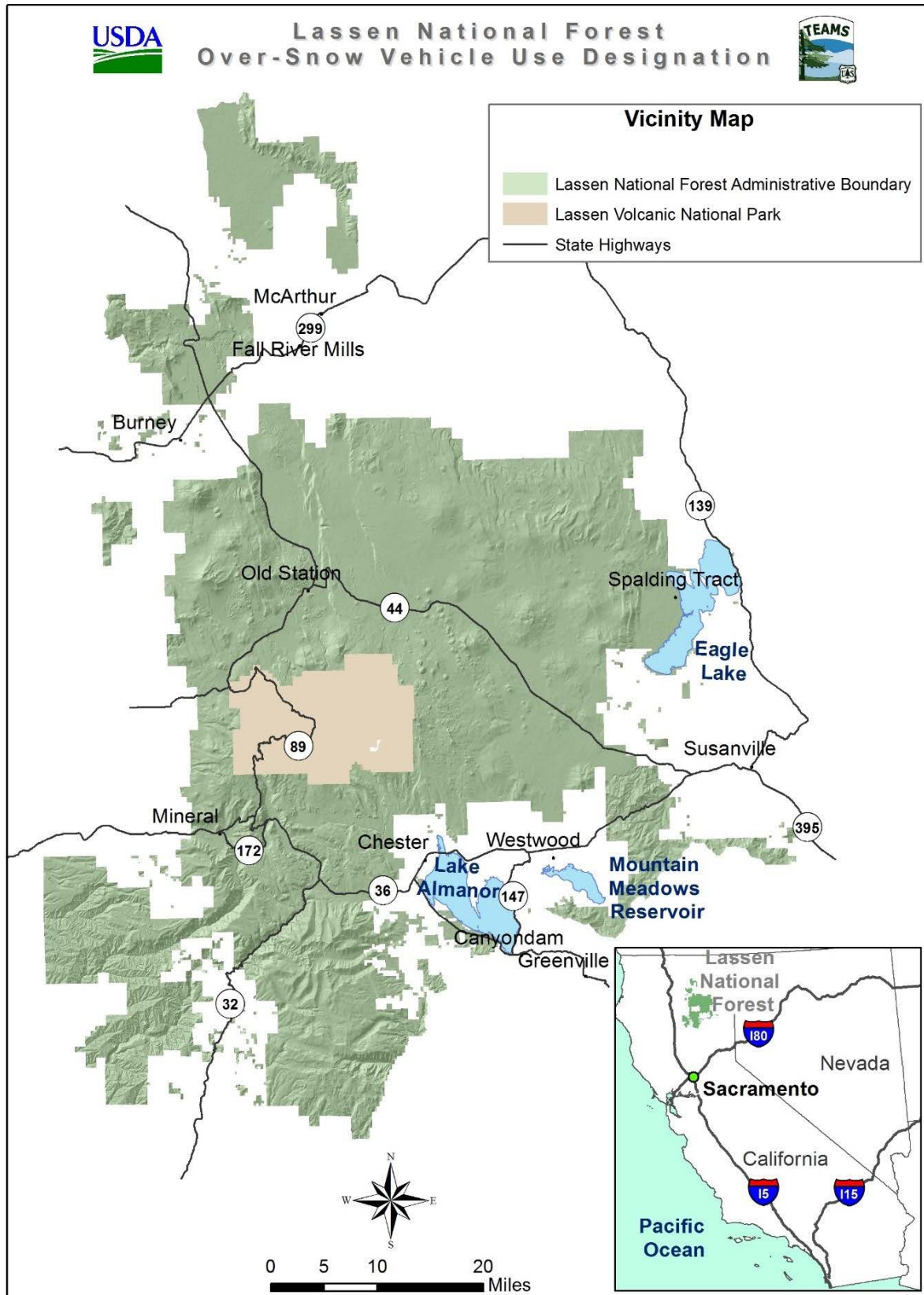


Figure 1. Vicinity map

Purpose and Need for Action

The existing system of public OSV snow 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 the Travel Management Regulations. Exceptions have been identified, based on internal and public input and the criteria listed at 36 CFR §212.55.

The Forest Service has identified areas in which public OSV use would be prohibited under existing forest plan management direction (Forest Plan, page 4-63), but there are no existing orders or directives that have formally prohibited public OSV use within them. Many areas are currently not accessible to OSV use, but are not closed to OSV use. These may be areas or trails that may be suitable for OSV use under the forest plan, but they are interspersed among areas currently closed to OSV use, such as Wilderness, proposed wilderness, and areas classified as semi-primitive non-motorized in the recreation opportunity spectrum; or are small areas adjacent to pedestrian trails that are currently closed to motorized use. All of these areas total 43,770 acres in addition to the 185,990 acres of NFS land that are currently closed to OSV use.

The desired conditions for recreation (winter sports) are found on pages 4-4 to 4-5 of the Lassen National Forest Land and Resource Management Plan (LRMP or forest plan). Desired conditions specific to this project state:

- Provide a wide range of outdoor recreation opportunities to meet public demand by furnishing different levels of access, service facilities, and information.
- Provide diverse opportunities for winter sports.

Our project purpose and need was developed after considering our existing conditions and the desired conditions in our forest plan. The purpose (goals and objectives) of this project are to effectively manage public OSV use on the Lassen National Forest and to comply with the settlement agreement with Snowlands Network et al. Effective management would provide public OSV 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 system of 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, Subpart C.

There is a need to designate a system of OSV trails and areas within the Lassen National Forest that provides public access, promotes the safety of all users, enhances public enjoyment, minimizes impacts to natural and cultural resources, and minimizes conflicts among various resources.

There is a need to correct inconsistencies with existing management direction and OSV use on the Lassen National Forest.

There is a need to provide a high-quality OSV trail system on the Lassen National Forest that is smooth and stable for the novice rider so they can use the trail system without difficulty.

Modified Proposed Action

The proposed action has been modified based on public concerns expressed in the public comment period for the original DEIS and in the pre-decisional objection review period for the FEIS and Draft Record of Decision, and this Revised Final EIS. These modifications are described in chapter 2 of this analysis.

The Forest Service proposes to designate NFS snow trails and areas on NFS land for public OSV use. These designations would occur on parts of administrative units or ranger districts of the Lassen National Forest where snowfall is adequate for that use to occur. These designations would be consistent with the requirements of Subpart C of the Forest Service's Travel Management Regulations at 36 CFR Part 212 (36 CFR 212). The Forest Service would also identify snow trails to be groomed for public OSV use under the Lassen National Forest OSV trail grooming program.

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

1. To designate areas and trails for OSV use.
2. To designate 8 discrete, specifically delineated areas for cross-country OSV use. There would be a total of 920,260 acres of NFS lands within the Lassen National Forest designated as areas where public, cross-country OSV use would be allowed. These areas would encompass approximately 80 percent of the NFS land on the Lassen National Forest. All existing OSV closures applying to areas and trails on the forest where public motorized use is not allowed would continue and these areas would not be designated.
3. To designate approximately 334 miles of NFS snow trails on NFS lands within the Lassen National Forest as trails where public OSV use would be allowed. All existing OSV closures applying to trails where public motorized use is not allowed would continue and these trails would not be designated.
4. To identify approximately 350 miles of snow trails that would be groomed for public OSV use by the Lassen National Forest Grooming Program. We would designate approximately 11.8 miles of snow trails for OSV use that would not be groomed. We would groom approximately 27.0 miles of snow trails for OSV use that would not be designated for OSV use, because we do not have jurisdiction over these trails.
5. 2,509 miles of trails would be open to OSV use in areas designated for cross-country OSV use, but these trails would not be designated. These trails would overlie existing maintenance level 2, 3, and 4 NFS roads that are not plowed in winter.
6. To groom snow trails for OSV use according to the California State Parks' snow grooming standards when there is a minimum of 12 inches of snow on trails.
7. To implement forestwide snow depth requirements for public OSV use that would provide for public safety and natural and cultural resource protection by:
 - a. Allowing public, cross-country OSV use in designated areas only when there are 12 or more inches of snow or ice covering the landscape based on weather and observations by Forest Service personnel and the public, to minimize potential for impacts to surface and subsurface resources; and
 - b. Allowing public OSV use on designated snow trails when there are 6 or more inches of snow covering the trail. Except for approximately 0.1 mile of OSV trail (which would require a

minimum of 12 or more inches of snow for OSV use),⁷ all snow trails to be designated for public OSV use or identified for OSV grooming in all alternatives would overlie an existing paved, gravel, or native surface travel route. These travel routes are trails and roads used by wheeled, motorized vehicles when such use is allowed, or for non-motorized recreation.

8. To designate no areas for public cross-country OSV use that would be located within 500 feet of the PCT on the Lassen National Forest.
9. To designate up to 28 OSV trails that would cross the PCT to provide connectivity to designated OSV areas without having to travel long distances to go around the PCT. Approximate locations of these trails have been identified to ensure greater safety in winter conditions and to facilitate the least difficult and most expedient access for OSV use between areas designated for OSV use. All of these trails would be located consistent with the guidelines in the Comprehensive Management Plan for the Pacific Crest National Scenic Trail (USDA Forest Service 1982). The PCT would be crossed by OSV trails no more frequently than ½-mile intervals.
10. In areas under NFS jurisdiction, the designated OSV trails crossing the PCT would occur in areas adjacent to and within 500 feet of the PCT that are not designated for cross-country OSV use. OSV use would be restricted only to the designated trail in these areas. All but 0.1 mile of these trails would overlie NFS roads or trails currently designated for wheeled motorized vehicle use in the Lassen National Forest's Motor Vehicle Use Map. All designated OSV trails would follow the most direct approach across the PCT. Assuming 28 of these trails would be designated, the total designated mileage of OSV trails crossing the PCT and the non-designated areas adjacent to it would be 8.1 miles.

The decision would apply only to the public use of OSVs as defined in the Forest Service's Travel Management Regulations (36 CFR §212.1).

Decision Framework

This decision would designate NFS snow trails and areas on NFS lands for public OSV use on the Lassen National Forest where snowfall is adequate for that use to occur. It would also identify the NFS and non-system snow trails where grooming for public OSV use would occur.

Responsible Official

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

Public Involvement

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.

⁷ This 0.1 mile of designated OSV trail crosses an area not designated for cross-country OSV use along the Pacific Crest National Scenic Trail, and is the most direct way to cross the Pacific Crest National Scenic Trail while allowing OSVs to remain on National Forest System land.

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

A pre-scoping meeting was held on November 5, 2014, which was attended by interested and affected stakeholders. These included people, agencies, and groups on the Forest Service's public notice mailing list for the Lassen National Forest, known winter recreation interest groups, and the plaintiffs and intervenors in the *Snowlands* lawsuit. 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 the 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 project's website 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 EIS was published in the *Federal Register* on January 20, 2015 (80 FR 2676). 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 concerns or endorsements, 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. We reviewed and analyzed all of the comments. All comments were thoughtful narratives responding 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.

During scoping, we also held and attended meetings and discussed the OSV designation process with local county governments, and we considered their opinions in developing alternatives.

A DEIS was released for public review and comment. A notice of availability to comment on the DEIS was published in the *Federal Register* on January 29, 2016 (81 FR 5013). The 45-day comment period began on January 30, 2016. A legal notice of opportunity to comment was published in the newspaper of record on February 2, 2016. Letters were sent to 402 interested groups, individuals, and agencies, notifying them that the DEIS was available for review. As a result of these solicitations, the Forest Service received 156 comment letters containing 623 comments from 142 interested groups, individuals, and agencies in the form of letters, emails, and website submissions. These comments were sorted for redundancies and the Forest Service addressed the 357 remaining comments that were considered materially relevant to the analysis. Documentation of our consideration of these comments is in the project record.

A final EIS and draft record of decision were released for pre-decisional administrative review in August 2016, and the "Legal Notice of Opportunity to Object" was published in the *Lassen County Times* on August 23, 2016. This notice signified the beginning of a 45-day objection period that began on

August 24, 2016. After considering the objections received, the Forest Service determined it would be necessary to revise the analysis.

We prepared a revised DEIS as required by the Council on Environmental Quality's implementing regulations for NEPA at 40 CFR §1502.9(a). A notice of availability was published in the *Federal Register* on October 6, 2017 (82 FR 193, p. 46808). A legal notice was also published in the *Lassen County Times* (newspaper of record) requesting public comment on October 10, 2017. Outreach efforts included an email sent to 511 recipients who had previously expressed interest in this analysis. The 45-day comment period concluded on November 20, 2017.

The Forest Service received 609 comment letters from different sectors of the public, expressing a range of concerns and comments. The responsible official considered the comments made on the RDEIS in the decision-making process. All correspondence was reviewed and our responses to these comments are located in Appendix I of this RFEIS.

Issues

Concerns about actual 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 mitigations or alternatives. They are the potential cause-effect relationships that we identified to consider and analyze in depth to determine the likely impacts of each alternative.

Significant issues generally concern cause-effect relationships that may result in significant impacts through the implementation of the proposed action. To determine the issues that might be significant, we considered the intensity of the environmental changes that might result from the proposed action, and the context in which these changes might occur.

Significant Issues

Based on our review of all previous comments and objections received, and analysis of issues in the previous versions of this EIS, we have identified two significant issues for the Lassen National Forest Over-snow Vehicle Use Designation analysis:

1. Effects on the availability of motorized over-snow recreation opportunities; and
2. Effects on the availability of non-motorized winter recreation opportunities.

In previous versions of this EIS, we listed noise, air quality, water and soil resources, aquatic wildlife, and terrestrial wildlife as significant issues. After review of the comments on the original DEIS and subsequent detailed analysis, we determined that effects to noise, air quality, water and soil resources, aquatic wildlife, and terrestrial wildlife were not significant issues in the analysis. These effects are disclosed in chapter 3.

Although noise and air quality effects from OSVs are not significant issues in and of themselves, increased noise and decreased air quality caused by OSVs can contribute to the quality of the recreational experience for both motorized and non-motorized enthusiasts. However, when considered in the context of the Lassen National Forest, noise and air quality effects from OSVs are infrequent, short-term, and mainly isolated to parking areas and trailheads. The low frequency and short duration of these effects are primarily due to the small amount of OSV use dispersed across the Lassen National Forest on a seasonal basis. Furthermore, the intensities of these effects are low and continuously reduced each year with the

retirement of older OSVs and their replacement by technologically improved OSVs, both of which reduce total exhaust emissions and noise.

However, we also determined that the quality recreation experience significant issue would be better addressed if divided into two separate significant issues, one each for motorized and non-motorized use.

Effects on the Availability of Motorized Over-snow Recreation Opportunities

The decision could impact the opportunities for public access and use of NFS lands by OSV-equipped winter recreation enthusiasts seeking enjoyable and challenging motorized experiences. The designation of snow trails and areas for public OSV use could impact the opportunities these enthusiasts seek by:

1. Changing the location of and/or reducing the amount of high-quality and desirable areas designated for public, cross-country OSV use on the forest;
2. Designating an insufficient number of opportunities for public OSV use of snow trails on the forest; and
3. Providing an insufficient number of opportunities for public OSV use of groomed snow trails on the forest.

Resource indicators and measures for this issue are shown in table 5.

Table 5. Resource indicators and measures for the issue of motorized recreation opportunities

Impact	Resource Indicator	Measure
Changing the location of and/or reducing the amount of high-quality and desirable areas designated for public cross-country OSV use on the forest	The area of NFS land designated for public cross-country OSV use	Total area (acres) where public OSV use would be designated; Percent change in total area (acres) where public OSV use would be designated as compared to current management
Designating an insufficient number of opportunities for public OSV use of snow trails on the forest	Snow trails designated for public OSV use	Total length of snow trail (miles) designated for public OSV use; Percent change in length of snow trail (miles) designated for public OSV use as compared to current management
Providing an insufficient number of opportunities for public OSV use of groomed snow trails on the forest	Groomed snow trails designated for public OSV use	Total length of snow trail (miles) groomed for public OSV use; Percent change in length of snow trail (miles) groomed for public OSV use as compared to current management

Effects on the Availability of Non-motorized Winter Recreation Opportunities

The decision could impact the opportunities for public access and use of NFS lands by non-motorized winter recreation enthusiasts seeking solitude and challenging physical experiences. The designation of snow trails and areas for public OSV use and grooming of snow trails for public OSV use could impact the opportunities these enthusiasts seek by:

1. Creating noise impacts that intrude on the solitude these enthusiasts seek;

2. Creating local air quality impacts that intrude on the unpolluted air and solitude these enthusiasts seek;
3. Creating visual impacts that intrude on the unaltered scenery these enthusiasts seek;
4. Displacing non-motorized winter recreation enthusiasts, or requiring them to travel longer distances through motorized trails and areas than they are physically able to traverse to access their desired quiet, non-motorized experiences;
5. Consuming untracked powder desired by backcountry skiers;
6. Making the snow surface difficult to ski on; and
7. Creating concerns for their safety when non-motorized winter recreationists share winter recreation trails and areas with OSVs.

Resource indicators and measures for this issue are shown in table 6.

Table 6. Resource indicators and measures for the issue of non-motorized recreation opportunities

Impact	Resource Indicator	Measure
Creating noise impacts that intrude on the solitude these enthusiasts seek	Potential noise impacts	Total area (acres) potentially affected by noise compared to the total area (acres) not designated for winter motorized use. Proximity of predicted noise increases above ambient levels in sensitive areas (GIS model for selected points).
	Proximity and frequency of OSV designations in relation to non-motorized areas (e.g., Wilderness, Inventoried Roadless, Lassen Volcanic National Park, Research Natural Areas (RNAs), Proposed Wilderness, Primitive and Semi-primitive Non-motorized ROS classifications)	Distance of groomed public OSV snow trails from designated areas/number of public OSV snow trails within designated areas, or number of designated OSV trails crossing linear non-motorized areas.
	Applicable Wilderness capability attributes/characteristics (FSH 1909.12 (72.1))	Total area (acres) affected and duration of impact. Qualitative description for each roadless area characteristic.
	Applicable Inventoried Roadless Area (IRA) criteria/characteristics (36 CFR §294.11)	Total area (acres) affected and duration of impact. Qualitative description for each roadless area characteristic.
	Potential air quality impacts	Qualitative/narrative description of potential impacts (with reference to the air quality analysis).

Impact	Resource Indicator	Measure
Creating local air quality impacts that intrude on the unpolluted air and solitude these enthusiasts seek	Proximity and frequency of OSV designations in relation to non-motorized areas (e.g., Wilderness, Inventoried Roadless, Lassen Volcanic National Park, RNAs, Proposed Wilderness, Primitive and Semi-primitive Non-motorized ROS classifications)	Distance of groomed public OSV snow trails from designated areas/number of public OSV snow trails within designated areas, or number of designated OSV trails crossing linear non-motorized areas.
	Applicable Wilderness capability attributes/characteristics (FSH 1909.12 (72.1))	Total area (acres) affected and duration of impact. Qualitative description for each roadless area characteristic.
	Applicable Inventoried Roadless Area (IRA) criteria/characteristics (36 CFR §294.11)	Total area (acres) affected and duration of impact. Qualitative description for each roadless area characteristic.
Creating visual impacts that intrude on the unaltered scenery these enthusiasts seek	Qualitative/narrative description of potential visual impacts	Qualitative description of potential effects
	Proximity and frequency of OSV designations in relation to non-motorized areas (e.g., Wilderness, Inventoried Roadless, Lassen Volcanic National Park, RNAs, Proposed Wilderness, Primitive and Semi-primitive Non-motorized ROS classifications)	Qualitative description of potential effects
	Applicable Wilderness capability attributes/characteristics (FSH 1909.12 (72.1))	Qualitative description of potential effects
	Applicable Inventoried Roadless Area (IRA) criteria/characteristics (36 CFR §294.11)	Qualitative description of potential effects
Displacing non-motorized winter recreation enthusiasts, or requiring them to travel longer distances through motorized trails and areas than they are physically able to traverse to access their desired quiet, non-motorized experiences Consuming untracked powder desired by backcountry skiers; making the snow surface difficult to ski on	Access to desired non-motorized settings and opportunities	Total area (acres) and trails (miles) available to non-motorized recreation enthusiasts within 10 miles of plowed trailheads
	Recreation Opportunity Spectrum (ROS)	Consistency of OSV designations with ROS classes
Creating concerns for their safety when non-motorized winter recreationists share winter recreation trails and areas with OSVs	Areas and trails available to non-motorized recreation enthusiasts for quality non-motorized recreation experiences	Total area (acres) designated for public OSV use, total area (acres) of non-motorized areas such as cross-country ski areas, non-motorized trail access

Issues Considered but not Analyzed in Detail

The Impacts of Unauthorized OSV Use

Public comments expressed the concern that “unauthorized OSV use is having and will have significant impacts that the analysis in the [original] DEIS does not discuss” (Comments 80-79 and 83-22). The comments cite litigation [*Sierra Club v. U.S. Forest Serv.*, 857 F. Supp. 2d 1167, 1176-78 (D. Utah 2012)] finding that NEPA requires the agency to take a hard look at the impacts of illegal motorized use on forest resources and the likelihood of illegal use continuing under each alternative.

We reviewed the Memorandum Decision and Order in the case cited [857 F. Supp. 2d 1167 (D. Utah 2012)] and we determined that it is not analogous to the present analysis nor its decision. The *Sierra Club* case was based on a wheeled, motorized vehicle use designation analysis under Subpart B of the Forest Service’s Travel Management Regulations. It dealt with the designation of trails for wheeled, motorized vehicles and the threat that the creation of unauthorized routes posed on forest resources. The environmental consequences of unauthorized routes created for wheeled, motorized vehicles are more substantial than unauthorized routes created by OSVs.

“The difference in management of motor vehicle use and OSV use on NFS lands stems from differences in their associated settings, activities, environmental impacts, and public preferences. National forests and grasslands change when snow blankets the landscape. Vegetation camouflages, animals burrow, and water transforms into ice...

OSV use occurs only in the months when snow is present, in contrast to other types of motor vehicle use, which can occur at any time of the year...

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 vegetation, whereas most other types of motor vehicles operate directly on the ground. Unlike other types of motor vehicles traveling cross-country, OSVs traveling cross-country generally do not create a permanent trail or have a direct impact on soil and ground vegetation...

Subpart B of the TMR recognizes that cross-country travel [and, by association, unauthorized routes created by cross-country travel] by [wheeled, motorized vehicles] is generally unacceptable [and the regulations are written to only permit such travel by wheeled, motorized vehicles in specific circumstances]. Subpart C of the TMR [Travel Management Regulations] as originally promulgated and in the proposed rule recognizes that cross-country travel by OSVs may be acceptable in appropriate circumstances” (79 FR 34679, June 18, 2014).

As the District Court in the *Sierra Club* case stated in its Memorandum Decision and Order, “The test of adequacy of an EIS is to be ‘pragmatic,’ requiring ‘a good faith attempt to identify and to discuss all foreseeable environmental consequences.’” After considering potential environmental impacts, we determined that illegal OSV trail creation and use is not a significant environmental issue. This is because although there may be some risk of OSV enthusiasts creating new OSV trails or going off-trail in areas where OSV use is not designated, the hazard of this activity resulting in long-term, adverse environmental consequences of any perceptible magnitude is negligible for several reasons:

- Illegal OSV trails that might exist on snow would not be likely to directly affect soil and vegetation;
- OSVs would be prohibited from directly affecting soil, vegetation, and other surface resources by snow depth restrictions in each action alternative;

- Illegal OSV trails would only exist until the next heavy snowfall or snow melt, so the effects on the snow would be temporary;
- We have found no evidence of illegal OSV use that would remain after the snow melts;
- Illegal OSV use would also not likely result in permanent trails because of the widely dispersed nature of off-trail, cross-country OSV travel. Unauthorized OSV trails are not likely to be worn permanently into the landscape due to repeated use;
- Although OSV trails would be designated, most of the designated trails would be located in areas where public, cross-country OSV use is allowed under current management. Therefore, there would be fewer opportunities for OSV use in areas not designated for OSV use.

Chapter 2. Alternatives

Introduction

This chapter describes and compares the no-action alternative and four 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.

General project mitigations and monitoring procedures are described in appendices C, D and F in Volume III of this document.

Development and Modification of Alternatives

The no-action alternative (alternative 1) would represent the current management of the OSV program on the Lassen National Forest. The description of this alternative is based primarily on the 2005 Lassen National Forest Winter Recreation Guide (project record) that identifies groomed and non-groomed OSV trails, trails currently open for non-motorized recreation and closed to OSV use, areas currently closed to OSV use, and areas currently open for cross-country OSV use.

The 2005 guide does not provide coverage for all of the Lassen National Forest. The guide only shows areas of the forest that have the most popular OSV trails. The areas not covered in the guide have no identified OSV trails, so they did not appear in the guide. However, they have maintenance level 2, 3, and 4 roads, which can be used as snow trails by OSVs and cross-country OSV use is allowed in these areas unless specifically prohibited.

The Forest Service developed the proposed action (alternative 2) as originally described in the Notice of Intent to meet the existing demand for OSV recreation, while continuing to protect important resources and provide for some quiet recreation. This alternative also specifically would not have designated OSV use on the PCT, which was not formally identified in the 2005 Lassen Winter Recreation Guide. In addition, this alternative would have not have designated OSV use in areas below 3,500 feet that historically receive low amounts of snowfall, which precludes OSV use. We eliminated this non-designation of areas for the use of OSVs below 3,500 feet from the proposed action after considering comments received on the original DEIS. This alternative also established a minimum snow depth of 12 inches in areas designated for cross-country OSV use and 6 inches for OSV use on designated trails.

Alternative 3 was submitted by Snowlands Network, et al. during scoping to respond to the issue of quality recreational experience and the potential of noise and air quality impacting quiet recreation. This alternative was also developed in part as a result of discussions with the Forest Service and a group of motorized use supporters to identify areas of low OSV use that could provide quiet recreation. This alternative identifies additional acres not designated for OSV use across the forest, but accommodates use of OSV trail riding by restricting OSVs to trail-only riding in some areas. This alternative expands areas of quiet recreation across the forest.

Alternative 4 was submitted during scoping by OSV groups, principally the Recreation Outdoor Coalition. Alternative 4 addresses the issue of decreased OSV recreation opportunities on the forest resulting from the proposed action. Specifically, the group proposed designating areas below 3,500 feet

for OSV use and allowing OSV use on a minimum of 6 inches of snow on groomed trails. This alternative proposed some areas that would not be designated for OSV use, but designated more of the forest for OSV use than alternative 3.

After considering scoping comments but prior to the release of the original DEIS, we modified the proposed action to better address the issues after discussions with organizations and individuals. The “Modified Proposed Action” as described in the original DEIS reflected the following changes from the proposed action as described in the Notice of Intent:

1. It clarified the State’s grooming requirements that a minimum of 12 inches of snow must exist on the snow trails before grooming may commence, rather than the 18-inch minimum as described in scoping;

We then made the following changes after the comment period on the original DEIS:

1. A comment asked us to consider a single universal minimum snow depth for the proposal and/or modify the proposed 6-inch minimum snow depth for OSV use on snow trails overlying Forest Service roads. The rationale behind this request was that 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. This is particularly true with the 6-inch depth for OSV trails overlying roads, and could lead to increased probability of OSV use off-trail in these areas.
 - Snow depth requirements were reconsidered in all alternatives. Some were changed. In the FEIS, this concern was addressed in alternative 5, which would apply a minimum 12-inch snow depth for public, cross-country OSV use, OSV use on snow trails, and for grooming. The alternative would remove any minimum snow depth requirement for OSV use on snow trails overlying on existing roads. The comment states that OSVs do not impact roads and the OSV operator should be allowed to decide whether he or she can safely travel on minimal snow to access the backcountry where deeper snow exists.
2. A comment asked us to consider ensuring flexibility in the requirement for minimum snow depths and consider them guidelines instead. The comment asked for flexibility to account for snow depths that are affected by variables such as elevation, temperature, aspect, and snow melt.
 - We considered this suggestion and modified the proposed action to include a 12-inch minimum snow depth for public cross-country OSV use and the retention of some flexibility in the application of snow depths on trails overlying Forest Service roads. The minimum snow depth component of alternative 4 would also address this concern.
3. A comment asked us to consider ensuring that the process used to measure snow depth and enforce minimum snow depths is equitable and that entire areas are not closed to OSV use based on a snow depth measurement taken, for example, at just one trailhead.
 - We considered this suggestion and developed monitoring measures to determine snow depth measurement criteria and locations, using an interdisciplinary team of resource specialists, which would apply to any of the action alternatives.
4. A comment asked us to consider designating areas below 3,500 feet in elevation for OSV use and apply a minimum snow depth as a guide to indicate where OSVs should not be used, instead.
 - We considered this suggestion and recognized that the provision for ensuring 12 inches of snow are on the ground before public OSV use would be allowed could be used in areas below 3,500 feet, as it would for the rest of the project area, as an alternative to not

designating OSV use based on this elevational band. This concern was addressed by the modified proposed action and alternative 4.

5. A comment asked us to consider designating OSV crossings of the PCT, overlying the same roads and trails designated for wheeled, motorized vehicle use, when such use is allowed, as shown on the Subpart B Motor Vehicle Use Map.
 - The Pacific Crest National Scenic Trail Comprehensive Plan recommends the number of crossings based on the Recreational Opportunity Spectrum (ROS) Classification of the land adjacent to the trail. Alternatives 2 and 4 were modified to designate trails across the PCT consistent with these recommendations.
6. A comment asked us to modify the minimum snow depth for cross-country OSV use to 10 inches instead of 12 inches; and 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.
 - This suggestion was addressed in alternative 4. Under this alternative, a specified snow depth was eliminated and the minimum snow depth for OSV use cross-country and on snow trails would be the depth necessary to avoid resource damage.
7. A comment asked us to consider an alternative to the proposed action with an emphasis on providing additional opportunities for motorized uses.
 - This suggestion was addressed by alternative 4.
8. A comment asked us to consider an alternative that would not require a minimum snow depth for cross-country OSV use as long as there is no damage to underlying surface resources.
 - Alternative 4 was designed with no restriction on public cross-country OSV use as long as there would be no damage to underlying surface resources.

We issued the Final Environmental Impact Statement and Draft ROD in August 2016. The Draft ROD proposed selecting alternative 4 with additional non-motorized areas added from alternative 3. In the pre-decisional objection period, several organizations and individuals objected to the proposed decision as described in the Draft ROD.

We met with objectors to discuss their concerns. The agency's resulting objection review determined that a Revised Draft Environmental Impact Statement (RDEIS) would be necessary to address concerns expressed by the objectors. As a result of objections received, the RDEIS reflected the following changes:

1. We elaborated on the use of minimization criteria to designate trails and areas for OSV use;
 - The analysis explained the application of the minimization criteria to mitigate the impacts of OSV use on resources in all action alternatives. Minimization criteria would be applied individually to each area and trail system in the designation of trails and areas for OSV use. These criteria would allow the Forest Service to weigh socioeconomic concerns against resource impact issues for each area, independently. Appendices C and D of the RDEIS and this RFEIS describe how the minimization criteria would be applied to each area and trail system and the actions that would be implemented if adverse resource impacts were to occur.
2. We explicitly analyzed and documented the method for determining adequate snow depth for resource protection;

- We modified alternative 4 to include new methods to determine whether adequate snow depth exists in designated areas. Minimal data are available to determine an “adequate” snow depth for resource protection. Alternative 4 proposes to use resource staff experience, expertise, and individual resource regulatory frameworks to inform the forest as to when snow conditions would allow OSV use in each area. Additional information would come from groomer operators, weather data stations, and observations from staff at trailheads and in the field as to when the Forest Service should allow or end the OSV season. This further takes the burden of determining adequate snow depth away from public recreationists and allows them to simply enjoy the OSV season when the Forest Service determines adequate snow exists.
3. We broadened the range of alternatives to include fewer areas and trails designated for OSV use;
- We modified the proposed action (alternative 2) to designate portions of the forest for OSV use that are below 3,500 feet in elevation, allowing the snow depth instead of the elevation to determine whether OSV use should occur on a trail or area.
 - The objection response letter instructed the responsible official to consider an alternative that included fewer routes for OSV use. We met this requirement in each action alternative by either varying the size of the designated OSV area where non-designated OSV trails would be located or not designating some areas at all. An alternative that would not designate an area would also remove the non-designated OSV trails within that area from availability for OSV use. When both designated OSV trails and non-designated OSV trails in designated areas are totaled, each action alternative would have fewer miles of OSV trails than current management (see the bottom of table 10). Non-designated OSV trails exist within designated OSV areas and would be open for OSV use. They overlaid roads used in the summer and would not be specifically designated as OSV trails. Alternative 5 would result in the largest reduction of OSV trail miles.
 - We designed alternative 5 and included it as a new alternative analyzed in detail in the RDEIS to address the issue of broadening the range of alternatives. It would provide for additional protection of resources, protection of non-motorized winter recreation, and more opportunities for non-motorized winter recreation by reducing the areas designated for OSV use. This alternative would not designate areas that receive historically low levels of snow, which is generally considered inadequate for quality OSV recreation, for OSV use; along with areas potentially important to both aquatic and terrestrial wildlife; and additional areas deemed inadequate for quality OSV recreation. In alternative 5, no areas designated for OSV use would be below 3,500 feet in elevation.
 - Along with alternatives 2 and 4, alternative 5 would also protect the PCT from OSV intrusions by designating as many as 12 OSV trails across the PCT. Like alternative 2, alternative 5 would further protect the trail from mechanized use by not designating areas under Forest Service jurisdiction for OSV use within 500 feet of either side of the trail.
4. We designated areas for OSV use smaller than a ranger district.
- We modified all action alternatives by dividing the forest into discrete, specifically delineated spaces that are areas designated for OSV use. All areas proposed for designation for cross-country OSV use would be smaller than a ranger district. Furthermore, use of OSVs would be allowed in areas and on trails designated for this use. Generally, most of these designated areas would encompass major components of the groomed trail system and would be readily accessible from affected communities that rely on the activity for

economic benefit. Where possible, the boundaries of each area would be defined by major state highways, NFS roads, and national forest boundaries.

The RDEIS was released for public comment in November 2017. After reviewing public comments on the RDEIS, we made additional modifications to the EIS, which are reflected in this RFEIS, as follows:

1. The National Trails System Act prohibits motor vehicles on the PCT except at designated crossings. Alternatives 3 and 4 would not have designated any OSV trails across the PCT. Without such designated trails, OSVs would not be able to cross the PCT except on non-NFS land, such as private land or non-NFS roads. In many cases, this would require many additional miles and hours of riding to find a legal crossing of the PCT in these alternatives. Furthermore, inconsistent language in the RDEIS led to a misperception as to whether alternative 4 would include designated OSV trails across the PCT.
 - We modified alternative 3 to include as many as 23 designated OSV trails across the PCT. We also modified alternative 4 to include as many as 28 designated OSV trails across the PCT. These modifications would allow OSVs to cross the PCT and access all sectors of each of the designated OSV areas without having to exit the designated OSV areas in order to go around the PCT.
2. The Lassen National Forest Land and Resource Management Plan direction prohibits motorized recreation, including four-wheel driving, motorcycling, and snowmobiling within forest plan management areas designated as semi-primitive non-motorized (LRMP page 4-63). Due to design errors and GIS data inconsistencies, we discovered that we had designated areas for OSV use in all action alternatives that included semi-primitive non-motorized management areas.
 - To be consistent with the forest plan, we modified all alternatives so they would not include semi-primitive non-motorized management areas within areas designated for OSV use. We also verified whether any of the alternatives would designate trails for OSV use within semi-primitive non-motorized management areas, and found none.
3. A comment on the RDEIS expressed a concern that many OSV enthusiasts were accustomed to parking their transport vehicles and trailers in a parking lot on private property between the southwestern shore of Lake Almanor and Highway 89. None of the action alternatives would provide a way to run an OSV between this parking lot and the OSV trail and the Jonesville OSV area on the west side of Highway 89.
 - To consider accommodating the reasonable and accustomed use of the parking area for OSV activities, we modified alternative 4 so it would designate an additional 1,814 acres of NFS land between the southwestern shore of Lake Almanor and Highway 89 for OSV use. This area would be included in the Jonesville OSV area.

Alternatives Considered in Detail

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

Alternative 1: No Action

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, snow trails, and areas within the Lassen National Forest except as prohibited by forest order. Most of the existing system

of OSV use on the Lassen National Forest is shown on the 2005 Winter Recreation Guide for the Lassen National Forest. 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.

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

- All areas of the forest are open to OSV use except areas where this use is specifically prohibited;
- Approximately 964,030 acres of NFS lands are open to public cross-country OSV use. This is approximately 84 percent of the Lassen National Forest;
- Approximately 185,980 acres of NFS lands are closed to public OSV use;
- Approximately 98.4 miles of the Pacific Crest National Scenic Trail are within 500 feet of areas open to public OSV use on the Lassen National Forest (table 15, page 64);
- Currently, 2,933 miles are groomed, non-groomed, marked, and unmarked snow trail open to public OSV and non-motorized. Not all of these trails are shown on the 2005 Lassen National Forest Winter Recreation Guide (project record) because that guide does not show a map of the whole forest. These trails overlie roads and trails designated for wheeled vehicle use and are within areas currently open to OSV use. Approximately 406 miles of these trails are maintained for OSV use through signage, snow trail grooming, or both. These trails are identified on the 2005 Lassen National Forest Winter Recreation Guide, and they are being considered for designation in one or more action alternatives;
- The Forest Service grooms approximately 349 miles of snow trails for public OSV use. Approximately 27 miles of these groomed trails are not under Forest Service jurisdiction; and
- Snow trail grooming is allowed when there are 12 or more inches of snow.

Figure 2 shows the current management.

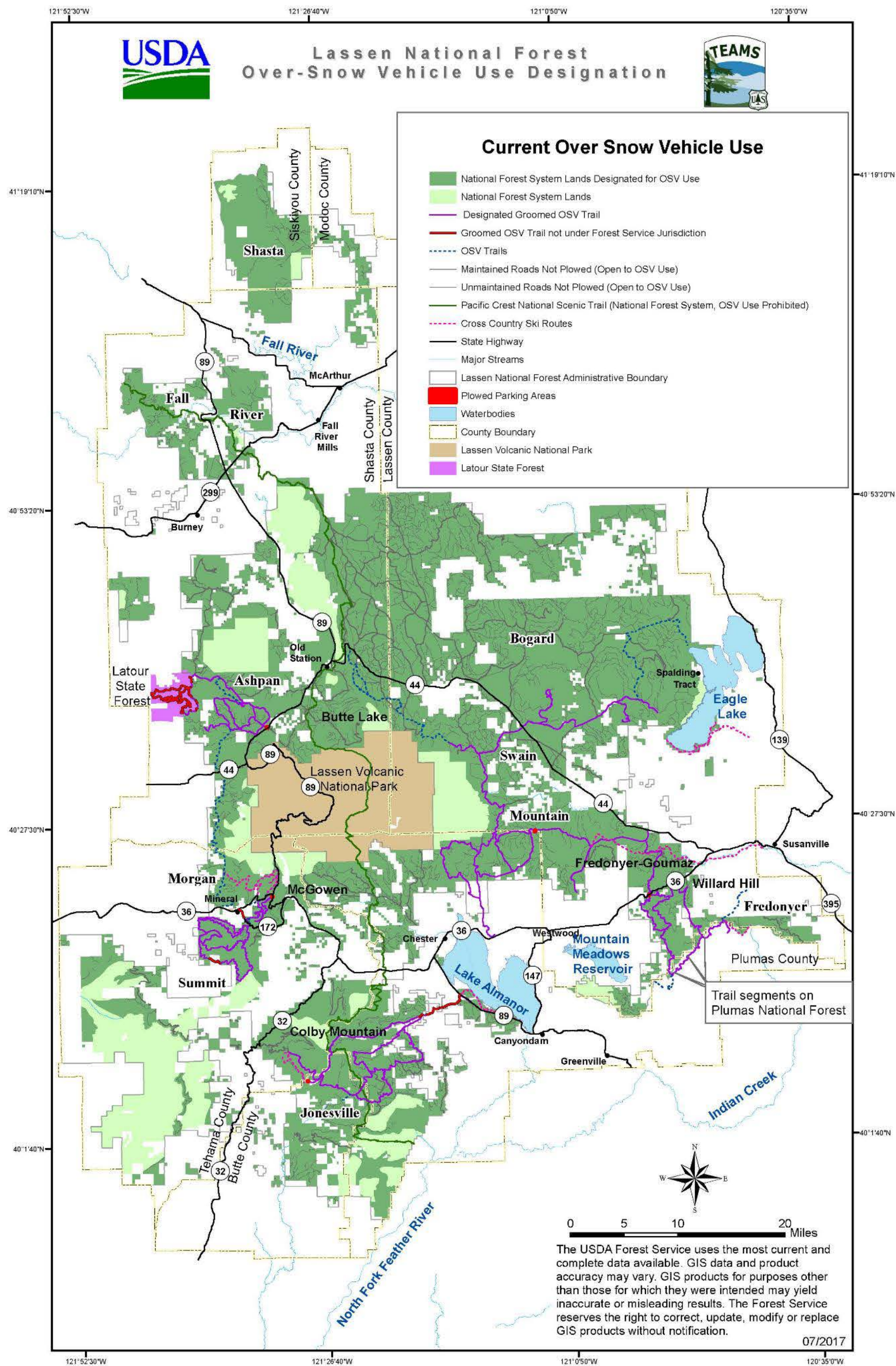


Figure 2. Map showing existing condition – current management

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Trail Grooming Operations Applicable to All Five Alternatives

The OSV trail grooming season generally begins the day after the Christmas holiday 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 has 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 snow trail grooming that would occur at each trail system for an average season are shown in table 7.

Table 7. Summary of grooming operations on the Lassen National Forest (Groomer Hours)

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

Snow trails would be groomed for public OSV use to a minimum width of 10 feet and typically up to 14 feet wide. Snow 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. Snow trails would not be groomed beyond the width of the underlying roadbed, where one exists. Where the terrain allows, main ingress and egress snow trails that connect to the trailhead would be groomed to 18 feet wide or greater to facilitate the added traffic.

Snowcats are operated at speeds in the range of 3 to 6 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.

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

- Operators shall be trained and directed by a grooming coordinator.
- Identify hazards in advance of grooming, preferably in autumn before snow falls.

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.

Management Direction, Mitigations, Best Management Practices, and Monitoring Applicable to All Action Alternatives

All four action alternatives would apply the following management direction that can be found in the appendices to this RFEIS:

- Forest Plan Direction and 36 CFR §212.55 (Appendix B)
- Mitigations to Address the Minimization Criteria in the Travel Regulations for Areas Designated for OSV Use (Appendix C)
- Mitigations to Address the Minimization Criteria in the Travel Regulations for Trails Designated for OSV Use (Appendix D)
- Water Quality Best Management Practices (Appendix E)
- General Monitoring Procedures (Appendix F)

Alternative 2 – Modified Proposed Action

Under this alternative, the Forest Service proposes the following actions:

1. To designate areas and trails for OSV use.
2. To designate 8 discrete, specifically delineated areas for cross-country OSV use. There would be a total of 920,260 acres of NFS lands within the Lassen National Forest designated as areas where public cross-country OSV use would be allowed. These areas would encompass approximately 80 percent of the NFS land on the Lassen National Forest. All existing OSV closures applying to areas and trails on the forest where public motorized use is not allowed would continue and these areas would not be designated.
3. To designate approximately 334 miles of NFS snow trails on NFS lands within the Lassen National Forest as trails where public OSV use would be allowed. All existing OSV closures applying to trails where public motorized use is not allowed would continue and these trails would not be designated.
4. To identify approximately 350 miles of snow trails that would be groomed for public OSV use by the Lassen National Forest Grooming Program. We would designate approximately 11.8 miles of snow trails for OSV use that would not be groomed. We would groom approximately 27.0 miles of snow trails for OSV use that would not be designated for OSV use because we do not have jurisdiction over these trails.
5. 2,509 miles of trails would be open to OSV use in areas designated for cross-country OSV use, but these trails would not be designated. These trails would overlie existing maintenance level 2, 3, and 4 NFS roads that are not plowed in winter.
6. To groom snow trails for OSV use according to the California State Parks' snow grooming standards when there is a minimum of 12 inches of snow on trails.
7. To implement forestwide snow depth requirements for public OSV use that would provide for public safety and natural and cultural resource protection by:
 - a. Allowing public cross-country OSV use in designated areas only when there are 12 or more inches of snow or ice covering the landscape.
 - b. Allowing public OSV use on designated snow trails when there are 6 or more inches of snow covering the trail. Except for approximately 0.1 mile of OSV trail (which would require a

- minimum of 12 or more inches of snow for OSV use),⁸ all snow trails to be designated for public OSV use or identified for OSV grooming in all alternatives would overlie an existing paved, gravel, or native surface travel route. These travel routes are trails and roads used by wheeled, motorized vehicles when such use is allowed, or for non-motorized recreation.
- c. Current snow depths would be determined by a combination of weather station data, observations at trailheads by staff, and when the conditions meet state requirements for grooming. The Forest Service would encourage or discourage OSV use based on conditions through Forest Service and partnership websites.
8. To designate no areas for public cross-country OSV use that would be located within 500 feet of the PCT on the Lassen National Forest.
 9. To designate up to 28 OSV trails that would cross the PCT to provide connectivity to designated OSV areas without having to travel long distances to go around the PCT. Approximate locations of these trails have been identified to ensure greater safety in winter conditions and to facilitate the least difficult and most expedient access for OSV use between areas designated for OSV use. All of these trails would be located consistent with the guidelines in the Comprehensive Management Plan for the PCT (USDA Forest Service 1982). The PCT would be crossed by OSV trails no more frequently than ½-mile intervals.
 10. In areas under NFS jurisdiction, the designated OSV trails crossing the PCT would occur in areas adjacent to and within 500 feet of the PCT that are not designated for cross-country OSV use. OSV use would be restricted only to the designated trail in these areas. All but 0.1 mile of these trails would overlie NFS roads or trails currently designated for wheeled motorized vehicle use in the Lassen National Forest's Motor Vehicle Use Map. All designated OSV trails would follow the most direct approach across the PCT. Assuming 28 of these trails would be designated, the total designated mileage of OSV trails crossing the PCT and the non-designated areas adjacent to it would be 8.1 miles.
 11. The McGowan Cross-country Ski Trail west of Wilson Meadow would be in an area designated for OSV use and the ski trail would be open to OSV use, but not designated as an OSV trail.
 12. The Bizz Johnson Ski Trail would not be designated for OSV use from Susanville to Westwood Junction. However, OSVs would be allowed to cross the Bizz Johnson trail on designated OSV trails and in areas designated for OSV use from Susanville to Westwood Junction.

⁸ This 0.1 mile of designated OSV trail crosses an area not designated for cross-country OSV use along the Pacific Crest National Scenic Trail, and is the most direct way to cross the Pacific Crest National Scenic Trail while allowing OSVs to remain on National Forest System land.

Table 8. Summary of alternative 2

Designated Area Name	OSV Areas Designated (Acres)	OSV Trails Designated (Miles)	Groomed OSV Trails (Miles)
Ashpan	82,910	37.7	57.4
Bogard	327,480	27.5	26.6
Fall River	40,480	2.2	0.0
Fredonyer	30,030	48.4	43.7
Jonesville	116,850	63.7	68.2
Morgan Summit	94,790	61.5	62.1
Shasta	56,820	0	0
Swain Mountain	170,900	93.5	91.8
Total	920,260	334.4	349.7
Percent of Total Forest Designated	80%		

The decision to select this alternative would only apply to the public use of OSVs as defined in the Forest Service's Travel Management Regulations (36 CFR §212.1). This alternative is shown on the maps in figure 3 and figure 4.

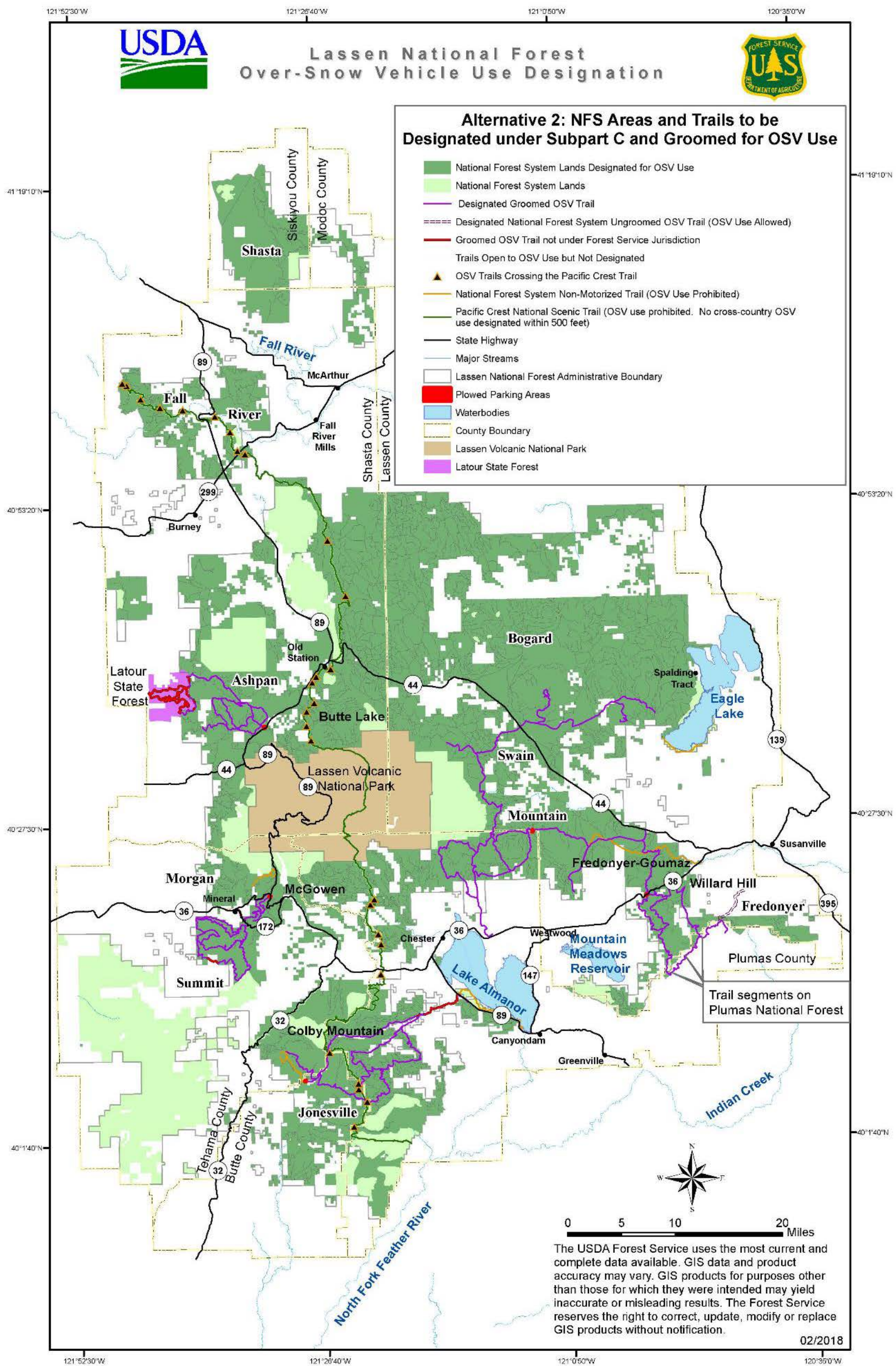


Figure 3. Map showing alternative 2, modified proposed action – NFS areas and trails to be designated under Subpart C and groomed for OSV use

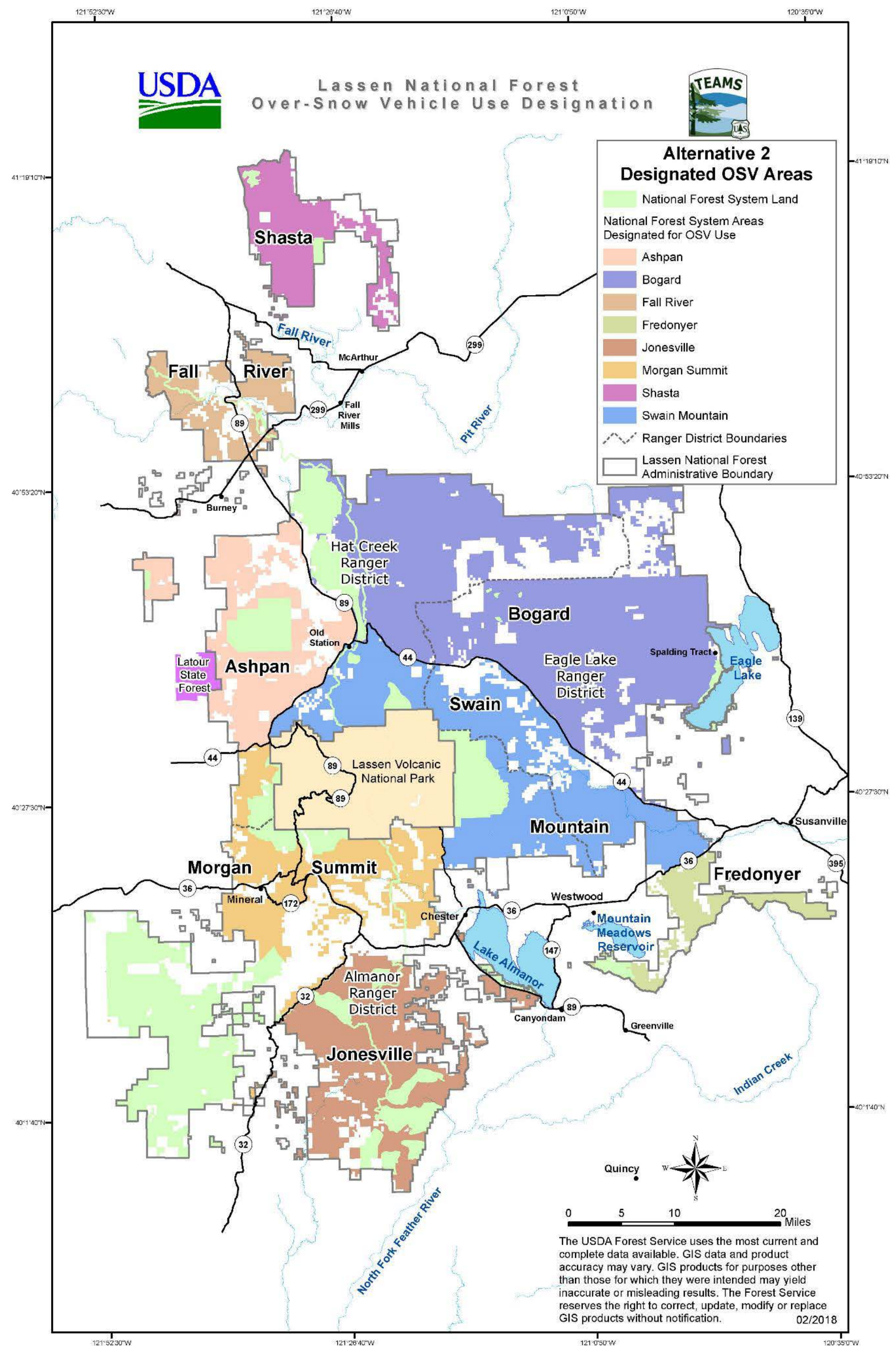


Figure 4. Map distinguishing areas designated for OSV use in alternative 2

Alternative 3

This alternative addresses the non-motorized recreational experience significant issue. This alternative includes the following actions:

1. To designate areas and trails for OSV use.
2. To designate 8 discrete, specifically delineated areas for cross-country OSV use. These areas would encompass 833,280 acres. This land area would represent approximately 73 percent of the NFS land within the Lassen National Forest.
3. To designate approximately 383 miles of snow trails for public OSV use.
4. 2,200 miles of trails would be open to OSV use in areas designated for cross-country OSV use, but these trails would not be designated. These trails would overlie existing maintenance level 2, 3, and 4 NFS roads that are not plowed in winter.
5. Mechanically groom 349 miles of snow trails public OSV use. We would groom approximately 27 miles of snow trails for OSV use that would not be designated for OSV use because we do not have jurisdiction over these trails.
6. To groom snow trails for OSV use when there is a minimum of 18 inches of snow on trails.
7. The minimum snow depth for public OSV use on designated snow trails would be 6 inches.
8. The minimum snow depth for OSV use in areas designated for public, cross-country OSV use would be 12 inches.
9. Current snow depths would be determined by a combination of weather station data, observations at trailheads by staff, and when the conditions meet state requirements for grooming. The Forest Service would encourage or discourage OSV use based on conditions through Forest Service and partnership websites.
10. To designate portions of 5 of the 8 designated areas that would be located within 500 feet of the PCT;
 - a. Approximately 85.4 miles of the Pacific Crest National Scenic Trail would be located within 500 feet of an area designated for public OSV use on the Lassen National Forest (table 15, page 64).
11. To designate up to 23 OSV trails that would cross the PCT to provide connectivity to designated OSV areas without having to travel long distances to go around the PCT. Approximate locations of these trails have been identified to ensure greater safety in winter conditions and to facilitate the least difficult and most expedient access for OSV use between areas designated for OSV use. All of these trails would be located consistent with the guidelines in the Comprehensive Management Plan for the PCT (USDA Forest Service 1982). The PCT would be crossed by OSV trails no more frequently than ½-mile intervals.
12. In areas under Forest Service jurisdiction, the designated OSV trails crossing the PCT would occur in areas adjacent to the PCT that are not designated for cross-country OSV use. OSV use would be restricted only to the designated trail in these areas. All but 0.1 mile of these trails would overlie NFS roads or trails currently designated for wheeled motorized vehicle use in the Lassen National Forest's Motor Vehicle Use Map. All designated OSV trails would follow the most direct approach across the PCT.

13. The McGowan Cross-country ski trails would be in areas not designated for OSV use and the trails would not be open or designated for OSV use.
14. The Bizz Johnson Ski Trail would not be designated for OSV use from Susanville to Westwood Junction. However, OSVs would be allowed to cross the Bizz Johnson trail on designated OSV trails and in areas designated for OSV use from Susanville to Westwood Junction.

Table 9. Summary of alternative 3

Designated Area Name	OSV Areas Designated (Acres)	OSV Trails Designated (Miles)	Groomed OSV Trails (Miles)
Ashpan	82,380	47.3	57.4
Bogard	327,770	26.6	26.6
Fall River	17,570	0.0	0.0
Fredonyer	29,350	48.9	44.1
Jonesville	115,500	63.8	67.9
Morgan Summit	90,230	83.2	62.1
Shasta	48,620	0	0
Swain Mountain	121,860	113.4	91.3
Total	833,280	383.2	349.4
Percent of Total Forest Designated	73%		

General project mitigations and monitoring procedures are described in appendices C, D, and F of this document.

No trails that are currently closed to OSV use would be designated for OSV use under this alternative.

The decision to select this alternative would only apply to the public use of OSVs as defined in the Forest Service's Travel Management Regulations (36 CFR §212.1). This alternative is shown on the maps in figure 5 and figure 6.

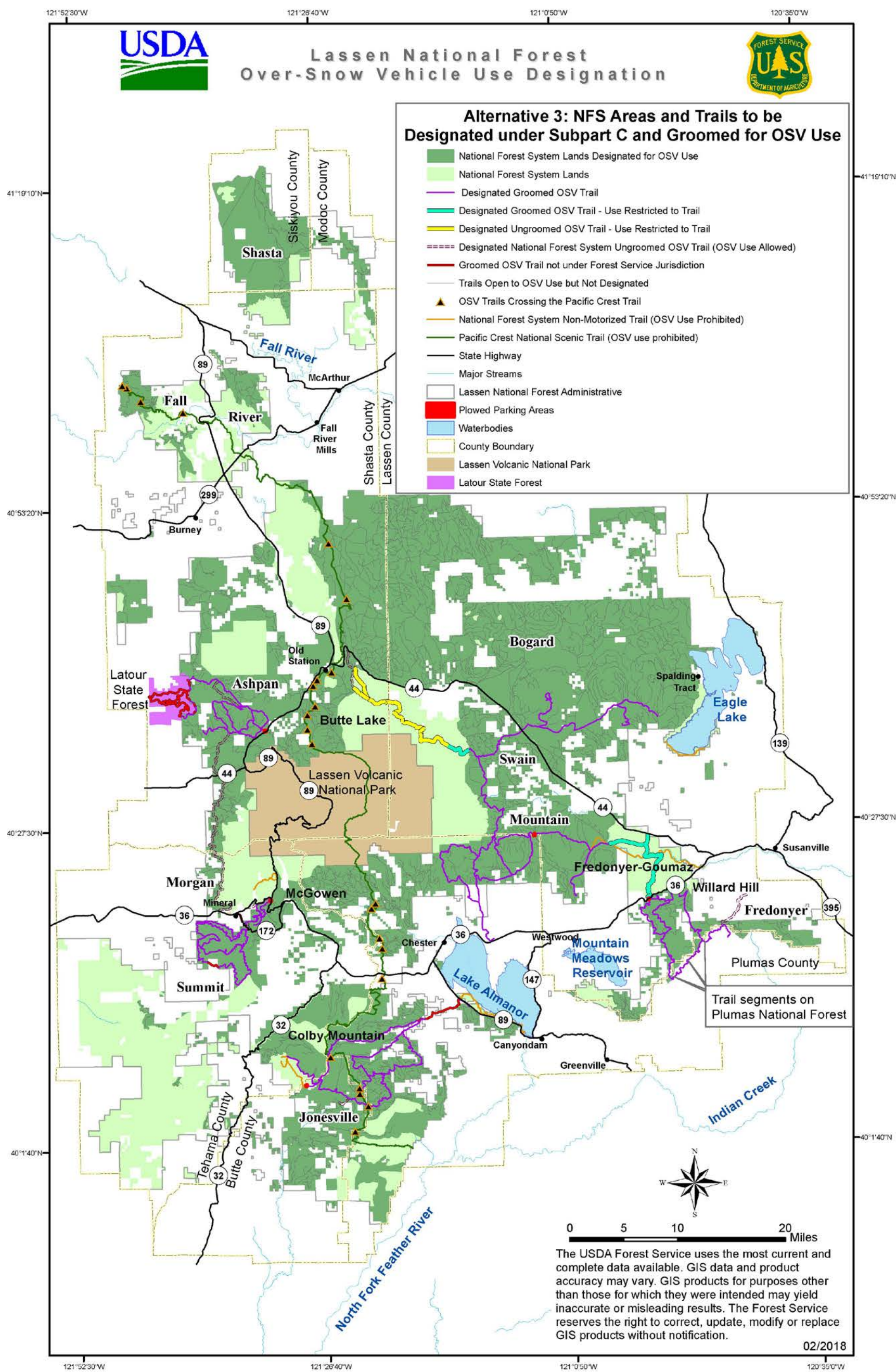


Figure 5. alternative 3 – NFS areas and trails to be designated under Subpart C and groomed for OSV use

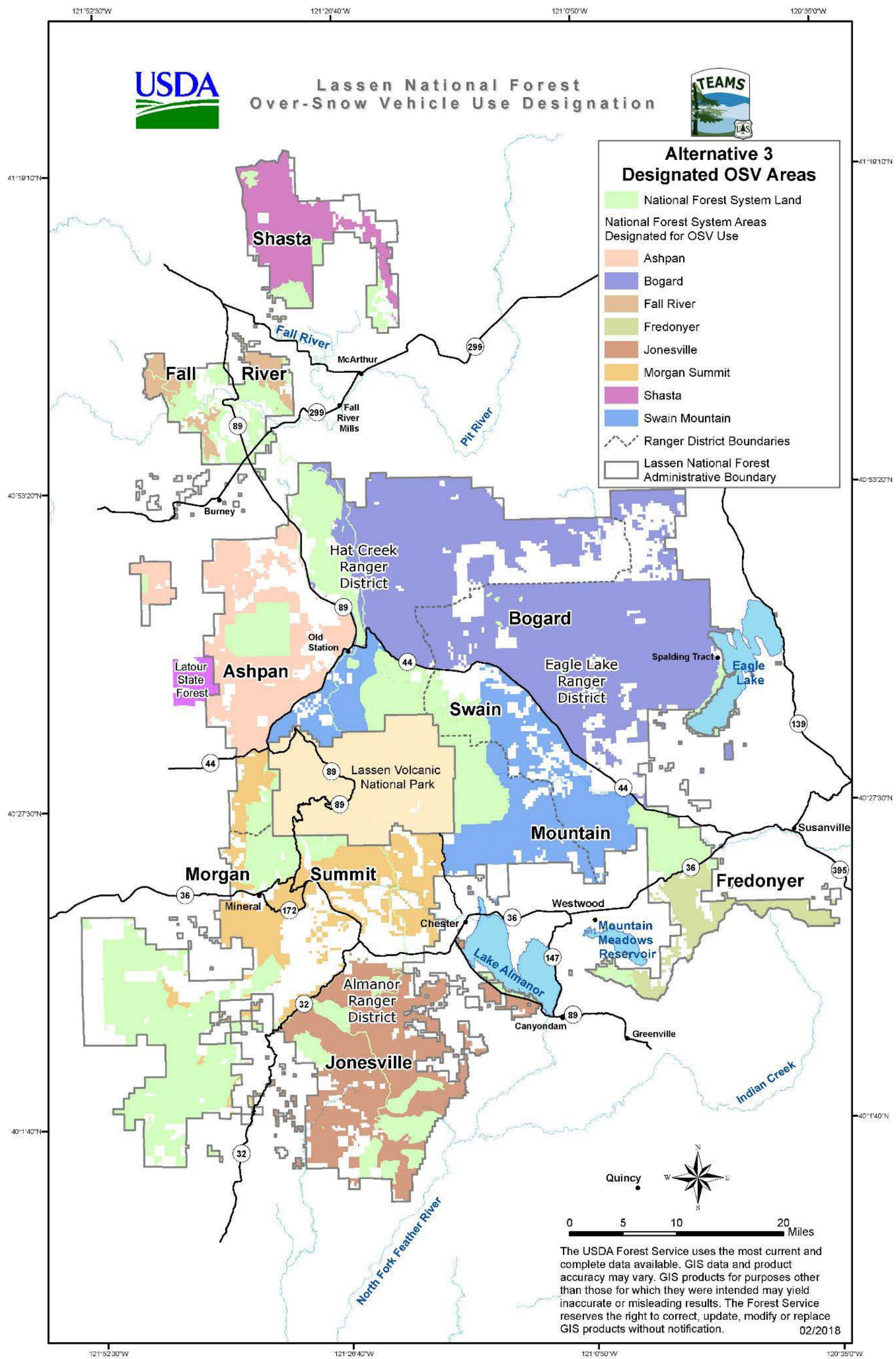


Figure 6. Map distinguishing areas designated for OSV use in alternative 3

Alternative 4

This alternative addresses the motorized recreational experience significant issue. This alternative includes the following actions:

1. To designate areas and trails for OSV use.
2. To designate 8 discrete, specifically delineated areas for cross-country OSV use. These areas would encompass 955,470 acres. This land area would represent approximately 83 percent of the NFS land within the Lassen National Forest.
3. To designate 380 miles of snow trails for public OSV use.
4. 2,534 miles of trails would be open to OSV use in areas designated for cross-country OSV use, but these trails would not be designated. These trails would overlie existing maintenance level 2, 3, and 4 NFS roads that are not plowed in winter.
5. Mechanically groom 349 miles of snow trails public OSV use. We would groom approximately 27 miles of snow trails for OSV use that would not be designated for OSV use because we do not have jurisdiction over these trails.
6. The minimum snow depth for snow trail grooming would be 12 inches.
7. There would be no defined minimum snow depth in areas designated for cross-country OSV travel or on designated OSV trails. OSV use would be allowed only when conditions are sufficient to allow OSV use while protecting underlying resources. This would be determined by a combination of weather station data, observations at trailheads by staff, and when the conditions meet state requirements for grooming. The Forest Service would encourage or discourage OSV use based on conditions through Forest Service and partnership websites.
8. To designate portions of 5 of the 8 designated areas that would be located within 500 feet of the PCT;
 - a. Approximately 97.7 miles of the Pacific Crest National Scenic Trail would be within 500 feet of an area designated for public OSV use on the Lassen National Forest (table 15, page 64).
9. To designate up to 28 OSV trails that would cross the PCT to provide connectivity to designated OSV areas without having to travel long distances to go around the PCT. Approximate locations of these trails have been identified to ensure greater safety in winter conditions and to facilitate the least difficult and most expedient access for OSV use between areas designated for OSV use. All of these trails would be located consistent with the guidelines in the Comprehensive Management Plan for the Pacific Crest National Scenic Trail (USDA Forest Service 1982). The PCT would be crossed by OSV trails no more frequently than ½-mile intervals.
10. In areas under Forest Service jurisdiction, the designated OSV trails crossing the PCT would occur in areas adjacent to the PCT that are not designated for cross-country OSV use. OSV use would be restricted only to the designated trail in these areas. All but 0.1 mile of these trails would overlie NFS roads or trails currently designated for wheeled motorized vehicle use in the Lassen National Forest's Motor Vehicle Use Map. All designated OSV trails would follow the most direct approach across the PCT.
11. The McGowan Cross-country Ski Trail west of Wilson Meadow would be in an area designated for OSV use and the ski trail would be open to OSV use, but not designated as an OSV trail.

12. The Bizz Johnson Ski Trail would not be designated for OSV use from Susanville to Westwood Junction. However, OSVs would be allowed to cross the Bizz Johnson trail on designated OSV trails and in areas designated for OSV use from Susanville to Westwood Junction.

Table 10. Summary of alternative 4

Designated Area Name	OSV Areas Designated (Acres)	OSV Trails Designated (Miles)	Groomed OSV Trails (Miles)
Ashpan	82,910	47.4	57.4
Bogard	330,180	26.6	26.6
Fall River	42,440	0.0	0.0
Fredonyer	30,030	48.4	43.7
Jonesville	121,750	63.8	67.9
Morgan Summit	119,130	81.9	62.1
Shasta	56,820	0	0
Swain Mountain	172,210	112.3	91.8
Total	955,470	380.3	349.4
Percentage of Total Forest Designated	83%		

General project mitigations and monitoring procedures are described in appendices C, D and F of this document.

The decision to select this alternative would only apply to the public use of OSVs as defined in the Forest Service's Travel Management Regulations (36 CFR §212.1). This alternative is shown on the maps in figure 7 and figure 8.

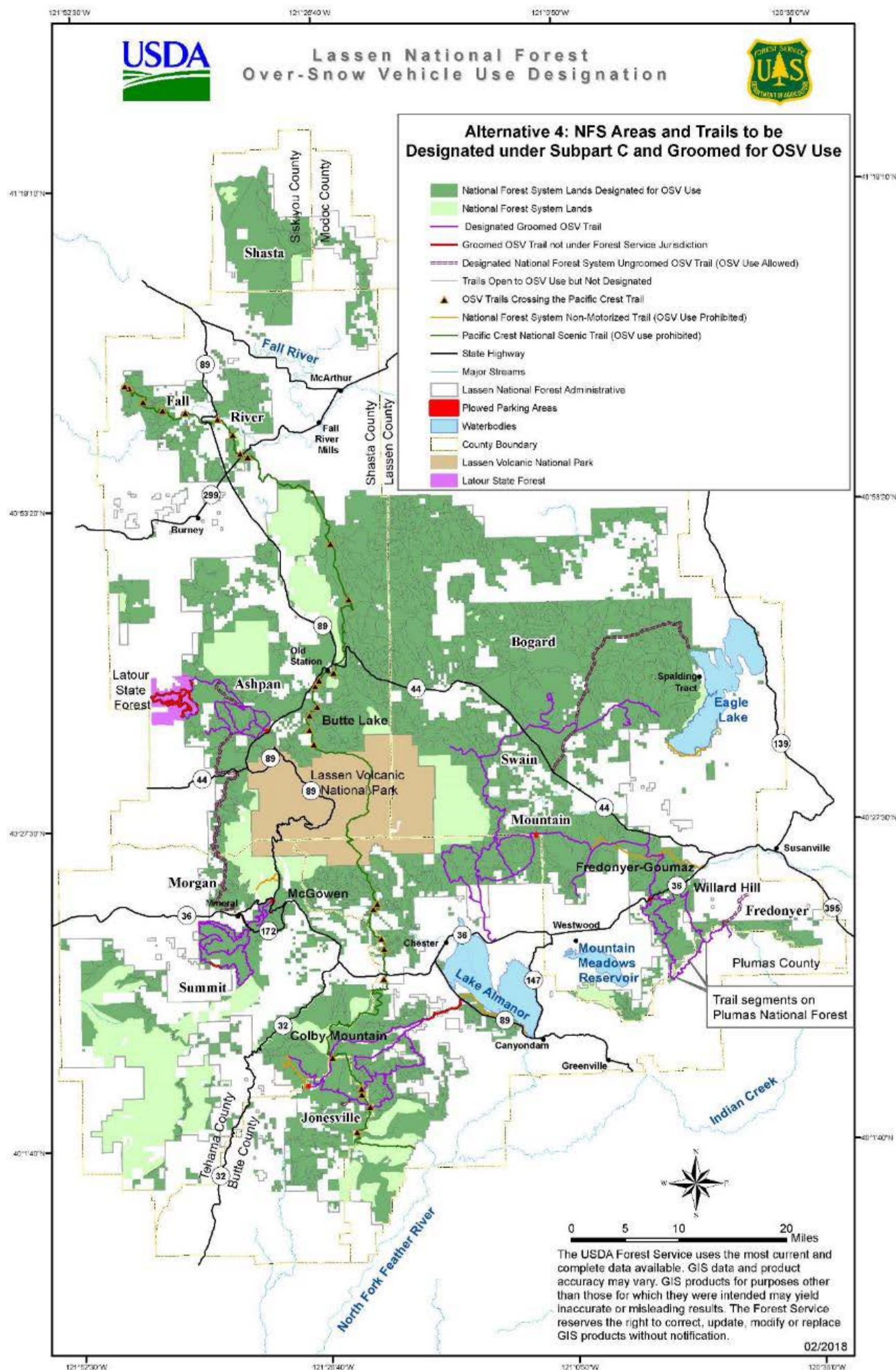


Figure 7. Map showing alternative 4 – NFS areas and trails to be designated under Subpart C and groomed for OSV use

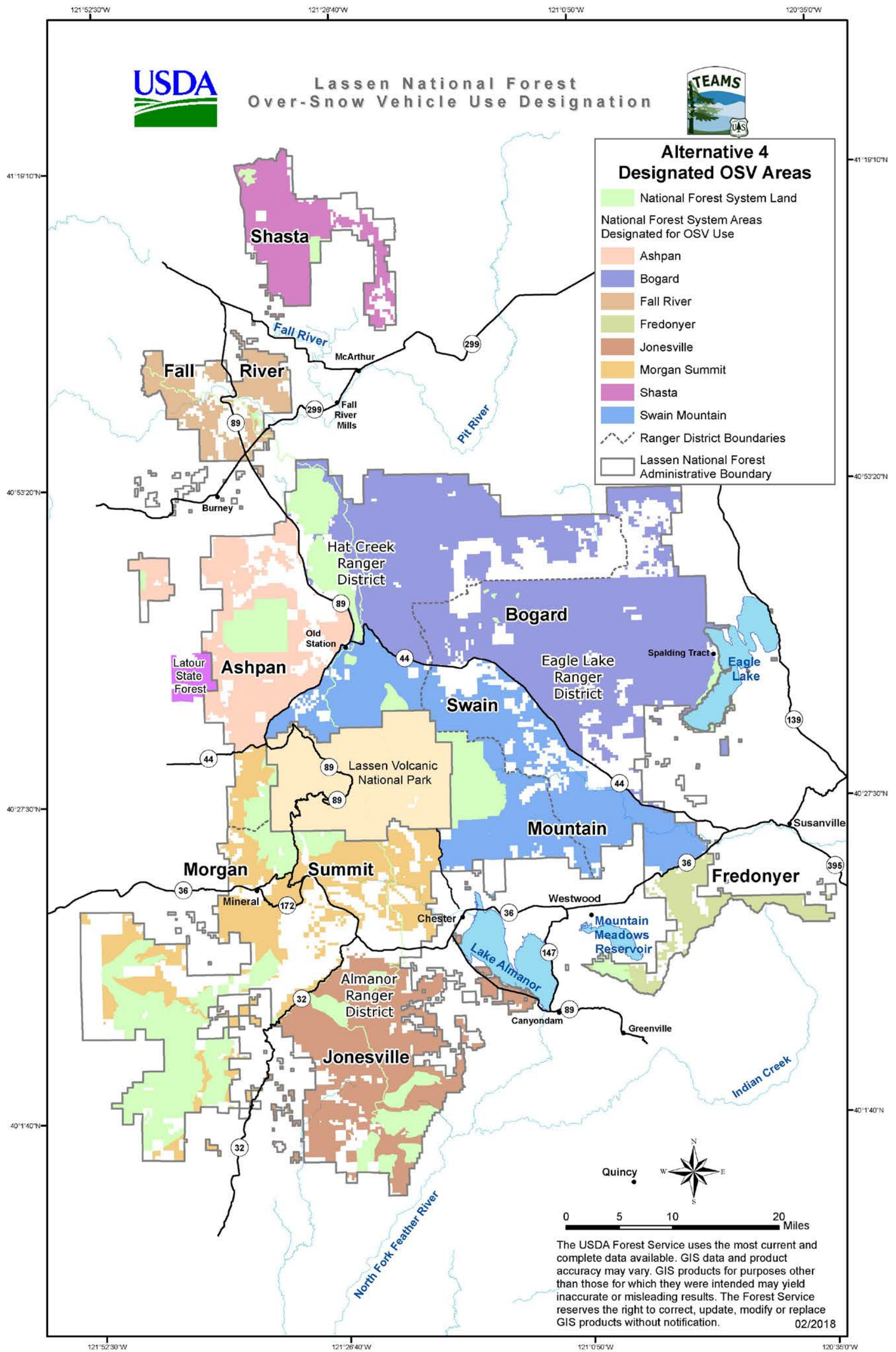


Figure 8. Map distinguishing areas designated for OSV use in alternative 4

Alternative 5

This alternative addresses the non-motorized recreational experience significant issue by not designating areas that may have adequate snow but not consistently throughout winter seasons, not designating areas for OSV use brought up during the objection process to avoid conflicts with motorized uses, and not designating areas for additional resource protection. We applied the minimization criteria more rigorously to develop Alternative 5 by eliminating areas and trails for designation that did not meet minimization criteria (or where mitigation did not minimize impacts for specific resource concerns). Minimization criteria were applied individually to each area to determine the need for designating or not designating OSV recreation trails and areas. These criteria allowed the forest to weigh socio-economic concerns against resource protection issues for each area independently, and develop areas of designation. This alternative includes the following actions:

1. To designate areas and trails for OSV use.
2. To designate 6 discrete, specifically delineated areas for cross-country OSV use. These areas would encompass 632,400 acres. This land area would represent approximately 55 percent of the NFS land within the Lassen National Forest.
3. To designate 393 miles of snow trails for public OSV use.
4. 1,677 miles of trails would be open to OSV use in areas designated for cross-country OSV use, but these trails would not be designated. These trails would overlie existing maintenance level 2, 3, and 4 NFS roads that are not plowed in winter.
5. To mechanically groom 350 miles of snow trails public OSV use. We would groom approximately 27 miles of snow trails for OSV use that would not be designated for OSV use because we do not have jurisdiction over these trails.
6. The minimum snow depth for snow trail grooming would be 12 inches.
7. The minimum snow depth for public OSV use on designated snow trails would be 12 inches.
8. The minimum snow depth for OSV use in areas designated for public, cross-country OSV use would be 12 inches.
9. Current snow depths would be determined by a combination of weather station data, observations at trailheads by staff, and when the conditions meet state requirements for grooming. The Forest Service would encourage or discourage OSV use based on conditions through Forest Service and partnership websites.
10. No areas below the elevation of 3,500 feet would be designated for OSV use. No winter deer range would be designated for OSV use. For the Bogard Area, this would include the small area located between the 3,500-foot elevation and winter deer range.
11. To designate no areas for public cross-country OSV use that would be within 500 feet of the PCT.
12. To designate up to 12 OSV trails that would cross the PCT to provide connectivity to designated OSV areas without having to travel long distances to go around the PCT. Approximate locations of these trails have been identified to ensure greater safety in winter conditions and to facilitate the least difficult and most expedient access for OSV use between areas designated for OSV use. All of these trails would be located consistent with the guidelines in the Comprehensive Management Plan for the Pacific Crest National Scenic Trail (USDA Forest Service 1982). The PCT would be crossed by OSV trails no more frequently than ½-mile intervals.

13. In areas under Forest Service jurisdiction, the designated OSV trails crossing the PCT would occur in areas adjacent to the PCT that are not designated for cross-country OSV use. OSV use would be restricted only to the designated trail in these areas. All but 0.1 mile of these trails would overlie NFS roads or trails currently designated for wheeled motorized vehicle use in the Lassen National Forest's Motor Vehicle Use Map. All designated OSV trails would follow the most direct approach across the PCT. Assuming 12 of these trails would be designated, the total designated mileage of OSV trails crossing the PCT and the non-designated areas adjacent to it would be 3.8 miles.
14. The McGowan Cross-country Ski Trails, including NFS Roads 30N16, 29N22, 29N64, 29N64Y, 29N22A, 29N22C, and an unnamed loop northeast of Christie Hill would not be designated for OSV use. Over-snow vehicles using the designated OSV area west of NFS Road 30N35 would be allowed to cross the McGowan Cross-Country ski trail as it overlies NFS Road 30N16, but would not be allowed to use it as an OSV trail. None of the McGowan Cross-country Ski Trails would be designated for OSV use.
15. The Bizz Johnson Ski Trail would not be designated for OSV use from Susanville to Westwood Junction. However, OSVs would be allowed to cross the Bizz Johnson trail on designated OSV trails and in areas designated for OSV use from Susanville to Westwood Junction.

Table 11. Summary of alternative 5

Designated Area Name	OSV Areas Designated (Acres)	OSV Trails Designated (Miles)	Groomed OSV Trails (Miles)
Ashpan	82,380	47.4	57.4
Bogard	243,620	26.6	26.6
Fall River	-	0.0	0.0
Fredonyer	22,570	48.4	43.7
Jonesville	93,940	64.3	68.2
Morgan Summit	82,570	83.7	62.1
Shasta	-	0	0
Swain Mountain	107,320	122.7	91.8
Total	632,400	393.1	349.7
Percent of Total Forest Designated	55%		

Alternative 5 would designate the highest mileage of snow trail for OSV use of all four of the action alternatives. This is because this alternative would also designate the fewest acres of NFS land for cross-country OSV use. We designed the trail system under this alternative so we could (1) maintain existing OSV trails to serve as connections between traditionally popular designated OSV areas through areas that would not be designated for cross-country OSV use in this alternative, and (2) allow continued use of existing popular OSV trails through areas that would not be designated for cross-country OSV use in this alternative. Therefore, to attain these two objectives, we designated more OSV trail in this alternative. OSV use through these non-designated areas would be restricted to the trail only.

General project mitigations and monitoring procedures are described in appendices C, D and F of this document.

The decision to select this alternative would only apply to the public use of OSVs as defined in the Forest Service's Travel Management Regulations (36 CFR §212.1). This alternative is shown on the map in figure 9.

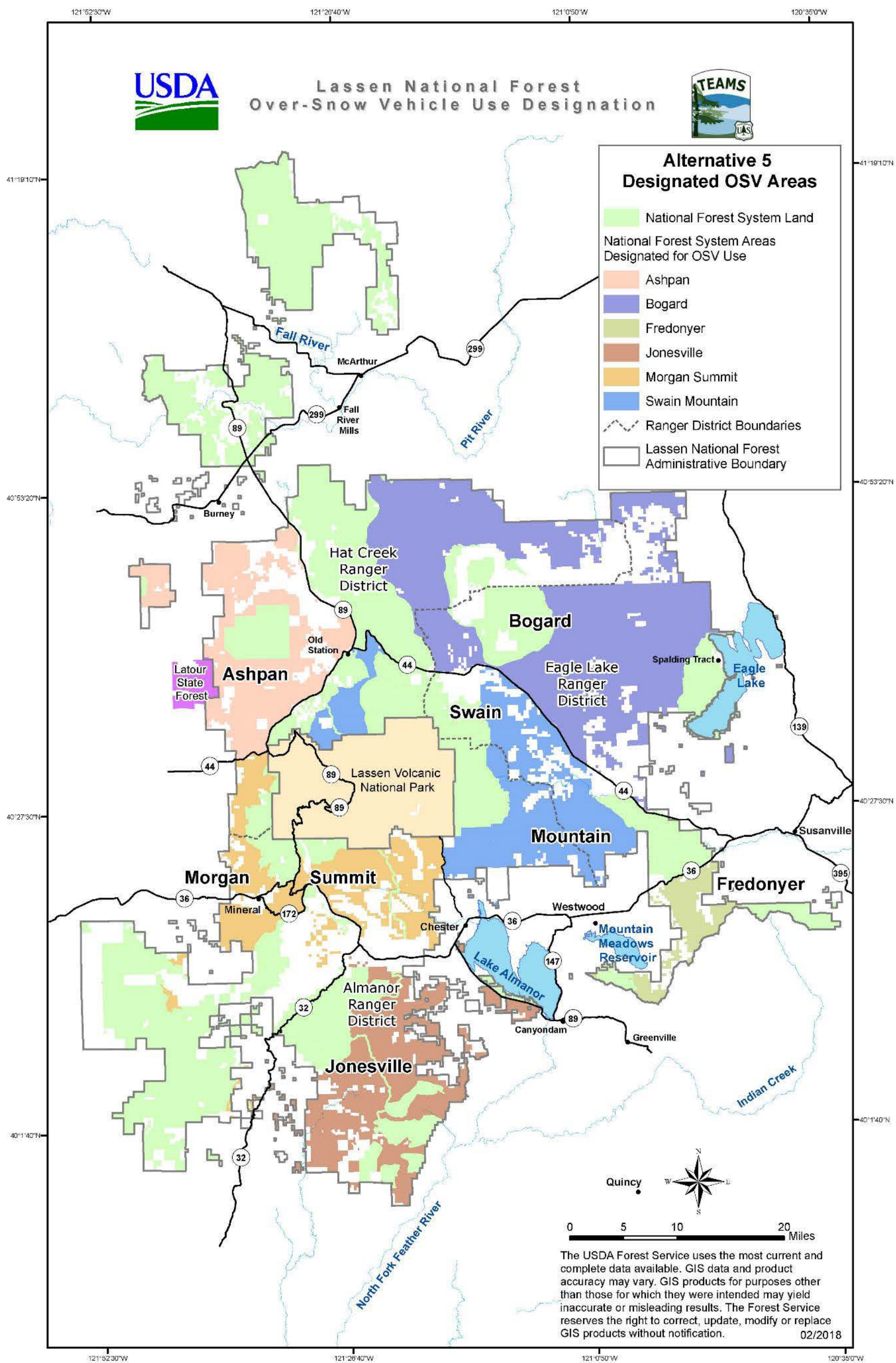


Figure 9. Map distinguishing areas designated for OSV use in alternative 5

Alternatives or Alternative Components Considered but not Analyzed in Detail

We carefully considered each of the public suggestions discussed below to determine whether the suggestion should be carried forward into detailed analysis or eliminated from further consideration. Those carried forward into detailed analysis could become a new alternative or part of a revision to the proposed action.

For an alternative to be analyzed in detail, it must meet the purpose and need for action, must address one or more significant issues, and should reduce the potential for significant impacts. Reasonable alternatives include those that are practical or feasible from a technical and economic standpoint and use common sense; they do not necessarily have to be within agency jurisdiction to implement.

Alternatives not considered in detail in an EIS may include, but are not limited to, those that fail to meet the purpose and need, are technologically infeasible or illegal, or would result in unreasonable environmental harm.

The suggested alternatives and the rationale for elimination from detailed study are summarized below.

1. A comment asked us to 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 rails are prioritized for grooming based on visitor use.” These dates are consistent with the previous wheeled, motorized vehicle travel management decision (Travel Management Regulations, 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 wheeled, motorized vehicle travel decision. For these reasons, this suggestion was eliminated from further detailed analysis.

2. A comment asked us to consider ensuring OSV use designations avoid municipal watersheds.

This suggestion was eliminated from further analysis because there are no designated municipal watersheds in the project area. Water quality is a non-significant issue and the effects of OSV use on water quality are briefly considered in chapter 3.

3. 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 for public cross-country OSV use is necessary to provide adequate snow cover 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 public OSV use. For these reasons, this suggestion was eliminated 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 mitigations have also been developed to ensure resource impacts are minimized as well.

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

We considered this suggestion and developed alternatives 3 and 5 that are included for detailed analysis in this RFEIS. However, not all aspects of this suggested alternative are within the scope of the analysis, as described below, and these specific components have been eliminated 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 system of snow trails and areas for public OSV use 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, Subpart C. Therefore, this feature is not included in any of the alternatives to be analyzed in detail.
- ◆ Monitoring of ambient air quality and noise near trails, in trailheads, and in OSV areas with heavy OSV 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 system of snow trails and areas for public OSV use 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, Subpart C. The Forest Service has no regulatory jurisdiction over air quality or noise. There are no standards that 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 Final EIR (2010), Appendix C). Therefore, this feature is not included in an alternative to be analyzed in detail. This RFEIS, however, examines effects on air quality and noise from the modified proposed action and alternatives to the modified proposed action, including the indirect effects of changes in air quality and noise levels on forest resources.
- ◆ Transition to cleaner and quieter OSVs through encouragement of best available technology (BAT) forestwide to reduce air and noise pollution. Exception is in the “Managed Shared Use” area where air quality and noise monitoring every five years will determine whether mandatory BAT would be needed.
 - The imposition of BAT requirements is outside the scope of the purpose and need for action, which is to provide a manageable, designated system of snow trails and areas for public OSV use 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, Subpart C. The regulation of BAT, 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 is not included in any alternatives 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 system of snow trails and areas for

public OSV use 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, Subpart C. Therefore, this feature is not included in any alternatives 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)). Therefore, all existing rights of access will be honored as part of this decision. Granting additional rights to access is outside the scope of the purpose and need for action, which is to provide a manageable, designated system of snow trails and areas for public OSV use 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, Subpart C. Therefore, this feature is not included in any alternative to be analyzed in detail. Under the scope of this project, the Forest Service would only designate trails under Subpart C of the Travel Management Regulations that are available for public use. Therefore, designating trails 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 Regulations.
- ♦ 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.”
 - The suggestion recommends that 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.”
 - The suggestion recommends that 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.”
 - The suggestion recommends that 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 trails, 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 would result in areas and trails that are clearly designated for public OSV use and use inconsistent with those designations would be prohibited under 36 CFR §261.14. 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 the objectives of the commenter’s alternative in the identified areas. As discussed above, the creation of separate, non-motorized trailheads and the

transition to cleaner and quieter OSVs through the encouragement of BAT are outside the scope of the purpose and need. This feature is, therefore, not included in any alternative to be analyzed in detail. However, alternatives 3 and 5 include the restrictions on public OSV use sought by the commenter for the same geographic areas.

- ◆ A 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 manageable, designated system of snow trails and areas for public OSV use 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, 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 the previous recommendation. Therefore, this feature is not included in any alternative to be analyzed in detail. However, alternatives 3 and 5 include the restrictions on public OSV use sought by the commenter for the Willard Hill area.

5. Segregate motorized and non-motorized use groups by designating separate trailheads, separate trails, and/or separate areas. Designate specific areas as snow play 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 snow play areas are outside the scope of this project. This analysis is focused on the designation of snow trails and areas for public OSV use. For this reason, this suggestion has been eliminated from further detailed analysis.

6. Ensure OSV trail 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 RFEIS.

7. 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.

8. Consider a “no OSV use” alternative.

The agency recognizes that OSV travel is a legitimate use of the national forests. The purpose and need for action in these designations is to “effectively manage public OSV use on the Lassen National Forest. Effective management would provide public OSV 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” (see page 45).

A reasonable alternative must address the purpose and need for action. An alternative that would not designate any trail or area on the Lassen National Forest for OSV use would be an action alternative because an action would be required to implement this alternative on the forest. However, a “no OSV use” action alternative would not address the purpose and need for action, and was therefore, not considered reasonable.

9. Consider designating all of the approximately 2,933 miles of snow trail on the forest for OSV use.

We considered this suggestion, but because many of these trails would be unmarked, non-groomed, and located in areas where cross-country OSV use would be allowed, the agency sees no need to designate them.

Although not designated, these trails would be open to OSV use if they are located in areas that would be designated for cross-country OSV use. They overlie roads in maintenance level categories 2, 3, and 4 that are not plowed in winter. The mileage of these trails that would be open to OSV use would vary by alternative. The second to last row of table 13, which starts on page 56, shows the mileage of these trails that would be designated for OSV use under each alternative.

- ♦ Many of these trails are non-groomed trails that 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-National Forest System land). Establishment of Forest Service jurisdiction would be required for these trails to be designated for OSV use under Subpart C.

10. Consider an alternative that does not require a minimum of 12 inches of snow for OSV trail grooming.

- ♦ The 12-inch snow depth for trail grooming is a standard set by the State of California, which funds the grooming program. The Forest Service is obligated to follow this standard in its OSV grooming program.

11. Prohibit OSV use in a 2.5-mile radius around the southwest Visitors’ Center of Lassen Volcanic National Park.

- ♦ Currently, there is no public OSV use allowed within a 2.5-mile radius of the southwest Visitors’ Center in any alternative. A review of the map of Lassen Volcanic National Park shows the Visitors’ Center approximately 1 mile inside the park boundary. No public OSV use is allowed within the park boundary. Outside the park boundary, no trail or area within 1.5 additional miles from the Visitors’ Center would be designated for OSV use. For these reasons, this suggestion was eliminated from further detailed analysis.

12. Consider an alternative that would prohibit OSV use on the PCT, but allow OSVs to cross this trail at any point where it would be accessible to OSVs.

- ♦ In order to provide for the nature and purposes of the PCT, including the legislative requirement for the trail to be non-motorized, designated OSV trails across the PCT are required to prevent motorized use along the trail. The Pacific Crest National Scenic Trail Comprehensive Plan recommends that we identify and designate public OSV trails across the PCT.

Comparison of Alternatives

Table 12. Comparison of areas to be designated for OSV use, by alternative (acres)

Areas Designated for OSV Use	Alternative 1 Open to OSV Use Under Current Management*	Alternative 2 OSV Designations	Alternative 3 OSV Designations	Alternative 4 OSV Designations	Alternative 5 OSV Designations
National Forest System Land Area within Administrative Boundary of Lassen National Forest (acres)	1,150,020	1,150,020	1,150,020	1,150,020	1,150,020
Total Designated OSV Areas	964,030	920,260	833,280	955,470	632,400
• Ashpan	82,910	82,910	82,380	82,910	82,380
• Bogard	331,850	327,480	327,770	330,180	243,620
• Fall River	42,440	40,480	17,570	42,440	-
• Fredonyer	30,030	30,030	29,350	30,030	22,570
• Jonesville	122,550	116,850	115,500	121,750	93,940
• Morgan Summit	125,220	94,790	90,230	119,130	82,570
• Shasta	56,820	56,820	48,620	56,820	-
• Swain Mountain	172,210	170,900	121,860	172,210	107,320
Percentage of Lassen National Forest where OSV Use would be Designated	84%	80%	72%	83%	55%

*Because no Subpart C designations of areas for OSV use have been made, areas are not "designated," but are either "open" or "closed" to OSV use under current management. All area size estimates are approximate and are rounded to the nearest 10 acres.

Table 13. Comparison of trails to be designated for OSV use, by alternative (miles)⁹

Snow Trails Designated for OSV Use	Area Location	Alternative 1 Open to OSV Use Under Current Management*	Alternative 2 OSV Designations	Alternative 3 OSV Designations	Alternative 4 OSV Designations	Alternative 5 OSV Designations
Grand Total	All	405.7	334.4	383.2	380.3	393.1
26N02	Jonesville	3.7	2.5	2.5	2.5	2.5
26N27	Jonesville	9.1	5.0	5.0	5.0	5.0
26N31	Jonesville	5.6	0.8	0.8	0.8	0.8
26N35	Jonesville	5.8	4.8	4.8	4.8	4.8
26N74	Jonesville	-	0.3	-	-	0.3
27N03	Jonesville	1.6	1.2	1.2	1.2	1.2
27N04	Jonesville	6.8	6.6	6.6	6.6	6.6
27N06	Jonesville	5.4	5.3	5.3	5.3	5.3
27N11	Jonesville	11.0	11.2	11.8	11.8	11.8
27N11G	Jonesville	-	0.2	-	-	0.2
27N43	Jonesville	37.7	16.0	16.0	16.0	16.0
27N65	Jonesville	10.0	9.7	9.7	9.7	9.7
280310UC03	Morgan Summit	4.1	0.2	0.2	0.2	0.2
28N08	Fredonyer	-	-	-	0.2	0.2
28N08 on Plumas	Fredonyer	16.0	11.2	11.2	10.9	10.9
28N16	Morgan Summit	-	0.6	-	-	0.6
28N28	Morgan Summit	4.6	4.2	4.2	4.2	4.2
28N61	Morgan Summit	-	0.8	-	-	0.8
28N70	Morgan Summit	4.5	4.2	4.2	4.2	4.2
29N03	Fredonyer	7.1	6.3	6.3	6.3	6.3
29N09	Swain Mountain	4.2	0.2	0.2	0.2	0.2
29N10	Fredonyer	-	4.8	4.8	4.8	4.8

⁹ An entry of 0.0 miles indicates a designated OSV trail less than 0.05 mile in length, rounded to the nearest 0.1 mile. A hyphen indicates no designated OSV trail in the alternative.

Snow Trails Designated for OSV Use	Area Location	Alternative 1 Open to OSV Use Under Current Management*	Alternative 2 OSV Designations	Alternative 3 OSV Designations	Alternative 4 OSV Designations	Alternative 5 OSV Designations
Grand Total	All	405.7	334.4	383.2	380.3	393.1
29N17	Morgan Summit	-	0.1	-	-	0.1
29N17J	Morgan Summit	-	0.0	-	-	0.0
29N20Y	Fredonyer	7.3	4.3	4.3	4.3	4.3
29N27	Morgan Summit	-	0.0	-	-	0.0
29N44	Morgan Summit	9.1	6.8	6.8	6.8	6.8
29N46	Fredonyer	14.7	13.0	13.0	13.0	13.0
29N46G	Fredonyer	0.7	0.4	0.4	0.4	0.4
29N48	Morgan Summit	26.5	25.7	25.7	25.7	25.7
29N55	Swain Mountain	5.1	4.0	4.0	4.0	4.0
29N57	Morgan Summit	1.6	0.6	0.9	0.6	0.6
29N58	Morgan Summit	8.5	1.1	1.1	1.1	1.1
29N60	Morgan Summit	7.9	4.9	4.9	4.9	4.9
29N60A	Morgan Summit	-	-	0.5	-	-
29N62	Morgan Summit	4.3	2.4	2.4	2.4	2.4
29N67	Morgan Summit	4.7	2.0	2.0	2.0	2.0
29N84YA	Fredonyer	3.8	0.4	0.4	0.4	0.4
29N85	Fredonyer	8.9	7.7	7.7	7.7	7.7
29N91	Morgan Summit	1.0	0.9	0.9	0.9	0.9
29N97	Morgan Summit	-	0.2	-	-	0.2
30N03	Swain Mountain	4.8	4.6	4.6	4.6	4.6
30N06	Swain Mountain	6.6	3.8	3.8	3.8	3.8
30N07	Swain Mountain	14.2	13.8	13.8	13.8	13.8
30N09	Swain Mountain	6.1	5.5	5.5	5.5	5.5
30N25	Swain Mountain	1.8	1.4	1.4	1.4	1.4

Snow Trails Designated for OSV Use	Area Location	Alternative 1 Open to OSV Use Under Current Management*	Alternative 2 OSV Designations	Alternative 3 OSV Designations	Alternative 4 OSV Designations	Alternative 5 OSV Designations
Grand Total	All	405.7	334.4	383.2	380.3	393.1
30N29	Swain Mountain	4.8	4.6	4.6	4.6	4.6
30N31	Swain Mountain	2.1	2.0	2.0	2.0	2.0
30N72	Swain Mountain	11.8	11.7	11.7	11.7	11.7
310314UC01	Morgan Summit	-	-	0.1	0.1	0.1
310314UC07	Morgan Summit	-	-	0.1	0.1	0.1
31N17	Ashpan	-	-	-	0.0	-
31N17	Morgan Summit	-	-	21.7	21.7	21.7
31N17O	Morgan Summit	-	-	0.2	0.2	0.2
320306UC01	Ashpan	3.0	2.9	2.9	2.9	2.9
32N02	Bogard	9.7	9.5	9.5	9.5	9.5
32N07	Bogard	4.2	3.9	3.9	3.9	3.9
32N08	Bogard	6.8	6.8	6.8	6.8	6.8
32N09	Swain Mountain	3.9	3.9	7.7	10.4	7.7
32N10	Bogard	0.0	0.0	-	0.0	0.0
32N10	Swain Mountain	29.3	29.3	29.3	29.3	29.3
32N12	Swain Mountain	-	0.3	-	-	4.8
32N13	Swain Mountain	-	-	-	-	2.1
32N17	Ashpan	-	-	4.8	4.8	4.8
32N17F	Ashpan	-	-	0.5	0.5	0.5
32N20	Swain Mountain	-	0.2	-	-	-
32N21	Swain Mountain	-	-	0.4	0.4	0.4
32N24	Ashpan	7.8	7.8	7.8	7.8	7.8
32N25	Ashpan	2.4	2.4	2.4	2.4	2.4
32N26	Swain Mountain	-	-	0.8	0.8	0.8

Snow Trails Designated for OSV Use	Area Location	Alternative 1 Open to OSV Use Under Current Management*	Alternative 2 OSV Designations	Alternative 3 OSV Designations	Alternative 4 OSV Designations	Alternative 5 OSV Designations
Grand Total	All	405.7	334.4	383.2	380.3	393.1
32N28Y	Bogard	0.6	0.6	0.6	0.6	0.6
32N30	Ashpan	3.2	3.2	3.2	3.2	3.2
32N31	Ashpan	6.2	6.2	6.2	6.2	6.2
32N36	Ashpan	3.3	3.3	3.3	3.3	3.3
32N42Y	Swain Mountain	-	0.2	-	-	0.2
32N44Y	Ashpan	1.3	1.3	1.3	1.3	1.3
32N46	Ashpan	-	-	4.0	4.0	4.0
32N47	Ashpan	0.5	0.5	0.5	0.5	0.5
32N56	Swain Mountain	-	-	3.0	3.0	3.0
32N61	Swain Mountain	-	-	2.3	2.3	2.3
32N63Y	Bogard	0.7	0.7	0.7	0.7	0.7
32N64Y	Bogard	1.2	1.2	1.2	1.2	1.2
32N71	Swain Mountain	-	0.3	-	-	-
32N73	Bogard	3.9	3.9	3.9	3.9	3.9
32N80Y	Swain Mountain	-	-	1.7	1.7	1.7
32N81Y	Swain Mountain	-	-	0.3	0.3	0.3
32N82Y	Swain Mountain	-	-	0.8	0.8	0.8
32N92	Swain Mountain	-	0.2	-	-	0.2
32N92Y	Swain Mountain	-	-	1.1	1.1	1.1
32N98	Swain Mountain	-	-	1.0	1.0	1.0
32N99	Swain Mountain	-	0.2	-	-	-
33N16	Ashpan	9.9	9.9	9.9	9.9	9.9
33N20	Swain Mountain	-	-	2.0	1.9	1.9
33N20A	Swain Mountain	-	-	2.6	0.7	2.6

Snow Trails Designated for OSV Use	Area Location	Alternative 1 Open to OSV Use Under Current Management*	Alternative 2 OSV Designations	Alternative 3 OSV Designations	Alternative 4 OSV Designations	Alternative 5 OSV Designations
Grand Total	All	405.7	334.4	383.2	380.3	393.1
33N22	Swain Mountain	-	0.2	-	-	-
33N56	Swain Mountain	-	-	1.2	0.0	2.4
33N56A1	Swain Mountain	-	-	0.1	-	0.2
33N56C	Swain Mountain	-	-	0.2	-	0.3
34N34	Bogard	-	0.2	-	-	-
34N94	Bogard	-	0.4	-	-	-
35N10	Bogard	-	0.3	-	-	-
36N09	Fall River	-	0.2	-	-	-
36N10	Fall River	-	0.2	-	-	-
36N33B	Fall River	-	0.2	-	-	-
36N36Y	Fall River	-	0.2	-	-	-
37N02	Fall River	-	0.1	-	-	-
37N05	Fall River	-	0.8	-	-	-
37N05C	Fall River	-	0.3	-	-	-
37N52Y	Fall River	-	0.1	-	-	-
CA 172	Morgan Summit	4.3	4.3	4.3	4.3	4.3
Fredonyer Pass connector	Fredonyer	0.0	-	0.5	0.0	-
Fredonyer Pass connector	Swain Mountain	0.5	0.5	-	0.5	0.5
Latour State Forest Trails	Ashpan	0.0	0.0	-	-	0.0
Manzanita Creek Connector	Ashpan	-	-	0.3	0.3	0.3
Manzanita Creek connector	Morgan Summit	-	-	0.1	0.1	0.1
Mineral Summit connector	Morgan Summit	-	-	0.4	-	-
Morgan Summit connector	Morgan Summit	1.0	1.0	1.0	1.0	1.0

Snow Trails Designated for OSV Use	Area Location	Alternative 1 Open to OSV Use Under Current Management*	Alternative 2 OSV Designations	Alternative 3 OSV Designations	Alternative 4 OSV Designations	Alternative 5 OSV Designations
Grand Total	All	405.7	334.4	383.2	380.3	393.1
PL 322A	Swain Mountain	0.5	0.5	0.5	0.5	0.5
TR9763, Bizz Johnson	Swain Mountain	5.2	5.2	5.2	5.2	5.2
UCC571	Swain Mountain	-	-	0.2	-	0.2
UCC572	Swain Mountain	-	-	0.1	-	0.1
UCC587	Swain Mountain	-	-	0.1	-	0.1
ULA186	Morgan Summit	-	-	0.1	-	-
ULA189	Morgan Summit	0.6	0.6	0.6	0.6	0.6
ULA190	Morgan Summit	0.9	0.9	0.9	0.9	0.9
ULA408	Swain Mountain	0.8	0.8	0.8	0.8	0.8
ULA557	Fredonyer	0.4	0.4	0.4	0.4	0.4
UMN790	Swain Mountain	-	-	0.2		0.2
UMN853	Swain Mountain	-	-	0.3	-	0.3
Unnamed Exit - Addition to East Hat Creek	Swain Mountain	-	0.1	-	-	0.1
	Total Ashpan	37.8	37.7	47.3	47.4	47.4
	Total Bogard	27.1	27.5	26.6	26.6	26.6
	Total Fall River	0.0	2.2	0.0	0.0	-
	Total Fredonyer	58.9	48.4	48.9	48.4	48.4
	Total Jonesville	96.7	63.7	63.8	63.8	64.3
	Total Morgan Summit	83.7	61.5	83.2	81.9	83.7
	Total Shasta	-	-	-	-	-
	Total Swain Mountain	101.6	93.5	113.4	112.3	122.7
Total OSV Trails Open but not Designated	Forest-wide	2,527.1	2,509.1	2,199.9	2,534.2	1,676.9

Snow Trails Designated for OSV Use	Area Location	Alternative 1 Open to OSV Use Under Current Management*	Alternative 2 OSV Designations	Alternative 3 OSV Designations	Alternative 4 OSV Designations	Alternative 5 OSV Designations
Grand Total	All	405.7	334.4	383.2	380.3	393.1
Total OSV Trails	Forest-wide	2,932.8	2,843.5	2,583.1	2,914.5	2,070.0

*Because no Subpart C designations of trails for OSV use have been made, trails are not "designated," but are either "open" or "closed" to OSV use under current management. All trail length estimates are approximate and are rounded to the nearest 0.1 mile. Alternative 1 lists 405.7 miles of trails open to OSV use under current management separately for comparison purposes because they are segments of OSV trails considered for designation in one or more action alternatives.

Table 14. Trails designated for OSV use crossing the Pacific Crest National Scenic Trail ¹⁰

OSV Trails Crossing the PCT	Alternative 1 Current Management	Alternative 2 OSV Designations	Alternative 3 OSV Designations	Alternative 4 OSV Designations	Alternative 5 OSV Designations
Designated OSV Trails Across the PCT (#)	No Designated Trails Across the PCT	28	23	28	12
Designated OSV Trails Across the PCT, by Road Name (miles)	-	8.1	6.5	8.1	3.8
• Pit River Canyon Rd. (St Dr 50). No NFS Jurisdiction on Adjacent Land.	-	< 0.1	< 0.1	< 0.1	-
• St. Bernard So Rd. (Collins 1). No NFS Jurisdiction on Adjacent Land.	-	< 0.1	< 0.1	< 0.1	< 0.1
• 26N02	-	0.2	0.2	0.2	0.2
• 26N74	-	0.3	0.3	0.3	0.3
• 27N11	-	0.3	0.3	0.3	0.3
• 27N11G	-	0.2	0.2	0.2	0.2
• 27N43	-	0.6	-	0.6	0.6
• 28N16	-	0.6	0.6	0.6	0.6
• 28N61	-	0.8	0.8	0.8	0.8
• 29N17	-	0.1	0.1	0.1	0.1
• 29N17J	-	0.0	0.0	0.0	0.0
• 29N27	-	0.0	0.0	0.0	0.0
• 29N97	-	0.2	0.2	0.2	0.2
• 32N12	-	0.3	0.3	0.3	-
• 32N20	-	0.2	0.2	0.2	-
• 32N42Y	-	0.2	0.2	0.2	0.2
• 32N71	-	0.3	0.3	0.3	-
• 32N92	-	0.2	0.2	0.2	0.2

¹⁰ An entry of 0.0 miles indicates a designated OSV trail less than 0.05 mile in length, rounded to the nearest 0.1 mile. A hyphen indicates no designated OSV trail in the alternative.

OSV Trails Crossing the PCT	Alternative 1 Current Management	Alternative 2 OSV Designations	Alternative 3 OSV Designations	Alternative 4 OSV Designations	Alternative 5 OSV Designations
• 32N99	-	0.2	0.2	0.2	-
• 33N22	-	0.2	0.2	0.2	-
• 34N34	-	0.2	0.2	0.2	-
• 34N94	-	0.4	0.4	0.4	-
• 35N10	-	0.3	0.3	0.3	-
• 36N09	-	0.2	-	0.2	-
• 36N10	-	0.2	-	0.2	-
• 36N33B	-	0.2	-	0.2	-
• 36N36Y	-	0.2	-	0.2	-
• 37N02	-	0.1	-	0.1	-
• 37N05	-	0.8	0.8	0.8	-
• 37N05C	-	0.3	0.3	0.3	-
• 37N52Y	-	0.1	0.1	0.1	-
• Unnamed Exit - Addition to East Hat Creek	-	0.1	0.1	0.1	0.1
Designated Non-groomed OSV Trails Across the PCT (#)	-	25	20	25	9
Designated Non-groomed OSV Trails Across the PCT (miles)	-	7.0	5.4	7.0	2.7
Designated Groomed OSV Trails Across the PCT (#)	-	3	3	3	3
Designated Groomed OSV Trails Across the PCT (miles)	-	1.1	1.1	1.1	1.1
Groomed, Non-Designated OSV Trails Across the PCT (#)	-	-	-	-	-

* Motorized use would be prohibited on the tread of the PCT except on designated trails across the PCT in all alternatives.
All area size and total trail distance estimates are approximate and are rounded to the nearest 10 acres or nearest 0.1 mile.

Table 15. Length of the Pacific Crest National Scenic Trail within 500 feet of an area designated for OSV use (miles by area)

Areas Designated for OSV Use (North to South)	Alternative 1 Open to OSV Use Under Current Management*	Alternative 2 OSV Designations	Alternative 3 OSV Designations*	Alternative 4 OSV Designations*	Alternative 5 OSV Designations
Fall River	18.05	-	7.34	18.05	-
Bogard	25.02	-	22.94	24.49	-
Swain Mountain	12.18	-	11.97	11.97	-
Morgan Summit	12.89	-	12.89	12.89	-
Jonesville	30.28	-	30.28	30.28	-
Total	98.42	-	85.42	97.68	-

*All trail miles shown under alternatives 1, 3, and 4 would exist immediately adjacent to areas designated for OSV use. A 500-foot wide area along the PCT where OSV use would not be designated would not exist.

Table 16. Comparison of trails to be groomed for OSV use, by alternative (miles)¹¹

Snow Trails identified for OSV Grooming	Area Location	Alternative 1 Groomed Under Current Management	Alternative 2 Groomed	Alternative 3 Groomed	Alternative 4 Groomed	Alternative 5 Groomed
Grand Total	All	349.5	349.7	349.4	349.4	349.7
26N02	Jonesville	2.5	2.5	2.5	2.5	2.5
26N27	Jonesville	5.0	5.0	5.0	5.0	5.0
26N31	Jonesville	0.8	0.8	0.8	0.8	0.8
26N35	Jonesville	4.8	4.8	4.8	4.8	4.8
27N03	Jonesville	1.2	1.2	1.2	1.2	1.2
27N04	Jonesville	6.6	6.6	6.6	6.6	6.6
27N06	Jonesville	5.3	5.3	5.3	5.3	5.3
27N11	Jonesville	11.0	11.2	11.0	11.0	11.2
27N43	Jonesville	21.0	21.0	21.0	21.0	21.0
27N65	Jonesville	9.7	9.7	9.7	9.7	9.7

¹¹ An entry of 0.0 mile indicates a groomed OSV trail less than 0.05 mile in length, rounded to the nearest 0.1 mile. A hyphen indicates no groomed OSV trail in the alternative.

Snow Trails identified for OSV Grooming	Area Location	Alternative 1 Groomed Under Current Management	Alternative 2 Groomed	Alternative 3 Groomed	Alternative 4 Groomed	Alternative 5 Groomed
Grand Total	All	349.5	349.7	349.4	349.4	349.7
280310UC03	Morgan Summit	0.2	0.2	0.2	0.2	0.2
28N08	Fredonyer	-	-	-	0.2	0.2
28N08 on Plumas	Fredonyer	11.2	11.2	11.2	10.9	10.9
28N28	Morgan Summit	4.2	4.2	4.2	4.2	4.2
28N70	Morgan Summit	4.2	4.2	4.2	4.2	4.2
29N03	Fredonyer	6.3	6.3	6.3	6.3	6.3
29N09	Swain Mountain	0.2	0.2	0.2	0.2	0.2
29N20Y	Fredonyer	4.3	4.3	4.3	4.3	4.3
29N44	Morgan Summit	6.8	6.8	6.8	6.8	6.8
29N46	Fredonyer	13.0	13.0	13.0	13.0	13.0
29N46G	Fredonyer	0.4	0.4	0.4	0.4	0.4
29N48	Morgan Summit	27.0	27.0	27.0	27.0	27.0
29N55	Swain Mountain	4.0	4.0	4.0	4.0	4.0
29N57	Morgan Summit	0.6	0.6	0.6	0.6	0.6
29N58	Morgan Summit	1.1	1.1	1.1	1.1	1.1
29N60	Morgan Summit	4.9	4.9	4.9	4.9	4.9
29N62	Morgan Summit	2.4	2.4	2.4	2.4	2.4
29N67	Morgan Summit	2.0	2.0	2.0	2.0	2.0
29N84YA	Fredonyer	0.4	0.4	0.4	0.4	0.4
29N85	Fredonyer	7.7	7.7	7.7	7.7	7.7
29N91	Morgan Summit	0.9	0.9	0.9	0.9	0.9
30N03	Swain Mountain	4.6	4.6	4.6	4.6	4.6
30N06	Swain Mountain	3.8	3.8	3.8	3.8	3.8
30N07	Swain Mountain	13.8	13.8	13.8	13.8	13.8

Snow Trails identified for OSV Grooming	Area Location	Alternative 1 Groomed Under Current Management	Alternative 2 Groomed	Alternative 3 Groomed	Alternative 4 Groomed	Alternative 5 Groomed
Grand Total	All	349.5	349.7	349.4	349.4	349.7
30N09	Swain Mountain	5.5	5.5	5.5	5.5	5.5
30N25	Swain Mountain	1.4	1.4	1.4	1.4	1.4
30N29	Swain Mountain	4.6	4.6	4.6	4.6	4.6
30N31	Swain Mountain	2.0	2.0	2.0	2.0	2.0
30N72	Swain Mountain	11.7	11.7	11.7	11.7	11.7
320306UC01	Ashpan	2.9	2.9	2.9	2.9	2.9
32N02	Bogard	9.5	9.5	9.5	9.5	9.5
32N07	Bogard	3.9	3.9	3.9	3.9	3.9
32N08	Bogard	6.8	6.8	6.8	6.8	6.8
32N09	Swain Mountain	3.9	3.9	3.9	3.9	3.9
32N10	Bogard	0.0	0.0	0.0	0.0	0.0
32N10	Swain Mountain	29.3	29.3	29.3	29.3	29.3
32N24	Ashpan	7.8	7.8	7.8	7.8	7.8
32N25	Ashpan	2.4	2.4	2.4	2.4	2.4
32N28Y	Bogard	0.6	0.6	0.6	0.6	0.6
32N30	Ashpan	3.2	3.2	3.2	3.2	3.2
32N31	Ashpan	6.2	6.2	6.2	6.2	6.2
32N36	Ashpan	3.3	3.3	3.3	3.3	3.3
32N44Y	Ashpan	1.3	1.3	1.3	1.3	1.3
32N47	Ashpan	0.5	0.5	0.5	0.5	0.5
32N63Y	Bogard	0.7	0.7	0.7	0.7	0.7
32N64Y	Bogard	1.2	1.2	1.2	1.2	1.2
32N73	Bogard	3.9	3.9	3.9	3.9	3.9
33N16	Ashpan	9.9	9.9	9.9	9.9	9.9

Snow Trails identified for OSV Grooming	Area Location	Alternative 1 Groomed Under Current Management	Alternative 2 Groomed	Alternative 3 Groomed	Alternative 4 Groomed	Alternative 5 Groomed
Grand Total	All	349.5	349.7	349.4	349.4	349.7
CA 172	Morgan Summit	5.4	5.4	5.4	5.4	5.4
Fredonyer Pass connector	Fredonyer	0.0	-	0.5	0.0	-
Fredonyer Pass connector	Swain Mountain	0.5	0.5	-	0.5	0.5
Latour State Forest Trails	Ashpan	19.7	19.7	19.7	19.7	19.7
Morgan Summit connector	Morgan Summit	1.0	1.0	1.0	1.0	1.0
PL 322A	Swain Mountain	0.5	0.5	0.5	0.5	0.5
TR9763, Bizz Johnson	Swain Mountain	5.2	5.2	5.2	5.2	5.2
ULA189	Morgan Summit	0.6	0.6	0.6	0.6	0.6
ULA190	Morgan Summit	0.9	0.9	0.9	0.9	0.9
ULA408	Swain Mountain	0.8	0.8	0.8	0.8	0.8
ULA557	Fredonyer	0.4	0.4	0.4	0.4	0.4
	Total Ashpan	57.4	57.4	57.4	57.4	57.4
	Total Bogard	26.6	26.6	26.6	26.6	26.6
	Total Fall River	-	-	-	-	-
	Total Fredonyer	43.7	43.7	44.1	43.7	43.7
	Total Jonesville	68.0	68.2	67.9	67.9	68.2
	Total Morgan Summit	62.1	62.1	62.1	62.1	62.1
	Total Shasta	-	-	-	-	-
	Total Swain Mountain	91.8	91.8	91.3	91.8	91.8

Table 17. Summary comparing current OSV management with the action alternatives for minimum snow depth (in inches) and OSV trail grooming season on the Lassen National Forest

OSV Management	Alternative 1 – Current Management	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Minimum Snow Depth for Public OSV Use on Snow Trails (Inches)	No minimum	6 inches on snow trails overlying roads and trails 12 inches on trail not overlying roads or trails	6 inches where site review determines there would be no damage to underlying resources	Depth necessary to avoid resource damage	12
Minimum Snow Depth for Public, Cross-country OSV Use (Inches)	No minimum	12	12	Depth necessary to avoid resource damage	12
Minimum Snow Depth for Snow Trail Grooming to Occur (Inches)	12	12*	18	12	12
OSV Trail Grooming Season	12/26 – 3/31	12/26 – 3/31	12/26 – 3/31	12/26 – 3/31	12/26 – 3/31

*The originally scoped 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" (California OSV Program Final EIR, page 2-12).

Table 18. Summary of comparison of alternatives by environmental effects (ranking alternatives averaged across indicators) (chapter 3)

Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Recreation						
Motorized Recreation Opportunities – Cross-country	Opportunities for motorized winter uses/total area (acres) and minimum snow depth	964,030 acres currently open to public, cross-country OSV use. No minimum snow depth requirement	920,260 acres designated for public cross-country OSV use. Minimum 12 inch snow depth requirement	833,280 acres designated for public cross-country OSV use. Minimum 12 inch snow depth requirement	955,470 acres designated for public cross-country OSV use. Minimum Depth necessary to avoid resource damage	632,400 acres designated for public cross-country OSV use. Minimum 12 inch snow depth requirement
Motorized Recreation Opportunities – Designated Snow Trails	OSV trail designations, length of trails (miles) and minimum snow depth	406 miles of groomed, non-groomed, marked and unmarked OSV trails currently open for OSV use, subject to snow depth restrictions. No minimum snow depth requirement	334 miles of designated OSV snow trails, subject to snow depth restrictions. Minimum 6 inch or more snow depth on snow trails overlying roads and trails	383 miles of designated OSV snow trails, subject to snow depth restrictions. Minimum 6 inches where site review determines there would be no damage to underlying resources	380 miles of designated OSV snow trails, subject to snow depth restrictions. Minimum snow depth necessary to avoid resource damage	390 miles of OSV snow trails, subject to snow depth restrictions. Minimum 12 inch snow depth requirement
Motorized Recreation Opportunities – Groomed Snow Trails	OSV trail grooming, length of trails (miles), and minimum snow depth	349 miles 12 inch snow depth requirement for grooming	349 miles, no change 12 inch snow depth requirement for grooming	349 miles, no change 18 inch snow depth requirement for grooming	349 miles, no change 12 inch snow depth requirement for grooming	349 miles, no change 12 inch snow depth requirement for grooming

Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Recreation						
Non-motorized Recreation Opportunities - Displacement	Access to desired non-motorized recreation settings and opportunities Total area (acres) and length of trails (miles) available to non-motorized recreation enthusiasts within 5 miles of plowed trailheads	Six plowed trailheads provide access for all winter uses. 10,346 acres available for non-motorized recreation within 5 miles of plowed trailheads 18.3 miles of cross-country ski trails and 15.6 miles of the PCT available for non-motorized recreation within 5 miles of plowed trailheads	Six plowed trailheads provide access for all winter uses. 12,164 acres available for non-motorized recreation within 5 miles of plowed trailheads. 18.3 miles of cross-country ski trails and 15.6 miles of the PCT available within 5 miles of plowed trailheads	Six plowed trailheads provide access for all winter uses. 39,317 acres available for non-motorized recreation within 5 miles of plowed trailheads. 18.3 miles of cross-country ski trails and 15.6 miles of the PCT available within 5 miles of plowed trailheads	Six plowed trailheads provide access for all winter uses. 15,082 acres available for non-motorized recreation within 5 miles of plowed trailheads. 18.3 miles of cross-country ski trails and 15.6 miles of the PCT available within 5 miles of plowed trailheads	Six plowed trailheads provide access for all winter uses. 52,454 acres available for non-motorized recreation within 5 miles of plowed trailheads. 18.3 miles of cross-country ski trails and 15.6 miles of the PCT available within 5 miles of plowed trailheads
Recreation Opportunity Spectrum	Consistency with ROS class	Consistent	Consistent	Consistent	Consistent	Consistent
Non-motorized Recreation Conflicts - Public Safety	Total area (acres) and length of trails (miles) available to non-motorized recreation enthusiasts for quality non-motorized recreation experiences	185,990 acres not designated for OSV use, a total of 148 miles of trail for non-motorized use.	229,760 acres, a 23.5 percent increase/ six non-motorized trails with a total of 148 miles of trail for non-motorized use.	316,740 acres, a 41.2 percent increase/ six non-motorized trails with a total of 148 miles of trail for non-motorized use.	194,550 acres, 4.6 percent increase/ six non-motorized trails with a total of 148 miles of trail for non-motorized use.	517,620 acres, 178 percent increase/ six non-motorized trails with a total of 148 miles of trail for non-motorized use.

Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Recreation						
Non-motorized recreation conflicts – potential due to overlap	Total area (acres) accessible to non-motorized winter enthusiasts (within 5 miles of plowed trailheads) that are designated for OSV use. Percent change from existing conditions	169,951 acres	168,133 acres 1 percent decrease in overlap	140,980 acres 17 percent decrease in overlap	153,455 acres 10 percent decrease in overlap	127,851 acres 25 percent decrease in overlap
Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Non-motorized Areas	Proximity and frequency of OSV designations in relation to non-motorized areas Distance of groomed public OSV snow trails from non-motorized areas under existing law or policy, or number of designated trails across non-motorized linear areas under existing law or policy	A total of approximately 9 miles of groomed OSV trails within 1/2 mile of Wilderness and proposed wilderness boundaries Lassen Volcanic National Park: Groomed OSV trails ¾ mile east of the park's southeast corner, and 1 1/2 miles north of the park's northwest corner. No designated OSV trails across the PCT. 98.42 miles of the PCT are within 500 feet of an area designated for OSV use.	A total of approximately 9 miles of groomed OSV trails within 1/2 mile of Wilderness and proposed wilderness boundaries Lassen Volcanic National Park: Groomed OSV trails ¾ mile east of the park's southeast corner, and 1 1/2 miles north of the park's northwest corner. Up to 28 designated OSV trails across the PCT. No areas designated for cross-country OSV use within 500 feet of the PCT.	A total of approximately 9 miles of groomed OSV trails within 1/2 mile of Wilderness and proposed wilderness boundaries Lassen Volcanic National Park: Groomed OSV trails ¾ mile east of the park's southeast corner, and 1 1/2 miles north of the park's northwest corner. Up to 23 designated OSV trails across the PCT. 85.4 miles of the PCT are within 500 feet of an area designated for OSV use.	A total of approximately 9 miles of groomed OSV trails within 1/2 mile of Wilderness and proposed wilderness boundaries Lassen Volcanic National Park: Groomed OSV trails ¾ mile east of the park's southeast corner, and 1 1/2 miles north of the park's northwest corner. Up to 28 designated OSV trails across the PCT. 97.7 miles of the PCT are within 500 feet of an area designated for OSV use.	A total of approximately 9 miles of groomed OSV trails within 1/2 mile of Wilderness and proposed wilderness boundaries Lassen Volcanic National Park: Groomed OSV trails ¾ mile east of the park's southeast corner, and 1 1/2 miles north of the park's northwest corner. Up to 12 designated OSV trails across the PCT. No areas designated for cross-country OSV use within 500 feet of the PCT.

Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Recreation						
Noise	Total area (acres) potentially affected by noise/total area (acres) not designated for winter motorized use	964,030 acres currently open to OSV use, potentially affected by noise.	920,260 acres designated for OSV use, potentially affected by noise.	833,280 acres designated for OSV use, potentially affected by noise.	955,470 acres designated for OSV use, potentially affected by noise.	632,400 acres designated for OSV use, potentially affected by noise.
Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Non-motorized Areas	Air Quality Qualitative/narrative description of potential impacts (with reference to air quality analysis)	Potential short-term impacts to the experience of recreational visitors in the vicinity of OSV and grooming equipment due to the smell of exhaust emissions (see air quality report (project record)).	Potential short-term impacts to the experience of recreational visitors in the vicinity of OSV and grooming equipment due to the smell of exhaust emissions.	Potential short-term impacts to the experience of recreational visitors in the vicinity of OSV and grooming equipment due to the smell of exhaust emissions.	Potential short-term impacts to the experience of recreational visitors in the vicinity of OSV and grooming equipment due to the smell of exhaust emissions.	Potential short-term impacts to the experience of recreational visitors in the vicinity of OSV and grooming equipment due to the smell of exhaust emissions.
Scenery	Qualitative/ narrative description of potential visual impacts	Cross-country OSV use creates temporary tracks in the snow that crisscross the landscape. The visual evidence of OSV use decreases as fresh snow covers the tracks and/or when the snow melts at the end of the season.	Fewer acres designated for cross-country OSV use, and associated visual impacts than in existing conditions.	Fewer acres designated for cross-country OSV use, and associated visual impacts than in existing conditions.	Slightly fewer acres designated for cross-country OSV use, and associated visual impacts than in existing conditions.	Substantially fewer acres designated for cross-country OSV use, and associated visual impacts than in existing conditions.
Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Non-motorized Areas	Wilderness Attributes Total area (acres) affected and duration of impact. Qualitative description for Wilderness attributes	27,108 acres currently open to OSV use within ½ mile of designated and proposed wilderness boundaries.	21,266 acres designated for OSV use within ½ mile of designated and proposed wilderness boundaries.	19,173 acres designated for OSV use within ½ mile of designated and proposed wilderness boundaries.	25,575 acres designated for OSV use within ½ mile of designated and proposed wilderness boundaries.	17,257 acres designated for OSV use within ½ mile of designated and proposed wilderness boundaries.

Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Recreation						
Roadless Characteristics	Total IRA area (acres) Designated for OSV Use	72,969	59,746	58,291	72,681	28,609
Transportation and Engineering						
Safety	Public Safety & Traffic	A reasonable level of public safety and avoidance of traffic conflicts	A reasonable level of public safety and avoidance of traffic conflicts	A reasonable level of public safety and avoidance of traffic conflicts	A reasonable level of public safety and avoidance of traffic conflicts	A reasonable level of public safety and avoidance of traffic conflicts
Cost	Affordability	Minor effects.	Minor effects.	Minor effects.	Minor effects.	Minor effects.
Transportation Property	Effects to Underlying NFS Roads and Trails	Minimum operating snow depths provide adequate protection of underlying roads and trails.	Minimum operating snow depths provide adequate protection of underlying roads and trails.	Minimum operating snow depths provide adequate protection of underlying roads and trails.	Minimum operating snow depths provide adequate protection of underlying roads and trails.	Minimum operating snow depths provide adequate protection of underlying roads and trails.
Noise						
Opportunities for Motorized Winter Uses	Size of areas (acres) open to/designated for public, cross-country OSV use; percentage change compared to current management	964,030 acres open to OSV use	920,260 acres designated for OSV use and potentially affected by noise, a 4.5 percent decrease from existing conditions.	833,280 acres designated for OSV use and potentially affected by noise, a 13.5 percent decrease from existing conditions.	955,470 acres designated for OSV use and potentially affected by noise, a 0.8 percent decrease from existing conditions.	632,400 acres designated for public cross-country OSV use, subject to snow depth restrictions, a 34 percent decrease from existing conditions.
OSV Trail Designations	Length of snow trails (miles), groomed and ungroomed, open/designated for public OSV use	405 miles open /349 miles groomed	334 miles designated /349 miles groomed	383 miles designated /349 miles groomed	380 miles designated /349 miles groomed	390 miles designated/ 349 miles groomed

Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Soil Resources						
Soil Productivity and Soil Stability	Acres designated for cross-country OSV travel on sensitive soils (including wet meadows, areas with potential low stability, and areas with potential erosion hazards).	53,902	52,964	40,590	53,507	33,221
Soil Stability	Minimum snow depths on trails (inches)	No enforced minimum snow depth prior to any OSV travel over existing roads and trails.	6 inches on snow trails overlying roads	6 inches on snow trails overlying roads	The depth necessary to avoid underlying resource damage	12
Soil Productivity	Minimum snow depths for cross-country travel (inches)	No minimum	12	12	The depth necessary to avoid underlying resource damage	12
Soil Productivity	Total Acres Designated for OSV Use	964,030	920,260	833,280	955,470	632,400

Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Air Quality						
Air Quality	Potential to create adverse impacts to air quality based on miles of trail designated for OSV use	405 miles open to OSV use.	17 percent reduction in miles as compared to the existing condition.	5 percent reduction in miles as compared to the existing condition.	6 percent reduction in miles as compared to the existing condition.	3 percent reduction in miles as compared to the existing condition.
	Potential to create adverse impacts based on acres designated for OSV use.	964,030 acres open to OSV use.	5 percent reduction in acres from current management.	14 percent reduction from current management.	<1 percent reduction from current management.	3 percent reduction from current management.
	Potential effects of OSV emissions to create adverse impacts (Class 1 and II areas).	Groomed OSV trails are in close proximity to Wilderness, and the boundary of Lassen Volcanic National Park.	Groomed OSV trails are in close proximity to Wilderness, and the boundary of Lassen Volcanic National Park.	Groomed OSV trails are in close proximity to Wilderness, and the boundary of Lassen Volcanic National Park.	Groomed OSV trails are in close proximity to Wilderness, and the boundary of Lassen Volcanic National Park.	Groomed OSV trails are in close proximity to Wilderness, and the boundary of Lassen Volcanic National Park.
Socioeconomic Conditions						
Economic Activity	Employment, Income, Tax Revenue	No change	No change	No change	No change	No change
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	No change due to management; visitor use expected to increase over time
Quality of Life	Values, Beliefs, and Attitudes	No net change	Benefit to quality of life of non-motorized winter recreation enthusiasts and may adversely affect quality of life for OSV enthusiasts	Benefit to quality of life of non-motorized winter recreation enthusiasts and may adversely affect quality of life for OSV enthusiasts	No net change in quality of life; use conflict may increase	Benefit quality of life of non-motorized winter recreation enthusiasts and may adversely affect OSV enthusiasts
Environmental Justice	Low-income and Minority Populations	No change	Minor change	Potential increase in travel costs	Minor change	Potential increase in travel costs

Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Water Resources						
Riparian Conservation Objectives 1, 2, 4, 5, and 6	Consistency	Consistent	Consistent	Consistent	Consistent	Consistent
Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Botanical Resources						
Threatened and Endangered plants and Designated Critical Habitat	Species Presence and effects to Primary Constituent Elements	No Effect	No Effect	No Effect	No Effect	No Effect
Sensitive Plants	Trees, Shrubs, Sub-shrubs Aquatic Plants	May Affect, no trend toward Federal listing	May Affect, no trend toward Federal listing	May Affect, no trend toward Federal listing	May Affect, no trend toward Federal listing	May Affect, no trend toward Federal listing
Sensitive Plants	Perennial Herbaceous	No Impacts or May Affect, no trend toward Federal listing	No Impacts or May Affect, no trend toward Federal listing	No Impacts or May Affect, no trend toward Federal listing	No Impacts or May Affect, no trend toward Federal listing	No Impacts or May Affect, no trend toward Federal listing
Sensitive Plants	Annual Plants	No Impacts	No Impacts	No Impacts	No Impacts	No Impacts
Survey and Manage Plants and Fungi		No Impacts	No Impacts	No Impacts	No Impacts	No Impacts
Special Interest Plants	Trees, Shrubs, and Sub-shrubs Perennial Herbaceous Annual Plants	Not affected or May be affected, not contributing to a downward trend	Not affected or May be affected, not contributing to a downward trend	Not affected or May be affected, not contributing to a downward trend	Not affected or May be affected, not contributing to a downward trend	Not affected or May be affected, not contributing to a downward trend
Special Interest Plants	Aquatic Plants	Not affected	Not affected	Not affected	Not affected	Not affected
Invasive Plant Species		Very low risk	Very low risk	Very low risk	Very low risk	Very low risk

Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Botanical Resources						
Botanical Special Interest Areas		Not affected	Not affected	Not affected	Not affected	Not affected
Research Natural Areas		Not affected	Not affected	Not affected	Not affected	Not affected
Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Cultural Resources						
	Effects to cultural resources	No adverse effect	No adverse effect	No adverse effect	Adverse effect to cultural resources	No adverse effect

Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Terrestrial Wildlife¹²						
Listed Wildlife Species	Northern spotted owl Gray wolf	NLAA	NLAA	NLAA	NLAA	NLAA-B
Listed Wildlife Species	Northern spotted owl Designated Critical Habitat	NE	NE	NE	NE	NE
Proposed Threatened and Sensitive Wildlife Species	North American wolverine	NJ	NJ	NJ	NJ	NJ
Sensitive Wildlife Species	Mammals, Reptiles and Birds (except as disclosed below)	MII	MII	MII	MII	MII

¹² NE=No Effect; NLAA=May affect, not likely to adversely affect; NLAA-B= May affect, not likely to adversely affect, Beneficial effect; NJ=Will not jeopardize; MII=May impact individuals, but not likely to lead to a loss of viability or a trend toward Federal listing; NI=No Impact

Resource/ Condition	Impacts Considered/ Indicators	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Terrestrial Wildlife¹²						
Sensitive Wildlife Species	Birds <ul style="list-style-type: none"> • Willow flycatcher • Greater Sandhill crane • Yellow rail Mollusks and Invertebrates	NI	NI	NI	NI	NI
Migratory Birds		Potential Impacts Minimized	Potential Impacts Minimized	Potential Impacts Minimized	Potential Impacts Minimized	Potential Impacts Minimized
Management Indicator Species	Habitat Structural Components	No Alteration	No Alteration	No Alteration	No Alteration	No Alteration
Management Indicator Species	Habitat Quantity	Would Not Affect	Would Not Affect	Would Not Affect	Would Not Affect	Would Not Affect
Survey and Manage Species	Habitat Structure and Composition	No Modification	No Modification	No Modification	No Modification	No Modification
Fish and Aquatic Species¹³						
Listed Fish and Aquatic Species and Critical Habitat	Central Valley spring-run Chinook salmon Central Valley steelhead Sierra Nevada yellow-legged frog	NLAA	NLAA	NLAA	NLAA	NLAA
Sensitive Species	Cascades frog Black juga	MII	MII	MII	MII	MII

¹³ NE=No Effect; NLAA=May affect, not likely to adversely affect; NLAA-B= May affect, not likely to adversely affect, Beneficial effect; NJ=Will not jeopardize; MII=May impact individuals, but not likely to lead to a loss of viability or a trend toward Federal listing; NI=No Impact

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 designations of trails and areas for OSVs within the planning area.

This RFEIS analyzes effects within the Lassen National Forest. The effects of the modified proposed action were aggregated rather than describing the site-specific effect at each road or trail, unless necessary for a particular sensitive resource or concern area. For instance, specialists' reports (project record) 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.

Area size and trail mileage totals are approximate and may vary inconsequentially within tables and text due to rounding. Most specialists used Geographic Information Systems (GIS) to calculate the miles and areas affected, or to model habitats. If specialists used models other than GIS, these exceptions are described in the resource sections of this chapter.

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, 3, 4 and 5).

OSV Use Assumptions

Assumptions regarding areas of high, moderate, low and potential OSV use were identified on an assumptions map. These assumptions will be utilized by all resource specialists when conducting their analyses. Refer to the Assumptions Maps, in appendix G for a visual depiction of where these areas are located.

High use: Areas within 0.5 mile of staging areas and of groomed trails; meadows within 0.5 mile of a groomed trail.

Moderate use: Areas within 0.5 mile of marked (not groomed) trails; areas between 0.5 mile and 1.5 miles of groomed trails; meadows 10 acres or greater in size or 0.5 to 1.5 miles from OSV trails.

Low use: Areas where OSV use is prohibited or restricted under current management; areas below 5,000 feet elevation; CWHR Vegetation 2D, 3D, 4D, 4M; vegetation types 5 and 6 with a slope greater than 20 percent; meadows 30 acres or greater, 1.5 miles or greater from OSV trail; areas more than 1.5 miles from groomed OSV trail; areas more than 0.5 mile from marked (not groomed) OSV trail.

General characteristics of existing OSV use on the forest:

1. Overall use of OSVs on the Lassen is limited relative to other forests in the Sierra Nevada and across the nation. Visitor use, based on 2001, 2005, and 2010 National Visitor Use Monitoring (NVUM) surveys as well as the California OSV Program Final EIR (2010) is characterized as follows:
 - a. Total annual visits to the forest by OSV recreationists vary from 7,000 to 25,000; average annual use over the last 15 years is estimated at approximately 10,000 OSV visits per winter season.
 - b. Weekend and holiday use of the forest by OSV recreationists is highest with an estimated average of approximately 212 OSVs on the forest per weekend/holiday day; during the week, forestwide use is estimated at approximately 42 OSVs per day (California OSV Program Final EIR (2010) data).
 - c. OSV use is primarily day use (generally 10:00 a.m. to 3:00 p.m.); OSV trail grooming occurs at night.
2. The majority of OSV use occurs on the groomed trail system. This information is derived from field observations conducted by recreation and patrol staff over the years and accounts of OSV enthusiasts, themselves. For analysis purposes, high OSV use is considered to occur within 0.5 mile of groomed trails and staging areas; moderate use is considered to occur within 0.5 mile of marked (not groomed) trails and areas between 0.5 and 1.5 miles of any groomed trail; the remaining area of the forest receives little or no OSV use.
3. There is limited OSV use on steep slopes with heavy forest cover/high tree density. For analysis purposes, we assume no use on slopes 35 percent or greater.
4. The months with the highest OSV use are January and February.
5. State OHV standards for grooming identify 12 inches to 18 inches as minimum for all grooming activities. Our interpretation of this guideline implies a minimum 12 inches of snow for grooming in alternatives 1, 2, 4, and 5.
6. OSV parking areas are primary staging areas for OSV use; once snow on the groomed system melts at trailheads and along the immediate trail system leading from trailheads, OSV access to the larger cross-country open areas is no longer available. Similarly, OSV trailheads are generally located at lower elevations along main roadways, and as such, tend to melt before cross-country areas.
7. Groomed trails and designated but non-groomed trails almost entirely overlie NFS roads. The use of OSVs on groomed trails has equal or less effect than wheeled OHVs on the same routes.
8. Non-groomed trails receive 50 percent less use than groomed trails.
9. Groomed trails and trailheads provide a higher degree of educational messages including those regarding awareness of wildlife, encouraging trail sharing to avoid use conflicts, etc.
10. No OSV use is allowed on the PCT.
11. There are no identified trails for OSVs across the PCT.

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

Adequate Snow Depth for OSV Use

In multiple reviews of best available scientific data, specialists determined that there is little or no science to support a universal snow depth for protecting multiple resources. Specialists believe this is due to differences in the snow depth needed to protect different resources, the variable nature of snowpack, and differences that occur regionally and nationally. For example, maritime snowpack (Sierra Nevada and Cascades) exhibits a greater accumulation than continental snowpack, but a shorter duration than continental snowpack (Rockies and Wasatch) and intermountain snowpack (Canadian Rockies and Bitterroots). Additionally, maritime snowpack exhibits the greatest ablation or snowmelt rates and the earliest onset of snowmelt. The snow level of maritime snowpack tends to occur at higher elevation than in other regions as well (Trujillo and Molotch 2014). These factors also create unique challenges for establishing dates when snow conditions allow OSV use.

The few empirical studies available do not provide a consistent conclusion regarding a snow depth at which multiple resources may be considered protected from OSV activities. In a report on the effects of winter recreation activities on subnivean species, Wildlife Resource Consultants (2004) reported that recreation probably plays a role, but the large number of variables present on the landscape prevent a confident conclusion. In this study, snowpack itself influenced the presence of these species, with larger snowpack having a greater negative effect. Other papers on subnivean fauna report that skiers actually may have a greater effect than OSVs because skis have a greater footload (weight per surface area) in comparison to an OSV track (Effects of Winter Recreation on Subnivean Fauna; In Olliff, et.al. 1999). In numerous additional studies, while there is a correlation between increasing compaction of snow and effects on small mammals, the results are not clear and most conclude that additional research is needed.

Studies on the effects of snow depth or snow compaction on vegetation are equally inconclusive. Again, there is a recognition that increasing snow depth provides some measure of protection, but no empirical studies exist that identify a specific cut-off depth. Vegetation studies in the Greater Yellowstone Area (Effects of Winter Recreation on Vegetation; In Olliff et al. 1999) indicate that there is little information available describing the ecological effects of snowmobiling and other winter recreational activities. They further show that the impact of OSV activities on the physical environment varies considerably with winter severity, the depth of snow accumulation, the intensity of OSV traffic, and the susceptibility of the organism to injury. Interestingly, one of the few empirical studies identifying a critical snow depth indicates that where snow cover exceeded 3 inches in depth there were no detrimental effects on grass or vegetation stands, although these were largely non-forest species (Proceedings of the 1973 Snowmobile and Off the Road Vehicle Symposium; 1974).

In arriving at a relatively consistent determination regarding the best estimate of a minimal depth necessary to protect resources, specialists monitoring the conditions on the ground provide most reliable current estimates of protective snow depth. The California State Historical Preservation Office (SHPO), in their programmatic agreement with Region 5 forests on the protection of cultural resources, has stipulated that 12 inches of snow or ice is considered sufficient for resource protection. Similarly, the California Department of Parks and Recreation, Winter Recreation Division, has identified 12 inches of snow depth as the minimum needed for grooming operations in order to protect their machines and the underlying natural surface. Finally, Forest Service staff at the forest and district level have decades of experience managing for OSV use and monitoring its effects. OSV managers, groomers, and other specialists with field knowledge of OSV use have observed timing of OSV use, weather and snowpack patterns, resource conditions throughout the winter season and during the summer season to develop their empirical understanding of appropriate measures needed for OSV management and for resource protection. Generally, staff agree that in the Sierra Nevada range, 12 inches of snow provides adequate protection for resources in areas designated for OSV use.

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 that “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 are captured, regardless of which event contributed to those effects.

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 H. They identified the ones expected to cause effects to their resource, at the same time and in the same place as effects from the modified proposed action or alternatives.

Specialist Reports

Relevant resource components from each resource specialist’s report (project record) 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 RFEIS 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, specific resource assumptions and methodologies, analyses, conclusions, maps, references, and technical documentation that the resource specialists relied upon to reach their conclusions.

Recreation Resources

This analysis considers and discloses potential effects to recreation settings and opportunities, access, scenery, and non-motorized areas under existing law or policy such as: Wilderness, Inventoried Roadless Areas, Wild and Scenic rivers, national trails, and Research Natural Areas that could result from the following proposed actions on the Lassen National Forest:

- Designating trails and areas for OSV use
- Identifying snow trails for grooming for OSV use

Designating trails and areas for OSV use could change recreation settings and opportunities by enhancing opportunities for motorized winter enthusiasts in some areas and limiting those opportunities in other areas. In the same way, OSV designations could enhance opportunities for non-motorized winter uses in some areas while limiting or displacing those opportunities in other areas. Conflict between motorized and non-motorized winter uses can arise due to differing desired recreation experiences, public safety concerns, noise, air quality, and access issues. OSV use and the grooming of snow trails for OSV use have the potential to impact non-motorized areas under existing law or policy that are managed for non-motorized recreation opportunities through incidental noise emanating from trails and areas where OSV use would be designated, increased human presence, and illegal encroachment on trails and areas where OSV use would not be designated (i.e., PCT, Wilderness).

This analysis compares alternatives that would result in varying levels of OSV use on the Lassen National Forest. The analysis considers the extent to which the alternatives respond to recreation management direction established in the Lassen National Forest Land and Resource Management Plan (LRMP or forest plan), as amended; the Sierra Nevada Forest Plan Amendment; and the requirements of Subpart C of the Forest Service's Travel Management Regulations (36 CFR Part 212).

The designation of trails and areas for OSV use is not intended to be a comprehensive winter recreation planning effort. The focus is on OSV use designations and identification of OSV trails for grooming. This analysis considers how the proposed actions and alternatives could impact quality recreation opportunities and experiences for both motorized and non-motorized enthusiasts.

In accordance with the Travel Management Regulations, and following a decision on the OSV use designations as required by Subpart C of those regulations, the Forest Service would publish an OSV use map (OSVUM) identifying snow trails and areas that would be designated for public OSV use on the Lassen National Forest. Public OSV use that is inconsistent with the OSVUM would be prohibited under Federal regulations at 36 CFR §261.14.

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 (forestwide 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 page 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 page 3-33).

The Lassen LRMP provides forestwide 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 [of the forest plan], and the Management Prescriptions. Refer to the separate ROS Map for the distribution of ROS classes throughout the Forest.

d. (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.

d. (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.

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

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

d. (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.

d. (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).

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

d. (8) Areas for snow play will not be designated. (LRMP page 4-24)

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 non-motorized areas under existing law or policy 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 page 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 page 4-3).

The desired outcome of this OSV use designation process would be a manageable, designated system of OSV 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 would 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 page 4-52)

M – Semi-Primitive Motorized Recreation

This prescription is derived from the Recreation Opportunity Spectrum (ROS) class of semi-Primitive Motorized (SPM) (see Appendix J [of the Forest Plan] 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 page 4-60)

N – Semi-Primitive Non-Motorized Recreation:

This prescription is derived from the Recreation Opportunity Spectrum (ROS) class of Semi-Primitive Non-Motorized (SPNM). See Appendix J [of the Forest Plan] 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).

6. Prohibit motorized recreation, including four-wheel driving, motorcycling, and snowmobiling (LRMP page 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 page 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 page 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 page 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 (USDA Forest Service 1982)
- 36 CFR §261.20 which prohibits use of a motorized vehicle on the PCT without a special-use authorization
- 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

This decision will include implementation of National Best Management Practices for Water Quality Management on National Forest System Lands – Rec – 7 Over-Snow Vehicle Use (USDA Forest Service 2012).

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 California OSV Program Final

EIR. The EIR includes annual monitoring and reporting requirements for Forest Service participation in the grooming program (California OSV Program Final EIR (2010)).

Topics and Issues Addressed in the Recreation 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 would help the Forest Service address 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 on the Lassen National Forest (USDA Forest Service 1992).

Significant Issues

Effects on the Availability of Motorized Over-snow Recreation Opportunities

The decision could impact the opportunities for public access and use of NFS lands by OSV-equipped winter recreation enthusiasts seeking enjoyable and challenging motorized experiences. The designation of snow trails and areas for public OSV use could impact the opportunities these enthusiasts seek by:

- a. Changing the location of and/or reducing the amount of high-quality and desirable areas designated for public, cross-country OSV use on the forest;
- b. Designating an insufficient number of opportunities for public OSV use of snow trails on the forest; and
- c. Providing an insufficient number of opportunities for public OSV use of groomed snow trails on the forest. These opportunities are subject to an external constraint due to limits on the amount of funding from the State of California for grooming snow trails for public OSV use. Snow trail grooming for OSV use on NFS land is 100 percent State-funded. The State's financial support of snow trail grooming for OSV use is not expected to increase.

Resource indicators and measures for this issue are shown in table 19.

Table 19. Resource indicators and measures for the issue of availability of motorized over-snow recreation opportunities

Impact	Resource Indicator	Measure
Changing the location of and/or reducing the amount of high-quality and desirable areas designated for public, cross-country OSV use on the forest	The area of National Forest System land designated for public, cross-country OSV use	Total area (acres) where public OSV use would be designated; Percent change in total area (acres) where public OSV use would be designated as compared to current management
Designating an insufficient number of opportunities for public OSV use of snow trails on the forest	Snow trails designated for public OSV use	Length of snow trail (miles) designated for public OSV use; Percent change in length of snow trail (miles) designated for public OSV use as compared to current management
Providing an insufficient number of opportunities for public OSV use of groomed snow trails on the forest	Groomed snow trails designated for public OSV use	Length of snow trail (miles) groomed for public OSV use; Percent change in length of snow trail (miles) groomed for public OSV use as compared to current management

Availability of Non-motorized Winter Recreation Opportunities

The decision has the potential to impact the opportunities for public access and use of NFS lands by non-motorized winter recreation enthusiasts seeking solitude and challenging physical experiences. The designation of snow trails and areas for public OSV use and grooming of snow trails for OSV use could impact the opportunities these enthusiasts seek by:

- a. Displacing non-motorized winter recreation enthusiasts, or requiring them to travel longer distances through motorized snow trails and areas than they are physically able to traverse to access their desired quiet, non-motorized experiences;
- b. Consuming untracked powder desired by backcountry skiers;
- c. Making the snow surface difficult to ski on;
- d. Creating concerns for their safety when non-motorized winter recreationists share winter recreation trails and areas with OSVs;
- e. Creating noise impacts that intrude on the solitude these enthusiasts seek;
- f. Creating local air quality impacts that intrude on the unpolluted air and solitude these enthusiasts seek; and
- g. Creating visual impacts that intrude on the unaltered scenery these enthusiasts seek.

Resource indicators and measures for this issue are shown in table 20.

Other Resource Concerns

Other resources relevant to this analysis that were addressed in public scoping comments include Wilderness, Research Natural Areas, Wild and Scenic Rivers, and the PCT.

Table 20. Resource indicators and measures for the issue of availability of non-motorized winter recreation opportunities

Impact	Resource Indicator	Measure
Creating noise impacts that intrude on the solitude these enthusiasts seek	Potential noise impacts	Total area (acres) potentially affected by noise compared to the total area (acres) not designated for winter motorized use Proximity of predicted noise increases above ambient levels in sensitive areas (GIS model for selected points)
	Proximity and frequency of OSV designations in relation to non-motorized areas (e.g., Wilderness, Inventoried Roadless, Lassen Volcanic National Park, Research Natural Areas (RNAs), Proposed Wilderness, Primitive and Semi-primitive Non-motorized ROS classifications)	Distance of groomed public OSV snow trails from designated areas/number of public OSV snow trails within designated areas, or number of trails designated across linear non-motorized areas
	Applicable Wilderness capability attributes/characteristics (FSH) 1909.12 (72.1))	Total area (acres) affected and duration of impact. Qualitative description for each roadless area characteristic.
	Applicable Inventoried Roadless Area (IRA) criteria/characteristics (36 CFR §294.11)	Total area (acres) affected and duration of impact. Qualitative description for each roadless area characteristic.
Creating local air quality impacts that intrude on the unpolluted air and solitude these enthusiasts seek	Potential air quality impacts	Qualitative/narrative description of potential impacts (with reference to the air quality analysis)
	Proximity and frequency of OSV designations in relation to non-motorized areas (e.g., Wilderness, Inventoried Roadless, Lassen Volcanic National Park, RNAs, Proposed Wilderness, Primitive and Semi-primitive Non-motorized ROS classifications)	Distance of groomed public OSV snow trails from designated areas/number of public OSV snow trails within designated areas, or number of trails designated across of linear non-motorized areas
	Applicable Wilderness capability attributes/characteristics (FSH) 1909.12 (72.1))	Total area (acres) affected and duration of impact. Qualitative description for each roadless area characteristic.
	Applicable Inventoried Roadless Area (IRA) criteria/characteristics (36 CFR §294.11)	Total area (acres) affected and duration of impact. Qualitative description for each roadless area characteristic.

Impact	Resource Indicator	Measure
Creating visual impacts that intrude on the unaltered scenery these enthusiasts seek	Qualitative/narrative description of potential visual impacts	Qualitative description of potential effects
	Proximity and frequency of OSV designations in relation to non-motorized areas (e.g., Wilderness, Inventoried Roadless, Lassen Volcanic National Park, RNAs, Proposed Wilderness, Primitive and Semi-primitive Non-motorized ROS classifications)	
	Applicable Wilderness capability attributes/characteristics (FSH 1909.12 (72.1))	
	Applicable Inventoried Roadless Area (IRA) criteria/characteristics (36 CFR §294.11)	
Displacing non-motorized winter recreation enthusiasts, or requiring them to travel longer distances through motorized trails and areas than they are physically able to traverse to access their desired quiet, non-motorized experiences Consuming untracked powder desired by backcountry skiers; Making the snow surface difficult to ski on	Access to desired non-motorized settings and opportunities	Total area (acres) and trails (miles) available to non-motorized recreation enthusiasts within 5 miles of plowed trailheads
	Recreation Opportunity Spectrum (ROS)	Consistency of OSV designations with ROS classes
Creating concerns for their safety when non-motorized winter recreationists share winter recreation trails and areas with OSVs	Areas and trails available to non-motorized recreation enthusiasts for quality non-motorized recreation experiences	Total area (acres) designated for public OSV use, total area (acres) of non-motorized areas such as cross-country ski areas, non-motorized trail access

Methodology

This analysis used ArcMap and relevant Geographic Information System (GIS) data layers covering 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 National Visitor Use Monitoring (NVUM) results, California State Parks, California Outdoor Recreation Plan, National Recreation Survey and the Environment information and online visitor

information sources provided by the Forest Service and other local organizations and industry was used as an overview of the recreation opportunities, visitor use, and trends within the analysis area. The Recreation Facility Analysis 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, 2010, and 2015 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 California OSV Program Final EIR. 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 21 will be used to measure and disclose effects to recreation resources related to OSV use designations and grooming trails for OSV use.

Table 21. Recreation resource indicators and measures for assessing effects

Resource Element	Resource Indicator	Measure (Quantify if possible)	Used to address: Purpose and Need (P/N), or key issue?	Source (LRMP S&G, ¹⁴ law or policy, BMPs, ¹⁵ etc.)?
Motorized Recreation Opportunities – cross-country	Opportunities for motorized winter uses	Total area (acres) designated for OSV use, percent change	P/N	LRMP Forest Goals, Recreation: <i>d. Provide diverse opportunities for winter sports</i> , and LRMP S&G 15 Recreation. (b)(5) <i>Accommodate snowmobile use over most of the Forest where not in conflict with other uses or resources...</i> Travel Management Regulations (36 CFR Part 212), Subpart C.
Motorized Recreation Opportunities – designated snow trails	OSV trail designations	Length of designated OSV trails (miles), percent change	P/N	Travel Management Regulations (36 CFR Part 212), Subpart C.
Motorized Recreation Opportunities – groomed snow trails	OSV trail grooming	Length of groomed OSV trails (miles), percent change	P/N	Travel Management Regulations (36 CFR Part 212), Subpart C.

¹⁴ Standard and guideline

¹⁵ Best management practices

Resource Element	Resource Indicator	Measure (Quantify if possible)	Used to address: Purpose and Need (P/N), or key issue?	Source (LRMP S&G, ¹⁴ law or policy, BMPs, ¹⁵ etc.)?
Non-motorized Recreation Opportunities - displacement	Access to desired non-motorized recreation settings and opportunities	Total area (acres) and length of trails (miles) available to non-motorized recreation enthusiasts within 5 miles of plowed trailheads	Significant Issue	Scoping, Civil Complaint
	Recreation Opportunity Spectrum	Consistency of OSV designations with ROS classes	Significant Issue	LRMP S&G 15 (3) – p 4-24: <i>Manage recreation according to the Recreation Opportunity Spectrum (ROS) classes described in the ROS User's Guide, as specified in Appendix J [of the Forest Plan], and the Management Prescriptions. Refer to the separate ROS Map for the distribution of ROS classes throughout the Forest.</i>
Non-motorized Recreation Conflicts - Public Safety	Areas and trails available to non-motorized recreation enthusiasts for quality non-motorized recreation experiences	Total area (acres) not designated for OSV use, percent change.	Significant Issue	Minimization Criteria: 36 CFR §212.55(b)(3): Consider effects on the following with the objective of minimizing: <i>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</i>
Non-motorized recreation conflicts – potential due to overlap	Total area (acres) accessible to non-motorized winter enthusiasts (within 5 miles of plowed trailheads) that are designated for OSV use	Total area (acres) overlap within 5 miles of plowed trailheads Percent change from existing conditions	Significant Issue	Scoping,

Resource Element	Resource Indicator	Measure (Quantify if possible)	Used to address: Purpose and Need (P/N), or key issue?	Source (LRMP S&G, ¹⁴ law or policy, BMPs, ¹⁵ etc.)?
Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Non-motorized areas	Proximity and frequency of OSV designations in relation to non-motorized areas	Distance of groomed public OSV snow trails from non-motorized areas under existing law or policy, or number of designated trails across non-motorized linear areas under existing law or policy	Significant Issue	Wilderness Act of 1964 Wild and Scenic Rivers Act of 1968 National Trails System Act of 1968 Pacific Crest National Scenic Trail Comprehensive Plan
	Noise	Total area (acres) potentially affected by noise/total area (acres) not designated for winter motorized use Proximity of predicted noise increases above ambient levels in sensitive areas (GIS model for selected points)	Issue analyzed to inform analysis of significant issue	Minimization Criteria: 36 CFR §212.55(b)(3)
	Air Quality	Qualitative/narrative description of potential impacts (with reference to air quality analysis)	Issue analyzed to inform analysis of significant issue	Minimization Criteria: 36 CFR §212.55(b)(3)
	Scenery	Qualitative/narrative description of potential visual impacts	Issue analyzed to inform analysis of significant issue	
Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Non-motorized areas (continued)	Wilderness Attributes	Total area (acres) affected and duration of impact. Qualitative description for Wilderness attributes	Issue analyzed to inform analysis of significant issue	FSH 1909.12 (72.1)
	Roadless Characteristics	Total area (acres) affected and duration of impact. Qualitative description for roadless characteristics	Issue analyzed to inform analysis of significant issue	36 CFR §294.11

OSV Use Assumptions for Analysis

The following OSV use assumptions were developed based on information in the California OSV Program Final 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 non-motorized areas under existing law or policy. These assumptions are based on topography, vegetation characteristics, and groomed OSV trail locations, which would remain the same in all alternatives. The maps of OSV use potential for the Almanor, Eagle Lake, and Hat Creek Ranger Districts are included as in appendix G of this RFEIS.

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 California OSV Program Final 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 coverage, 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). On the Lassen National Forest, this would include areas at or below 3,500 feet in elevation.
- Non-groomed OSV trails receive 50 percent less use than groomed trails (only 25,000 registered OSVs in California per the California OSV Program Final 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 that visitors 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 would provide for a diversity of opportunities for both motorized and non-motorized winter activities and the associated desired experiences. The ROS classes on the Lassen National Forest are described as follows:

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 22. 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 either Semi-Primitive Non-Motorized or Primitive. All Semi-Primitive Non-Motorized and Primitive areas are currently 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 OSV use. There are 2,933 miles of currently groomed, non-groomed, marked, and unmarked snow trail currently open to public OSV and non-motorized use. Not all of these trails are shown on the 2005 Lassen National Forest Winter Recreation Guide (project record). All of these trails overlie roads and trails designated for wheeled vehicle use and are within areas currently open to OSV use. Approximately 406 miles of these trails are maintained for OSV use through signage, snow trail grooming, or both.

For over 30 years, the Forest Service, Pacific Southwest Region, in cooperation with the California Department of Parks and Recreation (California State Parks) Off-highway Motor Vehicle Division has enhanced winter recreation, and more specifically, snowmobiling recreation by maintaining National

Forest System trails (snow trails) by grooming snow for OSV use. Plowing of local access roads and trailhead parking lots, grooming trails for OSV 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, and other geographic areas where OSV designations will be considered through this analysis are described below.

Ashpan OSV Area

This area covers 82,910 acres of the Lassen National Forest under current management. It consists of that portion of the Lassen National Forest that lies west and north of Highways 44/89 and south of Highway 299. The community of Old Station is located within this OSV area.

This is a popular area for OSV trail riding and also includes approximately 57 miles of groomed OSV trails accessed through the Ashpan OSV trailhead on Highways 44/89. Approximately 16 miles of these OSV trails are under Forest Service jurisdiction. The groomed trail system connects to the adjacent Latour State Forest, offering further opportunity for OSV recreation. Although it lacks jurisdiction to designate snow trails for OSV use on land that is not part of the National Forest System, the Forest Service still grooms the OSV trails in the Latour State Forest.

The Ashpan OSV Area is located 4 miles northeast of the north entrance to Lassen Volcanic National Park. 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.

Bogard OSV Area

This area covers 331,850 acres of the Lassen National Forest under current management. It is bounded by Highway 44 to the south and west and by the forest boundary to the north and east in the northeastern part of the forest. This OSV area is accessible from the communities of Burney, Fall River, Old Station and Susanville and from the Bogard Trailhead on Highway 44.

This area also includes approximately 27 miles of groomed OSV trails connecting riders to several popular destination points.

Fall River OSV Area

This area covers 42,440 acres under current management. It is not shown on the 2005 Winter Recreation Guide for the Lassen National Forest, but is currently open to OSV use. It is located in the vicinity of Lake Britton and MacArthur-Burney State Park. This area is also isolated from the remaining Lassen National Forest and comprises areas of the Shasta-Trinity National Forest administered by the Lassen National Forest. Nearby communities include Burney and Fall River. This area is within a zone of historically minimal snowfall and combined with the state park, tends to serve more as a focal point for non-motorized recreation. Although designated for OSV use, OSV opportunities are irregular throughout this area as there may not be sufficient snow in all parts of this area every year. No marked OSV trails currently exist in this area.

Fredonyer OSV Area

The Fredonyer OSV Area covers approximately 30,030 acres under current management and 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 OSV 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 a non-groomed 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 OSV 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 OSV 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 OSV Area

This area covers 122,550 acres of the Lassen National Forest under current management. It is isolated by private land and the Plumas National Forest in the southern part of the forest. It is bounded by Highway 36 to the north, Lake Almanor to the east, and the forest boundary to the south and west. The Jonesville area is a popular OSV destination, especially for the communities of Chester and Lake Almanor.

The area also contains approximately 68 miles of groomed snow trails accessed from the Jonesville Trailhead on Humboldt Road and Highway the 89 Staging Area at County Road 308.

Morgan Summit OSV Area

This area covers 125,220 acres of the Lassen National Forest under current management. It lies on the west end of the forest and is bordered by Highway 32 and portions of Highway 36 to the south, Highway 44 to the north, Lassen Volcanic National Park to the east and the western borders of the forest. This area is largely centered around the communities of Mineral and Chester, and winter recreation activities—predominately OSV use—contribute significantly to the social and economic health of the area.

This area also contains approximately 62 miles of groomed OSV trails, accessed by the Morgan Summit Trailhead on Highway 36.

Shasta OSV Area

This area covers 56,820 acres of the Lassen National Forest under current management. It is not shown on the 2005 Winter Recreation Guide for the Lassen National Forest, but is currently open to OSV use. It is located in the extreme northern portion of the forest and is isolated from the remaining forest by private, state, and other agency lands. It comprises areas of the Shasta-Trinity National Forest that are administered by the Lassen National Forest. The community of Day is located within this area. The area is largely comprised of rough lava debris and historically has limited snowfall. Although designated for OSV use, OSV opportunities are irregular throughout this area as there may not be sufficient snow in all parts of this area every year.

No marked OSV trails currently exist in this area and none would be designated in this area for OSV use in any alternative.

Swain Mountain OSV Area

This area covers 172,210 acres of the Lassen National Forest under current management. It is located east and south of Highway 44 and north of Highway 36, with the remaining boundaries formed by Lassen

Volcanic National Park and the Caribou Wilderness. This area is extremely popular with OSV enthusiasts, especially in the eastern and southeastern portions of the area.

The area also includes the Bizz Johnson ski trail, parts of which would not be designated for OSV use. A short segment of trail at its west end would be a designated OSV trail in all alternatives. This OSV area is directly accessible from the communities of Old Station, Chester and Susanville.

This area also contains approximately 92 miles of groomed OSV trails accessed via the Swain Mountain Trailhead on County Road A-21, the Chester-Lake Almanor Staging area on Highway 36, the Fredonyer Trailhead on Highway 36, and the Bogard Trailhead on Highway 44.

Table 23. Overview of State of California OSV grooming program activity on the Lassen National Forest

Project Location National Forest (NF) and County	Recreation Facility¹⁶	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 OSV 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 OSV 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 OSV 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 OSV 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) ROS classes, 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 currently 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 Trails, the Butte Lake Trail, the Bizz Johnson Trail, and Colby Meadows. The PCT runs through the center of the Lassen National Forest from north to south. The PCT is currently closed to motorized OSV use and provides non-motorized winter trail opportunities.

The 106,372-acre Lassen Volcanic National Park (LVNP) 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 snow play. The National Park Service (NPS) offers ranger-led

¹⁶ The only seasonal restrictions occur with regard to wheeled motorized use and grooming – wheeled vehicle use on groomed trails is prohibited from December 26 until March 31.

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). The groomed OSV trails located on the Lassen National Forest nearest the LVNP are approximately 0.75 mile to the east of the park's southeastern corner, and approximately 1.5 miles north of the park's northwestern corner.

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 National Forest System lands, the Forest Service developed a nationwide, systematic monitoring process for estimating annual recreation use: the 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 enthusiasts and their preferred activities, resource managers can make informed, strategic decisions about the types and amount of recreation opportunities provided on the national forest.

NVUM surveys were conducted on the Lassen National Forest during calendar year 2000 and fiscal years 2005, 2010 and 2015, the results of which were published in 2001, 2006, 2010, and 2015, respectively (USDA Forest Service 2001, 2006, 2010, 2015). Surveys collected information about participation in recreation activities, visitor demographics, and spending patterns. Summaries from these surveys are useful to describe recreation use patterns on the national forest. As displayed, these data are only valid at the forest level and cannot be disaggregated to specific sites or locations.

The Lassen serves a largely local client base. About 49 percent of visits came from people living within 50 miles of the national forest; another 15 percent came from people living 51 to 75 miles away. Most visits are short, day use lasting 6 hours or less. Over 65 percent are people who visit five times or less per year.

In 2015, the three most reported main activities were gathering forest products (27.3 percent), fishing (19.4 percent), and viewing natural features (13.8 percent). Winter activities were reported as main activities for downhill skiing (0.9 percent), snowmobiling (0.7 percent), and cross-country skiing (0.1 percent). 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), snowmobile travel (2 percent), cross-country skiing, and snowshoeing (1 percent).

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

Table 24. National visitor use monitoring data for winter activities on the Lassen National Forest

Year	Activity	Total Annual Lassen National Forest Visits	% Main Activity	Estimated Annual Lassen National Forests Visits based on the % main Activity	Average hours participating in main activity
2015	Snowmobiling	269,000	0.7%	1883	2
2015	Cross-country skiing	269,000	0.1%	269	1
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 25.

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

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

Table 26. California statewide OSV registration, 2009 through 2014

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

*Data from CA State Parks, not official DMV records

Snowmobile registrations in the Lassen National Forest counties and statewide have remained nearly stable, or declined slightly over the past six years. The California OSV Program Final 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 OSV Program Final EIR (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 27 is derived from the OSV trailhead survey conducted for the California OSV Program Final EIR (2010), and based on data summarized in the California OSV Program Final EIR (California OSV Program Final EIR (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 enthusiasts forestwide.

Table 27. Lassen National Forest OSV visitor use

Location	Day description	Number of vehicles	Number of OSVs*
Forestwide	Weekend or holiday (approx. 33 per season)	106	212
Forestwide	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 OSV Program Final EIR

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

Conflicts between Motorized and Non-motorized Winter Experiences

The 2015 NVUM report indicates that about 75 percent of visitors to the Lassen National Forest are very satisfied, and 14 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, scenery, and signage adequacy all were rated “keep up the good work” (USDA Forest Service 2015).

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 nearby groomed trails could occur. There are no other known conflicts between OSV use and other uses on National Forest System 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 uses arises 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 enthusiasts 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 enthusiasts; (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 California OSV Program Final EIR estimates triples the OSV use on trails to the detriment of non-motorized enthusiasts.

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

Opportunities for quality recreation experiences depend on both the settings (physical, social, and managerial aspects), and on the desired experience of the enthusiast. Conflicts occur when one recreationist affects 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 2014). 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 2014).

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

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 OSV Program Final EIR (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 enthusiasts 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).

Areas Designated Non-motorized under Existing Law or Policy

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. Proposed Wilderness areas on the Lassen National Forest are closed to OSV use, per forest plan direction, since

they fall within the Semi-Primitive Non-motorized ROS class and are managed to maintain their Wilderness characteristics. There are groomed OSV trails within one-quarter mile of the south and east boundaries of the Caribou Wilderness and Caribou extension proposed wilderness (approximately six miles) and north of the Mill Creek proposed wilderness (approximately two and one-half miles). There are groomed OSV trails within one-half mile south of Thousand Lakes Wilderness (approximately one-half mile).

Inventoried Roadless Areas:

Approximately 169,400 acres of Inventoried Roadless Areas (IRAs) are located within Lassen National Forest. The IRAs include Cypress (3,276), Devils Garden (3,329), Snow Mountain (1,456), Keddie Ridge (380), Butt Mountain (6,510), Chips Creek (11,103), Cub Creek (4,587), Heart Lake (958), Ishi (9,564), Mill Creek (821), Mount Harkness (195), Onion Springs (1,307), Polk Springs (1,206), Wild Cattle Mountain (1,049), Lava (5,975), Mayfield (14,428), Timbered Crater (2,715), Black Cinder *(228), Prospect (1,467), and Trail Lake (530).

Further direction for IRAs is provided in the 2001 Roadless Area Conservation Rule (36 CFR 294). The intent of the 2001 Roadless Rule is to provide lasting protection for inventoried roadless areas within the National Forest System in the context of multiple-use management. In particular, the direction is designed to maintain the roadless characteristics of the IRAs, which consist of: (1) high quality or undisturbed soil, water, and air; (2) sources of public drinking water; (3) diversity of plant and animal communities; (4) habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land; (5) primitive, semi-primitive non-motorized and semiprimitive motorized classes of dispersed recreation; (6) reference landscapes; (7) natural appearing landscapes with high scenic quality; (8) traditional cultural properties and sacred sites; and (9) other locally identified unique characteristics (36 CFR 294). Mechanized uses, such as OSV use, is “often allowed” within IRAs and “best reviewed through local land management planning” (36 CFR 294, pp. 3244, 3245, and 3250).

There are no groomed OSV trails within the IRAs. A majority of the roadless acreage is currently closed to cross-country OSV use, per forest plan direction, because the IRAs are within the semi-primitive non-motorized ROS class. However, in response to public comments received, the Forest also identified other areas that are generally unroaded outside of existing IRAs, or currently within designated or proposed wilderness areas. To be considered as unroaded, areas are greater than 5,000 acres or less than 5,000 acres, but are adjacent to other designated IRAs or Wilderness areas and do not contain roads designated as open to the public (USDA Forest Service 2008). There were an additional 131,876 acres identified on the LNF as meeting the criteria (see figure 10 below). We expect that these areas will receive minimal or no OSV use based on the OSV use assumptions (see appendix G of this RFEIS).

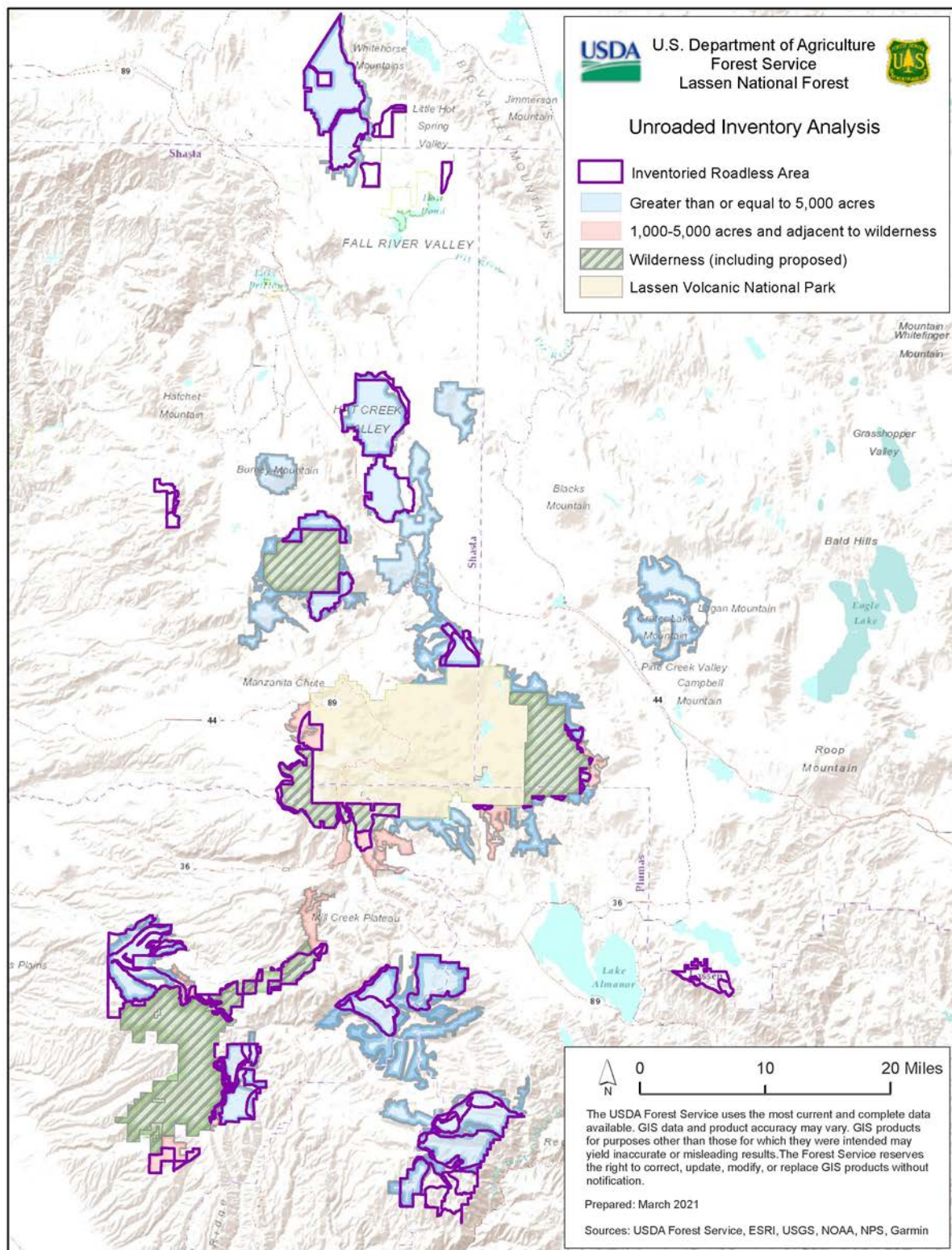


Figure 10: Unroaded areas outside Designated and Proposed Wilderness

IRAs with small portions of roaded natural and semi-primitive motorized that are designated for OSV use and fall in areas where moderate to high OSV is expected include: Devils Garden, Trail Lake, Black Cinder, and Heart Lake.

Wild and Scenic Rivers

There are three eligible Wild and Scenic Rivers located in the southwestern 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 River corridors are within areas currently 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 fall within an area where low to no OSV use is expected ((see OSV use potential maps in appendix G of this RFEIS).

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 management.

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

No groomed or non-groomed trails are within any of the research natural areas.

Pacific Crest National Scenic Trail

The Lassen National Forest contains 125 miles of the 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 currently 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 OSV Area with high to moderate OSV use. Groomed OSV trails cross the PCT in three locations (see OSV use potential maps in appendix G of this RFEIS).

Table 28. Resource indicators and measures for the existing condition, alternative 1

Resource Element	Resource Indicator	Measure (Quantify if possible)	Existing Conditions
Motorized Recreation Opportunities – cross-country	Opportunities for motorized winter uses	Total area (acres) open to OSV use	964,030 acres open to public, cross-country OSV use, subject to snow depth restrictions No minimum snow depth requirement
Motorized Recreation Opportunities – designated snow trails	OSV trail designations	Length of designated OSV trails (miles)	406 miles of groomed, non-groomed, marked and unmarked OSV trails open for OSV use, subject to snow depth restrictions Snow trail grooming is allowed when there are 12 inches of snow
Motorized Recreation Opportunities – groomed snow trails	OSV trail grooming	Length of groomed OSV trails (miles)	349 miles 12 inch snow depth requirement for grooming
Non-motorized Recreation Opportunities - displacement	Access to desired non-motorized recreation settings and opportunities	Total area (acres) and length of trails (miles) available to non-motorized recreation enthusiasts within 5 miles of plowed trailheads	Six plowed trailheads provide access for motorized and non-motorized winter use, 10,346 acres available for non-motorized recreation within 5 miles of plowed trailheads 18.3 miles of cross-country ski trails and 15.6 miles of the PCT available for non-motorized recreation within 5 miles of plowed trailheads
	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.
Non-motorized Recreation Conflicts - Public Safety	Areas and trails available to non-motorized recreation enthusiasts for quality non-motorized recreation experiences	Total area (acres) not designated for OSV use/length of non-motorized trails (miles)	185,990 acres/ six non-motorized trails with a total of 148 miles for non-motorized use.
Non-motorized recreation conflicts – potential due to overlap	Total area (acres) accessible to non-motorized winter enthusiasts (within 5 miles of plowed trailheads) that are designated for OSV use	Total area (acres) overlap within 5 miles of plowed trailheads Percent change from existing conditions	169,951 acres

Resource Element	Resource Indicator	Measure (Quantify if possible)	Existing Conditions
Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Non-motorized areas	Proximity and frequency of OSV designations in relation to non-motorized areas	Distance of groomed public OSV snow trails from non-motorized areas under existing law or policy, or number of designated trails across non-motorized linear areas under existing law or policy	<p>A total of approximately 9 miles of groomed OSV trails within 1/2 mile of the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries.</p> <p>Lassen Volcanic National Park: Groomed OSV trails $\frac{3}{4}$ mile east of the park's southeast corner, and 1 1/2 miles north of the park's northwest corner.</p> <p>No designated OSV trails crossing the PCT, Groomed OSV trails cross PCT in 3 locations.</p> <p>No known conflicts with tribal/spiritual areas, historic areas or populated areas.</p>
	Noise	<p>Total area (acres) potentially affected by noise/total area (acres) not designated for winter motorized use</p> <p>Proximity of predicted noise increases above ambient levels in sensitive areas (GIS model for selected points)</p>	964,030 acres open for OSV use and potentially affected by noise/185,990 acres not designated for OSV use and available for quiet recreation
	Air Quality	Qualitative/narrative description of potential impacts (with reference to air quality analysis)	Potential short-term impacts to the experience of recreational visitors in the vicinity of OSVs and grooming equipment due to the smell of exhaust emissions (see air quality report (project record)).
	Scenery	Qualitative/narrative description of potential visual impacts	Cross-country OSV use creates temporary tracks in the snow that crisscross the landscape. The visual evidence of snowmobile use decreases as fresh snow covers the tracks and/or when the snow melts at the end of the season.

Resource Element	Resource Indicator	Measure (Quantify if possible)	Existing Conditions
Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Non-motorized areas (continued)	Wilderness Attributes	Total area (acres) affected and duration of impact. Qualitative description for Wilderness attributes	Opportunities for solitude may be temporarily affected due to the sights and sounds of OSVs near the Wilderness or proposed wilderness boundaries. There are approximately 27,108 acres open to OSV use within ½ mile of designated and proposed wilderness boundaries. The duration of the potential impacts would be short-term, during the winter while snow depth is adequate for OSVs to access the area.
	Roadless Characteristics	Total area (acres) affected and duration of impact. Qualitative description for roadless characteristics	Approximately 72,972 IRA acres open to OSV use. Opportunities for solitude are temporarily affected in portions of four roadless areas (Table 30, pg. 114) that are within areas of expected high to moderate OSV use.

Environmental Consequences

Alternative 1 – No Action

Under alternative 1, there would be no changes to the existing system of OSV use on 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 National 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.

Recreation Settings and Opportunities

In the no-action alternative, opportunities for winter motorized recreation both cross-country and on groomed trails would remain the same as described in the current management. A majority of OSV use on the Lassen National Forest is expected to continue to be along the groomed trail system. There would be no reduction of opportunities or change in location for winter motorized OSV use. Current management requires a minimum snow depth of 12 inches for OSV use, this requirement would continue to limit access to deeper snow at higher elevations when snow depths at trailheads are below 12 inches.

Opportunities for winter non-motorized recreation would also remain the same as described in the current management. OSV use would remain consistent with existing ROS classes, with motorized use prohibited in primitive and semi-primitive non-motorized ROS classes and allowed in semi-primitive motorized, roaded natural, and rural ROS classes.

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 under alternative 1. There are only approximately

25,000 annual OSV registrations in the state of California, and according to the 2009 State DEIR trailhead survey, approximately 10,020 OSV visits to the Lassen NF per winter season, typically mid-December through March. OSV use would be spread across the available designated OSV acres and trails. Based on 10,020 visits, if use were spread evenly across each day of the season, there would be approximately 102 OSVs on the forest per day. Daily use may be higher during weekends and holidays and lower during the week. For the current management, this equates to 9,451 acres and 4 miles of trail per OSV.

Non-motorized winter recreation enthusiasts would continue to be displaced in some areas by motorized OSV use, or be unable to access areas for desired quiet, non-motorized experiences away from the sights, sounds, and smells of OSVs, since they would have to travel longer distances through OSV trails and areas than they are physically able to traverse. There are 10,346 acres available for quiet, non-motorized winter activities and 18.3 miles of cross-country ski trails and 15.6 miles of the PCT within 5 miles of plowed trailheads. There are a total of 185,990 acres across the Lassen National Forest available for quiet, non-motorized experiences, where OSV use would not be designated.

Table 29. Acres available for quality non-motorized winter activities – alternative 1

OSV Area	Acres available for quiet, non-motorized winter activities (not designated for OSV use) within 5 miles of plowed trailheads
Ashpan	0
Bogard	0
Fredonyer	0
Jonesville	2,255.96
Morgan Summit	7,290.28
Swain Mountain	799.98
Total	10,346.22

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

Areas Designated Non-motorized under Existing Law or Policy

Occasional illegal incursions into adjacent Wilderness areas and non-motorized areas on other Federal lands would continue to occur.

There are approximately 9 miles of groomed OSV trails within 0.5 mile of Wilderness and proposed wilderness boundaries.

Inventoried Roadless Areas

Approximately 44% (72,972 acres) of the total Inventoried Roadless Areas (IRAs) (169,400 acres) are currently open to OSV use under Alternative 1. Of that, only about 3% (2,467 acres) are in portions of inventoried roadless areas where moderate to high OSV use is expected due to their proximity near a designated and groomed trail. Table 31 describes this in further detail. The closest groomed OSV trails to the LVNP are approximately 1.5 miles north of the park's northwest corner and 0.75 mile east of the park's southeast corner. Portions of 11 IRAs that fall within the semi-primitive motorized or roaded natural ROS class are open under current management and designated for OSV use; however, low to no use is expected in the majority of those areas. There are also approximately 131,876 acres of "unroaded"

areas outside of IRAs that would be open to OSV use, with approximately 45,096 acres in areas where moderate to high OSV use is assumed to occur under current management. GIS maps visualizing these features and metrics are available in the project file.

Table 30: Inventoried Roadless Areas Current Use by Over-snow Vehicles - alternative 1

Inventoried Roadless Areas	Motorized Use Class		
	High/Moderate	Low/None	Not Designated/ Closed
Black Cinder	x		
Butt Mountain	x		
Chips Creek*		x	x
Cub Creek*		x	x
Cypress		x	
Devil's Garden	x		
Heart Lake			x
Ishi*		x	x
Keddie Ridge			x
Lava		x	
Mayfield		x	
Mill Creek			x
Mount Harkness		x	
Onion Springs*		x	x
Polk Springs			x
Prospect			x
Snow Mountain*		x	x
Timbered Crater		x	
Trail Lake*	x		x
Unnamed (Hwy 89)			x
Wild Cattle Mountain*		x	x

* Portions of IRAs occurring in multiple categories

The environmental consequences to IRAs and other unroaded areas are measured by estimating the potential impact of each alternative on the roadless characteristics as described in the 2001 Roadless Rule (36 CFR 294). There are no new roads, groomed trails, trailheads or other permanent developments proposed under any of the alternatives. Therefore, Alternative 1 is expected to have no effect or minimal or short-term impact on those roadless characteristics such as soil, water, and air quality; plant and animal communities; habitat for threatened, endangered, proposed, candidate, and sensitive species; or traditional cultural properties. Refer to the Soil and Water Resources, Terrestrial and Aquatic Wildlife, Botany, Air Quality, and Cultural Resources Environmental Consequences sections for more detailed information. Motorized use within one-half mile of the portion of IRAs that are not designated for OSV use can temporarily degrade the primitive and semi-primitive non-motorized experience when non-motorized users are present, similar to the potential impact on solitude in a wilderness setting. There may be shortterm localized impacts to natural scenic quality when OSVs are present or their tracks are visible in the snow. 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 reference landscapes within IRAs or other unroaded areas.

Designating areas or trails for OSV use within and adjacent to IRAs or other unroaded areas does not reduce the potential that these areas could be considered under future planning efforts as potential wilderness. The impacts to solitude and the undeveloped characteristics when OSVs or their tracks are present are limited in scope and short-term.

Ongoing motorized use in close proximity to the non-motorized areas temporarily degrades opportunities for solitude near the non-motorized area boundaries, when OSVs are present on the trails. Similarly, there may be temporary impacts to air quality in the vicinity of OSVs, and short-term impacts to scenery when OSV tracks through the snow crisscross the landscape, leaving visual evidence of motorized use. The tracks only remain on the landscape until they are covered by additional snowfall or until the snow melts, and do not cause long-term impacts to scenery or the underlying soils and vegetation (see additional analysis in the applicable resource sections of this analysis).

Pacific Crest Trail

The PCT would remain non-motorized, as it is currently managed. No designated OSV trails across the PCT would occur; OSVs could cross the PCT in any of the areas currently open to OSV use, potentially impacting the quiet, non-motorized trail experience when hikers and cross-country skiers encounter OSVs crossing the trail. Along 98.4 miles of the PCT within the Lassen National Forest, there are areas currently open to OSV use within 500 feet of the trail, potentially impacting the trail experience due to the sights and sounds of OSVs in close proximity to the trail.

Alternative 2 – Modified Proposed Action

The modified proposed action is described in detail in chapter 2. Alternative 2 would designate 8 discrete, specifically delineated areas for cross-country OSV use, and would designate public, cross-country OSV use on 920,260 acres of NFS lands within the Lassen National Forest when snow depth is adequate for that use to occur. There would be 334 miles of trails designated for public OSV use when snow depth is adequate for that use to occur. All existing OSV prohibitions applying to areas or trails would continue and these trails would not be designated. Alternative 2 would identify approximately 350 miles of snow trails that would be groomed for public OSV use by the Forest Service's Lassen National Forest Grooming Program. The California State Parks' snow grooming standards would be formally adopted, requiring a minimum of 12 inches of snow depth before OSV trail grooming could occur.

Alternative 2 would implement a forestwide snow depth requirement for OSV use that would provide for public safety and natural and cultural resource protection by designating public, cross-country OSV use when there is a minimum of 12 inches of snow covering the landscape; and designating public OSV trail use when 6 or more inches of snow cover the designated trails. All but 0.1 mile of snow trails to be designated for public OSV use or identified for OSV grooming in this alternative would overlie an existing paved, gravel, or native surface travel route. These travel routes are trails and roads used by wheeled, motorized vehicles, and non-motorized recreation. The exception would be a non-groomed OSV designated trail that crosses the PCT through an area adjacent to the PCT that would not be designated for cross-country OSV use. This non-groomed trail would require a minimum of 12 inches of snow for OSV use.

No areas would be designated for cross-country OSV use within 500 feet of the PCT on the Lassen National Forest.

Alternative 2 would not designate any areas for public cross-country OSV use that would be located within 500 feet of the PCT on the Lassen National Forest. Alternative 2 would designate up to 28 OSV trails across the PCT to provide OSV access to all sectors of each of the designated OSV areas without

having to exit the designated OSV areas. All designated OSV trails crossing the PCT would overlies NFS routes currently designated for wheeled motorized vehicle use on the Lassen National Forest's Motor Vehicle Use Map.

Public OSV use would not be designated on approximately 229,760 acres, including all of the approximately 185,990 acres of the Lassen National Forest where public OSV use is currently prohibited, and 43,770 acres of areas currently open to OSV use that would not be designated for OSV use in this alternative

Public OSV use that is inconsistent with the designations and snow depth requirements made under this decision would be prohibited under 36 CFR §261.14.

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. Although the designation of 334 miles of groomed and non-groomed OSV trails is a reduction in the number of miles of trail currently open, a majority of the current trails system would be either designated for public OSV use, or are located in areas that would be designated for public, cross-country OSV use in this alternative. Having a clearly designated system of trails and OSV use areas 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 between uses.

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 forest. Primitive and semi-primitive non-motorized areas would not be designated for OSV use while motorized opportunities would be available in semi-primitive motorized, roadless natural, and rural ROS classes.

There are 43,770 acres of areas currently open to OSV use that would not be designated for OSV use in alternative 2. This is a slight reduction in possible opportunities for cross-country OSV use that would have minor impacts to motorized OSV use opportunities. Additional acres in the Morgan Summit OSV area, located in the southwestern corner of Lassen National Forest would not be designated because there is limited access for OSVs due to the proximity to other non-motorized areas including the Ishi Wilderness, Mill Creek Proposed Wilderness, and semi-primitive non-motorized areas within the Ishi and Polk Springs Inventoried Roadless Areas. An area along Deer Creek would not be designated due to the presence of anadromous fish. This area is located in the southwestern portion of the forest, and runs along the northwestern boundary of the Cub Creek Inventoried Roadless Area. The impacts of not designating OSV use in the Blacks Mountain Research Natural Area (520 acres within the Blacks Mountain Experimental Forest on the Eagle Lake Ranger District), in the Bogard OSV area, to be consistent with forest plan management area direction to prohibit motorized vehicles in research natural areas would also be expected to be minor. Not designating the areas described above for OSV use would minimize impacts to resources such as wildlife (as described in the wildlife section), Wilderness, inventoried roadless areas, and eligible wild and scenic rivers (described in the Areas Designated Non-motorized under Existing Law or Policy section below), and the natural conditions of the research natural area that are managed for baseline and research purposes (described in the botany section). No OSV use would be designated within 500 feet of the PCT, within 1,840 acres along the southwestern shore of Lake Almanor, and within 1,150 acres along the southern shore of Eagle Lake to meet the objective of minimizing impacts on non-

motorized recreation opportunities, by eliminating OSV use and reducing the potential for conflict between motorized and non-motorized winter uses in these areas. Existing OSV prohibitions on non-motorized trails would continue and these trails would not be designated.

Alternative 2 would identify 350 miles of OSV trails for grooming for public use. Although identified for grooming and historically groomed by the Forest Service, approximately 27 miles of groomed trails would not be subject to designation because they are not under Forest Service jurisdiction on the Lassen National Forest. This would represent no change from current management. Alternative 2 would maintain the existing level of groomed trail riding opportunities, which Lassen National Forest staff indicates is adequate to meet existing demand (USDA Forest Service 2014). The California OSV Program Final EIR (2010) information also shows that Lassen National Forest trailheads have rare or no overflow capacity issues (California OSV Program Final EIR (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), and would continue to do so.

The forestwide snow depth requirement of 12 inches for areas designated for OSV use would impose restrictions on OSV use, although it is likely that most OSV owners would not ride with less than adequate snow depths to prevent damage to their OSVs. Establishing the forestwide 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. Designating public OSV use snow trails when 6 or more inches of snow cover the trail would provide improved trail access for OSV enthusiasts to reach areas of higher terrain with adequate snow depths.

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. Based on 10,020 OSV visits per winter season, if use were spread evenly across each day of the season, there would be approximately 102 OSVs on the forest per day. Daily use may be higher during weekends and holidays and lower during the week. For alternative 2, this equates to 9,022 acres and 3.3 miles of trail per OSV. Based on the OSV use assumption that most OSV use would be concentrated along groomed trails, the change from the existing 4 miles of trail per OSV to 3.3 miles of trail per OSV is not likely to create use conflict that does not currently exist. Similarly, the change from the existing 9,451 acres per OSV to 9,022 acres per OSV, there is likely adequate acreage to disperse the use and avoid use conflict.

Motorized use has inherent conflicts with non-motorized uses. Non-motorized enthusiasts 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 enthusiasts. OSV use may impact the setting for non-motorized uses by making tracks through the snow that often crisscross the landscape, leaving visual evidence of motorized use. The tracks only remain on the landscape until they are covered by additional snowfall or until the snow melts, and do not cause long-term impacts to scenery or the underlying soils and vegetation (see additional analysis in the applicable resource sections of this analysis). OSV tracks can interfere with cross-country skiing by causing ruts in the trails, and since OSVs travel faster and farther than non-motorized enthusiasts, they often “consume” the fresh powder slopes, limiting opportunities for backcountry skiers who are seeking similar opportunities on snow-covered slopes (Snowlands 2014).

Occasional incursions into adjacent Wilderness areas and non-motorized areas on other Federal lands would continue to occur. 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.

Non-motorized winter recreation enthusiasts would continue to be displaced in some areas by motorized OSV use, or be unable to access areas for desired quiet, non-motorized experiences away from the sights, sounds, and smells of motorized use, since they would have to travel longer distances through OSV trails and areas than they are physically able to traverse. However, there are 12,164 acres available for quiet, non-motorized winter activities, and 18.3 miles of cross-country ski trails, and 15.6 miles of the PCT within 5 miles of plowed trailheads. This is a 1,818-acre increase over current management. There are a total of 229,760 acres across the Lassen National Forest available for quiet, non-motorized experiences, where OSV use would not be designated.

Table 31. Acres available for quality non-motorized winter activities – alternative 2

OSV Area	Acres available for quiet, non-motorized winter activities (not designated for OSV use) within 5 miles of plowed trailheads
Ashpan	0
Bogard	0
Fredonyer	0
Jonesville	3,138.36
Morgan Summit	7,585.54
Swain Mountain	1,439.70
Total	12,163.6

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

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. Public comments indicated concern with emerging trends in OSVs such as snow bikes (motorcycles that are converted to OSVs by installing a single ski/track conversion kit) and other changing technology that allow OSVs to travel faster, farther, and in more confined spaces. The proposed OSV area and trail designations would apply to public use of all OSVs that meet the definition of an OSV, whether on a single ski, double ski, or track. The trails and areas proposed for designation were found to be suitable for OSV use, subject to snow-depth restrictions for protection of natural resources.

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

Areas Designated Non-motorized under Existing Law or Policy

The existing OSV prohibitions in designated Wilderness areas would continue, and semi-primitive non-motorized areas and research natural areas would not be designated for OSV use, protecting these areas from OSV impacts.

Over-snow vehicle use would not be designated in the southwestern portion of the forest (within the Morgan Summit OSV area) and would provide further protection from potential OSV impacts to the Ishi Wilderness, Mill Creek Proposed Wilderness, and semi-primitive non-motorized areas within the Ishi and Polk Springs Inventoried Roadless Areas. This would maintain or enhance the Wilderness attributes and roadless characteristics of naturalness, high-quality or undisturbed soil, water, and air, and outstanding opportunities for solitude. Not designating OSV use in the southwestern portion of the forest would also provide further protection to Antelope Creek and Mill Creek eligible wild and scenic river corridors.

There are groomed OSV trails within one-quarter mile of the southern and eastern boundaries of the Caribou Wilderness and Caribou extension proposed wilderness (approximately 6 miles) and north of the Mill Creek proposed wilderness (approximately 2.5 miles). There are groomed OSV trails within 0.5 mile south of Thousand Lakes Wilderness (approximately 0.5 mile). The presence of these groomed trails in close proximity to Wilderness and proposed wilderness may temporarily impact outstanding opportunities for solitude, when OSVs are present on the trails. Designating OSV use trails or areas adjacent to Wilderness and proposed wilderness does not, however, reduce the Wilderness potential of these areas. Most statewide wilderness acts include what has become known as “buffer zone preclusion language” such as

Congress does not intend that the designation of wilderness areas ... lead to the creation of protective perimeters or buffer zones around each wilderness area. The fact that nonwilderness activities or uses can be seen or heard from areas within the wilderness shall not, of itself, preclude such activities or uses up to the boundary of the wilderness area. (Kelson and Lilieholm 1999).

Virtually identical language has been included in 30 other wilderness statutes enacted since 1980 (Gorte 2011). This concept is also supported by Forest Service Manual 2320.3 that directs consideration of uses on both sides of Wilderness boundaries, but states

Do not maintain buffer strips of undeveloped wildland to provide an informal extension of wilderness. Do not maintain internal buffer zones that degrade wilderness values.

Inventoried Roadless Areas

Slightly fewer acres (59,225 or 35% of the total IRAs) within Inventoried Roadless Areas would be designated as open to OSV use in this alternative. The reduction in acreage open to OSV use is primarily in Ishi where all ROS classes are not designated for OSV use. Portions of 10 IRAs that fall within the semi-primitive motorized or roaded natural ROS class would be designated for OSV use; however, low to no use is expected in the majority of those areas. There is also about a 5% reduction in the acres of other unroaded areas outside of IRAs designated for OSV use.

Pacific Crest Trail

Up to 28 designated OSV trails across the PCT would minimize the potential for motorized use to impact the trail experience, and is consistent with the Pacific Crest National Scenic Trail Comprehensive Plan. Limiting the locations where OSVs cross the trail would enhance the quiet, non-motorized experience

while accommodating motorized access to OSV areas and maintaining OSV loop-riding opportunities. Using the wheeled vehicle trails designated in Subpart B for off-highway vehicle use as PCT crossing trails would limit motorized disturbance to areas of the trail that already contain motorized vehicle trails. The frequency of designated trails across the PCT 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.

A majority of the PCT mileage on the Lassen National Forest passes through NFS lands that are either not designated for OSV use, or areas where little to no OSV use is anticipated. Alternative 2 does not designate any area within 500 feet of the PCT for OSV use, except for designated OSV trails (8.1 miles) running across that non-designated area providing access to the designated OSV use areas on the other side of the PCT. Having no OSV area designations within 500 feet of the trail, would maintain quiet, non-motorized trails opportunities along the entire Lassen National Forest portion of the PCT and reduce the potential for conflicts between motorized and non-motorized uses along the trail. Identifying where designated OSV trails cross the PCT on the OSV use map would allow trail visitors to know in advance where they may encounter OSVs trails across the PCT, and alert OSV riders to locations of potential non-motorized recreationists along the trail. This knowledge enhances both public safety and the experience expectations of visitors in these areas. Alternative 2 would minimize potential motorized OSV impacts to the non-motorized PCT experience to a greater extent than alternative 1.

Formalizing the closure of the Blacks Mountain Research Natural Area to OSV use would be in compliance with the Lassen Forest Plan standard that prohibits motorized vehicles in research natural areas.

Table 32. Resource indicators and measures for alternative 2 direct and indirect effects

Resource Element	Resource Indicator	Measure (Quantify if possible)	Alternative 2
Motorized Recreation Opportunities – cross-country	Opportunities for motorized winter uses	Total area (acres) designated for OSV use, percent change	920,260 acres designated for public cross-country OSV use, subject to snow depth restrictions, a 4.5 percent decrease from current management. 12 inch snow depth requirement
Motorized Recreation Opportunities – designated snow trails	OSV trail designations	Length of designated OSV trails (miles), percent change	334 miles of designated OSV snow trails, subject to snow depth restrictions, 17.7 percent decrease from current management (however a majority of current trail system is designated or in OSV designated use areas). 6 inch or more snow depth on snow trails overlying roads and trails; 12 inch snow depth on 0.1 mile of trail not overlying roads or trails.
Motorized Recreation Opportunities – groomed snow trails	OSV trail grooming	Length of groomed OSV trails (miles), percent change	349 miles, no change 12 inch snow depth requirement for grooming
Non-motorized Recreation Opportunities - displacement	Access to desired non-motorized recreation settings and opportunities	Total area (acres) and length of trails (miles) available to non-motorized recreation enthusiasts within 5 miles of plowed trailheads	Six plowed trailheads provide access for motorized and non-motorized winter use, 12,164 acres available for non-motorized recreation within 10 miles of plowed trailheads 18.3 miles of cross-country ski trails and 15.6 miles of the PCT available within 5 miles of plowed trailheads
	Recreation Opportunity Spectrum	Consistency of OSV designations with ROS classes	Motorized OSV use not designated in Primitive and Semi-Primitive Non-Motorized ROS classes. Motorized OSV use designated in Semi-Primitive Motorized, Roaded Natural and Rural ROS classes.
Non-motorized Recreation Conflicts - Public Safety	Areas and trails available to non-motorized recreation enthusiasts for quality non-motorized recreation experiences	Total area (acres) not designated for OSV use/length of non-motorized trails (miles), percent change	229,760 acres, a 23.5 percent increase/ six non-motorized trails with a total of 148 miles for non-motorized use.

Resource Element	Resource Indicator	Measure (Quantify if possible)	Alternative 2
Non-motorized recreation conflicts – potential due to overlap	Total area (acres) accessible to non-motorized winter enthusiasts (within 5 miles of plowed trailheads) that are designated for OSV use	Total area (acres) overlap within 5 miles of plowed trailheads Percent change from existing conditions	168,133 acres 1 percent decrease in overlap
Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Non-motorized areas	Proximity and frequency of OSV designations in relation to non-motorized areas	Distance of groomed public OSV snow trails from non-motorized areas under existing law or policy, or number of designated trails across non-motorized linear areas under existing law or policy	<p>A total of approximately 9 miles of groomed OSV trails within 1/2 mile of the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries.</p> <p>Lassen Volcanic National Park: Groomed OSV trails ¾ mile east of the park's southeast corner, and 1 1/2 miles north of the park's northwest corner.</p> <p>No areas designated for OSV use within 500 feet of the PCT; up to 28 designated OSV trails across the PCT.</p> <p>No known conflicts with tribal/spiritual areas, historic areas or populated areas.</p>
	Noise	<p>Total area (acres) potentially affected by noise/total area (acres) not designated for winter motorized use</p> <p>Proximity of predicted noise increases above ambient levels in sensitive areas (GIS model for selected points)</p>	920,260 acres designated for OSV use and potentially affected by noise/229,760 acres not designated for OSV use and available for quiet recreation
	Air Quality	Qualitative/narrative description of potential impacts (with reference to air quality analysis)	Potential short-term impacts to the experience of recreational visitors in the vicinity of OSV and grooming equipment due to the smell of exhaust emissions. Slightly fewer acres designated for OSV use than in current management (see air quality report (project record)).

Resource Element	Resource Indicator	Measure (Quantify if possible)	Alternative 2
Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Non-motorized areas (continued)	Scenery	Qualitative/narrative description of potential visual impacts	Cross-country OSV use creates temporary tracks in the snow that crisscross the landscape. Fewer acres designated for cross-country OSV use, and associated visual impacts than in existing conditions. The visual evidence of snowmobile use decreases as fresh snow covers the tracks and/or when the snow melts at the end of the season
	Wilderness Attributes	Total area (acres) affected and duration of impact. Qualitative description for Wilderness attributes	Opportunities for solitude may be temporarily affected due to the sights and sounds of OSVs near the Wilderness or proposed wilderness boundaries. There are approximately 21,266 acres designated for OSV use within ½ mile of designated and proposed wilderness boundaries. The duration of the potential impacts would be short-term, during the winter while snow depth is adequate for OSVs to access the area.
	Roadless Characteristics	Total area (acres) affected and duration of impact. Qualitative description for roadless characteristics	Approximately 59,225 IRA acres designated for OSV use. Opportunities for solitude are temporarily affected in portions of four roadless areas (Table 30, pg. 114) that are within areas of expected high to moderate OSV use.

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 (including timber sales, fire salvage, and restoration projects), livestock grazing, prescribed burns, and recreation. There are many on-going and scheduled projects identified on the Lassen National Forest (appendix H) that may increase the management presence forestwide.

Recreation Settings and Opportunities

The OSV trail 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 Forest Service 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 current management.

There are four current vegetation management projects that overlap groomed OSV trails in the Jonesville OSV area (Lost, Yellow, Ursa, and Castle Timber Sale areas). Vegetation management activities, in addition to OSV use, and OSV grooming activities occurring at the same time would cumulatively impact the recreation setting due to the increased presence of people and vehicles in the area. Vegetation management and fire salvage projects adjacent to groomed OSV trails and in areas designated for cross-country OSV use may temporarily enhance opportunities for cross-country OSV use by removing trees that would otherwise obstruct OSV riding. Vegetation treatment, in addition to OSV grooming could cumulatively enhance OSV opportunities in this area.

In the current management, there are 185,990 acres not designated for OSV use due to the presence of designated Wilderness areas and other Forest Plan direction that limits OSV use. Alternative 2 proposes to designate 43,770 fewer acres than are open for OSV use under current management. This has the potential to limit opportunities for motorized OSV use, while enhancing opportunities for non-motorized winter uses, as described in this analysis.

Conflicts between Motorized and Non-Motorized Winter Experiences

Non-motorized winter visitors to the Lassen National Forest could experience noise from OSV use in areas and on trails designated for OSV use under this alternative, in addition to other noise such as snow grooming equipment, vehicles on roads, log trucks, heavy equipment associated with vegetation management projects, and aircraft that may be in the same area at the same time, cumulatively impacting the quiet recreation experience in the short term.

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

Areas Designated Non-motorized under Existing Law or Policy

OSV use is prohibited in certain areas designated by law, and the forest plan, such as Wilderness, proposed wilderness on the Lassen National Forest, there are no known potential cumulative impacts associated with the OSV designations, which are in compliance with the relevant management direction for specific non-motorized areas under existing law or policy. Illegal encroachment by OSVs into areas not designated for OSV use could occur, potentially adding to other ongoing future activities impacting these areas and causing cumulative impacts, but would be monitored and dealt with as a law enforcement issue.

Alternative 3

Alternative 3 is described in detail in chapter 2. Alternative 3 was developed to address the non-motorized recreational experience significant issue. Alternative 3 would designate eight discrete, specifically delineated areas for cross-country OSV use. These areas would encompass 833,990 acres of National Forest System lands within the Lassen National Forest when snow depth is adequate for that use to occur. It includes components of the modified proposed action with several additions. OSV use would not be designated in additional areas that are important for non-motorized recreation, including the Butte Lake area (OSV use on designated trails only) north of Lassen Volcanic National Park; some areas below 3,500 feet on the Lassen National Forest; the Fredonyer-Goumaz area (OSV use on designated trails only) between highways 36 and 44; the McGowan Cross-country Ski Trails (north of Mineral, East of Rd. 17); the Colby Mountain area; the areas along the southwestern shore of Lake Almanor and along the southern shore of Eagle Lake; and the Willard Hill area.

There would be 383 miles of designated public OSV use trails when snow depth is adequate for that use to occur. Designation of OSV use areas and trails would not occur where existing OSV prohibitions are in place. Alternative 3 would identify approximately 349 miles of snow trails that would be groomed for public OSV use by the Forest Service's Lassen National Forest Grooming Program. The minimum snow depth for trail grooming would be 18 inches.

Public OSV use of designated snow trails could occur when 6 or more inches of snow cover the trail and where site review determines there would be no damage to underlying resources. The minimum snow depth for OSV use in areas designated for public, cross-country OSV use would be 12 inches.

Public OSV use would not be designated on approximately 316,740 acres, including all of the approximately 185,990 acres of the Lassen National Forest where public OSV use is currently prohibited, and 130,750 acres of areas currently open to OSV use that would not be designated for OSV use in this alternative

Public OSV use would not be designated if it is inconsistent with the designations and snow depth requirements outlined under 36 CFR §261.14.

There would be up to 23 designated OSV trails across the PCT to allow OSV access to all sectors of each of the designated OSV areas without having to exit the designated OSV areas. All designated OSV trails crossing the PCT would overlie NFS routes currently designated for wheeled motorized vehicle use on the Lassen National Forest's Motor Vehicle Use Map. OSV use would be designated adjacent to and across the PCT in accordance with OSV area designations. The trail itself would remain non-motorized.

Direct and Indirect Effects - Alternative 3

Recreation Settings and Opportunities

Alternative 3 would not designate as many areas for OSV use as alternative 2, and would also designate some areas where motorized OSVs are restricted to designated trails. With additional areas not designated for OSV use and restricting OSVs to trails only, the opportunities for non-motorized use (in areas not influenced by the sights, sounds, and exhaust smells of OSV use) would be 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 not designated for OSV use, while motorized opportunities would be available in semi-primitive motorized, roaded natural, and rural ROS classes. The additional areas where OSV use would not be designated are located primarily within the roaded natural ROS class; this 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 areas where OSV use would not be designated, including areas south of Lassen Volcanic National Park in the Morgan Summit and Jonesville areas, along the southwestern shore of Lake Almanor, the southern shore of Eagle Lake, and Willard Hill areas, and the restriction of OSVs to designated trails in the Swain Mountain area north of Lassen Volcanic National Park would reduce opportunities for motorized OSV use to some extent. However, grooming 349 miles of OSV trails would maintain the current level of groomed OSV trail riding opportunities.

The forestwide snow depth requirement of 12 inches for areas designated for OSV use would impose 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. Designating OSV use when trails have at least 6 inches of snow would be slightly less restrictive than alternative 2, and would provide additional opportunities for OSVs to access higher terrain and legal snow depths.

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 not be designated, enhancing opportunities for non-motorized experiences, and reducing the potential for use conflict, because there would be greater separation of motorized and non-motorized uses. Based on 10,020 OSV visits per winter season, if use were spread evenly across each day of the season, there would be approximately 102 OSVs on the forest per day. Daily use may be higher during weekends and holidays and lower during the week. For alternative 3, this equates to 8,169 acres and 3.8 miles of trail per OSV. Based on the OSV use assumption that most OSV use would be concentrated along groomed trails, the change from the existing 4 miles of trail per OSV to 3.8 miles of trail per OSV is not likely to create use conflict that does not currently exist. Similarly, with the change from the existing 9,451 acres per OSV to 8,169 acres per OSV, there is likely adequate acreage to disperse the use and avoid use conflict.

The areas where OSV use would not be designated would reduce potential conflicts with non-motorized areas, including Wilderness, proposed wilderness, and IRA resources in the southwestern portion of the forest, as described in alternative 2. Alternative 3 would minimize conflicts between motorized and non-motorized winter uses in areas that are popular and suitable for non-motorized uses.

The restriction of OSV use to trails in the Butte Lake and Fredonyer-Goumaz areas would provide an opportunity to minimize impacts on non-motorized recreation experience, while also maintaining access

and opportunities for motorized OSV use. Not designating OSV use in the area north of the Caribou Wilderness and south of the Heart Lake and Wild Cattle Mountain Proposed Wilderness areas would also help to minimize potential impacts from the sights and sounds of OSVs to quiet, non-motorized areas and to Lassen Volcanic National Park.

Non-motorized winter recreation enthusiasts would continue to be displaced in some areas by motorized OSV use, or be unable to access areas for desired quiet, non-motorized experiences away from the sights, sounds, and smells of motorized use, because they would have to travel longer distances through OSV trails and areas than they are physically able to traverse. However, there would be 39,317 acres available for quiet, non-motorized winter activities, and 18.3 miles of cross-country ski trails and 15.6 miles of the PCT within 5 miles of plowed trailheads. This would be a 28,971-acre increase over current management. There would be a total of 316,074 acres across the Lassen National Forest available for quiet, non-motorized experiences, where OSV use would not be designated.

Table 33. Acres available for quality non-motorized winter activities – alternative 3

OSV Area	Acres available for quiet, non-motorized winter activities (not designated for public OSV use) within 5 miles of plowed trailheads
Ashpan	0
Bogard	0
Fredonyer	682.02
Jonesville	6,687.80
Morgan Summit	17,239.63
Swain Mountain	14,707.54
Total	39,316.99

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

Areas Designated Non-motorized under Existing Law or Policy

Not designating OSV use in the area north of the Caribou Wilderness and south of the Heart Lake and Wild Cattle Mountain Proposed Wilderness Areas would help minimize potential impacts from the sights and sounds of OSVs to quiet, non-motorized areas.

This alternative would not designate OSV use in a portion of the Swain Mountain area north of Lassen Volcanic National Park. This would minimize motorized impacts, such as loss of opportunities for solitude when OSVs are present, and impacts to natural scenery due to visual evidence of OSV tracks in the snow, on the Caribou Wilderness, the Caribou extension proposed wilderness, Prospect IRA, and Lassen Volcanic National Park, and would minimize potential impacts from OSV encroachment into Lassen Volcanic National Park.

Inventoried Roadless Areas

There is a reduction in the amount of area (approx. 57,888 acres or only about 35% of the total IRAs) open to OSV use within Inventoried Roadless Areas under this alternative. There is no difference from this alternative to alternative 1 where high to moderate use is anticipated near the groomed trail system (Table 30 Pg. 114). Approximately 118,204 acres of the unroaded areas outside of IRAs would be designated as open to OSV use, a reduction of 9% from Alternative 1.

The effects of this alternative on roadless area characteristics is the same as described in Alternative 2 but will occur on fewer acres than the other alternatives. This enhances the opportunity for solitude and

primitive or semi-primitive non-motorized classes of dispersed recreation for winter visitors when compared to Alternative 1.

Pacific Crest Trail

Up to 23 designated OSV use trails across the PCT would minimize the potential for motorized use to impact the trail experience, and is consistent with the Pacific Crest National Scenic Trail Comprehensive Plan. Limiting the locations where OSVs cross the trail would enhance the quiet, non-motorized experience while accommodating motorized access to OSV areas and maintaining OSV loop-riding opportunities. Using the wheeled-vehicle trails designated in Subpart B for off-highway vehicle use as designated trails crossing the PCT would limit motorized disturbance to areas of the trail that already contain motorized vehicle trails. The frequency of designated OSV use trails across the PCT 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.

OSV use would not be designated on the PCT itself; however, motorized use adjacent to, and across the PCT could continue to impact the quiet, non-motorized trail experience. There are areas designated for OSV use within 500 feet of the PCT along 85.42 miles of the trail on the Lassen National Forest. Identifying designated trails across the PCT on the OSV use map would allow trail visitors to know in advance where they may encounter OSVs trails across the PCT, and alert OSV riders to locations of potential non-motorized recreationists along the trail. This knowledge enhances both public safety and the experience expectations of visitors in these areas. Alternative 3 would minimize potential motorized OSV impacts to the non-motorized PCT experience to a greater extent than alternative 1, but has slightly more potential for disturbance of the non-motorized trail experience than in alternative 2.

However, the PCT is accessed in the winter by non-motorized enthusiasts who generally travel less than 5 miles along the trail from trailheads. Only two known thru-hikers have hiked the PCT in the winter and that was during a very low snow year. Non-motorized use of the PCT is nearly non-existent in the winter season and OSV use is also very low (reference use levels for OSV). The chance of PCT users encountering OSV users is very low. Additionally, OSV use leaves no permanent evidence of that use once snow melts. For these reasons we feel this alternative does not interfere with the nature and purpose of the PCT.

Otherwise, alternative 3 would be the same as alternative 2 in regard to non-motorized areas under existing law or policy.

Cumulative Effects – Alternative 3

The cumulative effects of alternative 3 would be similar to those described for alternative 2.

Under existing management, there are 185,990 acres not designated for OSV use due to the presence of designated Wilderness areas and other Forest Plan direction that limits OSV use. Alternative 3 proposes to designate 130,750 fewer acres. This has the potential to limit opportunities for motorized OSV use, while enhancing opportunities for non-motorized winter uses, as described in this analysis.

Table 34. Resource indicators and measures for alternative 3 direct and indirect effects

Resource Element	Resource Indicator	Measure (Quantify if possible)	Alternative 3
Motorized Recreation Opportunities – cross-country	Opportunities for motorized winter uses	Total area (acres) designated for OSV use, percent change	833,280 acres designated for public cross-country OSV use, subject to snow depth restrictions, a 13.5 percent decrease from current management. 12 inch snow depth requirement
Motorized Recreation Opportunities – designated snow trails	OSV trail designations	Length of designated OSV trails (miles), percent change	383 miles of designated OSV snow trails, subject to snow depth restrictions. 5.6 percent decrease from current management (however a majority of the current trail system is designated or in areas designated for OSV use) 6 inches where site review determines there would be no damage to underlying resources
Motorized Recreation Opportunities – groomed snow trails	OSV trail grooming	Length of groomed OSV trails (miles), percent change	349 miles, no change 18 inch snow depth requirement for grooming
Non-motorized Recreation Opportunities - displacement	Access to desired non-motorized recreation settings and opportunities	Total area (acres) and length of trails (miles) available to non-motorized recreation enthusiasts within 5 miles of plowed trailheads	Six plowed trailheads provide access for motorized and non-motorized winter use, 39,317 acres available for non-motorized recreation within 5 miles of plowed trailheads 18.3 miles of cross-country ski trails and 15.6 miles of the PCT available within 5 miles of plowed trailheads
	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 designated in Semi-Primitive Motorized, Roaded Natural and Rural ROS classes.
Non-motorized Recreation Conflicts - Public Safety	Areas and trails available to non-motorized recreation enthusiasts for quality non-motorized recreation experiences	Total area (acres) not designated for OSV use/length of non-motorized trails (miles), percent change	316,740 acres, a 41.2 percent increase/ six non-motorized trails with a total of 148 miles for non-motorized use.
Non-motorized recreation conflicts – potential due to overlap	Total area (acres) accessible to non-motorized winter enthusiasts (within 5 miles of plowed trailheads) that are designated for OSV use	Total area (acres) overlap within 5 miles of plowed trailheads Percent change from existing conditions	140,980 acres 17 percent decrease in overlap

Resource Element	Resource Indicator	Measure (Quantify if possible)	Alternative 3
Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Non-motorized areas	Proximity and frequency of OSV designations in relation to non-motorized areas	Distance of groomed public OSV snow trails from non-motorized areas under existing law or policy, or number of designated trails across non-motorized linear areas under existing law or policy	<p>A total of approximately 9 miles of groomed OSV trails within 1/2 mile of the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries</p> <p>Lassen Volcanic National Park: Groomed OSV trails ¾ mile east of the park's southeast corner, and 1 ½ miles north of the park's northwest corner.</p> <p>Up to 23 designated OSV trails across the PCT; groomed OSV trails cross PCT in 3 locations. OSV designated use areas within 500 feet of PCT along 85.4 miles.</p> <p>No known conflicts with tribal/spiritual areas, historic areas or populated areas.</p>
	Noise	<p>Total area (acres) potentially affected by noise/total area (acres) not designated for winter motorized use</p> <p>Proximity of predicted noise increases above ambient levels in sensitive areas (GIS model for selected points)</p>	833,280 acres designated for OSV use and potentially affected by noise/316,740 acres not designated for OSV use and available for quiet recreation
	Air Quality	Qualitative/narrative description of potential impacts (with reference to air quality analysis)	Potential short-term impacts to the experience of recreational visitors in the vicinity of OSV and grooming equipment due to the smell of exhaust emissions. Fewer acres designated for OSV use than in current management and alternative 2 (see air quality report (project record)).
	Scenery	Qualitative/narrative description of potential visual impacts	Cross-country OSV use creates temporary tracks in the snow that crisscross the landscape. Fewer acres designated for cross-country OSV use, and associated visual impacts than in existing conditions or alternative 2. The visual evidence of snowmobile use decreases as fresh snow covers the tracks and/or when the snow melts at the end of the season

Resource Element	Resource Indicator	Measure (Quantify if possible)	Alternative 3
Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Non-motorized areas (continued)	Wilderness Attributes	Total area (acres) affected and duration of impact. Qualitative description for Wilderness attributes	Opportunities for solitude may be temporarily affected due to the sights and sounds of OSVs near the Wilderness or proposed wilderness boundaries. There are approximately 19,173 acres designated for OSV use within ½ mile of designated and proposed wilderness boundaries. The duration of the potential impacts would be short-term, during the winter while snow depth is adequate for OSVs to access the area.
	Roadless Characteristics	Total area (acres) affected and duration of impact. Qualitative description for roadless characteristics	Approximately 57,888 IRA acres designated for OSV use. Opportunities for solitude are temporarily affected in portions of four roadless areas (Table 30, pg. 114) that are within areas of expected high to moderate OSV use.

Alternative 4

Alternative 4 is described in detail in chapter 2. Alternative 4 was developed to address the motorized recreational opportunities significant issue. This alternative would designate 8 discrete, specifically delineated areas for cross-country OSV use. These areas would encompass 955,470 acres.

Alternative 4 would designate 380 miles of OSV snow trails. This would represent a reduction in the number of miles of trail currently open to OSV use. However, a majority of the current trail system would be either designated for public OSV use or are located in areas that would be designated for public, cross-country OSV use in this alternative. Alternative 4 would identify 349 miles of snow trails for grooming, as in the current management.

In addition to areas where OSV use is already prohibited on the Lassen National Forest, alternative 4 would not designate OSV use in the Blacks Mountain RNA, and the area south of Lassen Volcanic National Park (North of Mineral, East of Rd. 17).

There would be no defined minimum snow depth in areas designated for cross-country OSV travel or on designated OSV trails. OSV use would be allowed in designated areas or on designated trails only when conditions are sufficient for OSV use to occur while protecting underlying resources. This would be determined by a combination of weather station data, observations at trailheads by staff, and when the conditions meet state requirements for grooming. The Forest Service would encourage or discourage OSV use based on conditions through Forest Service and partnership websites. The minimum snow depth for trail grooming to occur would be 12 inches.

OSV use would be designated below 3,500 feet when there is adequate snow depth to prevent damage to underlying surface resources.

This alternative would groom the same snow trails for OSV use as the modified proposed action.

OSV use would be designated adjacent to the PCT and designated OSV trails would cross the PCT in the same 28 places as described under alternative 2. The trail itself would remain non-motorized. There are areas designated for OSV use within 500 feet of the PCT along 97.7 miles of the PCT on the Lassen National Forest.

Direct and Indirect Effects - Alternative 4

Recreation Settings and Opportunities

Alternative 4 would designate OSV use on more acres than alternatives 2 and 3, and slightly fewer acres than in alternative 1. Designating OSV use on more acres below 3,500 feet would enhance OSV opportunities when snow depths are adequate for use in that area. There would be no defined minimum snow depth in areas designated for cross-country OSV travel or on designated OSV trails. Designated OSV use would only occur when conditions are sufficient for OSV use to occur while protecting underlying resources. This would be determined by a combination of weather station data, observations at trailheads by staff, and when the conditions meet state requirements for grooming. The Forest Service would encourage or discourage OSV use based on conditions through Forest Service and partnership websites. Having no defined minimum snow depth would provide improved public trail access for OSV enthusiasts from trailheads to deeper snow areas and allow motorized enthusiasts access to higher elevations and adequate snow depths. This would enhance OSV opportunities, while also protecting resources.

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 not designated for OSV use, while motorized opportunities would be available in semi-primitive motorized, roaded natural, and rural ROS classes.

Conflicts between Motorized and Non-motorized Winter Experiences

Although use conflicts are currently minimal on the Lassen National Forest, alternative 4 would provide more areas where OSV use would be designated, enhancing opportunities for motorized experiences across the forest. Based on 10,020 OSV visits per winter season, if use were spread evenly across each day of the season, there would be approximately 102 OSVs on the forest per day. Daily use may be higher during weekends and holidays and lower during the week. For alternative 4, this equates to 9,367 acres and 3.7 miles of trail per OSV. Based on the OSV use assumption that most OSV use would be concentrated along groomed trails, the change from the existing 4 miles of trail per OSV to 3.7 miles of trail per OSV is not likely to create use conflict that does not currently exist. Similarly, with the change from the existing 9,451 acres per OSV to 9,367 acres per OSV, there is likely adequate acreage to disperse the use and avoid use conflict.

Non-motorized winter recreation enthusiasts would continue to be displaced in some areas by motorized OSV use, or be unable to access areas for desired quiet, non-motorized experiences away from the sights, sounds, and smells of motorized use, because they would have to travel longer distances through OSV trails and areas than they are physically able to traverse. However, there would be 15,082 acres available for quiet, non-motorized winter activities and 18.3 miles of cross-country ski trails and 15.6 miles of the PCT within 5 miles of plowed trailheads. This would be a 4,736-acre increase over current management. There would be a total of 194,550 acres across the Lassen National Forest available for quiet, non-motorized experiences, where OSV use would not be designated.

Table 35. Acres available for quality non-motorized winter activities – alternative 4

OSV Area	Acres available for quiet, non-motorized winter activities (not designated for OSV use) within 5 miles of plowed trailheads
Ashpan	0
Bogard	0
Fredonyer	0
Jonesville	2,255.96
Morgan Summit	12,026.36
Swain Mountain	799.98
Total	15,082.3

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

Areas Designated Non-motorized under Existing Law or Policy

Alternative 4 would be the same as alternative 2 in regard to non-motorized areas under existing law and policy, with a couple exceptions. OSV use would be designated on a larger area below 3,500 feet. Designating use in a larger area below 3,500 feet in the southwestern portion of the Lassen National Forest would not provide additional protection from OSV use near Wilderness, proposed wilderness, and IRAs, or from OSV use near Antelope and Mill Creek eligible wild and scenic river corridors; however, a majority of the corridors would be located in areas that are closed to OSVs under existing management, or are in areas where low to no OSV use is expected. The other exception is a limitation to designated trails

in the area south of Lassen Volcanic National Park in the Swain Mountain and Morgan Summit areas. Restrictions to designated trails south of Lassen Volcanic National Park would minimize impacts from OSV encroachment into the Heart Lake and Wild Cattle Mountain proposed wilderness areas, and Lassen Volcanic National Park.

Inventoried Roadless Areas

Nearly 43% of the total IRA acreage (72,202 acres) would be designated as open to OSV use under this alternative – nearly identical in total acreage open under Alternative 1 (current management).

Additionally, 131,377 acres of unroaded areas would be open to OSV use which is also very similar to alternative 1. The effects of this alternative on roadless area characteristics is the same as described in Alternative 1.

Pacific Crest Trail

Up to 28 designated OSV trails across the PCT would minimize the potential for motorized use to impact the trail experience, and is consistent with the Pacific Crest National Scenic Trail Comprehensive Plan. Limiting the locations where OSVs cross the trail would enhance the quiet, non-motorized experience while accommodating motorized access to OSV areas and maintaining OSV loop-riding opportunities. Using the wheeled-vehicle trails designated in Subpart B for off-highway vehicle use as designated trails across the PCT would limit motorized disturbance to areas of the trail that already contain motorized vehicle trails. The frequency of designated OSV trails across the PCT 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.

OSV use would not be designated on the PCT itself; however, motorized use adjacent to the PCT could continue to impact the quiet, non-motorized trail experience. There are areas designated for OSV use within 500 feet of the PCT along 97.7 miles of the trail on the Lassen National Forest. Identifying where designated trails cross the PCT on the OSV use map would allow trail visitors to know in advance where they may encounter OSVs crossing the trail, and alert OSV riders to locations of potential non-motorized recreationists along the trail. This knowledge enhances both public safety and the experience expectations of visitors in these areas. Alternative 4 would minimize potential motorized OSV impacts to the non-motorized PCT experience slightly more than alternative 1, since crossings would be limited, but would not protect the non-motorized trail experience to the extent of alternative 2 or 3.

However, the PCT is accessed in the winter by non-motorized enthusiasts who generally travel less than 5 miles along the trail from trailheads. Only two known thru-hikers have hiked the PCT in the winter and that was during a very low snow year. Non-motorized use of the PCT is nearly non-existent in the winter season and OSV use is also very low (reference use levels for OSV). The chance of PCT users encountering OSV users is very low. Additionally, OSV use leaves no permanent evidence of that use once snow melts. For these reasons we feel this alternative does not interfere with the nature and purpose of the PCT.

Cumulative Effects – Alternative 4

The cumulative effects of alternative 4 would be similar to those described for alternative 2.

In the current management, there are 185,990 acres not designated for OSV use due to the presence of designated Wilderness areas and other Forest Plan direction that limits OSV use. Alternative 4 proposes to reduce the acreage of OSV use areas currently available by 8,560 acres. This has the potential to limit opportunities for motorized OSV use, while enhancing opportunities for non-motorized winter uses, as described in this analysis.

Table 36. Resource indicators and measures for alternative 4 direct and indirect effects

Resource Element	Resource Indicator	Measure (Quantify if possible)	Alternative 4
Motorized Recreation Opportunities – cross-country	Opportunities for motorized winter uses	Total area (acres) designated for OSV use, percent change	955,470 acres designated for public cross-country OSV use, subject to snow depth restrictions, less than 1 percent (0.8 percent) decrease from current management. Depth necessary to avoid resource damage
Motorized Recreation Opportunities – designated snow trails	OSV trail designations	Length of designated OSV trails (miles), percent change	380 miles of OSV snow trails, subject to snow depth restrictions. 6.4 percent decrease from current management (however a majority of the current trail system is designated or in OSV-designated use areas) Depth necessary to avoid resource damage
Motorized Recreation Opportunities – groomed snow trails	OSV trail grooming	Length groomed OSV trails (miles), percent change	349 miles, no change 12 inch snow depth requirement for grooming
Non-motorized Recreation Opportunities – displacement	Access to desired non-motorized recreation settings and opportunities	Total area (acres) and length of trails (miles) available to non-motorized recreation enthusiasts within 5 miles of plowed trailheads	Six plowed trailheads provide access for motorized and non-motorized winter use, 52,454 acres available for non-motorized recreation within 5 miles of plowed trailheads 18.3 miles of cross-country ski trails and 15.6 miles of the PCT within 5 miles of plowed trailheads
	Recreation Opportunity Spectrum	Consistency of OSV designations with ROS classes	Motorized OSV use not designated in Primitive and Semi-Primitive Non-Motorized ROS classes. Motorized OSV use designated in Semi-Primitive Motorized, Roaded Natural and Rural ROS classes.
Non-motorized Recreation Conflicts – Public Safety	Areas and trails available to non-motorized recreation enthusiasts for quality non-motorized recreation experiences	Total area (acres) not designated for OSV use/length of non-motorized trails (miles), percent change	194,550 acres, 4.6 percent increase/ six non-motorized trails with a total of 148 miles for non-motorized use.

Resource Element	Resource Indicator	Measure (Quantify if possible)	Alternative 4
Non-motorized recreation conflicts – potential due to overlap	Total area (acres) accessible to non-motorized winter enthusiasts (within 5 miles of plowed trailheads) that are designated for OSV use	Total area (acres) overlap within 5 miles of plowed trailheads Percent change from existing conditions	153,455 acres 10 percent decrease in overlap
Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Non-motorized areas	Proximity and frequency of OSV designations in relation to non-motorized areas	Distance of groomed public OSV snow trails from non-motorized areas, or number of designated trails across non-motorized linear areas under existing law or policy	<p>A total of approximately 9 miles of groomed OSV trails within 1/2 mile of the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries</p> <p>Lassen Volcanic National Park: Groomed OSV trails ¾ mile east of the park's southeastern corner, and 1 1/2 miles north of the park's northwestern corner.</p> <p>Up to 28 designated OSV trails across the PCT. 97.7 miles of the PCT are within 500 feet of an area designated for OSV use.</p> <p>No known conflicts with tribal/spiritual areas, historic areas or populated areas.</p>
	Noise	<p>Total area (acres) potentially affected by noise/total area (acres)not designated for winter motorized use</p> <p>Proximity of predicted noise increases above ambient levels in sensitive areas (GIS model for selected points)</p>	955,470 acres designated for OSV use and potentially affected by noise/194,550 acres not designated for OSV use and available for quiet recreation
	Air Quality	Qualitative/narrative description of potential impacts (with reference to air quality analysis)	Potential short-term impacts to the experience of recreational visitors in the vicinity of OSV and grooming equipment due to the smell of exhaust emissions. Slightly fewer acres designated for OSV use than in current management (see air quality report (project record)).

Resource Element	Resource Indicator	Measure (Quantify if possible)	Alternative 4
Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Non-motorized areas (continued)	Scenery	Qualitative/narrative description of potential visual impacts	Cross-country OSV use creates temporary tracks in the snow that crisscross the landscape. Slightly fewer acres designated for cross-country OSV use, and associated visual impacts than in current management. The visual evidence of snowmobile use decreases as fresh snow covers the tracks and/or when the snow melts at the end of the season
	Wilderness Attributes	Total area (acres) affected and duration of impact. Qualitative description for Wilderness attributes	Opportunities for solitude may be temporarily affected due to the sights and sounds of OSVs near the Wilderness or proposed wilderness boundaries. There are approximately 25,575 acres designated for OSV use within ½ mile of designated and proposed wilderness boundaries. The duration of the potential impacts would be short-term, during the winter while snow depth is adequate for OSVs to access the area.
	Roadless Characteristics	Total area (acres) affected and duration of impact. Qualitative description for roadless characteristics	Approximately 72,202 IRA acres designated for OSV use. Opportunities for solitude are temporarily affected in portions of four roadless areas (Table 30, pg. 114)) that are within areas of expected high to moderate OSV use.

Alternative 5

Alternative 5 is described in detail in chapter 2. Alternative 5 was developed to address the non-motorized recreational experience significant issue. Alternative 5 would designate six discrete, specifically delineated areas for cross-country OSV use. These areas would encompass 632,400 acres. Alternative 5 would designate 390 miles of OSV snow trails. This would represent a reduction in the number of miles of trail where OSV use is currently allowed. However, a majority of the current trail system would be either designated for public OSV use or located in areas that would be designated for public, cross-country OSV use in this alternative. Alternative 5 would identify 349 miles of snow trails for grooming, as in the current management.

The minimum snow depth for snow trail grooming would be 12 inches. The minimum snow depth for public OSV use on designated snow trails would be 12 inches. The minimum snow depth for OSV use in areas designated for public, cross-country OSV use would be 12 inches. No areas below the elevation of 3,500 feet would be designated for OSV use. No winter deer range would be designated for OSV use. For the Bogard Area, this would include the small area located between the 3,500-foot elevation and winter deer range.

Alternative 5 would not designate areas for public cross-country OSV use that would be located within 500 feet of the PCT on the Lassen National Forest. Alternative 5 would designate up to 12 OSV trails across the PCT to provide OSV access to all sectors of each of the designated OSV areas without having to exit the designated OSV areas. All designated OSV trails crossing the PCT would overlie NFS routes currently designated for wheeled motorized vehicle use on the Lassen National Forest's Motor Vehicle Use Map.

Direct and Indirect Effects - Alternative 5

Recreation Settings and Opportunities

Impacts to recreation settings and opportunities would be similar to those described in alternative 3, and would further enhance opportunities for quiet non-motorized winter activities because fewer acres are designated for OSV use. Alternative 5, however, would require a minimum snow depth of 12 inches for use of OSV trails, potentially reducing opportunities to reach adequate snow depths at higher elevations.

Conflicts between Motorized and Non-motorized Winter Experiences

Although use conflicts are currently minimal on the Lassen National Forest, alternative 5 would provide more areas where OSV use would not be designated, enhancing opportunities for non-motorized experiences, and reducing the potential for use conflict because there would be greater separation of motorized and non-motorized uses. Based on 10,020 OSV visits per winter season, if use were spread evenly across each day of the season, there would be approximately 102 OSVs on the forest per day. Daily use may be higher during weekends and holidays and lower during the week. For alternative 5, this equates to 6,200 acres and 3.8 miles of trail per OSV. Based on the OSV use assumption that most OSV use would be concentrated along groomed trails, the change from the existing 4 miles of trail per OSV to 3.8 miles of trail per OSV is not likely to create use conflict that does not currently exist. Similarly, the change from the existing 9,451 acres per OSV to 6,200 acres per OSV, the greatest reduction of any alternative, there is likely adequate acreage to disperse the use and avoid use conflict.

Non-motorized winter recreation enthusiasts would continue to be displaced in some areas by motorized OSV use, or be unable to access areas for desired quiet, non-motorized experiences away from the sights, sounds, and smells of motorized use, because they would have to travel longer distances through OSV trails and areas than they are physically able to traverse. However, there would be 52,454 acres available

for quiet, non-motorized winter activities and 18.3 miles of cross-country ski trails and other non-motorized trails within 5 miles of plowed trailheads. This would be a 42,108-acre increase over current management. A total of 517,620 acres across the Lassen National Forest are available for quiet, non-motorized experiences, where OSV use would not be designated.

Table 37. Acres available for quality non-motorized winter activities – alternative 5

OSV Area	Acres available for quiet, non-motorized winter activities (not designated for OSV use) within 5 miles of plowed trailheads
Ashpan	0
Bogard	0
Fredonyer	57.01
Jonesville	16,041.6
Morgan Summit	14,215.65
Swain Mountain	22,140.03
Total	52,454.29

Areas Designated Non-motorized under Existing Law or Policy

Not designating OSV use in the area north of the Caribou Wilderness and south of the Heart Lake and Wild Cattle Mountain Proposed Wilderness Areas would help minimize potential impacts from the sights and sounds of OSVs to quiet, non-motorized areas, similar to alternative 3.

In addition to those areas described in alternative 3 that would not be designated for OSV use in the Swain Mountain area, alternative 5 would not designate additional areas north of Lassen Volcanic National Park and south of Thousand Lakes Wilderness, further minimizing motorized impacts, such as loss of opportunities for solitude when OSVs are present, and impacts to natural scenery due to visual evidence of OSV tracks in the snow, and would further minimize potential impacts from OSV encroachment into Lassen Volcanic National Park.

Inventoried Roadless Areas

Alternative 5 would designate the fewest acres of Inventoried Roadless areas for OSV use, and would therefore have the least potential impact to opportunities for solitude within these areas. Fewer acres (just over 28,000 or 17% of the total IRAs) within Inventoried Roadless Areas would be designated as open to OSV use in this alternative. There is nearly a 30% reduction in the acres of other unroaded areas outside of IRAs designated for OSV use under Alternative 5 when compared with Alternative 1. The reduction in acreage open to OSV use occurs primarily in Lava, Mayfield and Timbered Crater ROS classes (Table 30, pg. 114) with these areas not designated for OSV use. This would provide additional opportunity for primitive and semi-primitive non-motorized classes of dispersed recreation in an area identified through public comments as being important to non-motorized winter recreationists.

Pacific Crest Trail

Up to 12 designated OSV trails that cross the PCT would minimize the potential for motorized use to impact the trail experience, and is consistent with the Pacific Crest National Scenic Trail Comprehensive Plan. Limiting the locations where OSVs cross the trail would enhance the quiet, non-motorized experience while accommodating motorized access to OSV areas and maintaining OSV loop-riding opportunities. Using the wheeled-vehicle trails designated in Subpart B for off-highway vehicle use as PCT crossings would limit motorized disturbance to areas of the trail that already contain motorized vehicle trails. The frequency of where designated OSV trails cross the PCT 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.

A majority of the PCT mileage on the Lassen National Forest passes through National Forest System lands that are either currently closed to OSV use, or areas where little to no OSV use is anticipated. Alternative 5 does not designate any area within 500 feet of the PCT for OSV use, except on designated trails (3.8 miles) running across that non-designated area. Having no OSV area designations within 500 feet of the trail, would maintain quiet, non-motorized trails opportunities along the entire Lassen National Forest portion of the PCT and reduce the potential for conflicts between motorized and non-motorized uses along the trail. Identifying where designated trails cross the PCT on the OSV use map would allow trail visitors to know in advance where they may encounter OSVs crossing the trail, and alert OSV riders to locations of potential non-motorized recreationists along the trail. This knowledge enhances both public safety and the experience expectations of visitors in these areas. Alternative 5 would minimize potential motorized OSV impacts to the non-motorized PCT experience to the greatest extent of all alternatives.

Cumulative Effects – Alternative 5

The cumulative effects of alternative 5 would be similar to those described for alternative 2.

In the current management, there are 185,990 acres not designated for OSV use due to the presence of designated Wilderness areas and other Forest Plan direction that limits OSV use. Alternative 5 proposes to designate 331,630 fewer acres. This could limit opportunities for motorized OSV use, while enhancing opportunities for non-motorized winter uses, as described in this analysis.

Summary

Degree to Which the Purpose and Need for Action is Met

All of the action alternatives (alternatives 2, 3, 4, and 5) 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 39 provides a comparison of the alternatives and the degree to which the alternatives address the recreation-related issues.

Table 38. Resource indicators and measures for alternative 5 direct and indirect effects

Resource Element	Resource Indicator	Measure (Quantify if possible)	Alternative 5
Motorized Recreation Opportunities – cross-country	Opportunities for motorized winter uses	Total area (acres) designated for OSV use, percent change	632,400 acres designated for public cross-country OSV use, subject to snow depth restrictions, a 34.4 percent decrease from current management. 12 inch snow depth requirement
Motorized Recreation Opportunities – designated snow trails	OSV trail designations	Length of designated OSV trails (miles), percent change	390 miles of OSV snow trails, subject to snow depth restrictions. 3.9 percent decrease from current management (however a majority of the current trail system is designated or in OSV designated use areas) 12 inch snow depth requirement
Motorized Recreation Opportunities – groomed snow trails	OSV trail grooming	Length groomed OSV trails (miles), percent change	349 miles, no change 12 inch snow depth requirement for grooming
Non-motorized Recreation Opportunities – displacement	Access to desired non-motorized recreation settings and opportunities	Total area (acres) and length of trails (miles) available to non-motorized recreation enthusiasts within 5 miles of plowed trailheads	Six plowed trailheads provide access for motorized and non-motorized winter use, 52,454 acres available for non-motorized recreation within 5 miles of plowed trailheads 18.3 miles of cross-country ski trails and 15.6 miles of the PCT available within 5 miles of plowed trailheads
	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 designated in Semi-Primitive Motorized, Roaded Natural and Rural ROS classes.
Non-motorized Recreation Conflicts – Public Safety	Areas and trails available to non-motorized recreation enthusiasts for quality non-motorized recreation experiences	Total area (acres) not designated for OSV use/length of non-motorized trails (miles), percent change	517,620 acres, 178 percent increase/ six non-motorized trails with a total of 148 miles for non-motorized use.
Non-motorized recreation conflicts – potential due to overlap	Total area (acres) accessible to non-motorized winter enthusiasts (within 5 miles of plowed trailheads) that are designated for OSV use	Total area (acres) overlap within 5 miles of plowed trailheads Percent change from existing conditions	127,851 acres 25 percent decrease in overlap

Resource Element	Resource Indicator	Measure (Quantify if possible)	Alternative 5
Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Non-motorized areas	Proximity and frequency of OSV designations in relation to non-motorized areas	Distance of groomed public OSV snow trails from non-motorized areas, or number of designated trails across non-motorized linear areas under existing law or policy	<p>A total of approximately 9 miles of groomed OSV trails within 1/2 mile of the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries</p> <p>Lassen Volcanic National Park: Groomed OSV trails ¾ mile east of the park's southeast corner, and 1 1/2 miles north of the park's northwest corner.</p> <p>Up to 12 designated trails across the PCT. No areas designated for cross-country OSV use within 500 feet of the PCT.</p> <p>No known conflicts with tribal/spiritual areas, historic areas or populated areas.</p>
	Noise	<p>Total area (acres) potentially affected by noise/total area (acres) not designated for winter motorized use</p> <p>Proximity of predicted noise increases above ambient levels in sensitive areas (GIS model for selected points)</p>	632,400 acres designated for OSV use and potentially affected by noise/517,620 acres not designated for OSV use and available for quiet recreation
	Air Quality	Qualitative/narrative description of potential impacts (with reference to air quality analysis)	Potential short-term impacts to the experience of recreational visitors in the vicinity of OSV and grooming equipment due to the smell of exhaust emissions. Substantially fewer acres designated for OSV use than in current management (see air quality report (project record)).
	Scenery	Qualitative/narrative description of potential visual impacts	Cross-country OSV use creates temporary tracks in the snow that crisscross the landscape. Substantially fewer acres designated for cross-country OSV use, and associated visual impacts than in current management. The visual evidence of snowmobile use decreases as fresh snow covers the tracks and/or when the snow melts at the end of the season

Resource Element	Resource Indicator	Measure (Quantify if possible)	Alternative 5
Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Non-motorized areas (continued)	Wilderness Attributes	Total area (acres) affected and duration of impact. Qualitative description for Wilderness attributes	Opportunities for solitude may be temporarily affected due to the sights and sounds of OSVs near the Wilderness or proposed wilderness boundaries. There are approximately 17,257 acres designated for OSV use within ½ mile of designated and proposed wilderness boundaries. The duration of the potential impacts would be short-term, during the winter while snow depth is adequate for OSVs to access the area.
	Roadless Characteristics	Total area (acres) affected and duration of impact. Qualitative description for roadless characteristics	Approximately 28,612 IRA acres designated for OSV use. Opportunities for solitude are temporarily affected in portions of four roadless areas (Table 30, pg. 114) that are within areas of expected high to moderate OSV use.

Table 39. Summary comparison of how the alternatives address the key issues

Resource Element	Resource Indicator/ Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Motorized Recreation Opportunities – cross-country	Opportunities for motorized winter uses/total area (acres) and percent change	964,030 acres currently open to public, cross-country OSV use, subject to snow depth restrictions No minimum snow depth requirement	920,260 acres designated for public cross-country OSV use, subject to snow depth restrictions, a 4.5 percent decrease from current management. 12 inch snow depth requirement	833,280 acres designated for public cross-country OSV use, subject to snow depth restrictions, a 13.5 percent decrease from current management. 12 inch snow depth requirement	955,470 acres designated for public cross-country OSV use, subject to snow depth restrictions, less than 1 percent (0.8 percent) decrease from current management. Depth necessary to avoid resource damage	632,400 acres designated for public cross-country OSV use, subject to snow depth restrictions, a 34.3 percent decrease from current management. 12 inch snow depth requirement

Resource Element	Resource Indicator/ Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Motorized Recreation Opportunities – designated snow trails	OSV trail designations, length of trails (miles) and percent change	406 miles of groomed, non-groomed, marked and unmarked OSV trails currently open for OSV use, subject to snow depth restrictions No minimum snow depth requirement	334 miles of designated OSV snow trails, subject to snow depth restrictions, 17.7 percent decrease from current management (however a majority of the current trail system is designated or in OSV designated use areas). 6 inches or more snow depth on snow trails overlying roads and trails; 12 inches snow depth on 0.1 mile of trail not overlying roads or trails.	383 miles of designated OSV snow trails, subject to snow depth restrictions. 5.6 percent decrease from current management (however a majority of the current trail system is designated or in OSV designated use areas). 6 inches where site review determines there would be no damage to underlying resources	380 miles of designated OSV snow trails, subject to snow depth restrictions. 6.4 percent decrease from current management (however a majority of the current trail system is designated or in OSV designated use areas) Depth necessary to avoid resource damage	390 miles of OSV snow trails, subject to snow depth restrictions. 3.9 percent decrease from current management (however a majority of the current trail system is designated or in OSV designated use areas) 12 inch snow depth requirement
Motorized Recreation Opportunities – groomed snow trails	OSV trail grooming, length of trails (miles), percent change	349 miles 12 inch snow depth requirement for grooming	349 miles, no change 12 inch snow depth requirement for grooming	349 miles, no change 18 inch snow depth requirement for grooming	349 miles, no change 12 inch snow depth requirement for grooming	349 miles, no change 12 inch snow depth requirement for grooming

Resource Element	Resource Indicator/ Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Non-motorized Recreation Opportunities – displacement	Access to desired non-motorized recreation settings and opportunities	Six plowed trailheads provide access for motorized and non-motorized winter use,	Six plowed trailheads provide access for motorized and non-motorized winter use,	Six plowed trailheads provide access for motorized and non-motorized winter use,	Six plowed trailheads provide access for motorized and non-motorized winter use,	Six plowed trailheads provide access for motorized and non-motorized winter use,
	Total area (acres) and length of trails (miles) available to non-motorized recreation enthusiasts within 5 miles of plowed trailheads	10,346 acres available for non-motorized recreation within 5 miles of plowed trailheads 18.3 miles of cross-country ski trails and 15.6 miles of the PCT available for non-motorized recreation within 5 miles of plowed trailheads	12,164 acres available for non-motorized recreation within 5 miles of plowed trailheads. An increase of 1,818 acres from current management. 18.3 miles of cross-country ski trails and 15.6 miles of the PCT available within 5 miles of plowed trailheads	39,317 acres available for non-motorized recreation within 5 miles of plowed trailheads. An increase of 28,917 acres from current management. 18.3 miles of cross-country ski trails and 15.6 miles of the PCT available within 5 miles of plowed trailheads	15,082 acres available for non-motorized recreation within 5 miles of plowed trailheads. An increase of 4,736 acres from current management. 18.3 miles of cross-country ski trails and 15.6 miles of the PCT available within 5 miles of plowed trailheads	52,454 acres available for non-motorized recreation within 5 miles of plowed trailheads. An increase of 42,108 acres from current management. 18.3 miles of cross-country ski trails and 15.6 miles of the PCT available within 5 miles of plowed trailheads
	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	Consistent – with substantially enhanced opportunities for non-motorized recreation experiences
Non-motorized Recreation Conflicts – Public Safety	Total area (acres) and length of trails (miles) available to non-motorized recreation enthusiasts for quality non-motorized recreation experiences	185,990 acres closed to OSV use, a total of 148 miles for non-motorized use.	229,760 acres, a 23.5 percent increase/ six non-motorized trails with a total of 148 miles for non-motorized use.	316,740 acres, a 41.2 percent increase/ six non-motorized trails with a total of 148 miles for non-motorized use.	194,550 acres, 4.6 percent increase/ six non-motorized trails with a total of 148 miles for non-motorized use.	517,620 acres, 178 percent increase/ six non-motorized trails with a total of 148 miles for non-motorized use.

Resource Element	Resource Indicator/ Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Non-motorized areas	<p>Proximity and frequency of OSV designations in relation to non-motorized areas</p> <p>Distance of groomed public OSV snow trails from non-motorized areas under existing law or policy, or number of designated trails across non-motorized linear areas under existing law or policy</p>	<p>A total of approximately 9 miles of groomed OSV trails within ½ mile of the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries.</p> <p>Lassen Volcanic National Park: Groomed OSV trails ¾ mile east of the park's southeast corner, and 1 1/2 miles north of the park's northwest corner.</p> <p>No designated OSV trails across the PCT.</p> <p>98.42 miles of the PCT are within 500 feet of an area designated for OSV use.</p> <p>No known conflicts with tribal/spiritual areas, historic areas or populated areas.</p>	<p>A total of approximately 9 miles of groomed OSV trails within ½ mile of the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries.</p> <p>Lassen Volcanic National Park: Groomed OSV trails ¾ mile east of the park's southeast corner, and 1 ½ miles north of the park's northwest corner.</p> <p>Up to 28 designated OSV trails across the PCT. No areas designated for cross-country OSV use within 500 feet of the PCT.</p> <p>No known conflicts with tribal/spiritual areas, historic areas or populated areas.</p>	<p>A total of approximately 9 miles of groomed OSV trails within ½ mile of the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries.</p> <p>Lassen Volcanic National Park: Groomed OSV trails ¾ mile east of the park's southeast corner, and 1 ½ miles north of the park's northwest corner.</p> <p>Up to 23 designated OSV trails across the PCT. 85.4 miles of the PCT are within 500 feet of an area designated for OSV use.</p> <p>No known conflicts with tribal/spiritual areas, historic areas or populated areas.</p>	<p>A total of approximately 9 miles of groomed OSV trails within ½ mile of the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries.</p> <p>Lassen Volcanic National Park: Groomed OSV trails ¾ mile east of the park's southeast corner, and 1 ½ miles north of the park's northwest corner.</p> <p>Up to 28 designated OSV trails across the PCT. 97.7 miles of the PCT are within 500 feet of an area designated for OSV use.</p> <p>No known conflicts with tribal/spiritual areas, historic areas or populated areas.</p>	<p>A total of approximately 9 miles of groomed OSV trails within ½ mile of the Caribou Wilderness, Caribou extension proposed Wilderness, Mill Creek Proposed Wilderness and Thousand Lakes Wilderness boundaries.</p> <p>Lassen Volcanic National Park: Groomed OSV trails ¾ mile east of the park's southeast corner, and 1 ½ miles north of the park's northwest corner.</p> <p>Up to 12 designated OSV trails across the PCT. No areas designated for cross-country OSV use within 500 feet of the PCT.</p> <p>No known conflicts with tribal/spiritual areas, historic areas or populated areas.</p>

Resource Element	Resource Indicator/ Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Non-motorized areas (continued)	Noise Total area (acres) potentially affected by noise/total area (acres) not designated for winter motorized use	964,030 acres currently open to OSV use, potentially affected by noise; 185,990 acres currently closed to OSV use, available for quiet recreation.	920,260 acres designated for OSV use, potentially affected by noise; 229,760 acres not designated for OSV use, available for quiet recreation.	833,280 acres designated for OSV use, potentially affected by noise; 316,740 acres not designated for OSV use, available for quiet recreation.	955,470 acres designated for OSV use, potentially affected by noise; 194,550 acres not designated for OSV use, available for quiet recreation.	632,400 acres designated for OSV use, potentially affected by noise; 517,620 acres not designated for OSV use, available for quiet recreation
	Air Quality Qualitative/ narrative description of potential impacts (with reference to air quality analysis)	Potential short-term impacts to the experience of recreational visitors in the vicinity of OSV and grooming equipment due to the smell of exhaust emissions (see air quality report (project record)).	Potential short-term impacts to the experience of recreational visitors in the vicinity of OSV and grooming equipment due to the smell of exhaust emissions. Slightly fewer acres designated for OSV use than in current management (see air quality report (project record)).	Potential short-term impacts to the experience of recreational visitors in the vicinity of OSV and grooming equipment due to the smell of exhaust emissions. Fewer acres designated for OSV use than in current management and alternative 2 (see air quality report (project record)).	Potential short-term impacts to the experience of recreational visitors in the vicinity of OSV and grooming equipment due to the smell of exhaust emissions. Slightly fewer acres designated for OSV use than in current management (see air quality report (project record)).	Potential short-term impacts to the experience of recreational visitors in the vicinity of OSV and grooming equipment due to the smell of exhaust emissions. Substantially fewer acres designated for OSV use than in current management (see air quality report (project record)).

Resource Element	Resource Indicator/ Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Non-motorized areas (continued)	Scenery Qualitative/ narrative description of potential visual impacts	Cross-country OSV use creates temporary tracks in the snow that crisscross the landscape. The visual evidence of snowmobile use decreases as fresh snow covers the tracks and/or when the snow melts at the end of the season.	Cross-country OSV use creates temporary tracks in the snow that crisscross the landscape. Fewer acres designated for cross-country OSV use, and associated visual impacts than in existing conditions. The visual evidence of snowmobile use decreases as fresh snow covers the tracks and/or when the snow melts at the end of the season	Cross-country OSV use creates temporary tracks in the snow that crisscross the landscape. Fewer acres designated for cross-country OSV use, and associated visual impacts than in existing conditions or Alt. 2. The visual evidence of snowmobile use decreases as fresh snow covers the tracks and/or when the snow melts at the end of the season	Cross-country OSV use creates temporary tracks in the snow that crisscross the landscape. Slightly fewer acres designated for cross-country OSV use, and associated visual impacts than in existing conditions. The visual evidence of snowmobile use decreases as fresh snow covers the tracks and/or when the snow melts at the end of the season	Cross-country OSV use creates temporary tracks in the snow that crisscross the landscape. Substantially fewer acres designated for cross-country OSV use, and associated visual impacts than in existing conditions. The visual evidence of snowmobile use decreases as fresh snow covers the tracks and/or when the snow melts at the end of the season
	Wilderness Attributes Total area (acres) affected and duration of impact. Qualitative description for Wilderness attributes	Opportunities for solitude may be temporarily affected due to the sights and sounds of OSVs near the Wilderness or proposed wilderness boundaries. There are approximately 27,108 acres currently open to OSV use within ½ mile of designated and proposed wilderness boundaries. The duration of the	Opportunities for solitude may be temporarily affected due to the sights and sounds of OSVs near the Wilderness or proposed wilderness boundaries. There are approximately 21,266 acres designated for OSV use within ½ mile of designated and proposed wilderness boundaries. The duration of the potential impacts	Opportunities for solitude may be temporarily affected due to the sights and sounds of OSVs near the Wilderness or proposed wilderness boundaries. There are approximately 19,173 acres designated for OSV use within ½ mile of designated and proposed wilderness boundaries. The duration of the potential impacts	Opportunities for solitude may be temporarily affected due to the sights and sounds of OSVs near the Wilderness or proposed wilderness boundaries. There are approximately 25,575 acres designated for OSV use within ½ mile of designated and proposed wilderness boundaries. The duration of the potential impacts	Opportunities for solitude may be temporarily affected due to the sights and sounds of OSVs near the Wilderness or proposed wilderness boundaries. There are approximately 17,257 acres designated for OSV use within ½ mile of designated and proposed wilderness boundaries. The duration of the potential impacts

Resource Element	Resource Indicator/ Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Non-motorized Recreation Conflicts – Solitude, Air Quality, Scenery, Non-motorized areas (continued)	Wilderness Attributes (continued)	potential impacts would be short-term, during the winter while snow depth is adequate for OSVs to access the area.	would be short-term, during the winter while snow depth is adequate for OSVs to access the area.	would be short-term, during the winter while snow depth is adequate for OSVs to access the area.	would be short-term, during the winter while snow depth is adequate for OSVs to access the area.	would be short-term, during the winter while snow depth is adequate for OSVs to access the area.
	Roadless Characteristics Total area (acres) affected and duration of impact. Qualitative description for roadless characteristics	Approximately 72,972 IRA acres currently open to OSV use. Opportunities for solitude are temporarily affected in portions of four roadless areas (Black Cinder, Butt Mountain, Devil's Garden and Trail Lake) that are within areas of expected high to moderate OSV use.	Approximately 59,225 IRA acres designated for OSV use. Opportunities for solitude are temporarily affected in portions of four roadless areas (Black Cinder, Butt Mountain, Devil's Garden and Trail Lake) that are within areas of expected high to moderate OSV use.	Approximately 57,888 IRA acres designated for OSV use. Opportunities for solitude are temporarily affected in portions of four roadless areas (Black Cinder, Butt Mountain, Devil's Garden and Trail Lake) that are within areas of expected high to moderate OSV use.	Approximately 72,202 IRA acres designated for OSV use. Opportunities for solitude are temporarily affected in portions of four roadless areas (Black Cinder, Butt Mountain, Devil's Garden and Trail Lake) that are within areas of expected high to moderate OSV use.	Approximately 28,612 IRA acres designated for OSV use Opportunities for solitude are temporarily affected in portions of four roadless areas (Black Cinder, Butt Mountain, Devil's Garden and Trail Lake) that are within areas of expected high to moderate OSV use.

Summary of Environmental Effects

Recreation Settings and Opportunities

All action alternatives would provide the same level of groomed motorized OSV trail opportunities. Cross-country travel, and use of OSV trails would be limited by minimum snow depth requirements for all action alternatives; however, alternative 4 would provide the least restrictive snow depth, described as the depth necessary to avoid resource damage. Alternative 2 would designate for use OSV trails with a 6-inch minimum snow depth and alternative 3 provides some flexibility in the snow depth requirements for trails where site review determines there would be no damage to underlying resources. This flexibility would designate OSV use access to higher elevations and adequate snow depths. Alternative 4 would provide the most access for motorized OSV use forestwide, compared to alternatives 2 and 3. Alternative 5 provides the least access for motorized OSV use forest-wide.

Alternatives 3 and 5 would enhance opportunities for quiet, non-motorized recreation with additional areas where OSV use would not be designated, and areas where OSV use would be designated only on designated OSV use trails, while maintaining the existing level of groomed OSV trail opportunities. However, all of the action alternatives increase the number of acres available for quiet, non-motorized use (not designated for OSV use) within 5 miles of plowed trailheads to some extent.

Alternative 2 would maintain OSV opportunities most similar to the current management on the Lassen National Forest.

Conflicts between Motorized and Non-Motorized Uses

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

Alternative 3 would substantially minimize conflicts between motorized and non-motorized uses by designating fewer acres for OSV use, and designating two areas where OSVs would be restricted to designated OSV trails. Alternative 5 would enhance the quiet, non-motorized recreation experience to the greatest extent of all alternatives, by designating the least amount of acres for OSV use. These designations would provide separate areas for non-motorized recreation that would not be influenced by the noise, smell of exhaust, and presence of OSVs. Alternatives 3 and 5 also would enhance public safety for non-motorized enthusiasts by providing areas that would be separated from the influence of OSVs.

Alternative 4 would provide the most acres designated for OSV use, and therefore, would have the potential for continued or increased conflict with non-motorized uses in the future, with the exception of one area where OSVs would be restricted to the designated OSV trail. Alternative 4 would also enhance public safety for non-motorized enthusiasts in this area.

There are approximately 25,000 annual OSV registrations in the state of California, and according to the 2009 State DEIR trailhead survey, approximately 10,020 OSV visits to the Lassen National Forest per winter season, typically mid-December through March. OSV use would be spread across the available designated OSV acres and trails. Based on 10,020 visits, if use were spread evenly across each day of the season, there would be approximately 102 OSVs on the forest per day. Daily use may be higher during weekends and holidays and lower during the week. For the current management, this equates to 9,451 acres and 4 miles of trail per OSV. In alternative 4 with the most acreage proposed for designation

for OSV use, there would be 9,367 acres and 3.7 miles of trail per OSV, and in alternative 5, with the least acreage proposed for designation for OSV use, there would be 6,200 acres and 3.8 miles of trail per OSV. Based on the OSV use assumption that most OSV use would be concentrated along groomed trails, the change from the existing 4 miles of trail per OSV to the most limiting potential alternative at 3.3 miles of trail per OSV is not likely to create use conflict that does not currently exist. Similarly, the change from the existing 9,451 acres per OSV to the most limiting potential alternative at 6,200 acres per OSV, there is likely adequate acreage to disperse the use and avoid use conflict.

Areas Designated Non-motorized under Existing Law or Policy

Potential impacts to non-motorized areas under existing law or policy related to the groomed OSV trail system, such as encroachment into Wilderness, proposed wilderness, and adjacent Federal lands, would be the same for all action alternatives, since all alternatives would provide the same level of groomed motorized snow trail opportunities. Alternatives 2, 3, and 5 would provide slightly more protection for the Ishi Wilderness, Mill Creek Proposed Wilderness, semi-primitive non-motorized areas within the Ishi and Polk Springs Inventoried Roadless Areas, and Antelope and Mill Creek eligible wild and scenic river corridors, because OSV use would not be designated in the southwestern portion of the forest and some areas below 3,500 feet in elevation. Alternatives 3 and 5 would minimize potential impacts to Wilderness and proposed wilderness areas to the greatest extent with the additional areas where OSV use would not be designated north of Caribou Wilderness and south of the Heart Lake and Wild Cattle Mountain Proposed Wilderness Areas. Not designating OSV use in these areas would also help to minimize potential impacts from the sights and sounds of OSVs to quiet, non-motorized areas within Lassen Volcanic National Park.

Alternative 4 would include restrictions to designated trails in the areas south of Lassen Volcanic National Park that would minimize impacts from OSV encroachment into the Heart Lake and Wild Cattle Mountain proposed wilderness areas, and Lassen Volcanic National Park.

Inventoried Roadless Areas

The environmental consequences to IRAs and other unroaded areas are similar in all alternatives. There are no new roads, groomed trails, trailheads or other permanent developments proposed under any of the alternatives, therefore, potential impacts to roadless characteristics are considered short-term when OSVs or their tracks are present. Designating areas or trails for OSV use within and adjacent to IRAs or other unroaded areas under any of the Alternatives does not preclude future Forest planning efforts to consider these area as potential wilderness recommendations (FSH 1909.12, Ch.70).

Pacific Crest Trail

Alternatives 2 and 5 do not designate any OSV areas within 500 feet of the PCT. There would be 28 designated OSV trails across the PCT under alternative 2 and 12 under alternative 5. Both alternatives would minimize potential conflicts between motorized and non-motorized use along the PCT. Alternatives 2 and 5 would comply with the direction in the Pacific Crest National Scenic Trail Comprehensive Plan regarding management of the PCT and would maintain non-motorized opportunities and quiet settings along the trail. In alternatives 3 and 4, the PCT trail itself would remain non-motorized; however, there would be areas within 500 feet of the trail designated for OSV use, potentially impacting the quiet, non-motorized trail experience. There would be 23 designated OSV trails across the PCT under alternative 3 and 28 under alternative 4. Identifying where OSV designated trails cross the PCT on the OSV use map would allow trail visitors to know in advance where they may encounter OSVs crossing the trail, and alert OSV riders to locations of potential non-motorized recreationists along the trail. This knowledge enhances both public safety and the experience expectations of visitors in these areas.

In all action alternatives, Wilderness areas, semi-primitive non-motorized areas and research natural areas would not be designated for 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 trails, and areas on NFS lands to provide for OSV 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, 4, and 5 would comply with Subpart C of the Travel Management Regulations and the Lassen Forest Plan.

Short-term Uses and Long-term Productivity

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

Unavoidable Adverse Effects

Designating 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.

Transportation Resources

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 action alternatives designed to implement Subpart C of the Travel Management Regulations (36 CFR Part 212). These regulations require designating trails and areas for OSV use.

This analysis also addresses other actions included in the alternatives, including identification of snow trails for grooming for snowmobile use.

This analysis will provide a comparison of alternatives that would result in varying levels of snowmobile use.

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

- Motorized recreation opportunities
- Non-motorized recreation opportunities

Relevant Laws, Regulations, and Policy

Laws

National Forest Roads and Trails Act of October 13, 1964, as amended (16 U.S.C. 532-538)

This act authorizes road and trail systems for the national forests. It also authorizes granting of easements across 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

This act appropriates funds for the Forest Service's road and trail programs.

Organic Administration Act of 1897 (16 U.S.C. 551).

This act authorizes the regulation of national forests.

National Trails System Act of October 2, 1968 (16 U.S.C. 1241-1249)

This act established the National Trails System and authorizes planning, right-of-way acquisition, and construction of trails established by Congress or the Secretary of Agriculture.

Federal Regulations

Code of Federal Regulations

- 36 CFR Part 212 (Forest Service travel management)
- 36 CFR Part 251 (Land Uses)
- 36 CFR Part 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

Lassen National Forest Plan

Forestwide 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.

Topics and Issues Addressed in this Analysis

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 system of OSV trails and areas 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. This action responds to direction provided by the Forest Service's Travel Management Rule at 36 CFR Part 212 and Subpart C of the Travel Management Rule, as proposed.

A second purpose of this project is to identify those designated National Forest System (NFS) 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. This action would identify snow trails for grooming.

The settlement agreement also requires analyzing ancillary activities such as the plowing of related parking lots and trailheads as part of the effects analysis. If determined to be relevant and useful for the analysis of cumulative impacts, the cumulative impacts of these activities would be analyzed.

Based on the above purpose and need, transportation and engineering are not directly related; however, the forest transportation system does include OSV trails, and many of the trails are located atop underlying NFS roads. Therefore, the effects to engineering and roads will be analyzed here.

Resource Indicators and Measures

- Measurement Indicator 1: Public Safety and Traffic – For each alternative, display or discuss the effects on public safety. Discuss the proposed changes to the trail system and effects it would have to motor vehicle operators and other recreationists on the trail system. Note any 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 or discuss how over-snow uses and grooming would affect the total cost of maintaining the Forest Transportation System (FTS) that would be designated for motor vehicle use. Include the annual maintenance changes associated with OSV use of access roads and parking and staging areas. This analysis will not involve road maintenance costs associated with standard wheeled motor vehicles.
- 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 or scale of the alternatives.

Methodology

Information Sources

The Forest Transportation Atlas was the primary data used, along with professional expertise. The atlas is primarily composed of roads and motorized trail information as contained in geographic information system (GIS) spatial data and Forest Service Infrastructure (INFRA) tabular data. In addition, the proposed OSV trail network for designation, by alternative (GIS data) were included. Last of all, the existing National Forest System roads and OSV-related engineering facilities, including snow parks, warming huts, parking areas (GIS data) were considered.

All distance figures are approximate values based on the Forest Transportation Atlas (including spatial GIS data and tabular INFRA data) and are limited to the accuracy of those sources which includes measurements from GIS, GPS, field instruments and aerial photography. Mileages have been updated throughout the planning process as better information has been made available and may change slightly with additional field verification and project implementation.

Assumptions

- All OSV recreationists would follow applicable laws and designations as described under each alternative.
- All proposed and analyzed OSV trails would be located where the Forest Service has jurisdiction.

Spatial and Temporal Context for Effects Analysis

The affected spatial area where direct, indirect, and cumulative transportation effects may be caused by proposed activities involves the project area (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 rules, 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 12 inches.

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

- 2,760 miles of currently groomed, ungroomed, marked, and unmarked snow trail are currently open to public OSV use. Not all of these trails are shown on the 2005 Lassen National Forest Winter Recreation Guide (project record).
- Approximately 349 miles of groomed OSV trails are currently open to OSV use. This includes 27 miles of snow trail not under Forest Service jurisdiction;
- Approximately 964,030 acres of NFS land are currently open to off-trail cross-country OSV use; and
- Approximately 185,980 acres of NFS land are currently 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

Under alternative 1, there would be no changes to the existing OSV use on 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 Travel Management Regulations, Subpart C, would not be implemented, and no OSV use map would be produced.

Direct and Indirect Effects – Alternative 1

Table 40. 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 recreationists on 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 would be designated for motor vehicle use	Minor effects (minor costs) due to OSV 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 or more inches of snow for grooming and 12 inches for cross-country and trail and road OSV use requirement provides more than adequate protection of underlying roads and trails.

Alternative 2 – Proposed Action

Alternative 2 proposes to designate NFS trails and areas on NFS lands for OSV use within the Lassen National Forest where snowfall depth is adequate for that use to occur. The responsible official would designate OSV use on parts of administrative units or ranger districts of the Lassen National Forest. Areas where off-trail cross-country OSV use would be designated would cover 920,260 acres. Existing OSV prohibitions applying to areas or trails would continue. After these trails, and areas are designated, OSV use not in accordance with these designations would be prohibited by 36 CFR §261.14.

Alternative 2 would require 12 inches of snow depth for snow grooming and cross-country OSV use, and 6 inches of snow depth for OSV use on snow trails with underlying roads and trails.

A total of 350 miles of groomed snow trails are proposed for public OSV use. A total of 334 miles of NFS snow trails would be designated for public OSV use.

Up to 28 OSV trails across the PCT would be designated to allow OSV access to all sectors of each of the designated OSV areas without having to exit the designated OSV areas. All designated trails crossing the PCT would overlie NFS roads currently designated for wheeled motorized vehicle use on the Lassen National Forest's Motor Vehicle Use Map.

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 various 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 the 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.

Project Design Features and Mitigation Measures (for all action alternatives)

Mitigation measures that address minimization criteria for travel regulations for areas designated for OSV use are included in the RFEIS appendix C. Mitigations that address minimization criteria for travel regulations for trails designated for OSV use are included in RFEIS appendix D. Best management practices for watershed protection are included in RFEIS, appendix E.

Mitigations for minimizing conflicts among different classes of motor vehicles is included in: Minimizing Conflicts among Different Classes of Motor Vehicle Uses of National Forest System Lands or Neighboring Federal Lands (36 CFR §212.55(b)(4).

For groomed snow trails the objective of minimizing conflicts between public OSV use and other existing or proposed recreational use would be addressed by prohibiting wheeled-vehicle use of groomed snow trails from December 26 through March 31.

Required Monitoring (for all action alternatives)

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. However, the analysis assumes the following monitoring procedures would be implemented:

1. The Forest Service has an obligation to monitor the effects of public 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 the groomed trail system for evidence of OSV trespass into areas not designated for OSV use, OSV use near or damage to sensitive plant and wildlife sites, and low snow areas subject to erosion concerns (California Department of Parks and Recreation, Off Highway Motor Vehicle Recreation Division 2010, Appendix C).
2. Monitoring that will occur during implementation of any alternative includes effectiveness monitoring, based on available resources. Monitoring will ensure that:
 - 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 depth 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;
 - a) Where resource damage is suspected due to public OSV use on less than the prescribed minimum snow depth, monitoring would occur to help inform the responsible official if damage is occurring, the extent of the damage, and what steps need to be taken to address the issue;
 - Public OSV use is not damaging sensitive resource locations, in consultation with forest resource specialists;
 - Public OSV use is not occurring in areas and on trails not designated for OSV use; and
 - Public OSV use restricted to designated trails is not encroaching away from the trails into areas not designated for OSV use.

Direct and Indirect Effects - Alternative 2

Table 41. 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 recreationists on the trail system	The OSV use map would provide adequate information to maintain a reasonable level of public safety and avoid traffic conflicts; the map and information would also improve understanding of trails and areas designated for OSV use, and prohibitions.
Cost	Affordability	Qualitative effects to the total cost of maintaining the FTS that would be designated for motor vehicle use	Minor effects (minor costs) due to OSV 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-inch snow depth for grooming and general cross-country OSV use and 6-inch snow depth for OSV use on underlying roads requirement would provide adequate protection of underlying roads, trails and other resources.

Climate Change

Climate change and extreme weather events could impact forest lands infrastructure such as roads, bridges, and culverts (USDA Forest Service 2014). Climate change effects are described in other resource analyses for this project. Heavy precipitation, could increase in the future, and overload existing infrastructure that has not been built to that capacity. Extreme weather events may require more frequent road and other infrastructure maintenance, even if designed to appropriate specifications (USDA Forest Service 2014). Potential climate change effects could require additional transportation network planning and changes in infrastructure design. Climate change effects would be the same for all alternatives.

Cumulative Effects – Alternative 2

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

Cumulative effects are similar for all alternatives.

Past Actions

Effects of past actions are included in existing conditions.

Present Actions

Current projects on the forest include:

- Bald Fire Salvage and Restoration and Jellico Fire Salvage and Restoration projects include salvage logging, roadside hazard, fuels treatment, removing non-merchantable hazard trees along roads and trails, treatment of activity slash, site preparation, and reforestation planting.
- Tamarack and Dutch Fire Salvage include salvage log approximately 3,048 acres, removing roadside hazard trees on 1,174 acres, fuel treatment on 4,480 acres and reforestation 5,645 acres within the fire perimeter. About 2.4 miles of existing non-system roads would be added to the road system as Maintenance Level (ML) 2. About one-half mile would be constructed and added as ML 1. Best management practices would be applied to one water source for use on the project.

- Timber salvage on approximately 200 acres on the Lassen Day Salvage Sale.
- Timber harvest on Castle, Lost and Urfa Timber Sale.

Grazing would continue on existing allotments.

Projects are listed in the Lassen National Forest Schedule of Proposed Actions; project descriptions are included in the EIS appendix.

- Jellico Fire Salvage and Restoration
- Tamarack Fire Salvage
- Dutch Fire Salvage
- Castle Timber Sale
- Lassen Day Salvage Sale
- Lost Timber Sale
- Urfa Timber Sale
- Yellow Modified Contract Timber Sale
- Various ongoing grazing allotments
- Big Meadows Powerline Improvement Project CE
- Big Springs Project CE
- Chips Creek Bridge CE
- Grizzly Restoration Project EA
- High Lakes Motorized Trail Re- routes and Staging Area Improvements EA
- Ridge Project CE
- Rocks Restoration EA
- Storrie Aquatic Organism Passage (AOP) Project CE
- Moonlight Hand Thinning Project CE
- Re-issuance of Eagle Lake Rec Area Special Use Permit (Concessionaire) CE
- Rust Resistant Sugar Pine Maintenance CE
- Bailey Creek Aquatic Organism Passage (AOP) Project CE
- Big Lake Restoration Project CE
- Halls Flat Windthrow Project EA
- Hat Creek Valley Powerline Spur CE
- Plum Restoration Project EA

Reasonably Foreseeable Future Actions

Future projects on the Lassen National Forest include: power pole replacement, fence upkeep for spring protection, development of safe trails across the PCT, hazardous fuel reduction, reforestation, road stream crossing improvements, hand thinning, spring protection, wind throw salvage and other vegetation

treatments. Additional future projects include the re-routing and reconstructing High Lakes motorized trail segments, decommissioning the eliminated trail segments, restoring or improving dispersed recreation areas within the roadless area, and developing a staging area outside the roadless area.

Table 42. 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 recreationists on the trail system	Negligible cumulative effects; use of temporary closures for timber harvest and other forest operations activities would eliminate conflicts.
Cost	Affordability	Qualitative effects to the total cost of maintaining the FTS that would be designated for 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

Alternative 3 proposes to designate NFS trails and areas on NFS lands for OSV use within the Lassen National Forest where snowfall depth is adequate for that use to occur. The responsible official would designate OSV use on parts of administrative units or ranger districts of the Lassen National Forest. Areas where off-trail cross-country OSV use would be designated would cover 833,280 acres. After these trails and areas are designated, OSV use not in accordance with these designations would be prohibited by 36 CFR §261.14.

Alternative 3 would require 18 inches of snow depth for snow grooming, 12 inches of snow depth for cross-country OSV use, and 6 inches of snow depth for OSV use on snow trails with underlying roads and trails. A total of 349 miles of snow trails would be groomed for public OSV use. A total of 383 miles of NFS snow trails would be designated for public OSV use.

Up to 23 OSV trails across the PCT would be designated to allow OSV access to all sectors of each of the designated OSV areas without having to exit the designated OSV areas. All designated trails crossing the PCT would overlie NFS roads currently designated for wheeled motorized vehicle use on the Lassen National Forest's Motor Vehicle Use Map.

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 various 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 the width of the 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.

*Direct and Indirect Effects - Alternative 3***Table 43. 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 recreationists on the trail system	The OSV use map would provide adequate information to maintain a reasonable level of public safety and avoid traffic conflicts; this would also improve understanding of trails and areas designated for OSV use and prohibitions.
Cost	Affordability	Qualitative effects to the total cost of maintaining the FTS that would be designated for motor vehicle use	Minor effects (minor costs) due to OSV 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 inches snow depth for grooming, 12 inches for general cross-country OSV use and 6 inches snow depth for OSV use on underlying roads requirements would provide adequate protection of underlying roads, trails and resources.

*Cumulative Effects – Alternative 3***Table 44. 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 recreationists on 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 FTS that would be designated for 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

Alternative 4 proposes to designate NFS trails and areas on NFS lands for OSV use within the Lassen National Forest where snowfall depth is adequate for that use to occur. The responsible official would designate OSV use on parts of administrative units or ranger districts of the Lassen National Forest. Areas where off-trail cross-country OSV use would be designated would cover 955,470 acres. After these trails and areas are designated, OSV use not in accordance with these designations would be prohibited by 36 CFR §261.14.

Alternative 4 would require 12 inches of snow depth for snow grooming. The minimum snow depth for public OSV use on designated snow trails and on cross-country OSV use areas would be the depth necessary to avoid underlying resource damage.

A total of 380 miles of NFS snow trails would be designated for public OSV use. A total of 349 miles of trails would be groomed for public OSV use.

Up to 28 OSV trails across the PCT would be designated to allow OSV access to all sectors of each of the designated OSV areas without having to exit the designated OSV areas. All designated trails crossing the PCT would overlie NFS roads currently designated for wheeled motorized vehicle use in the Lassen National Forest's Motor Vehicle Use Map.

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 various 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 the width of the 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.

Direct and Indirect Effects - Alternative 4

Table 45. 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 recreationists on the trail system	The OSV use map would provide adequate information to maintain a reasonable level of public safety and avoid traffic conflicts; this would also improve understanding of trails and areas designated for OSV use and prohibitions.
Cost	Affordability	Qualitative effects to the total cost of maintaining the FTS that would be designated for motor vehicle use	Minor effects (minor costs) due to OSV 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 inch minimum snow depth for grooming and the minimum snow depth necessary to avoid underlying resource damage requirements for OSV cross-country designated use areas, roads and trails would provide adequate protection of underlying roads and trails and other resources.

*Cumulative Effects – Alternative 4***Table 46. 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 recreationists on 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 would be designated for 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 5

The responsible official would designate OSV use on parts of administrative units or ranger districts of the Lassen National Forest. Off-trail cross-country OSV use would be designated on six designated areas totaling 632,400 acres. After these trails and areas are designated, OSV use not in accordance with these designations would be prohibited by 36 CFR §261.14.

Alternative 5 would require 12 inches minimum snow depth for trail grooming, designated NFS trail OSV use, and cross-country public OSV use areas. Minimum snow depth requirements for OSV use would avoid underlying resource damage.

A total of 390 miles of NFS snow trails would be designated for public OSV use, 349 miles of trails would be groomed for public OSV use.

Up to 12 OSV trails across the PCT would be designated to allow OSV access to all sectors of each of the designated OSV areas without having to exit the designated OSV areas. All designated trails crossing the PCT would overlie NFS roads currently designated for wheeled motorized vehicle use on the Lassen National Forest's Motor Vehicle Use Map T.

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 various 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 the width of the 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.

Direct and Indirect Effects - Alternative 5

Table 47. Resource indicators and measures for alternative 5

Resource Element	Resource Indicator	Measure	Alternative 5
Safety	Public Safety & Traffic	Qualitative effects to motor vehicle operators and other recreationists on the trail system	The OSV use map would provide adequate information to maintain a reasonable level of public safety and avoid traffic conflicts; this would also improve understanding of trails and areas designated for OSV use and prohibitions.
Cost	Affordability	Qualitative effects to the total cost of maintaining the Forest transportation system (FTS) that would be designated for motor vehicle use	Minor effects (minor costs) due to OSV use for access roads to popular parking and staging areas.
Transportation property	Effects to underlying NFS roads and trails	Wear and tear that may affect wheeled motor vehicle use	12 inches minimum snow depth requirement for grooming, designated public cross-country OSV use areas and on designated trails (on roads and trails) would avoid underlying resource damage and would provide adequate protection of underlying roads, trails and other resources.

Cumulative Effects – Alternative 5

Table 48. Resource indicators and measures for alternative 5 cumulative effects

Resource Element	Resource Indicator	Measure	Alternative 5
Safety	Public Safety & Traffic	Qualitative effects to motor vehicle operators and other recreationists on 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 would be designated for 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 of Environmental Effects

Table 49 is a summary of effects for each alternative.

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

Alternatives 2, 3, 4 and 5 are compliant with all applicable direction, since they all involve production of a motor vehicle use map as required in Subpart C of the travel management regulations (36 CFR Part 212).

Alternative 1 does not involve production of a motor vehicle use map as required in Subpart C of the travel management regulations. Alternative 1 is otherwise compliant with applicable direction.

Table 49. Summary comparison of environmental effects to transportation and engineering resources

Resource Element	Indicator/ Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Safety	Public Safety & Traffic	The current Lassen National Forest Winter Recreation Guide map provides adequate information to maintain a reasonable level of public safety and avoid traffic conflicts	The OSV use map would provide adequate information to maintain a reasonable level of public safety and avoid traffic conflicts; this would also improve understanding of trails and areas designated for OSV use and prohibitions.	The OSV use map would provide adequate information to maintain a reasonable level of public safety and avoid traffic conflicts; this would also improve understanding of trails and areas designated for OSV use and prohibitions.	The OSV use map would provide adequate information to maintain a reasonable level of public safety and avoid traffic conflicts; this would also improve understanding of trails and areas designated for OSV use and prohibitions.	The OSV use map would provide adequate information to maintain a reasonable level of public safety and avoid traffic conflicts; this would also improve understanding of trails and areas designated for OSV use and prohibitions.
Cost	Affordability	Minor effects (minor costs) due to OSV use for access roads to popular parking and staging areas.	Minor effects (minor costs) due to OSV use for access roads to popular parking and staging areas.	Minor effects (minor costs) due to OSV use for access roads to popular parking and staging areas.	Minor effects (minor costs) due to OSV use for access roads to popular parking and staging areas.	Minor effects (minor costs) due to OSV use for access roads to popular parking and staging areas.
Transportation property	Effects to underlying NFS roads and trails	12 or more inches of snow for grooming and 12 inches or more for general cross-country OSV use areas and on trails or roads requirement provides more than adequate protection of underlying roads and trails.	12 inches minimum snow depth for grooming and general cross-country OSV use, and 6 inches minimum snow depth for OSV use on underlying roads requirement would provide adequate protection of underlying roads and trails.	18 inches minimum snow depth for grooming, 6 inch minimum snow depth for use on underlying roads and trails and 12 inch minimum snow depth for OSV cross-country use area requirement would provide adequate protection of underlying roads and trails.	12 inch minimum snow depth for grooming. The minimum snow depth necessary to avoid underlying resource damage requirements on trails and cross-country OSV use areas would provide protection of underlying roads and trails.	12 inches minimum snow depth requirement for grooming, designated public cross-country OSV use areas and on designated trails would provide protection of underlying roads and trails.

Noise

This analysis considers and discloses the potential acoustic impacts of sound related to the following proposed actions:

- Designating trails and areas for over-snow vehicle (OSV) use
- Identifying snow trails for grooming for OSV use

This analysis compares alternatives that would result in varying levels of snowmobile 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 recreationists' 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 2009b)).

Land and Resource Management Plan

The Lassen National Forest Land and Resource Management Plan (LRMP or Forest Plan) provides standards and guidelines for areas that are relevant to this noise analysis as follows:

Forest Goals:

Wilderness and Further Planning Areas

- a. Protect Wilderness character in designated and recommended wilderness

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 [of the Forest Plan], and the Management Prescriptions. Refer to the separate ROS Map for the distribution of ROS classes throughout the forest.
- (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).

Desired Condition

The desired outcome of this OSV use designation process is a manageable, designated system of OSV 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 would 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.

Management Area

The following management areas are relevant to providing both motorized recreation opportunities, and quiet non-motorized recreation opportunities.

M – Semi-Primitive Motorized Recreation

This prescription is derived from the ROS class of semi-primitive motorized (SPM) (see Appendix J of the LRMP 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 ROS class of semi-primitive non-motorized (SPNM) (See Appendix J of the LRMP 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).

Special Area Designations

Special Area Designations within the Lassen National Forest that are relevant to the noise analysis include Wilderness, proposed wilderness, inventoried roadless areas, and national trails.

Federal Law

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

- Wilderness Act of 1964 and applicable Wilderness Implementation Plans
- National Trails System Act of 1968 (P.L. 90-543) and the Pacific Crest National Scenic Trail Comprehensive Plan
- 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.”

State and Local Law

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

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

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

Noise Impacts

Designating snow trails and areas for public OSV use and grooming snow trails for public OSV use have the potential to generate anthropogenic (human-related) noise and increase noise levels above ambient levels in the short term. This could adversely impact wildlife species that are sensitive to this sort of disturbance as well as the experience of the recreational enthusiast who values solitude and quiet recreational opportunities.

Measurement Indicators

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

- Opportunities for motorized winter uses – Size of areas (acres) designated for public, cross-country OSV use; percentage change compared to current management;

- OSV designations – Length of snow trails (miles), groomed and ungroomed, designated and identified for public OSV use.

The GIS noise model will consider:

- Proximity of predicted noise increases above ambient levels in sensitive areas to include:
 - ◆ Points along the PCT
 - ◆ OSV trails near Wilderness areas;
 - ◆ OSV trails near communities;
 - ◆ OSV trails brought forward by the public as concern areas during scoping (Butte Lake area);
 - ◆ Plowed OSV trailheads

Methodology

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

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

Spatial Context:

- Forest Boundary

Effects Timeframe:

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

Table 50. Resource indicators and measures for assessing effects

Resource Element	Resource Indicator	Measure (Quantify if possible)	Used to address: Purpose and Need (P/N), or Issue?	Source (LRMP S&G ¹⁷ ; law or policy, BMPs ¹⁸ , etc.)?
Noise	Opportunities for motorized winter uses	Size of areas (acres) designated for public, cross-country OSV use; percentage change compared to current management;	Issue	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.
	OSV designations	Length of snow trails (miles), groomed and ungroomed, designated and identified for public OSV use.	Issue	

Affected Environment

Existing Condition

The Forest Service has a well-developed winter recreation program on the Lassen National Forest that emphasizes snowmobile use. There are 2,933 miles of currently groomed, ungroomed, marked, and unmarked snow trail that are currently open to public OSV use. Not all of these trails and areas are shown on the 2005 Lassen National Forest Winter Recreation Guide (project record). These trails are within areas currently open to OSV use. All but 406 miles of these trails are roads that are not plowed, but are open to OSVs, all-terrain vehicles, 4-wheel drive vehicles, and skiers.

For over 30 years, the Forest Service, Pacific Southwest Region, in cooperation with the California Department of Parks and Recreation (California State Parks) Off-highway Motor Vehicle Division has enhanced winter recreation, and more specifically, snowmobiling recreation by maintaining National Forest System trails (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 systems on the Hat Creek, Eagle Lake, and Almanor Ranger Districts are described in detail in the Recreation section of this analysis.

¹⁷ Standard and Guideline

¹⁸ Best Management Practices

Noise

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

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

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

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

Areas of specific concern to non-motorized enthusiasts who are typically seeking a quiet recreation setting that is not influenced by the sight, sound, or exhaust smell of motorized vehicles include cross-country ski trails, the PCT, the Butte Lake area, Wilderness, proposed wilderness and semi-primitive non-motorized ROS classes.

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

Sound Propagation

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

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

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

Table 51. Resource indicators and measures for the existing conditions and alternative 1

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	Existing Condition
Noise	Opportunities for motorized winter uses	Size of areas (acres) designated for public, cross-country OSV use	964,030 acres open to public, cross-country OSV use
	OSV designations	Length of snow trails (miles), groomed and ungroomed, designated and identified for public OSV use.	406 miles of groomed and ungroomed trails identified for OSV use/349 miles groomed for OSV use

Environmental Consequences

Alternative 1 – No Action

Under alternative 1, there would be no changes to the existing system of OSV use on 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 Travel Management Regulations, Subpart C, would not be implemented, and no OSV use map would be produced. 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.

Noise

Under the no-action alternative, 964,030 acres would remain open to OSV use and the associated influence of OSV noise. Noise sources of multiple OSVs and vehicles would be concentrated at plowed OSV trailheads, and more dispersed along groomed trails. Of the 964,030 acres, only approximately 304,820 acres are anticipated to have high to moderate OSV use levels (see maps in the recreation section of this analysis) and the associated potential noise impacts.

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

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

Alternative 2 – Proposed Action

Minimization Measures

The modified proposed action is described in detail in chapter 2. Alternative 2 would designate eight discrete, specifically delineated areas for cross-country OSV use. These areas would total 920,260 acres of NFS lands within the Lassen National Forest. OSV use would be allowed in these areas when snow depth is adequate for that use to occur. Trails designated for public OSV use when snow depth is adequate for that use to occur would total 334 miles. All existing OSV prohibitions applying to areas or trails would continue. Alternative 2 would identify approximately 350 miles of snow trails that would be groomed for public OSV use by the Forest Service's Lassen National Forest Grooming Program. The California State Parks' snow grooming standards would be formally adopted, requiring a minimum of 12 inches of snow depth before grooming could occur.

Alternative 2 would implement a forestwide snow depth requirement for OSV use that would provide for public safety and natural and cultural resource protection by allowing public cross-country OSV use in areas designated for OSV use when a minimum of 12 inches of snow covers the landscape; and allowing public OSV use on designated snow trails when 6 or more inches of snow covers the trail. All snow trails to be designated for public OSV use or identified for OSV grooming in all alternatives would overlie an existing paved, gravel, or native surface travel route. These travel routes are trails and roads used by wheeled motorized vehicles, when allowed, and non-motorized recreation.

Alternative 2 would designate up to 28 public OSV trails across the PCT that would overlie trails designated for wheeled motorized vehicle use when such use is allowed. Other than on these PCT crossing trails, no trails or areas would be designated for cross-country OSV use within 500 feet of the PCT on the Lassen National Forest.

Public OSV use would not be designated on approximately 229,760 acres, including all of the approximately 185,990 acres of the Lassen National Forest where public OSV use is currently prohibited, and 42,770 acres of areas currently open to OSV use that would not be designated for OSV use in this alternative

Public OSV use that is inconsistent with the designations and snow depth requirements made under this decision would be prohibited under 36 CFR Part 261.

Minimizing Conflicts between Motor Vehicle Use and Existing or Proposed Recreational Uses of National Forest System Lands or Neighboring Federal Lands (36 CFR §212.55(b)(3))

All Public OSV Use:

1. In alternatives 2, 3, 4, and 5, the objective of minimizing conflicts between OSV uses and non-motorized recreation uses on the PCT would be addressed by designating OSV trails across the PCT at intervals within limits specified by the Pacific Crest National Scenic Trail Comprehensive Plan (USDA Forest Service 1982, pp. 18-19).
2. In alternatives 2 and 5, the objective of minimizing conflicts between OSV uses and non-motorized recreation uses on the PCT would be addressed by not designating any areas for OSV use within 500 feet of the trail.
3. In alternatives 2 and 5, the objective of minimizing conflicts between OSV uses and non-motorized recreation uses on the PCT would be addressed by designating OSV trails across PCT with the objective of minimizing the distance an OSV would travel to cross the 500-foot wide non-designated area along each side of the PCT. These trails would, with the exception of 0.1 mile, exist as designated OSV trails located on roads and trails already designated for wheeled, motorized vehicles under Subpart B of the Travel Management Regulations, where possible.
4. The objective of minimizing conflicts between OSV uses and non-motorized recreation uses on the PCT would be addressed by installing additional signage along the PCT, to enhance wayfinding of winter OSV recreationists. Agency signage procedures would be followed. As a guideline, trail markers would be at eye level, approximately 40 inches above the average snow depth.
5. The objective of minimizing conflicts between OSV use and other existing or proposed recreational use would be addressed by identifying the PCT as non-motorized on the OSV Use Map.

6. The objective of minimizing conflicts between OSV use and other existing or proposed recreational use would be addressed by encouraging public awareness and education regarding locations of non-motorized trails or areas not designated for public OSV use; considering additional signage; or applying other methods to minimize OSV encroachment in these areas.

Groomed Snow Trails:

1. The objective of minimizing conflicts between OSV trail grooming and other existing or proposed recreation uses would be addressed by coordinating the timing of trail grooming to minimize impact on recreation experiences.

Public, Cross-Country OSV Use:

1. The objective of minimizing conflicts between public OSV use and other existing or proposed recreational use would be addressed by encouraging public awareness and education regarding locations of non-motorized trails or areas not designated for public OSV use. We would install additional signage or other methods to minimize OSV encroachment in these areas where necessary.
2. In alternatives 2, 3, and 5, the objective of minimizing conflicts between public OSV use and other existing or proposed recreational use would be addressed by not designating the area along Lake Almanor's south shoreline. Skiers use the bike trail in this area in the winter. The bike trail is non-motorized (not designated for OSV use) in all alternatives. .
3. In all action alternatives, the objective of minimizing conflicts between public OSV use and other existing or proposed recreational use would be addressed by not designating areas around the south end of Eagle Lake for OSV use. Skiers and fishermen use the lake in the winter. This would also protect the lake from potential OSV incursions on Eagle Lake trout (an important forest natural resource).
4. The objective of minimizing conflicts between public OSV use and other existing or proposed recreational use would be addressed by not designating specific areas around the perimeter of Lassen Volcanic National Park for public OSV use. These undesignated areas vary by alternative.

Monitoring to Minimize Conflicts:

1. The objective of minimizing conflicts between public OSV use and other existing or proposed recreational use would be addressed by monitoring Wilderness boundaries and other closed areas near groomed snow trails and areas designated for OSV use for OSV incursions. We would coordinate and implement increased education or enforcement actions as needed.
2. The objective of minimizing conflicts between public OSV use and other existing or proposed recreational use would be addressed by monitoring trailheads and groomed trail areas for use conflicts and public safety concerns, coordinating and 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).
3. The objective of minimizing conflicts between public OSV use and other existing or proposed recreational use would be addressed by monitoring to ensure that, where restricted, public OSV use is restricted to designated trails and is not encroaching off the designated trail in areas not designated for such use.

Minimizing Conflicts among Different Classes of Motor Vehicle Uses of National Forest System Lands or Neighboring Federal Lands (36 CFR §212.55(b)(4))

Groomed Snow Trails

1. The objective of minimizing conflicts between public OSV use and other existing or proposed recreational uses would be addressed by prohibiting wheeled vehicle use of groomed snow trails from December 26 through March 31.

Direct and Indirect Effects - Alternative 2

Under alternative 2, 920,260 acres would remain designated for OSV use and be susceptible to OSV noise. Noise sources of multiple OSVs and vehicles would be concentrated at plowed OSV trailheads, and more dispersed along groomed trails and in designated areas. Of the 920,260 acres, only 304,820 acres are anticipated to have high to moderate OSV use levels (see maps in the recreation section of this analysis) and the associated potential noise impacts.

Using average environmental factors for the winter season on the Lassen National Forest and the SPreAD-GIS model, figure 11 shows the anticipated sound propagation away from point source sound locations along OSV trails. The trail points represent a snapshot in time, and were selected based on their proximity to important non-motorized trails and areas. OSV sound source points shown on figure 11 include the plowed OSV trailheads, points where OSV trails are near cross-country ski trails, designated Wilderness areas and Lassen Volcanic National Park, and points where OSV trails cross the PCT. The noise propagation contour lines on the map show how the OSV sound is expected to spread out from the source location, given unique environmental, vegetation, and terrain conditions. The map also shows excess noise levels where the introduced OSV noise would be in excess of ambient sound conditions.

As shown in figure 12 (Sound Propagation near Caribou Wilderness Area), OSV noise along the groomed OSV trails near the Wilderness boundary may be heard from within the Wilderness area. This represents a short-term disturbance to opportunities for solitude that would be temporary as the OSV passes by on the trail.

Figure 13 (Sound Propagation near the PCT and Cross Country Ski Trails) shows the extent of potential noise impacts from OSV trails crossing the PCT, and near several non-motorized cross-country ski trails. The experience of non-motorized recreationists along the PCT near designated OSV trails would be temporarily impacted by noise from OSVs. Since 28 PCT crossing trails would be designated in this alternative, the potential for noise impacts is confined to the area near the designated crossing trails. Quiet recreation opportunities would be maintained on the rest of the trail by not designating areas for OSV use within 500 feet of the trail. This would reduce the influence of noise that may be experienced under existing conditions, since there are currently no designated PCT crossing trails, and no restrictions on OSV use up to and adjacent to the trail. Potential noise impacts to cross-country ski trails are generally concentrated near the plowed trailheads and less as both motorized and non-motorized recreationists move away from the trailhead.

Figure 14 (Sound Propagation near Lassen Volcanic National Park) shows the extent of potential noise impacts at several points, near popular non-motorized recreation areas.

Additionally, in alternative 2, OSV use would not be designated, and opportunities for solitude and quiet non-motorized experiences would be enhanced in the following areas:

- Portions of the Morgan Summit area in the southwestern corner of Lassen National Forest that are not designated because of limited access for OSVs due to the proximity to other non-motorized

areas including the Ishi Wilderness, Mill Creek Proposed Wilderness, and semi-primitive non-motorized areas within the Ishi and Polk Springs Inventoried Roadless Areas.

- The Deer Creek Anadromous Fish area that would run along the northwestern boundary of the Cub Creek Inventoried Roadless Area, the area along the southwest shore of Lake Almanor, and the area along the South Shore of Eagle Lake.

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

Table 52. Resource indicators and measures for alternative 2 direct and indirect effects

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	Alternative 2 Direct and Indirect Effects
Noise	Opportunities for motorized winter uses	Size of areas (acres) designated for public, cross-country OSV use; percentage change compared to current management;	920,260 acres designated for OSV use, a 4.5 percent decrease from current management.
	OSV designations	Length of snow trails (miles), groomed and ungroomed, designated and identified for public OSV use	345 miles of designated OSV trails/350 miles groomed OSV trails

Cumulative Effects – Alternative 2

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

Past, present, and reasonably foreseeable projects in the project area include vegetation management (including timber sales, fire salvage, and restoration projects), livestock grazing, prescribed burns, and recreation. There are many ongoing and scheduled projects identified on the Lassen National Forest which may increase the management presence across the forest.

Noise

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

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

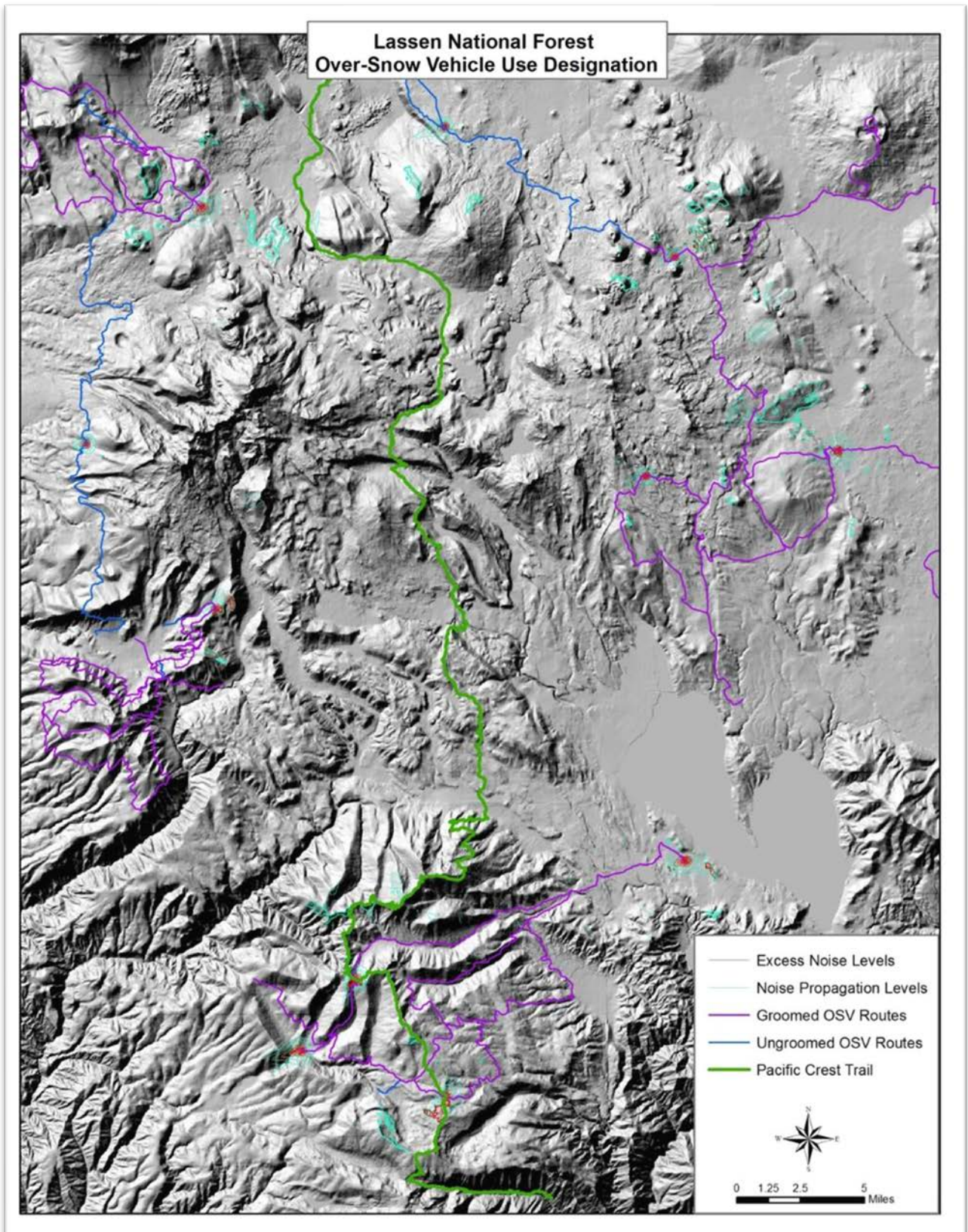


Figure 11. Lassen National Forest OSV sound propagation

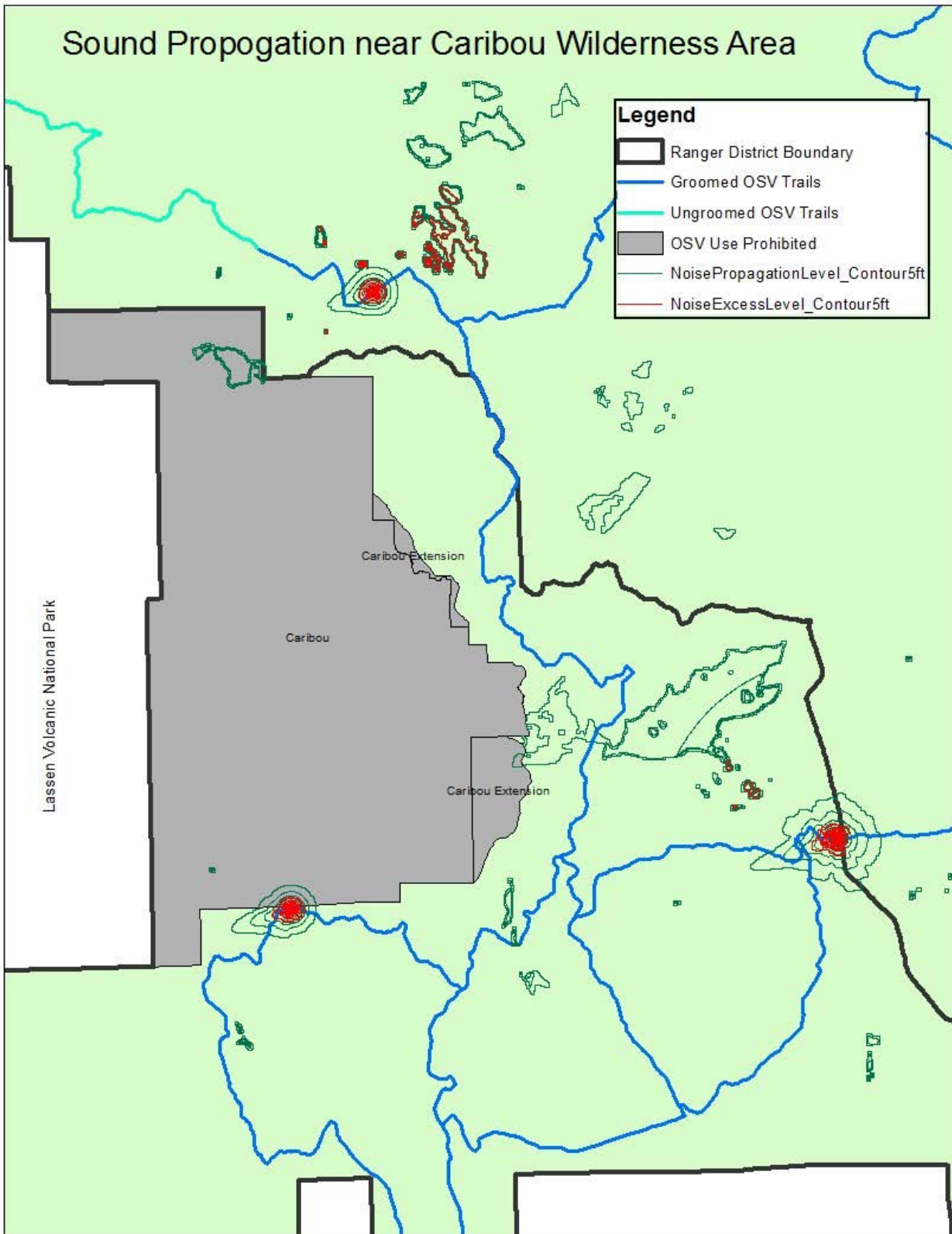


Figure 12. OSV sound propagation near Caribou Wilderness Area

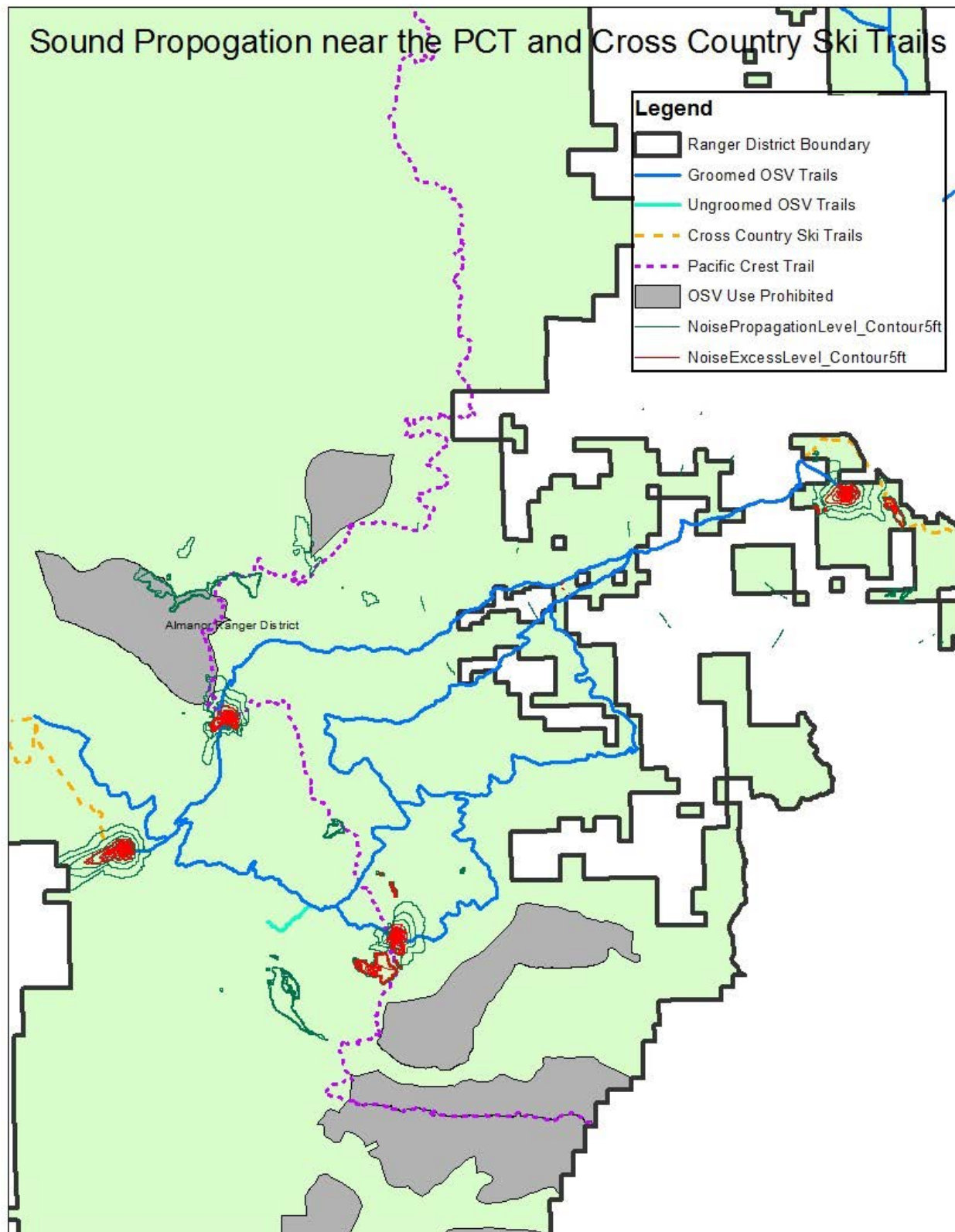


Figure 13. OSV sound propagation near PCT and cross-country ski trails

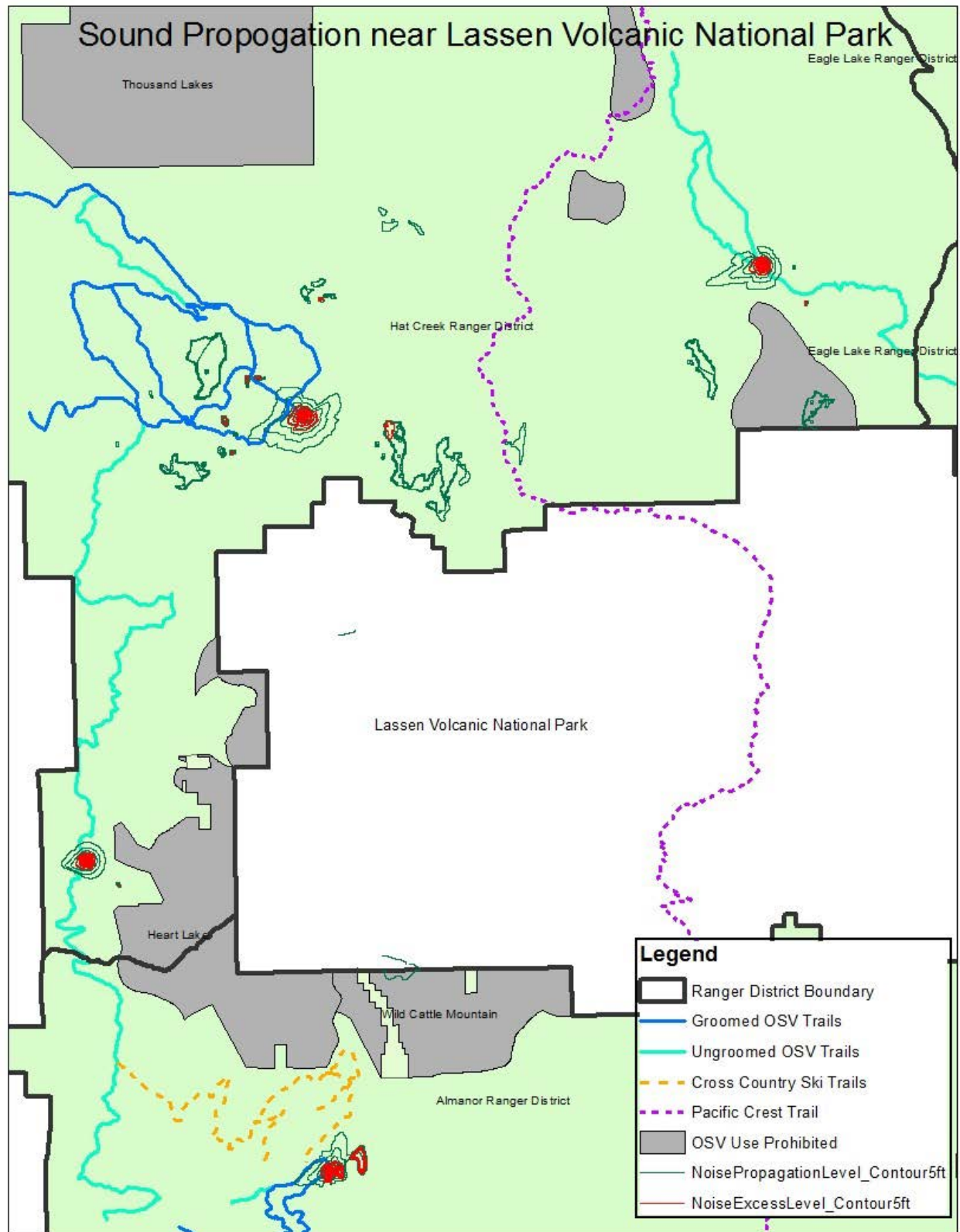


Figure 14. OSV sound propagation near Lassen Volcanic National Park

Alternative 3

Alternative 3 is described in detail in chapter 2. Alternative 3 was developed to address the non-motorized recreational experience significant issue. Alternative 3 would designate eight discrete, specifically delineated areas for cross-country OSV use. These areas would encompass 833,280 acres of NFS lands within the Lassen National Forest when snow depth is adequate for that use to occur. This alternative includes components of the modified proposed action with several additions: OSV use would not be designated in additional areas that are important for non-motorized recreation, including the Butte Lake area (OSV use restricted to trail only) north of LVNP; some areas below 3,500 feet on the Lassen National Forest; the Fredonyer-Goumaz area (OSV use restricted to trail only) between highways 36 and 44; the McGowan Cross-country Ski Trails (North of Mineral, East of Rd. 17); the Colby Mountain area; and areas along the southwestern shore of Lake Almanor, and the southern shore of Eagle Lake; and the Willard Hill area.

Trails designated for public OSV use when snow depth is adequate for that use to occur would total 383 miles. All existing OSV prohibitions applying to areas or trails would continue. Alternative 3 would identify approximately 349 miles of snow trails to be groomed for public OSV use by the Forest Service's Lassen National Forest Grooming Program. The minimum snow depth for trail grooming would be 18 inches.

Alternative 3 would allow public OSV use on designated snow trails generally when 6 or more inches of snow covers the trail. The minimum snow depth for OSV use in areas designated for public cross-country OSV use would be 12 inches.

Public OSV use would not be designated on approximately 316,740 acres, including all of the approximately 185,990 acres of the Lassen National Forest where public OSV use is currently prohibited, and 130,750 acres of areas currently open to OSV use that would not be designated for OSV use in this alternative.

Public OSV use that is inconsistent with the designations and snow depth requirements made under this decision would be prohibited under 36 CFR Part 261.

This alternative would designate up to 23 OSV trails across the PCT. OSV use would be designated adjacent to, and across the PCT on designated trails in accordance with OSV trail and area designations. The PCT itself would remain non-motorized.

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 use conflicts.

Direct and Indirect Effects - Alternative 3

Noise impacts associated with the groomed and ungroomed OSV trail system in alternative 3 would be slightly more than alternative 2 with 383 miles of designated OSV trails.

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

In addition to the areas described in alternative 2, OSV use would not be designated, and opportunities for solitude and quiet, non-motorized experiences would be enhanced in the following areas: areas below 3,500 feet, the McGowan Cross-country Ski Trails, the Colby Mountain area, areas along the southwest shore of Lake Almanor and the south shore of Eagle Lake, and the Willard Hill area, and the restriction to trails in the Butte Lake and Fredonyer-Goumaz areas. Not designating areas for OSV use north of Caribou Wilderness (Butte Lake) and south of the Heart Lake and Wild Cattle Mountain Proposed Wilderness Areas (McGowan) would also help to minimize potential impacts from the sights and sounds of OSVs to solitude and quiet, non-motorized areas and to Lassen Volcanic National Park.

Potential impacts from OSV noise would continue along the PCT, as described in alternative 1.

Table 53. Resource indicators and measures for alternative 3 direct and indirect effects

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	Alternative 3 Direct and Indirect Effects
Noise	Opportunities for motorized winter uses	Size of areas (acres) designated for public, cross-country OSV use; percentage change compared to current management	833,280 acres designated for OSV use, a 13.5 percent reduction from current management.
	OSV designations	Length of snow trails (miles), groomed and ungroomed, designated and identified for public OSV use	383 miles of designated OSV trails/349 miles of groomed OSV trails

Alternative 4

Alternative 4 is described in detail in chapter 2. Alternative 4 was developed to address the motorized recreational opportunities significant issue. This alternative would designate eight discrete, specifically delineated areas for cross-country OSV use. These areas would encompass 955,470 acres.

Alternative 4 would designate 380 miles of OSV snow trails. This would represent a reduction in the number of miles of trail where OSV use is currently allowed. However, a majority of the current trail system would be either designated for public OSV use or are located in areas that would be designated for public cross-country OSV use in this alternative. Alternative 4 would identify 349 miles of snow trails for grooming, as in the current management.

In addition to areas where OSV use is already prohibited on the Lassen National Forest, alternative 4 would not designate OSV use in the Blacks Mountain Research Natural Area, and the McGowan Cross-country Ski Trails (North of Mineral, East of Rd. 17).

There would be no defined minimum snow depth in areas designated for cross-country OSV travel or on designated OSV trails. OSV use would be allowed only when forest staff determine that conditions are sufficient to allow OSV use while protecting underlying resources. This would be determined by a combination of weather station data, observations at trailheads by staff, and when the conditions meet state requirements for grooming. The Forest Service would encourage or discourage OSV use based on conditions through Forest Service and partnership websites. Seasonal opening and closing would be announced through public service announcements, on information kiosks at trailheads, and via the forest website. The minimum snow depth for trail grooming to occur would be 12 inches.

OSV use would be designated below 3,500 feet and allowed when there is adequate snow depth to prevent damage to underlying surface resources.

This alternative would groom the same snow trails for OSV use as the modified proposed action.

This alternative would designate up to 28 OSV trails across the PCT. The area adjacent to the PCT would be designated for OSV use. The PCT itself would remain non-motorized. Areas designated for OSV use within 500 feet of the PCT would total 97.7 miles of the PCT on the Lassen National Forest.

Direct and Indirect Effects - Alternative 4

Alternative 4 would designate OSV use on more acres than alternative 3, and slightly more acres than alternative 2. Designating use of OSVs below 3,500 feet would enhance OSV opportunities when snow depths are adequate for use in that area, and with this use, additional acres would be subject to potential noise impacts from OSV use.

Potential impacts from OSV noise would continue along the PCT, as described in alternative 1.

Otherwise, noise impacts associated with the groomed and ungroomed OSV trail system in alternative 4 would be the same as alternative 2.

Table 54. Resource indicators and measures for alternative 4 direct and indirect effects

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	Alternative 4 Direct and Indirect Effects
Noise	Opportunities for motorized winter uses	Size of areas (acres) designated for public, cross-country OSV use; percentage change compared to current management	955,470 acres designated for OSV use, a 0.8 percent reduction from current management.
	OSV designations	Length of snow trails (miles), groomed and ungroomed, designated and identified for public OSV use	380 miles of designated OSV trails/349 miles of groomed OSV trails

Alternative 5

Alternative 5 is described in detail in chapter 2. Alternative 5 was developed to address the non-motorized recreational experience significant issue. Alternative 5 would designate six discrete, specifically delineated areas for cross-country OSV use. These areas would encompass 632,400 acres. Alternative 5 would designate 393 miles of OSV snow trails. This would be a reduction in the number of miles of trail where OSV use is currently allowed. However, a majority of the current trail system would be either designated for public OSV use or located in areas that would be designated for public, cross-country OSV use in this alternative. Alternative 5 would identify 350 miles of snow trails for grooming, as in the current management.

The minimum snow depth for snow trail grooming and public OSV use on designated snow trails would be 12 inches. And, the minimum snow depth for OSV use in areas designated for public cross-country OSV use would be 12 inches. No areas below 3,500 feet elevation would be designated for OSV use. No winter deer range would be designated for OSV use. For the Bogard Area, this would include the small area located between the 3,500-foot and winter deer range restrictions.

Direct and Indirect Effects - Alternative 5

Alternative 5 would designate OSV use on fewer acres than any other alternative, enhancing opportunities for quiet winter recreation.

Potential impacts from OSV noise would be the same as described in alternative 2.

Otherwise, noise impacts associated with the groomed and ungroomed OSV trail system in alternative 4 would be the same as alternative 2.

Table 55. Resource indicators and measures for alternative 5 direct and indirect effects

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	Alternative 5 Direct and Indirect Effects
Noise	Opportunities for motorized winter uses	Size of areas (acres) designated for public, cross-country OSV use; percentage change compared to current management	632,400 acres designated for OSV use, a 34 percent reduction from current management.
	OSV designations	Length of snow trails (miles), groomed and ungroomed, designated and identified for public OSV use	390 miles of designated OSV trails/349 miles of groomed OSV trails

Summary

Table 56 provides a comparison of the alternatives and the degree to which the alternatives address the noise-related issues.

Summary of Environmental Effects

All action alternatives would provide the same level of groomed motorized OSV trail opportunities, and therefore, the same degree of potential noise impacts associated with groomed trail use. Cross-country travel and use of OSV trails would be limited by minimum snow depth requirements for all action alternatives; however, alternative 4 would provide the least restrictive snow depth, described as the depth necessary to avoid resource damage. Alternative 2 would allow use of OSV trails with a 6-inch minimum snow depth, and alternative 3 would provide some flexibility in the snow depth requirements for trails where site review determines there would be no damage to underlying resources. This flexibility would allow OSV access to higher elevations and adequate snow depths. Alternative 4 would provide the most access for motorized OSV use forestwide, compared to alternatives 2 and 3. Alternative 5 provides the least access for motorized OSV use forestwide.

Alternatives 3 and 5 would enhance opportunities for quiet, non-motorized recreation with more areas where OSV use would not be designated or where OSV use would be restricted to designated OSV trails, while maintaining the existing level of groomed OSV trail opportunities.

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

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 require designation of trails and areas on NFS lands to provide for OSV 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, 4, and 5 would comply with Subpart C of the Travel Management Regulations and the Lassen Forest Plan.

Table 56. Summary comparison of how the alternatives address the issues

Issue	Indicator/ Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Noise	Opportunities for motorized winter uses	964,030 acres open to OSV use and potentially affected by noise	920,260 acres designated for OSV use and potentially affected by noise, a 4.5 percent decrease from existing conditions	833,280 acres designated for OSV use and potentially affected by noise, a 13.5 percent decrease from existing conditions	955,470 acres designated for OSV use and potentially affected by noise, a 0.8 percent decrease from existing conditions	632,400 acres designated for public cross-country OSV use, subject to snow depth restrictions, a 34 percent decrease from existing conditions.
	Size of areas (acres) open to/designated for public, cross-country OSV use; percentage change compared to current management	185,990 acres not designated for OSV use and available for quiet recreation	229,760,847 acres not designated for OSV use and available for quiet recreation, a 23.5 percent increase from existing conditions	316,740 acres not designated for to OSV use and available for quiet recreation, a 41 percent increase from existing conditions	194,550 acres not designated for OSV use and available for quiet recreation, a 4.6 percent increase from existing conditions	510,540 acres not designated for OSV use and available for quiet recreation, a 178 percent increase from existing conditions
	OSV designations Length of snow trails (miles), groomed and ungroomed, open/designated for public OSV use	405 miles open / 349 miles groomed	334 miles designated / 349 miles groomed	383 miles designated / 349 miles groomed	380 miles designated / 349 miles groomed	390 miles designated / 349 miles groomed

Other Relevant Mandatory Disclosures

Short-term Uses and Long-term Productivity

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

Unavoidable Adverse Effects

Designating areas and trails for OSV use, which is an acceptable use of NFS lands, would unavoidably affect 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 would not be irreversible and irretrievable commitments of resources.

Soils

The purpose of this analysis is to analyze the potential impacts (direct, indirect, and cumulative effects) of the designation of trails and areas for OSV use on the soil resource by alternative within the Lassen National Forest. The Lassen National Forest encompasses approximately 1,150,020 acres and has approximately 2,760 miles of NFS OSV trails with 349 miles of those trails groomed. Approximately 964,030 acres of the forest are currently open to OSV cross-country travel. The Lassen National Forest OSV management program would comply with the Lassen National Forest Land and Resource Management Plan and the Region 5 Soil Quality Standards for long-term soil productivity. The design criteria and monitoring for each alternative would ensure that there are no adverse effects to the soil resource.

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 activities on the forest including OSV management.

- ◆ LRMP Standards and Guidelines pertinent to OSV management (USDA Forest Service 1993: Chapter 4):
 - Prevent irreversible losses of soil productivity: Assess impacts of proposed projects on the soil resource and take appropriate mitigative action.
 - The areal extent of detrimental soil disturbance will not exceed 15 percent of the area dedicated to growing vegetation
 - Soil cover is sufficient to prevent the rate of accelerated soil erosion from exceeding the rate of soil formation
 - Soil porosity and bulk density are at least 90 percent of the measurements found under undisturbed or natural conditions
 - Organic matter is present in amounts sufficient to prevent significant short- or long-term nutrient cycle deficits
 - Field verify existing reconnaissance soil resource inventory data for each ground-disturbing project
 - Conduct detailed soil surveys for all project areas that have an erosion hazard rating of “high” or “very high,” landslides or unstable areas, potential revegetation or regeneration problems, active erosion or a significant potential to contribute to cumulative degradation of water quality
 - Retain ground-covering litter, duff and vegetation on at least 90 percent of non-rocky riparian areas, except when removal is needed to improve vegetative diversity or wildlife habitat
 - Rehabilitate areas of significant soil degradation caused by off-highway vehicles. Close trails and areas to motorized use if necessary to protect soils.
 - Map the occurrence of unstable Eocene non-marine deposits and granitic soils prior to ground-disturbing activities.

- ♦ Monitor and take necessary actions to prevent damage to meadows and soils in the high Lakes area.

Desired Condition

The desired condition for soils is that soil productivity and water quality remain high on the forest.

Regional Direction

Pacific Southwest Region Soil Management Handbook Supplement (Pacific Southwest Region FSH Supplement No. 2509.18-95-1)

This supplement establishes regional soil quality analysis standards. The analysis standards address three basic elements for the soil resource: (1) soil productivity (including soil loss, porosity and organic matter), (2) soil hydrologic function, and (3) soil buffering capacity. The analysis standards are to be used for areas growing vegetation. They are not applied to lands with other dedicated uses, such as developed campgrounds, administrative facilities, or in this case, the actual land surface of routes authorized for travel by OSVs. This standard does apply to cross-country OSV travel.

Federal Law

National Forest Roads and Trails Act of 1964 (78 Stat. 1089; 16 U.S.C. 532-538)

Section 1 of the National Forest Roads and Trails Act states “Congress hereby finds and declares that the construction and maintenance of an adequate system of roads and trails within and near the national forests and other lands administered by the Forest Service is essential.” This system of roads is needed “to provide for intensive use, protection, development, and management of these lands under principles of multiple use and sustained yield of products and services.” (16 U.S.C. 532)

Section 2 of this act states, “The Secretary is authorized, under such regulations as he may prescribe, subject to provisions of this Act, to grant permanent or temporary easements for specified periods or otherwise for road rights-of-way (1) over national forest lands administered by the Forest Service.” (16 U.S.C. 533).

Implicit in this legal direction is Forest Service authority to withdraw lands from vegetation production and related soil productivity on the national forest for dedication to road and trail corridors for transportation and access uses.

National Environmental Policy Act of 1969

This analysis was developed using the principal elements from the National Environmental Policy Act (NEPA) of 1969 and the regulations for implementing the procedural provisions of the NEPA from the Council on Environmental Quality (40 CFR Parts 1500-1508) and Regulation 36 CFR Part 220.

National Forest Management Act of 1976 (90 Stat. 2949; 16 U.S.C. 1608)

Section 8(b) of the National Forest Management Act states, “any road constructed on land of the National Forest System in connection with a timber contract or other lease shall be designed with the goal of reestablishing vegetation cover on the roadway and areas where vegetation cover has been disturbed by the construction of the road, within ten years after the termination of the contract, permit, or lease.” This section of the act further states, “Such action shall be taken unless it is determined that the road is needed for use as a part of the National Forest Transportation System.”

This legal direction states that lands no longer needed for, and dedicated to, transportation or access uses should be returned to a vegetated state. Implicit in this legal direction is Forest Service responsibility to recover soil productivity on these lands, to the extent that vegetation can be re-established. Type and degree of soil recovery necessary for re-establishment of vegetation would depend on site-specific conditions and land management objectives for that area.

Section 8(c) of this act states “Roads constructed on National Forest System lands shall be designed to standards appropriate for the intended uses, considering safety, cost of transportation, and impacts on land resources.”

Topics and Issues Addressed in This Analysis

Issues

Designating snow trails and areas for OSV use could 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.

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 effects are highly dependent on location, particularly areas of thin snow cover, and the amount and timing of use.

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

Resolution

This issue will be carried forward through the effects analysis. Measurement indicators will be used to compare and contrast alternatives in the environmental impact statement (EIS) and minimization criteria will be applied to reduce the impacts to the soil resource.

We addressed this issue by developing an alternative to the proposed action that includes establishing a uniform 12-inch minimum snow depth for all uses, with some exceptions and added clarification to all alternatives (via project design criteria and monitoring measures) regarding how snow depths would be measured, enforced, and used as guidelines to ensure resource impacts are minimized.

This minimum snow depth would minimize the likelihood of adverse impacts to soil and water resources from OSV use.

Resource Indicators and Measures

Soil productivity and soil stability are the two soil resource indicators (table 57).

Table 57. Resource indicators and measures for assessing effects

Resource Element	Resource Indicator	Measure (Quantify if possible)
Soil Productivity and Soil Stability	OSV use on sensitive soils including wet meadows, areas with potential low stability and areas with potential erosion hazards.	Acres of cross-country travel designated for OSV use on sensitive soils
Soil Stability	Minimum snow depths on trails	Inches of snow
Soil Productivity	Minimum snow depths for cross-country travel	Inches of snow
Soil Productivity	Total area designated for OSV use	Acres designated for cross-country OSV travel

Methodology and Information Sources

We analyzed soil resources within the project area using geographic information system (GIS) data, soils survey data, corporate soils data layers including the geology and geomorphology layers for the Lassen National Forest, a variety of reports and assessments of OSV impacts, and professional experience and judgement using scientific literature on OSV impacts. We consulted the Lassen National Forest Soil Scientist to help determine where the sensitive soils might be located on the forest.

Incomplete and Unavailable Information

We performed no field observations and collected no site-specific soils information to support this analysis. Very little monitoring information is available on OSV impacts to the soil resource. The Forest Service does monitor OSV use on the Lassen National Forest, but no specific soils monitoring has been conducted. Assessments of soil resource impacts of OSV use were primarily based on the scientific literature.

To determine where potential sensitive soils might be located on the forest, we used the soils survey data and other corporate GIS layers to determine where wet meadow soils, soils with low stability, and soils with erosion potential might be located. The Forest Service does not have a specific meadows layer or slope stability layer for the Lassen National Forest.

Spatial and Temporal Context for Effects Analysis

Direct, Indirect, and Cumulative Effects Boundaries

The spatial boundaries for analyzing the direct, indirect, and cumulative effects to the soil resource are the area of land managed by the Lassen National Forest.

The short-term temporal boundary for analyzing the direct, indirect, and cumulative effects to the soil resource is 1 year; the long-term temporal boundary is 10 years because climate changes, unforeseeable future projects, and other factors make assumptions beyond this timeframe speculative.

Affected Environment

Existing Condition

The majority of precipitation occurs on the Lassen National Forest from about late October to early May. At elevations above 5,000 feet, the majority of precipitation occurs as snow, and very little rainfall occurs during the summer months. The amount of annual precipitation ranges from about 16 inches along the eastern boundary and the northern Little Valley area, to 80 or 90 inches in and around Lassen Volcanic National Park, Philbrook Reservoir, and Snow Mountain. The median annual precipitation is

approximately 30 to 50 inches. East of the Lassen National Forest boundary is high desert country with only 6 to 10 inches of annual precipitation.

The Lassen National Forest has diverse vegetation because of its wide ranges in precipitation and elevation. In the upper elevations, white pine, red and white fir, and manzanita grow well. Lodgepole pine, willow, alder, and ceanothus, snowbrush, and grasses can also be found at this elevation. The lower elevations typically see various oaks (blue, live, and black), grasses, and ceanothus, along with ponderosa pine and Jeffrey pine.

Soils and Geology

Soil resources on the Lassen National Forest are varied with a diversity of parent materials present. About 85 percent of the forest is volcanic in origin including basalt, rhyolite, andesite, cinders, and ash parent materials. These soils are generally coarser-textured soils, but with good water-holding capacity and abundant nutrients. The southern 15 percent of the forest is derived from non-volcanic parent materials including granitics, and metamorphic and sedimentary rocks of different ages. These soil types tend to be less productive and are more prone to erosion, especially on steeper slopes. Tertiary age gravelly sediments are also present on the southern portion of the forest, and these soil types are more prone to slope instability and landslides. Lassen National Forest soils are included and described in the Tehama County soil survey (USDA Soil Conservation Service and Forest Service 1967) and the Soil Survey of Lassen National Forest Area, California (Kliwer 1994).

Elevations throughout the forest range from 2,500 to 8,700 feet. The western and southern sections are composed of gentle to steep slopes; the northern and eastern sections have larger swaths of gently sloping and flatter stretches of land. The higher elevation portions of the forest were glaciated in the last ice age.

The soils are grouped into 224 soil map units within 41 taxonomic groups.

Soil Productivity

Soil productivity is important to maintain. Soil organic matter and soil porosity are two indicators of soil productivity. The importance of soil organic matter cannot be overstated (Jurgensen et al. 1997). This organic component contains a large reserve of nutrients and carbon, and it is dynamically alive with microbial activity. The character of forest soil organic matter influences many critical ecosystem processes, such as the formation of soil structure, which in turn influences soil gas exchange, soil water infiltration rates, and soil water-holding capacity. Soil organic matter is also the primary location of nutrient recycling and humus formation, which enhances soil cation exchange capacity and overall fertility. Organic matter including the forest floor and large woody material are essential for maintaining ecosystem function by supporting moderate soil temperatures, improved water availability and biodiversity (Page-Dumroese et al. 2010).

Soil porosity refers to the amount and character of void space within the soil. In a “typical” soil, approximately 50 percent of the soil volume is void space. Pore space is lost primarily through mechanical compaction. Three fundamental processes are negatively impacted by compromised soil pore space:

- Gas exchange;
- Soil water infiltration rates; and
- Water-holding capacity.

Gas Exchange

Soil oxygen is fundamental to all soil biologic activity. Roots, soil fauna, and fungi all respire, using oxygen while releasing carbon dioxide. When gas exchange is compromised, biologic activity is also compromised. Maintaining appropriate soil biologic activity is paramount when considering long-term forest vitality.

Soil Water Infiltration Rates

Severely compacted soils do not allow appropriate water infiltration, leading to overland flow and associated erosion, sediment delivery, spring flooding, and low summer flows.

Soil productivity within the Lassen National Forest could be most affected by OSV use within sensitive soil types including wet meadow areas and soils that are prone to erosion. Wet meadows are located on approximately 1 percent of the Lassen National Forest (approximately 13,759 acres). Maintaining a minimum snow depth to not disturb the organic matter at the soil surface or compact the soil and reduce soil porosity are essential to reducing the effects of OSV use on the soil resource in these sensitive areas.

Soil Stability

Non-marine sediments in the southern part of the forest, as well as some granitic slopes, can be unstable when slopes are steep (over 35 percent). Generally, the instability and slumping only occurs when soils are excavated deeper than 2 feet. These soil types make up about 6 percent of the forest. These areas generally have a moderate stability hazard, with less than 2 percent of the soils having a high or very high stability hazard. Most of the remaining portions of the forest have low-relief volcanic topography where the stability hazard is low. Old landslides are present within the project area on approximately 2 percent of the forest (28,818 acres). None of the actual proposed snowmobile trails (groomed or ungroomed) occur on any mapped landslide deposits.

Some smaller portions of the granitic soils on steep slopes and some small areas of poorly consolidated rhyolite are the areas on the forest with potential erosion hazards when soils have no vegetation present. These soil types are found on approximately 4 percent of the project area (64,101 acres).

Existing roads also have the potential for soil erosion (Cacek 1989). The dominant processes in roaded areas are surface erosion from bare soil areas of roads, including the cutslope, fillslope, and travelway. Snow cover on roads is an important component in reducing risks of erosion from roads due to OSV use.

Environmental Consequences

Alternative 1 – No Action

Direct and Indirect Effects

Current OSV use would continue on 964,030 acres of the Lassen National Forest under the no-action alternative; and 2,933 miles of currently groomed, ungroomed, marked and unmarked snow trails would be designated for public OSV use. Under this alternative, there would be no minimum snow depth to travel on trails or cross country. Minimum snow depth prior to grooming would be 12 inches, and approximately 349 miles of snow trails would be groomed for public OSV use.

Soil Productivity

Incidental direct effects of OSV use on and off trails could include compaction, rutting, and disturbance of the forest floor and organic matter within the soil in low-snow areas. Although OSVs generally have low ground pressure, the tracks on OSVs could churn soil and cause compaction with repeated travel over

areas with low snow conditions (Baker and Buthmann 2005; Gage and Cooper 2009). This type of incidental contact with the soil surface or low snow conditions would likely occur during the fall or spring season, would more likely be found on ridges that are windy and exposed or on south-facing slopes, and would be very limited. Repeated compaction of snow can also alter soil temperatures, potentially changing or reducing microbial activity, but some research has shown that with repeated compaction, soil temperatures were not affected (Gage and Cooper 2009; Keller et al. 2004).

Currently, grooming generally occurs when there is 12 inches of snow on trails, meaning that there is little to no chance that soil would be exposed on groomed OSV trails. A 12-inch snow depth off trails has been observed to be adequate for cross-country travel and to mitigate and eliminate contact with soil surface, compaction, or rutting or disturbance of organic matter on ungroomed trails (USDA FSH 2509.25 for Region 2). Under the no-action alternative however, there would be no minimum snow depth for travel over trails or cross-country travel, so soil resource damage would be likely as described above.

Soils within the Lassen National Forest that may be most prone to compaction and rutting include the soils located within the wet meadows. These soils tend to have finer soil textures and more soil moisture for longer periods throughout the year. Monitoring of wet meadow areas would ensure that 12 inches of snow is adequate to protect these sensitive soil types that cover approximately 1 percent of the forest.

Moderate snowpack levels have been shown to minimize possible compaction from OSV use (Gage and Cooper 2009). With adequate snow depth, on-trail and off-trail OSV use would have minimal to no impact on the soil resource and would not likely lead to any loss of soil productivity.

Soil Stability

With adequate snow depths, cross-country OSV use is unlikely to affect soil stability. Approximately 28,818 acres have landslide potential. Landslides within the Lassen National Forest are generally caused by excavating soil to a depth greater than 2 feet. OSV use on these soils would not lead to excavated soils and would likely be widely dispersed throughout the forest versus concentrated on landslide-prone areas. Even with concentrated use on sites where landslide potential is high, OSV use would not likely cause landslides.

Cross-country use of OSVs could have a small effect on ground disturbance that could lead to erosion, especially on soils derived from granitic or rhyolitic parent materials (approximately 64,101 acres). Depending on site-specific factors including slope, aspect, elevation, level of use, and weather conditions, trails and off-trail riding on steep slopes could contribute to erosion (Baker and Buthmann 2005; Olliff et al. 1999). Adequate snowpack would likely mitigate possible erosion on these sites. Also, OSV operators generally avoid traveling over bare soil because it can damage their machines.

Trail Grooming

Trail grooming occurs on snow trails overlying an NFS road. Adequate snowpack is present on the trail prior to grooming and grooming is not likely to cause impacts to the soil resource on trails or roads.

Table 58. Resource indicators and measures for alternative 1

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	Alternative 1
Soil Productivity and Soil Stability	OSV use on sensitive soils (Meadow soils, erosive soils, low stability soils)	Acres of cross-country travel designated for OSV use on sensitive soils	53,902
Soil Stability	Minimum Snow Depths on trails	Inches of snow	No minimum
Soil Productivity	Minimum snow depths for cross-country travel	Inches of snow	No minimum
Soil Productivity	Total area designated for OSV use	Acres designated for cross-country OSV travel	964,030

Alternatives 2 (Proposed Action), 3, 4, and 5

Table 59 provides a summary of the different alternatives proposed.

Table 59. Alternative comparisons

OSV Management	Alternative 1 No Action: Current OSV Management	Alternative 2 Proposed Action	Alternative 3	Alternative 4	Alternative 5
National Forest System (NFS) Lands within the Lassen National Forest (Acres)	1,150,020	1,150,020	1,150,020	1,150,020	1,150,020
OSV Use Designated:					
• Designated OSV Areas (Acres)	964,030	920,260	833,280	955,470	632,400
• Designated OSV Trails (Miles)	2,933	334	383	380	393
Minimum Snow Depth for OSV Use on Designated Trails (Inches)	12	6 inches on snow trails overlying roads 12 inches on 0.1 mile of trail not overlying roads or trails	6 inches on snow trails overlying roads	The depth necessary to avoid underlying resource damage	12
Minimum Snow Depth for Cross-country OSV Use (Inches)	12	12	12	The depth necessary to avoid underlying resource damage	12

Project Design Features and Mitigation Measures (Minimization Criteria)

Soil and Water Resources

- All activities will adhere to Best Management Practices (BMPs) related to Over Snow Vehicle Use from the 2012 USDA Forest Service National Core BMP Technical Guide and the 2011 Region 5 Soil and Water Conservation Handbook (Volume III, Appendix E).

- Forest Service National Best Management Practices for Water Quality Management on National Forest System Lands, Volume 1 National Core BMP Technical Guide (Volume III, Appendix E) applicable to OSV use will be implemented under all alternatives.
- Grooming of snow trails for OSV use will occur only when the ground surface is covered with adequate snowpack to prevent soil damage or soil rutting. The operator shall consider recent, current, and forecasted weather and snow conditions to ensure these conditions are met.
- OSV use of groomed trails will occur only when and where adequate snow cover ensures negligible potential for contact with bare soil and practically no disturbance of underlying trail and road surfaces. This would prevent substantial impacts to water quality in perennial, intermittent, or ephemeral streams, or in wetlands or other bodies of water.
- To prevent substantial impacts to soil resources, areas designated for public, cross-country OSV use will be clearly delineated and marked in the field, where practical.
- Areas will be protected from substantial impacts to resources resulting from overuse by closing or managing designated OSV areas to mitigate adverse effects to soil, water quality, and riparian resources, by adaptive management, or changing season-of use periods as necessary to allow rehabilitation of an area, particularly hill-climb areas.
- Watershed resources will be protected by making spill containment equipment available at the facilities where grooming equipment is re-fueled.
- Watershed resources will be protected by designating equipment maintenance and refueling sites to ensure that they are located on gentle slopes, on uplands, and outside of riparian conservation areas and sensitive terrestrial wildlife habitats.
- To protect watershed resources, all stream crossings and other in-stream structures facilitating OSV passage will be designed and maintained to provide for the passage of flow and sediment, to withstand expected flood flows, and to allow for free movement of resident aquatic life (California Snowmobile Trail Grooming, California Department of Parks and Recreation, Off-Highway Motor Vehicle Recreation Division).
- To protect watershed resources, public OSV use of trails and grooming snow trails for OSV use will be prohibited in wetlands unless protected by at least 12 inches of packed snow or 2 inches of frozen soil. If OSV trails must enter wetlands, bridges or raised prisms with diffuse drainage to sustain flow patterns will be used.
- To protect watershed resources, crossing bottoms will be set at natural levels of channel beds and wet meadow surfaces.
- To protect watershed resources, actions that dewater or reduce water budgets in wetlands will be avoided.

Required Monitoring

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 component of the State-funded OSV program, California State Parks requires and provides funds to the Forest Service to monitor OSV trail systems for evidence of OSV trespass into areas not designated for OSV use, OSV use near or damage of sensitive plant and wildlife sites, and low snow areas subject to erosion.

Monitoring that will occur during implementation of all alternatives includes effectiveness monitoring, based on available resources. Monitoring will ensure that:

- a. Resource damage is not occurring when there is less than the prescribed minimum snow depth with certain exceptions as described in alternative 4. Snow depth measurement locations and techniques will be developed using an interdisciplinary team approach and will consider terrain, season, proximity to sensitive areas, and resource damage criteria;
 - i. Where resource damage is suspected due to public OSV use on less than the prescribed minimum snow depth, monitoring will occur to help inform the responsible official if damage is occurring, the extent of the damage, and what steps need to be taken to address the issue;
 - ii. Public OSV use is not damaging sensitive resource locations, in consultation with forest resource specialists;
 - iii. Public OSV use is not occurring in prohibited areas; and
 - iv. Public OSV use restricted to designated routes in not encroaching away from the trail into areas not designated for OSV use.

Monitoring Soil Resources

- Impacts to soils, vegetation and water quality will be addressed by monitoring precipitation and temperature changes and adapting seasons of use for public OSV use
- Impacts to soils will be addressed by monitoring to ensure that resource damage is not occurring when there is less than sufficient snow coverage
- Impacts to soils, water quality, vegetation, and aquatic species will be addressed by monitoring the High Lakes area and prescribing corrective actions if resource impacts are found

Direct and Indirect Effects

The direct and indirect effects for alternatives 2, 3, 4, and 5 are similar to the no-action alternative except that the no-action alternative has more acreage open to cross-country OSV use along with no minimum snow depth for OSV use on trails or cross-country and could have the most impacts to the soil resource. Project design features proposed here would not be implemented under the no-action alternative either. Also, under alternatives 2 and 3, OSV use can occur on existing trails with a minimum snow depth of 6 inches instead of 12 inches, which could lead to localized soil disturbance where there is repeated use at lower snow depths. The effects of snow plowing and trail grooming would be similar to those effects described under the no-action alternative above.

Soil Productivity

Impacts of OSV use on soil productivity would be similar to the impacts described under the no-action alternative. No new trail or road construction would occur under any of the alternatives. Because OSV use would occur with sufficient amounts of snow to protect the soil resource, there would not likely be soil disturbance including compaction or the disturbance of organic matter consisting of forest floor litter and large woody debris present on the soil surface. Existing regulations would allow the issuance of a closure order if snow cover had the potential to become inadequate during the open season. During times of the year when snowpack can be more variable, there could be incidental indirect effects including some minor ground disturbance in low-snow areas. Under alternative 2, the acres designated for cross-country OSV travel on sensitive soils would be similar to the no-action alternative, but that acreage would decrease under alternatives 3, 4 and 5 (table 60). Alternative 5 would have the least impact on sensitive soils and soil productivity overall, because the least acreage would be designated for potential cross-county OSV travel within the Lassen National Forest.

Soil Stability

Impacts of OSV use on soil stability would be similar to the impacts described under the no-action alternative. OSV use would not increase landslide potential on low stability sites across the forest. Erosion would likely not increase with adequate snow cover, although there is slightly more possibility of exposed bare soil on underlying trails and roads under alternatives 2 and 3, because the minimum snow depth for OSV travel on designated snow trails overlying existing roads is reduced to 6 inches of unpacked snow. Monitoring under these alternatives is important to determine the site-specific effects of a reduced minimum snow depth on the soil resource. The minimum snow depth in alternative 4 would avoid damage to underlying soils.

Table 60. Resource indicators and measures for alternatives 2, 3, 4, and 5 direct and indirect effects

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Soil Productivity and Soil Stability	OSV use on sensitive soils (meadow soils, erosive soils, low stability soils)	Acres (%) of cross-country designated for OSV use on sensitive soils	52,964 (6%)	40,590 (5%)	53,507 (6%)	33,221 (5%)
Soil Stability	Minimum Snow Depths on trails	Inches of snow	6 inches on snow trails overlying roads	6 inches on snow trails overlying roads	The depth necessary to avoid underlying resource damage	12
Soil Productivity	Minimum snow depths for cross-country travel	Inches of snow	12	12	The depth necessary to avoid underlying resource damage	12
Soil Productivity	Total area designated for OSV use	Acres designated for cross-country OSV travel	920,260	833,280	955,470	632,400

Cumulative Effects

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

Cumulative effects include a discussion of the combined, incremental effects of human activities. For activities to be considered cumulative, their effects need to overlap in both time and space with those of the proposed actions. For the soil resource, the area for consideration is the entire project area.

Vegetation Management

Several past, current, and future vegetation management activities are occurring on the Lassen National Forest over approximately 722,391 acres. These ground-disturbing activities could have cumulative effects on the soil resource if the soil disturbance occurs in the same location as possible soil disturbance from OSV use. This is very unlikely, as effects of OSV use would be minimal throughout the forest. Potential road-building activities associated with vegetation management activities could increase soil disturbance and decrease soil productivity and stability where the roads are located. These vegetation

management activities are regulated by Forest Plan standards and guidelines, Regional Standards, and best management practices to ensure soil productivity is maintained.

In general, snowmobiling is the primary winter recreational use in the action area. Snowmobiling primarily occurs on existing trails, naturally unforested areas, or in areas with limited forest cover or associated structural complexity at the ground level. Because snowmobiles operate over snow that protects the ground, it is unlikely that OSV use has a significant direct impact upon soils.

Grazing

Almost the entire Lassen National Forest is located within grazing allotments. There are 60 grazing allotments present. Impacts of grazing are generally limited to areas where the animals bed, lounge, trail or access water, and this generally only occurs during the spring, summer, and fall seasons when no snow covers on the ground. Cumulative impacts from grazing are unlikely, as OSV use would not likely occur at the same time as grazing, and impacts from OSV use are minimal.

Other Recreation Activities

Disturbance from general motorized use and recreational access occurs and would continue to occur throughout the forest, indefinitely. We anticipate no changes in the existing recreation profile. Other recreational activities that take place off the developed roads, such as the gathering of miscellaneous forest products and hunting, occur within the project area, but because OSV use would generally occur on minimum snowpack, we anticipate no cumulative effects from other ongoing recreational activities.

Climate Change

Climate change affects and would continue to affect California and the Lassen National Forest in the future. Precipitation events would likely become more unpredictable and warmer temperatures would decrease the amount of precipitation that falls as snow, likely decreasing the total snowpack and the amount of time that snow would be on the ground (State of California 2007). This could potentially increase the amount of time the soil would be exposed to OSV impacts if seasons of OSV use are not shortened. Potentially, this could increase the impacts on sensitive soil sites including wet meadows and erosive sites because of increased soil exposure.

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

This project complies with the Lassen National Forest Land and Resource Management Plan, which provides standards and guidelines to protect the soil resource and the Southwest Regional Soils Quality Standards by maintaining soil productivity.

Summary of Environmental Effects

Table 61 summarizes the soil issue indicators and the potential effects to those indicators by alternative.

Table 61. Summary comparison of environmental effects to the soil resource

Resource Element	Indicator/ Measure	Alternative 1 (no-action alternative)	Alternative 2 (proposed action)	Alternative 3	Alternative 4	Alternative 5
Soil Productivity and Soil Stability	OSV acres designated for 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 53,902 acres with mapped sensitive soil types are open to cross-country travel. The no action alternative has the most acres of sensitive soils open to OSV use.	Approximately 52,964 acres of sensitive soils would be designated for cross-country OSV travel within the forest. This is slightly less acres than the no-action alternative and alternative 4, but more acres than alternative 3 and alternative 5.	Approximately 40,590 acres of sensitive soils would be designated for cross-country OSV travel. This is less acres designated for OSV use than any other alternative other than alternative 5.	Approximately 53,507 acres of sensitive soils would be designated for cross-country OSV travel. Under this alternative, there would be more acres of sensitive soils designated for cross-country OSV travel than any other action alternative, but there would less acres of sensitive soils designated for OSV use than under the no-action alternative.	Approximately 33,221 acres of sensitive soils would be designated for cross-country OSV travel. Under this alternative, the least amount of sensitive soils would be designated for OSV cross-country travel.
Soil Stability	Minimum snow depths on trails (inches)	No enforced minimum snow depth prior to any OSV travel over existing underlying roads. Without a minimum snow depth, soil resource damage is more likely to occur as OSV use could occur when bare soil is exposed on trails, leading to potential erosion.	Minimum snow depth is 6 inches of snow prior to any OSV travel over existing underlying roads. This minimum snow depth may potentially create conditions in which the underlying road surface is exposed to OSVs and there is potential for some soil erosion or rutting	Minimum snow depth is 6 inches of snow prior to any OSV travel over existing underlying roads. This minimum snow depth may potentially create conditions in which the underlying road surface is exposed to OSVs and there is potential for some soil erosion or rutting	No defined snow depth for OSV use on trails. No minimum snow depth may potentially create conditions in which the underlying road surface is exposed to OSVs and there is potential for some soil erosion or rutting of the underlying road surface. Monitoring will occur to further evaluate the potential effects to soils.	Minimum snow depth is 12 inches of unpacked snow prior to any OSV travel over existing underlying roads. This minimum snow depth has been observed to be sufficient to prevent contact of OSVs with the bare soil surface.

Resource Element	Indicator/ Measure	Alternative 1 (no-action alternative)	Alternative 2 (proposed action)	Alternative 3	Alternative 4	Alternative 5
Soil Stability (continued)			of the underlying road surface. Monitoring of this snow depth would occur to further evaluate the potential effects to soils.	of the underlying road surface. Monitoring of this snow depth would occur to further evaluate the potential effects to soils.		
Soil Productivity	Minimum snow depths for cross-country travel (inches)	No minimum snow depth for cross-country OSV travel could lead to greater soil resource damage. If bare soil or forest floor is exposed, soil erosion, soil loss, compaction, rutting and displacement could occur. With no minimum snow depth, the no-action alternative could potentially have the greatest impacts to soil productivity.	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.	No minimum snow depth exists under this alternative. The potential for reduced soil productivity could occur, but Forest staff will monitor use and recommend usage seasons based on monitoring to prevent soil resource damage.	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.

Resource Element	Indicator/ Measure	Alternative 1 (no-action alternative)	Alternative 2 (proposed action)	Alternative 3	Alternative 4	Alternative 5
Soil Productivity	Total acres designated for OSV use	Approximately 964,030 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 920,260 acres of the forest would be designated for OSV use. This is less area designated for OSV use compared to the no-action alternative and alternative 4, but it is greater than alternative 3 and alternative 5. The proposed action has the potential for more impacts than alternatives 3 and 5, but less than the proposed action and alternative 4.	Approximately 833,280 acres of the forest would be designated for OSV use, which is less than all the alternatives except alternative 5.	Approximately 955,470 acres of the forest would be designated for OSV use, which is a greater area than under the proposed action, alternative 3 and alternative 5, but less area than the no-action action alternative. Alternative 4 could have the greatest soil impacts out of the 3 action alternatives.	Approximately 632,400 acres of the forest would be designated for OSV use, which is the least amount of land designated for OSV use out of all the five alternatives.

Air Quality

Air quality is a key resource and a valued element of the forest experience. Air quality is protected under several provisions of the Clean Air Act (CAA), including the Prevention of Significant Deterioration (PSD) program, the National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS). Potential impacts to air quality from winter use on the Lassen National Forest relate to OSV¹⁹ emissions. This analysis describes the existing condition of air quality on the Lassen National Forest and evaluates the potential changes and effects of the alternatives on air quality.

Relevant Laws, Regulations, and Policy

Regulatory Framework

Land and Resource Management Plan

The Lassen National Forest Land and Resource Management Plan (LRMP) (USDA Forest Service 1992) provides standards and guidelines for Air Quality. The LRMP's Standards and Guidelines call for compliance with State and local air quality requirements, and minimizing of smoke encroachment from prescribed burning (pg. 2-1).

The Forest Standards and Guidelines, with regard to OSV use, apply to the entire Forest.

a. Maintain air quality to meet or exceed legal requirements of appropriate levels of Government.

(1) Comply with the Federal Clean Act, as amended, and State and local air quality regulations.

Federal Clean Air Act

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

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

The Clean Air Act requires that Forest Service actions have “no adverse effect” on air resources by meeting the National Ambient Air Quality Standards and non-degradation standards for Class 1 areas. Managers are further directed to improve existing substandard conditions and reverse negative trends where practicable. The NAAQS and California Ambient Air Quality Standards (CAAQS) for particle

¹⁹ An OSV is defined in the Forest Service's Travel Management Rule 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).

pollution as set by the Clean Air Act and California Air Resources Board can be viewed online at the California Air Resources Board webpage.²⁰

National Ambient Air Quality Standards (NAAQS)

NAAQS requirements were established to protect human health and the environment and acceptable maximum air quality concentrations. The NAAQS consist of numerical standards for air pollution, which are broken into “primary” and “secondary” standards for six major air pollutants described below. Primary standards protect public health (including sensitive populations such as asthmatics, children, and the elderly) and represent levels at which there are no known major effects on human health. Secondary standards are intended to protect the nation’s welfare, and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the environment. These standards are detailed in table 62 and accompanying footnotes.

California Air Resources Board

California law authorizes the California Air Resources Board to set ambient (outdoor) air pollution standards (California Health & Safety Code section 39606) in consideration of public health, safety, and welfare. The Air Resources Board has established State Ambient Air Quality Standards (CAAQS) to identify outdoor pollutant levels considered safe for the public. After State standards are established, State law requires the Air Resources Board to designate each area as attainment, nonattainment, or unclassified for each State standard. The area designations, which are based on the most recent available data, indicate the healthfulness of air quality throughout the state (ARB 2015). The State and National Ambient Air Quality Standards are displayed in table 62 and accompanying footnotes. (Further information can be found at: <http://www.arb.ca.gov/desig/statedesig.htm>.)

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

State Implementation Plans are comprehensive plans that describe how an area would attain national ambient air quality standards (NAAQS). The 1990 amendments to the Federal Clean Air Act set deadlines for attainment based on the severity of an area's air pollution problem.

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

²⁰ <http://www.arb.ca.gov/research/aaqs/aaqs2.pdf>

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

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

Table 62. State and National Ambient Air Quality Standards

Pollutant	Averaging	California Standards ¹		National Standards ²		
	Time	Concentration ³	Method ⁴	Primary ^{3,5}	Secondary ^{3,6}	Method ⁷
Ozone (O ₃) ⁸	1 hour	0.09 ppm (180 µg/m ³)	Ultraviolet Photometry	---	Same as Primary Standard	Ultraviolet Photometry
	8 hour	0.070 ppm (137 µg/m ³)		0.070 ppm (137 µg/m ³)		
Respirable Particulate Matter (PM ₁₀) ⁹	24 hour	50 µg/m ³	Gravimetric or Beta Attenuation	150 µg/m ³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m ³		---		
Fine Particulate Matter (PM _{2.5}) ⁹	24 hour	---	---	35 µg/m ³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m ³	Gravimetric or Beta Attenuation	12.0 µg/m ³	15 µg/m ³	
Carbon Monoxide (CO)	1 hour	20 ppm (23 mg/m ³)	Non-dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m ³)	---	Non-dispersive Infrared Photometry (NDIR)
	8 hour	9.0 ppm(10 mg/m ³)		9 ppm (10 mg/m ³)	---	
	8 hour (Lake Tahoe)	6 ppm (7 mg/m ³)		---	---	
Nitrogen Dioxide (NO ₂) ¹⁰	1 hour	0.18 ppm (339 µg/m ³)	Gas Phase	100 ppb (188 µg/m ³)	---	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m ³)	Chemiluminescence	0.053 ppm (100 µg/m ³)	Same as Primary Standard	
	1 hour	0.25 ppm (655 µg/m ³)	Ultraviolet Fluorescence	75 ppb (196 µg/m ³)	---	Ultraviolet Fluorescence
	3 hour	---		---	0.5 ppm (1300 µg/m ³)	
Sulfur Dioxide (SO ₂) ¹¹	24 hour	0.04 ppm (105 µg/m ³)		0.14 ppm (for certain areas) ¹⁰	---	Spectrophotometry (Pararosaniline Method)
	Annual Arithmetic Mean	---		0.030 ppm (for certain areas) ¹⁰	---	
Lead ^{12,13}	30 Day Average	1.5 µg/m3	Atomic Absorption	---	---	High Volume Sampler and Atomic Absorption
	Calendar Quarter	---		1.5 µg/m ³	Same as Primary Standard	
	Rolling 3-Month Average	---		0.15 µg/m ³		
Visibility Reducing Particles ¹⁴	8 hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 hour	25 µg/m ³	Ion Chromatography			
Hydrogen Sulfide	1 hour	0.03 ppm (42 µg/m ³)	Ultraviolet Fluorescence			
Vinyl Chloride ¹²	24 hour	0.01 ppm (26 µg/m ³)	Gas Chromatography			

Source: California Air Resources Board (5/4/16) (See footnotes below.)

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equalled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above $150 \mu\text{g}/\text{m}^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.
5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse
7. Reference method as described by the U.S. EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the U.S. EPA.
8. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.
9. On December 14, 2012, the national annual PM2.5 primary standard was lowered from $15 \mu\text{g}/\text{m}^3$ to $12.0 \mu\text{g}/\text{m}^3$. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at $35 \mu\text{g}/\text{m}^3$, as was the annual secondary standard of $15 \mu\text{g}/\text{m}^3$. The existing 24-hour PM10 standards (primary and secondary) of $150 \mu\text{g}/\text{m}^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.
10. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.
11. On June 2, 2010, a new 1-hour SO2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.
12. Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.
13. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
14. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard ($1.5 \mu\text{g}/\text{m}^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
15. In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

Criteria Pollutants Regulated by EPA

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

In April 2005, the Air Resources Board approved a new 9-hour standard of 0.070 ppm and retained the one-hour ozone standard of 0.09 after an extensive review of the scientific literature. (ARB 2015)

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

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

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

Nitrogen Dioxide (NO₂) is a reddish-brown gas with an irritating odor. It is emitted from motor vehicles, industrial facilities, and power plants. Indoors, home heaters and gas stoves also produce substantial amounts of NO₂. Nitrogen dioxide and nitric oxide are products of all types of combustion. Nitric oxide reacts with hydrocarbons in the presence of sunlight to form nitrogen dioxide. In the summer months NO₂ is a major component of photochemical smog and an essential ingredient in the formation of ground-level ozone pollution. Exposure to NO₂ along with other traffic-related pollutants, is associated with respiratory symptoms, episodes of respiratory illness and impaired lung functioning. In February 2007, the Air Resources Board established a new annual average NO₂ standard of 0.030 ppm and lowered the one-hour NO₂ standard to 0.18 ppm, after an extensive review of the scientific literature (source: ARB 2015).

Carbon Monoxide (CO) A colorless, odorless gas, carbon monoxide is a byproduct of incomplete combustion and is emitted directly into the atmosphere, primarily from motor vehicle exhaust. Carbon monoxide concentrations typically peak nearest a source, such as roadways, and decrease rapidly as

distance from the source increases. Carbon monoxide is readily absorbed into the body from the lungs. It decreases the capacity of the blood to transport oxygen, leading to health risks for unborn children and people suffering from heart and lung disease. The symptoms of excessive exposure-- headaches, fatigue, slow reflexes, and dizziness--also occur in healthy people (source: ARB 2015)

Sulfur Dioxide (SO₂) A colorless gas with a strong, suffocating odor, sulfur dioxide is primarily a combustion product of coal, fuel oil, and diesel fuel. Only small quantities of SO₂ come from gasoline fueled motor vehicle exhaust. Sulfur Dioxide is emitted directly into the atmosphere and can remain suspended for days allowing for wide distribution of the pollutant. Sulfur dioxide can trigger constriction of the airways, causing particular difficulties for asthmatics. Children can experience increased respiratory tract infections and healthy people may experience sore throats, coughing, and breathing difficulties. Long-term exposure has been associated with increased risk of mortality from respiratory or cardiovascular disease (source: ARB 2015).

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

Desired Condition

The Lassen LRMP states for the desired future condition that present air quality is maintained. Baseline conditions for all air quality related values are defined and limits of acceptable change are established for Class 1 Wilderness areas. (USDA Forest Service 1992, page 4-2)

Topics and Issues Addressed in This Analysis

Issues

Designating trails, and areas for OSV use and grooming trails for OSV use could generate exhaust and emit pollutants into the air. This could degrade air quality, which can impact recreational uses and sensitive areas.

Resource Indicators and Measures

The air quality analysis is a qualitative discussion comparing miles of trails designated for OSV use and acres designated for OSV use. The resource indicators are shown in table 63 and will be used throughout the analysis to compare the alternatives and their potential effects to air quality.

Table 63. Resource indicators and measures for assessing effects

Resource Element	Resource Indicator	Measure	Used to address: P/N, or key issue?	Source (LRMP S/G; law or policy, BMPs, etc.)?
Air Quality	Potential effects of OSV emissions to create adverse impacts to air quality.	Miles of snow trail designated for OSV use.	No	Forest Standards and Guidelines (pg. 4-15) Air Quality a. Maintain air quality to meet or exceed legal requirements of appropriate levels of government. 1. Comply with the Federal Clean Air Act, as amended, and state and local air quality regulations.
	Potential effects of OSV emissions to create adverse impacts to air quality.	Acres designated for OSV use.	No	Forest Standards and Guidelines (pg. 4-15) Air Quality a. Maintain air quality to meet or exceed legal requirements of appropriate levels of government. 3. Comply with the Federal Clean Air Act, as amended, and state and local air quality regulations.
	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).	No	Forest Standards and Guidelines (pg. 4-15) Air Quality a. Maintain air quality to meet or exceed legal requirements of appropriate levels of government. 1. Comply with the Federal Clean Air Act, as amended, and state and local air quality regulations. LRMP (pg. 3-3) Caribou, Thousand Lakes and Lassen Volcanic Wilderness Areas are designated as Class I areas, allowing no degradation in air quality.

Methodology

Information Sources

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

- ArcMap and relevant Geographic Information System (GIS) data layers from the Lassen National Forest, Environmental Protection Agency (EPA), and the California Air Resources Board (CARB) including county boundaries, air basin boundaries, air district boundaries and class 1 and 2 areas.
- GIS layer of proposed OSV designations and groomed trails

- Lassen National Forest Plan (USDA Forest Service 1992).
- Scientific literature cited in the “References” section.
- The National Visitor Use Monitoring (NVUM) information from the years 2001, 2006, and 2010.
- OSV use from the 2009 OSV Winter Trailhead Survey conducted in support of the 2010 State OSV Program Environmental Impact Report (EIR) for Program Years 2010-2020.
- Information and correspondence obtained from the Air Resource Specialist at the California Air Resources Board (CARB).

Incomplete and Unavailable Information

No information was found on past monitoring of air quality or OSV emissions in the Lassen National Forest.

Assumptions used in the Analysis

For analysis purposes, snowmobile emission data used was obtained from the Environmental Protection Agency (EPA 2010). Analysis was based on emission estimates for a 2-stroke snowmobile (worst-case scenario). Snowmobile miles traveled per day was estimated at 50 miles per day and was averaged based on the responses received through a survey forum (snowest.com).

Approximate annual use was an estimated 10,000 OSV visitors forestwide for the winter season based on previous use records.

Spatial and Temporal Context for Effects Analysis

The spatial context for effects analysis will be the forest boundary. The temporal context for effects analysis will be one year.

Affected Environment

Existing Condition

Air Quality Management

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



Figure 15. Designated air basins in California

Air Pollution Control District

Air quality for the forest is managed and regulated by seven air management districts. Air management districts typically follow county boundaries. Most of the forest lies within the Shasta and Lassen air districts with the southern third of the forest in the Tehama, Northern Sierra (Nevada, Plumas and Sierra counties) and Butte Districts and the northern portion within the Siskiyou and Modoc Air Districts. See figure 16 for a map of air districts in relation to the Lassen National Forest. Air quality rules and regulations for each air pollution control district can be found at their website.

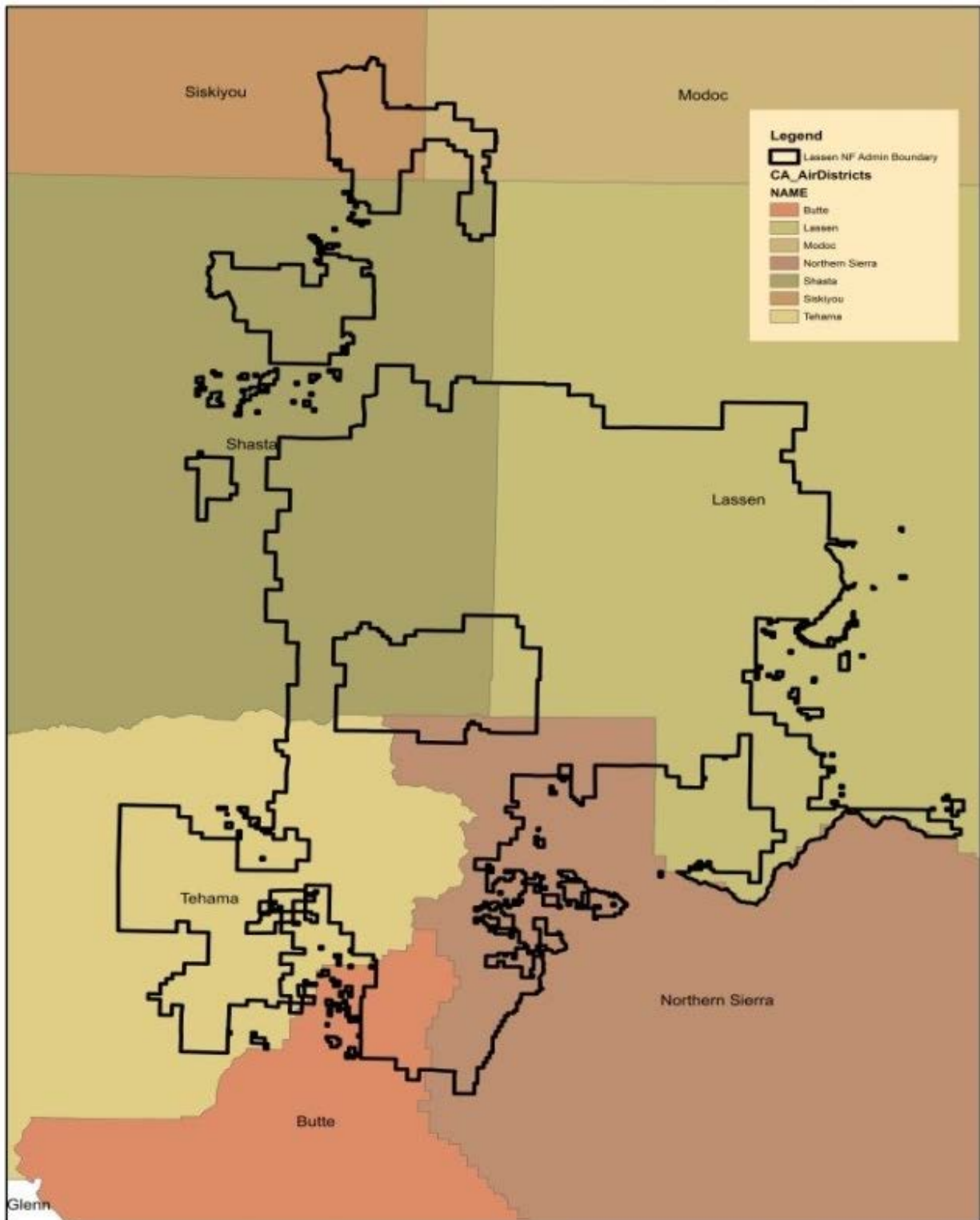


Figure 16. Air pollution control districts within the Lassen National Forest

Class 1 and II Areas

The Thousand Lakes and Caribou Wilderness are designated as Federal Class 1 Areas on the Lassen National Forest (figure 17). The Lassen Volcanic National Park, managed by the National Park Service, is also a designated Class 1 area that is surrounded by the Lassen National Forest. The Caribou Wilderness lies along the eastern boundary of Lassen Volcanic National Park and the Thousand Lakes Wilderness is located northwest of Lassen National Park. The Ishi Wilderness lies in the southwestern portion of the forest and is classified as a Class II area by EPA, which allows some reduction in air quality.

Visibility impairment is defined as any humanly perceptible change in visual air quality from that which would have existed under natural conditions (in other words, absent human-related influence). This change is caused by air pollutants: particles and gases in the atmosphere that either scatter or absorb light. The net effect is the creation of a hazy condition. Sources for visibility impairment in these Class 1 areas include, but are not limited to, industrial sources, on-road and off-road vehicle emissions, road dust, windblown dust, and smoke. Sources can be local or very distant. Progress toward better visibility is calculated from data collected at the Interagency Monitoring of Protected Visual Environments (IMPROVE) network. The IMPROVE monitors measure the concentration of each haze-causing pollutant every three days. There are 17 IMPROVE monitors representing one or more of the Class 1 Areas in California. The LAV01 IMPROVE monitoring site is located at Lassen Volcanic National Park. Smoke directly impacted the Class 1 Areas and had an overwhelming impact on visibility progress at many monitoring sites throughout California and the West (ARB 2015).

However, the Air Resources Board also noted, as evidenced by reductions in human-related source emissions in California and the concurrent improvement in visibility at all of California's Class 1 Area IMPROVE monitors, California determines the current regional haze plan strategies are sufficient for California and its neighboring states to meet their 2018 Reasonable Progress Goals (ARB 2015).

Air Quality Standards

The Lassen National Forest must comply with Federal and State ambient air quality standards as mandated by the Clean Air Act of 1963. These standards have been established for seven criteria air pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO₂), PM₁₀, PM_{2.5}, ozone (O₃), and sulfur dioxide (SO₂). California also has standards in place for sulfates, hydrogen sulfide, visibility-reducing particles and vinyl chloride (ARB 2015).

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

Currently, the Lassen National Forest complies with Federal and State standards and there are no known violations of the Clean Air Act. According to the Environmental Protection Agency, Butte County is in non-attainment for three criteria pollutants: 8-hour ozone, carbon monoxide and PM_{2.5}. The non-attainment boundary for 8-hour ozone crosses the Lassen National Forest at the south central section on the Almanor Ranger District. The concern for ozone is in the summer only according to the air pollution specialist at the Air Resources Board (Lopina 2015). The city of Chico, California, within the Butte Air Pollution Control District is in non-attainment for carbon monoxide and PM_{2.5}. A portion of Tehama County is also in non-attainment for 8-hour ozone and Plumas County is classified as moderate non-attainment for PM_{2.5} (table 64).



Figure 17. Class 1 Areas in California

Table 64. Federal non-attainment areas for criteria pollutants

County and/or Air District	8 hour Ozone	Carbon Monoxide (CO)	Lead (Pb)	Particulate Matter 2.5 (PM_{2.5})	Particulate Matter 10 (PM₁₀)	Nitrogen Dioxide (NO₂)	Sulfur Dioxide (SO₂)
Butte	<i>MN=Chico city</i>	<i>MM=Chico area</i>	U /A	A N=Chico city	U /A	U /A	U /A
Lassen	U/A	U /A	U /A	U /A	U /A	U /A	U /A
Modoc	U /A	U/A	U /A	U /A	U /A	U /A	U /A
Plumas (Within Northern Sierra Air District)	U /A	U/A	U /A	N	U /A	U /A	U /A
Nevada (Within Northern Sierra Air District)	U N=Western portion of county	U/A	U /A	U /A	U /A	U /A	U /A
Sierra (Within Northern Sierra Air District)	U /A	U/A	U /A	U /A	U /A	U /A	U /A
Shasta	U /A	U /A	U /A	U /A	U /A	U /A	U /A
Siskiyou	U /A	U /A	U /A	U /A	U /A	U /A	U /A
Tehama	N=Tuscan Buttes area	U /A	U/A	U /A	U/A	U /A	U /A

Source: <http://www.epa.gov/green-book/>. Accessed: 02/14/18

A=Attainment; N=Non-attainment; M=Maintenance area; U=Unclassified.

Table 65 shows the California Ambient Air Quality Standards (CAAQS) state designations for all criteria pollutants in California. The Air Resources Board makes State area designations for ten criteria pollutants: ozone, suspended particulate matter (PM₁₀), fine suspended particulate matter (PM_{2.5}), carbon monoxide, nitrogen dioxide, sulfur dioxide, sulfates, lead, hydrogen sulfide, and visibility reducing particles (ARB 2015). The Air Resources Board lists eight counties in non-attainment for PM₁₀, four in non-attainment for ozone and Butte County also in non-attainment for PM_{2.5}.

Table 65. State designated non-attainment areas for criteria pollutants

County and/ or Air District	Ozone	Carbon Monoxide (CO)	Lead (Pb)	PM _{2.5}	PM ₁₀	Nitrogen Dioxide (NO ₂)	Sulfur Dioxide (SO ₂)	Sulfates	Hydrogen Sulfide	Visibility Reducing Particles
Butte	N	A	A	N	N	A	A	A	U	U
Lassen	A	U	A	A	N	A	A	A	U	U
Modoc	A	U	A	A	N	A	A	A	U	U
Nevada (within No Sierra Air Dist.)	N	U	A	U	N	A	A	A	U	U
Plumas	U	A	A	U*(Portola Valley in non-attainment)	N	A	A	A	U	U
Sierra	U	U	A	U	N	A	A	A	U	U
Shasta	N	U	A	A	N	A	A	A	U	U
Siskiyou	A	U	A	A	A	A	A	A	U	U
Tehama	N	U	A	U	N	A	A	A	U	U

Source: <https://www.arb.ca.gov/desig/adm/adm.htm> (Accessed: 02/14/18)

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

For ozone, PM_{2.5}, and PM₁₀, the required minimum number of monitors is based on the population of the Core-Based Statistical Area (CBSA) and the severity of the pollutant concentrations each CBSA. Table 66 includes the CBSAs, population of the CBSAs, the site in each CBSA that is currently measuring the highest concentration, and monitor information used to evaluate whether the minimum monitoring requirement is satisfied. In all cases, sufficient monitoring exists and no additional monitoring is required (ARB 2015).

Table 66. Minimum monitoring requirements for ozone

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

²¹See footnote information below. Source: ARB 2015

²¹ FOOTNOTES:

2012-2014 air quality data was used in determining the number of required sites.

This table excludes tribal monitoring sites.

Population is based on year 2010 Census data.

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

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

1 SLAMS: State and Local Air Monitoring Stations.

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

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

3 SSI: Size Selective Inlet. The SSI is an FRM for PM₁₀. N/A means there is no PM₁₀ monitor in the CBSA.

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

Table 67 displays the annual average emissions (tons per year) generated for the air districts within the Lassen National Forest (EPA 2013).

Table 67. Annual average emissions (tons/year) by air district

Air District	TOG	ROG	CO	NOx	SOx	PM	PM ₁₀	PM _{2.5}
Butte	9,380.5	6,212.3	30,389.9	6,643	109.5	10,793.05	6,270.7	2,171.75
Lassen	6,288.95	2,197.3	12,884.5	1,766.6	94.9	5,880.15	3,777.75	1,153.4
Modoc	5,715.9	1,135.15	3,157.25	1,003.75	14.6	6,303.55	3,606.2	543.85
Northern Sierra	10,577.7	5,131.9	33,572.7	4,796.1	270.1	12,380.8	7,577.4	1,941.8
Shasta	10,829.55	5,650.2	34,525.35	8,570.2	175.2	7,548.2	4,847.2	2,014.8
Siskiyou	9,084.85	3,854.4	15,173.05	3,467.5	58.4	9,698.05	6,015.2	1,573.15
Tehama	7,971.6	2,449.15	8,913.3	4,117.2	36.5	5,208.55	3,014.9	810.3
TOTAL Emissions for Air Districts (tons/year)	59,849.05	26,630.4	138,616.1	30,364.35	759.2	57,812.35	35,109.35	10,209.05

Greenhouse Gases and Climate Change

Greenhouse gases trap heat and make the planet warmer. Human activities are responsible for almost all of the increase in greenhouse gases in the atmosphere over the last 150 years. The largest source of greenhouse gas emissions from human activities in the United States is from burning fossil fuels for electricity, heat, and transportation. The transportation sector made up 27 percent of the 2015 greenhouse gas emissions. Greenhouse gas emissions from transportation primarily come from burning fossil fuel for our cars, trucks, ships, trains, and planes. Almost all (95 percent) of the world's transportation energy comes from petroleum-based fuels, largely gasoline and diesel. Fossil fuel use is the primary source of CO₂. CO₂ can also be emitted from direct human-induced impacts on forestry and other land use, such as through deforestation, land clearing for agriculture, and degradation of soils. Likewise, land can also remove CO₂ from the atmosphere through reforestation, improvement of soils, and other activities.

Global carbon emissions from fossil fuels have significantly increased since 1900. Since 1970, CO₂ emissions have increased by about 90 percent, with emissions from fossil fuel combustion and industrial processes contributing about 78 percent of the total greenhouse gas emissions increase from 1970 to 2011. Agriculture, deforestation, and other land-use changes have been the second-largest contributors (Edenhofer et al 2014). In 2001, the EPA estimated the percentage contributions made by snowmobiles to the overall output in the United States to be: hydrocarbons (HC) 1.2 percent, carbon dioxide (CO) 0.5 percent, nitrogen oxides (NOx) 0.007 percent, and particulate matter (PM) 0.07 percent. This is truly a tiny contribution to the total emissions released in a year, but snowmobile engines were lumped in with many off-road engine types and standards were established for them all (Snow Goer 2006).

Snowmobile Emission Standards

The effect of emissions from snowmobile activity on air quality and deposition in high elevation ecosystems has been studied primarily at Yellowstone National Park (YNP) in Northwest Wyoming. They emit hydrocarbons (HC), nitrogen oxides (NO_x), particulate matter (PM), carbon monoxide (CO), and non-combusted fuel vapors (USDI 2000). Combustion engine emissions contain

carcinogens, including benzene, butadiene, and polycyclic aromatic hydrocarbons (USDI NPS 2000). Combustion engines also emit large amounts of carbon dioxide.

In the case of snowmobiles, the EPA measures and regulates only HC and CO levels in the exhaust. Levels of NO_x are inherently low in two-stroke engines because of their lower combustion chamber temperatures. While four-stroke engines would have higher NO_x emissions, they are not of great concern in the winter when temperatures aren't high enough to act as the catalyst to create smog (Snow Goer 2006).

In 2002, the EPA issued a regulation that imposed stringent pollution regulations requiring that snowmobiles fall under regulations of the Clear Air Act (Jehl 2002). In 2012, snowmobile manufacturers were required to meet one of two alternatives. One would require reductions in emissions of both hydrocarbons and carbon monoxide by 50 percent from current levels. The other is intended to encourage further reductions in hydrocarbons and would require a 70 percent reduction in hydrocarbons, the source of the more urgent health concerns, in return for a 30 percent reduction in carbon monoxide (Jehl 2002). The result is that snowmobile engines now have significantly lower emissions and are much cleaner. EPA regulations target model year 2006 or newer snowmobiles (Raap 2014).

The EPA also requires that manufacturers ensure that each new engine, vehicle, or equipment meets the latest emission standards. Once manufacturers sell a certified product, no further effort is required to complete certification. If products were built before EPA emission standards started to apply, they are generally not affected by the standards or other regulatory requirements (EPA 2015(3)).

Table 68. Exhaust emission standards for snowmobiles

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

Source: Code of Federal Regulations, Accessed November 2015

¹ See § 1051.103(a)(2):

(a) ***

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

(2) For Phase 3, the HC and CO standards are defined by a functional relationship. Choose your corporate average HC and CO standards for each year according to the following criteria: <https://www.federalregister.gov/articles/2008/06/25/E8-14411/exhaust-emission-standards-for-2012-and-later-model-year-snowmobiles>

Best Available Technology (BAT)

Snowmobiles must be certified by the National Park Service to enter some national parks (Yellowstone and Grand Teton). BAT certification is one of the most stringent standards for air and noise emissions in the world, requiring hydrocarbon emissions of less than 15 g/kW-hr, carbon monoxide emissions of less than 120 g/kW-hr, and sound level limited to 73 decibels (BRP 2011). The use of BAT snowmobiles, which result in lower CO and hydrocarbon emissions (USDI NPS 2013), is not currently required on the Lassen National Forest.

Motorized Winter Recreation

The Lassen National Forest has a well-developed winter recreation program that emphasizes snowmobile use. Details on the groomed OSV trail system on the Lassen National Forest can be found in the Recreation report (project record, Valentine 2018).

Table 69 is derived from the OSV trailhead survey conducted for the State EIR, and based on data summarized in the State EIR (California Department of Parks 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 10,000 OSV recreationists forestwide (Valentine 2018).

Table 69. Lassen National Forest OSV visitor use

Location	Day Description	Number of Vehicles	Number of OSVs
Forestwide	Weekend/Holiday (approx. 33 per season)	106	212
	Weekday (approx. 65 per season)	21	42
Individual Trailheads	Weekend/Holiday	15 (average)	30
	Weekday	3.5	7

Based on 2009 Data from CA State DEIR

*assumes an average of 2 OSVs per vehicle parked at a trailhead (Valentine 2018)

Grooming Activities

Currently, approximately 349 miles of NFS trails are groomed for OSV use on the Lassen National Forest. Snow trail grooming for OSV use typically occurs from December and continues through March (December 26 through March 31). Grooming has historically occurred several times per week with a maximum of 12 hours per day and a total of 1,743 hours for the season (USDA Forest Service 2018).

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 to satisfy CARB requirements (USDA Forest Service 2018). Due to the CARB requirement, grooming activities on the Lassen were not discussed in detail.

Table 70. Resource indicators and measures for the existing condition and alternative 1

Resource Indicator	Measure	Alternative 1 Existing Condition
Estimate of change (increase/decrease) in emissions and the potential to create adverse impacts to air quality.	Approximate miles of snow trail designated for OSV use.	2,405 miles
Estimate of change (increase/decrease) in emissions and the potential to create adverse impacts to air quality.	Acres designated for OSV visitor use	964,030 acres
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).	No known impacts to air quality or NAAQS/CAAQS violations exist.

Environmental Consequences

Alternative 1 – No Action

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 snow trails and areas within the Lassen National Forest except as prohibited by forest order.

Approximately 964,030 acres are currently open to public OSV use, representing approximately 84 percent of the NFS land within the Lassen National Forest. There are 405 miles of snow trail designated for OSV use.

Air quality on the Lassen National Forest can be affected by land management and development activities on and off the forest. Air pollution sources include emissions from mobile and stationary sources including industrial activity, highway vehicles, off-road vehicles (all-terrain vehicles, aircraft, locomotives, construction machinery). Dust and burning can also have significant impacts to air quality as they are occurring on and off the forest. These sources can emit a host of regulated pollutants in and around the forest. Currently, good dispersion and topographic influences on the forest have resulted in no violations of Federal and State Ambient Air Quality Standards and have not attained concentrations high enough to warrant measurement or to result in degradation of air quality in the Class 1 areas.

There are three factors, largely beyond State control, that can interfere with air quality in Class 1 Areas: wildfire smoke, offshore shipping emissions, and Asian dust. These factors are either from natural sources (wildfire smoke), uncontrollable sources (shipping emissions beyond California's jurisdiction), or both (Asian dust, a combination of human-related and natural sources beyond California's control) (ARB 2015).

Table 71 displays the potential contribution of snowmobile emissions from the estimated 10,000 OSV visitors that recreate on the Lassen National Forest each year. All calculations were done using emission estimates from a 2-stroke snowmobile (EPA 2010). As shown in table 71, it is estimated that emissions from OSV use on the Lassen contributes approximately 0.12 percent of carbon monoxide (CO) to the air districts under the no-action alternative and less than 0.01 percent of nitrogen oxide (NOx) and particulate matter (PM).

Table 71. Emission estimate (tons/year) for OSV use on the Lassen National Forest

Source	Number of OSVs	Miles*	CO	NOx	PM
Snowmobile (2-stroke)	10,000	50	163.47	.47	1.49
% Pollutant Contribution to Air Districts	-----	----	0.12%	Less than 0.01	Less than 0.01

*Assumes 10,000 OSVs recreate on the Lassen per year and travel an average of 50 miles.

Alternative 2 – Proposed Action

The actions proposed relevant to the air analysis are as follows: (For a detailed discussion of all actions proposed under alternative 2, please refer to chapter 2.

- Designate 334 miles of snow trails for public OSV use.
- Designate approximately 920,260 acres for OSV use. This land area would represent approximately 80 percent of the NFS land within the Lassen National Forest.

Direct and Indirect Effects - Alternative 2

Under alternative 2 there would be a 4 percent reduction in acres designated for OSV use. The reduction of acres may cause a shift in OSV use to other areas. However, it is not likely this shift would result in increased accumulation or notable effects to air quality. It is likely emissions generated as a result of OSVs would be similar to or less than what is currently estimated and displayed in table 71 under the no-action alternative section of this section. Current emissions generated as a result of OSV use on the Lassen National Forest are estimated to contribute less than 1 percent (0.0011 percent of carbon monoxide (CO), 0.000016 percent of nitrogen oxide (NOx) and 0.0019 percent of particulate matter (PM)) of pollutants to the seven air districts within the Lassen National Forest. These emissions are minor compared to other off-forest sources of air pollution that can impact the forest. Impacts to air quality include vehicle emissions such as nitrogen oxides, particulate matter, and carbon monoxide from all motorized vehicles including snowmobiles and snowcats. Diesel engines also emit sulfur oxides and particulates. Air quality impacts from vehicle emissions are influenced by the effectiveness of the smog control devices on cars, amount of traffic, and the duration of engine idling. As people recreate in the forest during the winter months, the effects of vehicle exhaust on air quality may become a localized temporary issue where concentrated motorized use conflicts with non-motorized uses and nuisance smell occurs.

Although there can be localized air quality impacts where a large number of snowmobiles are occupying a parking lot, as studied at Yellowstone National Park, those conditions do not apply in this case. The number of anticipated recreationists for this assessment would be considered low as compared to Yellowstone National Park, which records 75,000 snowmobile visitors each winter (Millner 2015). The issue of snowmobile emissions and air quality was studied more intensely in Yellowstone National Park than anywhere else in the world during the early 2000s. Intensive studies confirmed that, despite high levels of unregulated snowmobile use, National Ambient Air Quality Standards (NAAQS) were never close to being exceeded in Yellowstone National Park due to snowmobile use. NAAQS thresholds have also never been exceeded elsewhere due to snowmobile use (Raap 2014).

The estimated 10,000 OSV visitors forestwide for the winter season on 334 miles of trail would equate to approximately one recreationist per mile of trail each weekend day (assuming 13 to 15 weekends and two days per weekend). It is expected OSV emissions would dissipate and the possibility of accumulation would be eliminated, based on topographic influences and wind dispersion. Non-motorized recreationists' air quality concerns in parking lots, at trailheads, and on trails would continue since non-motorized and motorized recreationists would still share the same parking areas, trailheads, and many of the same trails. The odor generated by emissions from combustion engines, particularly two-cycle engines, can diminish

a non-motorized recreationist's experience. However, this is likely a recreation (use satisfaction) issue rather than a general air quality issue (see Recreation report (project record) for more discussion on the topic of visitor experience). Bishop et al. (2006) found emissions were greatest during initial startup and idling, especially when the engine is cold. They also observed that reducing wait times at entrance stations would further lower emissions and exposure. Implementing similar measures or idling limits at parking lots and trailheads, may address public concerns regarding nuisance smell and potential impacts to air quality in those areas. It is anticipated that any impacts to air quality from winter motorized recreation under alternative 2 would not result in violations to National and State Ambient Air Quality Standards.

A study by Musselman et al. (2007) was conducted in Wyoming to evaluate the effects of winter recreation snowmobile activity on air quality at a high-elevation site. They measured levels of nitrogen oxides (NO_x , NO), carbon monoxide (CO), ozone (O_3) and particulate matter (PM_{10} mass). They found nitrogen oxides and carbon monoxide were significantly higher on weekends than weekdays due to higher snowmobile use on weekends. Ozone and particulate matter were not significantly different during the weekend compared to weekdays. Air quality data during the summer were also compared to the winter data and they found carbon monoxide levels at the site were significantly higher during the winter than during the summer. Nitrogen oxides and particulates were significantly higher during the summer compared to winter. Nevertheless, air pollutants were well dispersed and diluted by strong winds common at the site, and snowmobile emissions did not have a significant impact on air quality at the site (Musselman and Korfmacher 2007). It was also determined that pollutant concentrations were generally low in both winter and summer, and were considerably lower than maximum levels allowed by the NAAQS (Raap 2014).

Class / Areas

In Yellowstone National Park, the implementation of BAT requirements and the reduction in the number of OSVs entering the park during the managed use era dramatically reduced CO, PM, and hydrocarbon emissions. The substantial CO and PM emissions reductions from implementing BAT requirements have come with one important tradeoff—an increase in NO_x emissions. Snowmobiles that meet BAT requirements have higher NO_x emissions than snowmobiles that do not meet BAT requirements. They found overall, from 2003 to 2011, air quality stabilized at the monitoring stations in the park, with the exception of 2010. These positive trends in air quality are primarily the result of BAT requirements for snowmobiles, fewer snowmobiles entering the park in recent years, and carbureted snow coaches being replaced with modern fuel-injected engines. Requiring the use of only BAT snowmobiles has improved emissions despite the increasing number of snow coaches now entering the park. Although these changes present an overall positive trend toward lower emissions by OSVs, other local sources, such as uncontrolled wood stoves in warming huts and some facilities in the park, still contribute to winter CO and $\text{PM}_{2.5}$ concentrations (USDI 2013).

Climate Change

Projected climate change through the 21st century would generate warmer temperatures and changes in precipitation that are expected to decrease the duration and extent of natural snow cover across the northern hemisphere (Wobus et al. 2017).

Average snowmobile seasons in the 2020s are projected to be reduced between 11 and 40 percent under a low-emission climate change scenario and between 39 to 68 percent under a high-emission climate change scenario. Under the high-emission scenario for the 2050s, a reliable snowmobiling season would essentially be eliminated from Canada's non-mountainous regions (Wakefield 2016).

A study in Vermont concluded declining snowfall in Vermont at the normal elevations of most snowmobile trails has already occurred and is likely to continue in coming years. Days of snow cover were a significant detractor and with fewer days of snow cover, participation rates would begin to decline. (Wakefield 2016). Based on this research, snowmobile usage on the Lassen could also decline or usage could shift to higher-elevation trails due to availability of snow. The quantity of greenhouse gas emitted is not expected to increase. With estimated annual visitor use of 10,000 on the Lassen, it is likely emissions contributions to the atmosphere would decline as visitor use declines due to lack of snow. Insufficient information is available to predict the effect of greenhouse gas emissions on global climate change from snowmobile use on the Lassen National Forest.

Conclusion

Implementation of alternative 2 would be expected to maintain the same air quality conditions as compared to the existing condition due to good dispersion characteristics across the forest, low inversion potential, low emissions generated from OSVs as compared to other potential sources, and the equivalent number of OSV trail miles designated. In addition, it is expected the proposed reduction in acres and areas designated for OSV use would reduce air quality impacts in those areas and nearby Class 1 areas. Compliance with State and Federal air quality standards is expected to occur under alternative 2. Motorized recreation emission sources on the forest are localized, transient, and not expected to result in any significant air quality impacts under alternative 2. No violations of the Clean Air Act are expected to occur under alternative 2.

Table 72. Resource indicators and measures for alternative 2

Resource Element	Resource Indicator	Measure	Alternative 2
Air Quality	Estimate of change (increase/decrease) in emissions and the potential to create adverse impacts to air quality.	Miles of trail designated for OSV visitor use.	3,334 miles
	Estimate of change (increase/decrease) in emissions and the potential to create adverse impacts to air quality.	Acres designated for OSV visitor use.	920,260 acres (4 percent decrease from existing condition)
	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)	OSV trails within ¼ mile of sensitive areas (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 impacts to air quality or NAAQS/CAAQS violations exist.

Cumulative Effects – Alternative 2

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

Past, present, and reasonably foreseeable future actions could impact air quality and are summarized below. Air quality on the forest could be affected by land management and development activities on and off the forest. Air pollution sources include emissions from industrial activity, highway vehicles, off-road vehicles (all-terrain vehicles, aircraft, locomotives, construction machinery). Dust and burning can also have significant impacts to air quality as they are occurring on and off the forest. None of the on-forest sources discussed in the existing condition are expected to increase or impact air quality when

combined with alternative 2. In addition, emissions generated from snowcats plowing and grooming parking lots and trailheads could also contribute to localized air pollution on the forest. However, it is estimated the contribution from administrative snowcat use, to the overall cumulative impacts on air quality would be minimal.

Air quality impacts are expected to grow with continued growth of population around the Lassen National Forest. Substantial impacts are not expected to occur during winter months on the Lassen National Forest due to regulations already in place by the EPA and the Clean Air Act. The past, present, and reasonably foreseeable future actions would be the primary contributors to air quality impacts on the forest. Due to the short-term and localized impact of OSV use, alternative 2 is not expected to significantly contribute to the cumulative impacts of other local and regional air pollution sources. However, it is impossible to predict future pollutant discharge from off-forest mobile and stationary sources and how those sources may contribute to or impact air quality on the forest. There are no known unavoidable adverse, irreversible or irretrievable effects to air quality as a result of implementing alternative 2.

Climate Change

It is not possible to determine the cumulative impact on global climate change from the estimated emissions associated with alternative 2.

Alternative 3

This alternative addresses the non-motorized recreational experience significant issue. The actions proposed relevant to the air analysis are as follows: (For a detailed discussion of all actions proposed under alternative 3, please see chapter 2.)

- Designate approximately 383 miles of snow trails for public OSV use.
- Designate eight discrete, specifically delineated areas for cross-country OSV use. These areas would encompass 833,280 acres, representing approximately 73 percent of the NFS land within the Lassen National Forest.
- Mechanically groom 349 miles of snow trails for public OSV use. We would groom approximately 27 miles of snow trails for OSV use that would not be designated for OSV use because the Forest Service does not have jurisdiction over these trails.

Direct and Indirect Effects - Alternative 3

Alternative 3 would not designate OSV use on more acres than alternative 2. With a proposed 14 percent reduction in acres designated for OSV use, it is likely emissions generated as a result of OSVs would be similar to or less than is currently estimated and displayed in table 71 under the no-action alternative. Current emissions generated as a result of OSV use on the Lassen National Forest are estimated to contribute less than 1 percent (0.0011 percent of carbon monoxide (CO), 0.000016 percent of nitrogen oxide (NOx) and 0.0019 percent of particulate matter (PM)) of pollutants to the seven air districts within the Lassen National Forest. These emissions are minor compared to other sources of air pollution impacting the forest.

The direct and indirect effects discussed in detail under alternative 2 would also apply for alternative 3.

Cumulative Effects- Alternative 3

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

Table 73. Resource indicators and measures for alternative 3

Resource Element	Resource Indicator	Measure	Alternative 3
Air Quality	Estimate of change (increase/decrease) in emissions and the potential to create adverse impacts to air quality.	Miles of trail designated for OSV visitor use.	383 miles
	Estimate of change (increase/decrease) in emissions and the potential to create adverse impacts to air quality.	Acres designated for OSV visitor use.	833,280 acres designated for OSV use (a 14 percent decrease from the current management)
	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).	OSV trails in close proximity of sensitive areas (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 impacts to air quality or NAAQS/CAAQS violations exist.

Alternative 4

This alternative addresses the motorized recreational experience significant issue. The actions proposed relevant to the air analysis are as follows:

- To designate 380 miles of snow trails for public OSV use.
- To designate eight discrete, specifically delineated areas for cross-country OSV use. These areas would encompass 955,470 acres, representing approximately 83 percent of the NFS land within the Lassen National Forest.
- Mechanically groom 349 miles of snow trails for public OSV use. We would groom approximately 27 miles of snow trails for OSV use that would not be designated for OSV use because the Forest Service does not have jurisdiction over these trails.

Direct and Indirect Effects - Alternative 4

Alternative 4 would designate more acres for public OSV use than alternative 3, and slightly fewer acres than alternative 2.

Alternative 4 effects would be similar as described for alternative 2, and with a 1 percent reduction in acres designated for OSV use forestwide as compared to the existing condition, it is likely OSV emissions generated would be similar to or less than that estimated and displayed in table 71 under the no-action alternative section. Current emissions generated as a result of OSV use on the Lassen National Forest are estimated to contribute less than 1 percent (0.0011 percent of carbon monoxide (CO), 0.000016 percent of nitrogen oxide (NO_x), and 0.0019 percent of particulate matter (PM)) of pollutants to the seven air districts within the Lassen National Forest. These emissions are minor compared to other sources of air pollution impacting the forest.

The direct and indirect effects discussed in detail under alternative 2 would also apply for alternative 4.

Cumulative Effects for Alternative 4

The cumulative effects listed for alternative 2 would also apply for alternative 4.

Table 74. Resource indicators and measures for alternative 4

Resource Element	Resource Indicator	Measure	Alternative 4
Air Quality	Estimate of change (increase/decrease) in emissions and the potential to create adverse impacts to air quality.	Miles of trail designated for OSV visitor use.	380 miles
	Estimate of change (increase/decrease) in emissions and the potential to create adverse impacts to air quality.	Acres designated for OSV visitor use.	955,470 acres designated for OSV use (a <1 percent decrease from the current management)
	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).	OSV trails in close proximity (approx. ¼ mile) of sensitive areas (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 impacts to air quality or NAAQS/CAAQS violations exist.

Alternative 5

This alternative addresses the non-motorized recreational experience significant issue. The actions proposed relevant to the air analysis are as follows:

- To designate 393 miles of snow trails for public OSV use.
- To designate six discrete, specifically delineated areas for public cross-country OSV use. These areas would encompass 632,400 acres, representing approximately 56 percent of the NFS land within the Lassen National Forest.

Direct and Indirect Effects - Alternative 5

Alternative 5 would designate the least amount of acres for public OSV use compared to alternatives 2, 3 and 4.

Alternative 5 effects would be similar to those described for alternative 2. With a proposed 3 percent reduction in acres designated for public OSV use and 3 percent reduction in miles of trail designated for public OSV use, as compared to the existing condition, it is likely emissions generated as a result of OSVs would be less than what is currently estimated and displayed in table 71 under the no-action alternative. Current emissions generated as a result of OSV use on the Lassen National Forest are estimated to contribute less than 1 percent (0.0011 percent of carbon monoxide (CO), 0.000016 percent of nitrogen oxide (NOx), and 0.0019 percent of particulate matter (PM)) of pollutants to the seven air districts within the Lassen National Forest. These emissions are minor compared to other sources of air pollution impacting the forest.

The direct and indirect effects discussed in detail under alternative 2 would also apply for alternative 5.

Cumulative Effects for Alternative 5.

The cumulative effects listed for alternative 2 would also apply for alternative 5.

Table 75. Resource indicators and measures for alternative 5

Resource Element	Resource Indicator	Measure	Alternative 5
Air Quality	Estimate of change (increase/decrease) in emissions and the potential to create adverse impacts to air quality.	Miles of trail designated for OSV visitor use.	393 miles
	Estimate of change (increase/decrease) in emissions and the potential to create adverse impacts to air quality.	Acres designated for OSV visitor use.	632,400 acres designated for OSV use (a 3 percent reduction from the current management)
	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).	OSV trails in close proximity (approx. ¼ mile) of sensitive areas (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 impacts to air quality or NAAQS/CAAQS violations exist.

Summary

It is expected the levels of pollutants for the alternatives would fall within the ranges currently experienced and no violation of State or Federal ambient air quality standards would occur on the Lassen National Forest during the OSV season. Table 76 provides a comparison of the alternatives and the degree to which the alternatives address potential air quality issues.

Summary of Environmental Effects

Potential impacts of public OSV use on Class I and II areas would be fairly similar for all action alternatives. Alternatives 3 and 5 would provide slightly more protection due to additional OSV restrictions and closures in the vicinity of sensitive areas. In all action alternatives, Class I and II areas are closed to OSV use. There are no known violations of ambient air quality standards and to the Clean Air Act under the existing condition, and it is anticipated there would also be no violations with the action alternatives due to the significant reduction in miles and acres designated for OSV use. Short-term impacts to air quality in some areas, including trailheads and parking lots may be noticeable due to the concentration of OSVs, particularly in the morning and/or at engine start-up. However, this is likely a nuisance smell issue rather than an air quality issue.

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

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

Table 76. Summary comparison of alternatives

Resource Element	Resource Indicator/Measure	Alternative 1 – No Action	Alternative 2 – Modified Proposed Action	Alternative 3	Alternative 4	Alternative 5
Air Quality	Estimate of change (increase/decrease) in emissions and the potential to create adverse impacts to air quality, miles designated for OSV visitor use	405 miles open to OSV use. No known violations of the CAA as a result of OSV use under the existing condition.	334 miles designated for OSV use. A 17 percent reduction in miles as compared to the existing condition. No violations of the CAA are anticipated.	383 miles designated for OSV use. A 5 percent reduction in miles as compared to the existing condition. No violations of the CAA are anticipated.	380 miles designated for OSV use. A 6 percent reduction in miles as compared to the existing condition. No violations of the CAA are anticipated.	393 miles of trails designated for OSV use. A 3 percent reduction in miles as compared to the existing condition. 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 designated for OSV visitor use	964,030 acres open to OSV use. No known violations of the CAA as a result of OSV use under the existing condition	920,260 acres designated for OSV use, a 5 percent reduction from current management. No violations of the CAA are anticipated.	833,280 acres designated for OSV use, a 14 percent reduction from current management. No violations of the CAA are anticipated.	955,470 acres designated for OSV use, a <1 percent reduction from current management. No violations of the CAA are anticipated.	632,400 acres designated for OSV use, a 3 percent reduction from current management. No violations of the CAA are anticipated.
	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 impacts 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 impacts 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.	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.

Socioeconomic Conditions

This analysis considers the social and economic consequences of management alternatives to designate trails and areas for public OSV use on the Lassen National Forest. These designations would comply with Subpart C - Use by Over-Snow Vehicles, of the Forest Service Travel Management Regulations. In addition, the Lassen National Forest will combine the analysis needed for OSV use designations with analysis to formalize the identification of National Forest System Snow Trails that would be groomed for OSV use.

The human environment is central to the purpose and need for this project. OSV use designation on the Lassen National Forest seeks to protect public values related to access, safety, recreational enjoyment, and natural and cultural resources (ecosystem services). This analysis estimates the social and economic effects of designating trails and areas for public OSV use.

Relevant Laws, Regulations, and Policy

Regulatory Framework

Land and Resource Management Plan

The 1992 Lassen National Forest Land and Resource Management Plan (LRMP) does not specify goals and objectives for the social and economic environment. However, the LRMP's goals and objectives for cultural resources, facilities, and recreation are relevant to the social and economic analysis. In particular, the following goals help to frame the social and economic analysis in this EIS:

- Ensure that Forest actions are not detrimental to traditional Native American religious rights and practices (pg. 4-3)
- Provide stable and cost-efficient road and trail systems (pg. 4-3)
- Provide a wide range of outdoor recreation opportunities to meet public demand (pg. 4-4)
- Provide diverse opportunities for off-highway vehicle recreation (pg. 4-4)
- Provide diverse opportunities for winter sports (pg. 4-4)
- Work in partnership with local communities to expand recreational facilities, programs, and trails on both public and private land (pg. 4-5)

Travel Management Regulations Subpart C

The Forest Service's 2005 Travel Management Regulations requires the designation of trails and areas on national forests and grasslands for motor vehicle use. Subpart C mandates the designation of routes and areas for OSV use.

Federal Law

Multiple Use and Sustained Yield Act

The Multiple Use and Sustained Yield Act requires that economic impacts are considered when establishing management plans or decisions that may affect the management of renewable forest and rangeland resources. This analysis meets the requirements of this law by addressing the economic impacts of OSV use designation on the local economy.

National Environmental Policy Act

The National Environmental Policy Act (NEPA) requires that economic and social impacts of Federal actions be considered as part of the environmental analysis. This section includes analysis on social and economic issues identified during the scoping process to meet the terms of NEPA and regulations.

National Forest Management Act

The National Forest Management Act (NFMA) and regulations require that the economic impacts of decisions or plans affecting the management of renewable resources are analyzed and that the economic stability of communities whose economies are dependent on national forest lands is considered. This analysis meets the requirements of the NFMA by specifically considering the economic impacts of the implementation of the OSV use designation project and its impacts on local communities and minority populations.

Executive Orders

Environmental Justice, Executive Order 12898 of February 11, 1994

Executive Order 12898 directs Federal agencies to identify and address any adverse human health and environmental effects of agency programs that disproportionately impact minority and low-income populations. This section identifies minority and low-income populations in the analysis area and addresses the potential for disproportionate and adverse effects to these populations.

Topics and Issues Addressed in This Analysis

Resource Indicators and Measures

Table 77. Socioeconomic resource indicators and measures for assessing effects

Resource Element	Resource Indicator	Measure (Quantify if possible)	Used to address: P/N, or key issue?	Source (LRMP S/G; law or policy, BMPs, etc.)?
Economic activity	Employment	Number of jobs and amount of labor income	No	--
Quality of life	Recreation visitation	Number of recreation visits	No	--
Quality of life	Values, beliefs, and attitudes	Qualitative evaluation of public values, beliefs, and attitudes	No	--
Environmental Justice	Effects to low-income and minority populations	Qualitative evaluation of disproportionate effects to low-income and minority populations	No	Executive Order 12898

Methodology

Economic Analysis

Economic impacts were modeled using IMPLAN Professional Version 3.0 with 2012 data. IMPLAN is an input-output model, which estimates the economic impacts of projects, programs, policies, and economic changes on a region. IMPLAN analyzes the direct, indirect, and induced economic impacts. Direct economic impacts are generated by the activity itself, such as visitor spending associated with recreational OSV use on the Lassen National Forest. Indirect employment and labor income contributions occur when a sector purchases supplies and services from other industries in order to produce their product. Induced contributions are the employment and labor income generated as a result of spending new household income generated by direct and indirect employment. The employment estimated is defined as any part-time, seasonal, or full-time job. In the economic impact tables, direct, indirect and induced contributions are included in the estimated impacts. The IMPLAN database describes the economy in 440 sectors using Federal data from 2012.

Data on use levels under each alternative were collected from Forest Service resource specialists. In most instances, the precise change is unknown. Therefore, the changes are based on the professional expertise of Forest Service resource specialists. Regional economic impacts are estimated based on the assumption of full implementation of each alternative. The actual changes in the economy would depend on individuals taking advantage of the resource-related opportunities that would be supported by each alternative. If market conditions or trends in resource use were not conducive to developing some opportunities, the economic impact would be different from what is estimated in this analysis.

Social Analysis

Social effects analysis uses the baseline social conditions presented in the Affected Environment section, NVUM profiles (USDA Forest Service 2015b), and public comments to discern the primary values that the Lassen National Forest provides to area residents and visitors. Social effects are based on the interaction of the identified values with estimated changes to resource availability and uses. Key determinants of quality of life that may be affected by OSV trail and area designation were identified through the scoping process.

Information Sources

Key data sources for the social and economic analysis include:

- Economic Profile System (EPS), Headwaters Economics
- U.S. Census Bureau, American Community Survey
- U.S. Forest Service, Ecosystem Management Coordination, National Forest Recreation Economic Contributions website
- National Visitor Use Monitoring program data for the Lassen National Forest, last collected in FY2010
- Public scoping comments

Incomplete and Unavailable Information

Due to incomplete and unavailable information, the socioeconomic analysis uses the following assumptions:

- Local economic composition (e.g., sectoral specialization, size of labor market) is constant throughout the analysis period.
- OSV trail grooming increases OSV visitor use.
- Forest visitors' recreation preferences do not change during the analysis period.
- OSV and non-motorized winter recreation visitors have similar characteristics to forest visitors overall (e.g., place of residence).

Spatial and Temporal Context for Effects Analysis

The Lassen National Forest is located in northeastern California. Forest Service economists have defined economic analysis areas for all national forests and grasslands using a protocol that identifies interactions between Forest Service resource management and local economic activity. Based on this protocol, the Lassen National Forest's economic area of influence encompasses Butte, Lassen, Plumas, Shasta, and Tehama counties. These five counties form the social and economic analysis area for this EIS.

The temporal boundaries for analyzing effects to the social and economic environment extend 10 years into the future (2025). This is the period for which social and economic consequences are foreseeable. Social and economic change, including changes in recreation preferences, cannot plausibly be predicted outside this temporal frame.

Affected Environment

Existing Condition

Table 78. Socioeconomic resource indicators and measures for the existing condition

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)
Economic activity	Employment	Number of jobs and amount of labor income
Quality of life	Recreation visitation	Number of recreation visits
Quality of life	Values, beliefs, and attitudes	Qualitative evaluation of public values, beliefs, and attitudes
Environmental Justice	Low-income and minority populations	Identification of low-income and minority populations in the analysis area

Demographic and Economic Characteristics

The Lassen National Forest is located in northeastern California in Butte, Lassen, Plumas, Shasta, and Tehama Counties. The area around the Lassen National Forest is mostly non-metropolitan; the nearest major population centers are Redding, California (in Shasta County) to the west and Chico, California (in Butte County) to the south.

The analysis area counties have higher shares of older residents than the state. Plumas County has nearly double the share of residents over the age of 65 compared to California. Older populations may have

different recreational preferences. For instance, mobility limitations associated with age may increase the importance of easy access to recreational sites.

Table 79. Demographic characteristics by county

Location	Population (ACS 2013 5-year Estimate)	Rural-Urban Continuum Code (ERS 2013)	Share of Population Over 65 (ACS 2013 5-year Estimate)
Butte County	220,542	3 (Metro, less than 250,000)	15.8%
Lassen County	34,018	7 (Nonmetro, not adjacent to metro)	10.3%
Plumas County	19,586	7 (Nonmetro, not adjacent to metro)	22.1%
Shasta County	177,966	3 (Metro, less than 250,000)	17.6%
Tehama County	63,241	4 (Nonmetro, adjacent to metro)	16.4%
California	37,659,181	--	11.8%

Source: U.S. Census Bureau 2015a and USDA ERS 2013

The five counties in the analysis area experience a greater degree of economic insecurity than the state overall. Median household incomes are lower and unemployment rates are higher in every county compared to the state. These economic characteristics suggest that changes in local employment and income may be felt acutely. Lassen National Forest recreation visitors spend money on lodging, food, fuel, and other goods and services in the economic analysis area. The designation of OSV trails and areas may affect recreation visitation and spending. As a result, local employment and income may change. Additionally, visitor spending contributes to county and municipal revenue from lodging and sales taxes. Tax revenues are used to fund essential public services, such as emergency management. The environmental consequences analysis addresses potential changes in employment, income, and public finances in the context of local economic characteristics.

Table 80. Economic characteristics by county

Location	Median Household Income (ACS 2013 5-year Estimate)	Unemployment Rate (ACS 2013 5-year Estimate)	Share of Tourism-related Employment (County Business Patterns 2013, accessed via EPS)
Butte County	\$43,752	14.1%	18.6%
Lassen County	\$53,107	13.6%	20.4%
Plumas County	\$45,794	17.2%	15.4%
Shasta County	\$44,651	13.4%	17.8%
Tehama County	\$41,924	15.8%	19.2%
California	\$61,094	11.5%	16.3%

Source: U.S. Census Bureau 2015a and 2015b

Much of the Lassen National Forest recreation visitor spending contributes to economic activity in travel and tourism-related sectors. These sectors include retail trade, passenger transportation, accommodation and food, and arts, entertainment, and recreation. Travel and tourism sectors account for a larger share of employment in the analysis area counties than in California overall. This suggests that the analysis area economy is reliant on tourism (including outdoor recreation).

Recreation Visitors

National Visitor Use Monitoring (NVUM) data were last collected on the Lassen National Forest in fiscal year 2010. Approximately 300,000 visits to the Lassen National Forest occur each year (USDA Forest Service 2015b). Nearly 10 percent of survey respondents indicate that they participate in snowmobiling during their trip, with 8.4 percent reporting that snowmobiling is the primary purpose of their trip (USDA Forest Service 2015b). That makes snowmobile use the third most common recreation activity on the forest, behind only viewing natural features and fishing, which account for 19.4 percent and 22.0 percent of main activities, respectively (USDA Forest Service 2015b). The majority of forest visitors (60.2 percent) traveled fewer than 100 miles to reach the site. Nearly one-fifth of visits originated from a single zip code (96130), which covers the city of Susanville, California (USDA Forest Service 2015b). The NVUM data do not break out visitor origin by activity type. Therefore, the analysis assumes that OSV and non-motorized winter recreation visitors reside in the same areas as forest visitors overall.

Economic Contributions

Visitors to national forests spend money on lodging, restaurants, gasoline, entry fees, and souvenirs. These purchases support employment and labor income in communities that surround NFS lands. Visitor spending is influenced by both the type of trip (local or non-local; day or overnight) and the type of recreation activities. Snowmobilers spend more than most other recreation visitors (White and Stynes 2010). The NVUM survey collects data on “previous and planned spending of the entire recreation party within 50 miles of the interview site during the trip to the area” (White and Stynes 2010). These data indicate that a snowmobiler spends an average of \$642 (\$2007) on a non-local overnight trip and \$74 (\$2007) on a local day trip, compared to \$366 (\$2007) and \$34 (\$2007) for the same types of trips among participants of all recreation activities (White and Stynes 2010). Therefore, snowmobilers spend nearly twice what an average recreation enthusiast spends on their trip.

Recreation visitation (all activities and trip types) on the Lassen National Forest supports approximately 79 jobs²² and \$2.6 million in labor income on an average annual basis (USFS 2015a). The largest contributions are to the retail trade and accommodation and food services sectors (USFS 2015a). Due to the high spending of snowmobilers, changes to OSV opportunities on the Lassen National Forest have the potential to measurably affect economic contributions associated with national forest recreation. The environmental consequences analysis addresses the economic impact of OSV trail and area designations.

Values, Beliefs, and Attitudes

Values are “relatively general, yet enduring, conceptions of what is good or bad, right or wrong, desirable or undesirable.”

Beliefs are “judgments about what is true or false – judgments about what attributes are linked to a given object. Beliefs can also link actions to effects.”

Attitudes are “tendencies to react favorably or unfavorably to a situation, individual, object, or concept. They arise in part from a person’s values and beliefs regarding the attitude object” (Allen et al. 2009).

²² The economic modeling software (IMPLAN) reports jobs as average annual full-time and part-time jobs. No distinction is made between full-time and part-time employment, so the job calculations in this analysis are not full-time equivalents (FTEs). However, the duration of employment is used to calculate the number of jobs. Therefore, 1 full-time or part-time job lasting 1 year is equivalent to 2 full-time or part-time jobs lasting 6 months each. Both of these examples will be reported as 1 job in this analysis.

OSV trail and area designation may affect nearby residents and visitors to the Lassen National Forest. Public comments received during the scoping process provide insight into the values, beliefs, and attitudes of stakeholders in the OSV designation process. These comments reflect diverse opinions on the costs and benefits of various types of winter recreation on the Lassen National Forest.

Snow depth restrictions were controversial among some commenters with one noting that “Snow depth restrictions have always been difficult for the FS to enforce, and have often resulted in Law Enforcement closing down an entire area based solely on snow depths at trailheads” (Scoping letter #2, project record). However, other snowmobile enthusiasts found the snow depth restriction reasonable, stating their “support [for] the implementation of the 6-inch minimum for OSV usage on roads and trails...parking or trailhead facilities are located in areas where there may be minimal snowfall but exceptional recreational opportunities remain for the snowmobile community in areas that are higher and colder and may have numerous feet of snow” (Scoping letter #62, project record).

Some commenters believe that elevation restrictions are, at best, redundant and perhaps arbitrary given the snowpack restriction (Scoping letter #62, Scoping letter #49, project record). Furthermore, another commenter noted that “snowmobiling cross-country is self-limiting. A snowmobiler quickly pays the high price for riding his snowmobile with inadequate snow” (Scoping letter #2, project record). Public beliefs that OSV enthusiasts self-regulate may contribute to negative attitudes about Forest Service restrictions on OSV access and use.

The contribution of OSV use to local economic activity, and the potential for restrictions to decrease these economic contributions, was noted by a commenter: “It is critical that an economic analysis be completed as part of the environmental analysis...If the restrictions that are currently proposed in the NOI were implemented this year, there would be a great impact to local businesses and loss of jobs” (Scoping letter #2, project record).

Some commenters noted that motorized and non-motorized recreationists face asymmetrical use conflict: “Quiet non-motorized recreationists can have the quality of their experience dramatically altered by snowmobiles, while motorized enthusiasts often don’t even notice skiers using the same landscape” (Switalski 2014). In particular, some commenters identified the following effects that reduce the quality of the recreation experience for non-motorized enthusiasts: “OSV impacts on other recreational users include noise, toxic exhaust, consumption of powder snow and rutting of trails. Because non-motorized users wish to avoid such impacts, non-motorized use becomes concentrated at the areas where motorized use is prohibited. Where snowmobile use is heavy, non-motorized users are displaced to the extent that the area becomes effectively motorized use-only” (Scoping letter #27, project record).

A number of non-motorized winter recreationists expressed concerns that shared motorized and non-motorized spaces pose health (from snowmobile emissions) and safety (potential for collision or triggering an avalanche) risks to non-motorized enthusiasts (Switalski 2014).

Additionally, some commenters believe that motorized and non-motorized winter recreation enthusiasts have inequitable opportunities on the Lassen National Forest. For example, one comment argued that “the motorized community has more than enough open space to use compared to areas that are exclusive to human powered backcountry use” (Scoping letter #27, project record). Additionally, other comments expressed concern that the proposed action would leave over 82 percent of the forest open to cross-county OSV use (Scoping letter #42, Scoping letter #9, project record). As a result of asymmetrical use conflict and few restrictions on OSV use, these commenters argue that “with fewer or smaller areas available, there will be a concentration of use which may lead to increased crowding, recreational conflict and

resource damage. For example, it is becoming more commonplace for snowmobilers to travel on dry roadbeds or snow-free trails to access receding snowline” (Switalski 2014).

These views led some commenters to suggest that the forest dedicate some terrain to non-motorized snow sports only, to reduce conflict: “Motorists with OSVs now travel, per visit, faster, farther, higher and longer than in the past. This turbocharged magnification of demand for terrain has increased impacts to forest resources, to air and water quality, to modest (bipedal) forest visitors, and likely to resident wildlife” (Scoping letter #40, project record). Snowlands Network identifies the following areas as particularly important for non-motorized recreational enthusiasts: Eagle Lake, Butte Lake, McGowan, Colby Mountain, Lake Almanor, and Fredonyer-Goumaz (Scoping letter #27, project record).

The relationship between OSV enthusiasts and PCT recreationists was highlighted in several comments. For some, “the prohibition of snowmobiles on the PCT trail tread only is inadequate in protecting the trail and experience afforded PCT winter users” (Scoping Letter #66, project record). Other commenters, however, argued that OSVs should be allowed to cross the PCT at any location (Scoping letter #61, project record).

Environmental Justice

As noted above, residents of the analysis area counties experience a higher degree of economic insecurity than California residents overall. This is borne out in the poverty data, which reveals that four of the five analysis area counties have a higher poverty rate than California. In particular, residents of Butte and Tehama counties experience particularly high rates of poverty.

However, the analysis area counties have lower shares of minority residents than the state. In California, 60 percent of the population identifies other than non-Hispanic white. In the analysis area counties, the shares of minority residents are much lower, accounting for between 15 and 34 percent of the population.

Table 81. Environmental justice characteristics by county

Location	Poverty Rate²³ (ACS 2013 5-year Estimate)	Share Other than White Alone, Non-Hispanic (ACS 2013 5-year Estimate)
Butte County	20.4%	25%
Lassen County	16.9%	34%
Plumas County	15.2%	15%
Shasta County	17.5%	18%
Tehama County	19.7%	29%
California	15.9%	60%

Source: U.S. Census Bureau 2015a

Given high rates of poverty in the analysis area, the environmental consequences analysis will address the potential for management actions to disproportionately and adversely affect low-income individuals.

²³ “Following the Office of Management and Budget’s (OMB) Statistical Policy Directive 14, the Census Bureau uses a set of money income thresholds that vary by family size and composition to determine who is in poverty. If a family’s total income is less than the family’s threshold, then that family and every individual in it is considered in poverty. The official poverty thresholds do not vary geographically, but they are updated for inflation using Consumer Price Index (CPI-U). The official poverty definition uses money income before taxes and does not include capital gains or noncash benefits (such as public housing, Medicaid, and food stamps)” (U.S. Census Bureau 2015a).

Low-income individuals may be less able to adapt to changes in employment, income, and recreation opportunities on the Lassen National Forest.

Environmental Consequences

Alternative 1 (No action)

The no-action alternative is required by the National Environmental Policy Act and serves as a baseline to compare effects of action alternatives. This alternative would continue current management and would not affect public OSV use in the project area.

Table 82. Socioeconomic resource indicators and measures for alternative 1

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	Alternative 1
Economic activity	Employment, income, tax revenue	Number of jobs, amount of labor income, tax revenue	No change due to management; increased visitor use over time would increase number of jobs, labor income, and tax revenue
Quality of life	Recreation visitation	Number of recreation visits	No change due to management; visitor use expected to increase over time
Quality of life	Values, beliefs, and attitudes	Qualitative evaluation of public values, beliefs, and attitudes	Use conflict may increase due to population growth and increased visitor use
Environmental Justice	Low-income and minority populations	Change in cost of participating in recreation activities	No change due to management; climate change may increase distances winter recreation enthusiasts must travel for adequate snow depth

Economic Activity

Alternative 1 would not affect forest recreation use or visitor spending. Therefore, this alternative would not affect the number of jobs, amount of labor income, or tax revenue in the local economy. Visitor use is expected to increase over time due to factors outside the control of the Forest Service (e.g., population growth), which would increase employment, labor income, and tax revenue. However, these increases in visitor use would not be affected by the selection of any of the alternatives.

Quality of Life

The values, beliefs, and attitudes discussion above identified several key issues related to OSV use on the Lassen National Forest and quality of life for visitors and area residents. In particular, commenters discussed recreation opportunities and use conflict. Alternative 1 would not implement management activities that affect recreation opportunities or use conflict. As noted in the air quality report (project record), conflicts between motorized and non-motorized winter experiences on the Lassen National Forest are currently minor and infrequent. However, conflict may increase as population and visitor use increase. As a number of commenters noted, use conflict is often asymmetrical (motorized use inhibits non-motorized use, but not the reverse). Therefore, the potential for increased use conflict may particularly affect quality of life for non-motorized winter recreation enthusiasts.

Environmental Justice

Alternative 1 would not affect the cost of participating in recreation activities on the forest. Therefore, this alternative would not disproportionately and adversely affect the low-income individuals and households in the analysis area. However, climate change may reduce the areas on the forest that are suitable for

winter recreation due to reduced precipitation and warmer winters. This could increase the travel costs (i.e., in terms of time and fuel) for accessing winter recreation opportunities on the forest. Low-income individuals and households have fewer financial resources and, thus, may be disproportionately affected by increased recreational travel costs.

Alternative 2

Alternative 2 is the modified proposed action. Alternative 2 would designate trails and areas for public OSV use on the Lassen National Forest.

Direct and Indirect Effects - Alternative 2

Economic Activity

Alternative 2 would decrease the acres designated for OSV use to 920,260 acres, a 5 percent reduction from current management. This alternative would designate 334 miles of snow trails on NFS lands and groom 350 miles of snow trails on NFS lands and adjacent non-NFS lands. This is approximately equivalent to current conditions. As stated in the assumptions, based on observational evidence, OSV visitor use is driven by the miles of groomed trails. Therefore, this alternative is not expected to change recreational visitor use compared to alternative 1. As a result, recreation-related employment, labor income, and tax revenue would not change relative to alternative 1.

Quality of Life

The values, beliefs, and attitudes discussion above identified several key issues related to public OSV use on the Lassen National Forest and quality of life for visitors and area residents. In particular, commenters discussed recreation opportunities and use conflict. The proposed action would not designate 229,760 acres for OSV use (185,990 acres are not designated for OSV use under current management), which is a 24 percent increase in areas not designated for OSV use relative to current management. Therefore, alternative 2 would improve quality of life for non-motorized winter recreation enthusiasts on the Lassen National Forest who prefer to have areas separated from OSV enthusiasts. The increase in acres not designated for OSV use may alleviate some concerns expressed by non-motorized winter recreation enthusiasts related to vehicle exhaust fumes, disparities in speed, noise, and competition for fresh powder. Although the miles of groomed OSV trails would not change significantly relative to current conditions, some OSV enthusiasts may feel that the reduction in acres designated for OSV use adversely affects their quality of life by reducing the acreage available for cross-county OSV travel relative to existing conditions.

Under alternative 2, the Forest Service would groom OSV trails, designate trails, and designate areas for cross-country OSV use near Wilderness boundaries, Lassen Volcanic National Park, existing recreation areas, and adjacent State and Federal lands. Additionally, non-motorized and motorized enthusiasts would continue to share trailheads for access. These areas are described in detail in chapter 2 – Areas Identified for OSV Designation in the Action Alternatives. Therefore, the potential for use conflict to adversely affect quality of life would continue under this alternative.

To minimize and mitigate the conflicts between motor vehicle use and existing or proposed recreational uses on the eight discrete OSV area designations, the following measures would be taken. This list is not all encompassing; see appendices C and D (Volume III) for a full list of mitigations to address the minimization criteria.

1. If incursions occur, patrols, kiosk information and signage in the area would be increased.

2. Prohibit by order, OSV use in areas where conflicts are found, as described by discrete area in appendices C and D (Volume III). Exceptions would include areas that are designated groomed and non-groomed trails.
3. A broad area along Almanor lakeshore and the associated non-motorized ski trails would not be designated for OSV use.
4. McGowan Cross-country Ski Trails would not be designated for OSV use, while the broader area would be designated for cross-county OSV use.
5. The majority of the area surrounding Lassen Volcanic National Park would not be designated for OSV use.

Under alternative 2, up to 28 OSV trails across the PCT would be designated. This may alleviate concerns expressed by both non-motorized enthusiasts who feel restricting OSV enthusiasts at the trailhead only is not adequate, and motorized enthusiasts who desire access to recreation on both sides of the PCT.

However, some OSV enthusiasts feel they should be able to cross the trail at any location, and other OSV enthusiasts feel that any restriction to PCT use adversely affects their quality of life. Additionally, some non-motorized enthusiasts may feel any OSV use on or near the PCT adversely affects their quality of life, this concern is mitigated by not designating any areas within 500 feet of either side of the PCT for OSV use.

Table 83. Socioeconomic resource indicators and measures for alternative 2 direct and indirect effects

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	Alternative 2 Direct and Indirect Effects
Economic activity	Employment, income, tax revenue	Number of jobs, amount of labor income, tax revenue	No change due to management; increased visitor use over time would increase number of jobs, labor income, and tax revenue
Quality of life	Recreation visitation	Number of recreation visits	No change due to management; visitor use expected to increase over time
Quality of life	Values, beliefs, and attitudes	Qualitative evaluation of public values, beliefs, and attitudes	24 percent increase in acres not designated for OSV use would benefit quality of life of non-motorized winter recreation enthusiasts and may adversely affect quality of life for OSV enthusiasts; potential for continued use conflict due to trails in proximity to Wilderness, national park, and shared trailheads
Environmental Justice	Low-income and minority populations	Change in cost of participating in recreation activities	Minor change in travel costs due to fewer areas designated for OSV use and reductions in snow depth requirements; climate change may increase distances winter recreation enthusiasts must travel for adequate snow depth

Environmental Justice

The reduction in acres designated for OSV use may require some OSV enthusiasts to travel farther to recreate on the forest. However, under alternative 2, miles of groomed trails would not change significantly from alternative 1, so the effect of the closures on travel costs is expected to be minor. This may reduce the distance that OSV enthusiasts must travel to recreate on the forest. Like alternative 1, climate change may affect travel costs due to reduced precipitation and warmer winters. Low-income individuals would be disproportionately affected by changes in the cost of participating in winter recreation on the forest. Overall, alternative 2 is expected to have a minor effect on recreation travel costs.

Cumulative Effects – Alternative 2

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

Past, present, and reasonably foreseeable projects in the planning area include vegetation management, livestock grazing, and prescribed burns. These actions have the potential to temporarily restrict or displace recreation use. However, none of the actions are expected to measurably affect annual recreation use, visitor spending, and associated employment, labor income, and tax revenue. Therefore, no cumulative effects related to economic activity are anticipated. The temporary displacement of recreation use may affect quality of life if preferred sites are temporarily unavailable. However, such effects are expected to be infrequent and minor. Temporary displacement is not expected to increase conflict between motorized and non-motorized recreational uses. Finally, these past, present, and reasonably foreseeable actions may affect travel costs if visitors must travel farther because preferred recreation sites are temporarily unavailable. However, since displacement would be infrequent and minor, effects to travel costs are not expected to meaningfully add to the potential environmental justice effects described in the direct and indirect effects analysis.

Table 84. Resource indicators and measures for alternative 2 cumulative effects

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	Alternative 2 Cumulative Effects
Economic activity	Employment, income, tax revenue	Number of jobs, amount of labor income, tax revenue	No effects to employment, labor income, and tax revenue are expected
Quality of life	Recreation visitation	Number of recreation visits	Infrequent and minor displacement not expected to change number of recreation visits
Quality of life	Values, beliefs, and attitudes	Qualitative evaluation of public values, beliefs, and attitudes	Infrequent and minor displacement not expected to change use conflict or quality of life
Environmental Justice	Low-income and minority populations	Change in cost of participating in recreation activities	No measurable change in travel costs

Alternative 3

Alternative 3 is described in detail in chapter 2 of this RFEIS. Alternative 3 was developed to address the non-motorized recreational experience significant issue.

Direct and Indirect Effects - Alternative 3

Economic Activity

Alternative 3 would decrease the acres designated for OSV use to 833,280 acres, a 14 percent reduction from current management. Alternative 3 would designate 383 miles of snow trails on NFS lands and groom 349 miles of snow trails on NFS lands and adjacent non-NFS lands. This is an increase in designated trails of 49 miles compared to alternative 2, but the miles of groomed trails are consistent with all other alternatives. As stated in the assumptions, based on observational evidence, OSV visitor use is driven by the miles of groomed trails. Therefore, alternative 3 is not expected to change recreational visitor use compared to alternative 1. As a result, recreation-related employment, labor income, and tax revenue would not change relative to the no-action alternative.

Quality of Life

The values, beliefs, and attitudes discussion above identified several key issues related to OSV use on the Lassen National Forest and quality of life for visitors and area residents. In particular, commenters discussed recreation opportunities and use conflict. Alternative 3 would not designate 316,740 acres for OSV use (185,990 acres are not designated for OSV use under current management), which is a 70 percent increase from current management. Therefore, alternative 3 would improve quality of life for non-motorized winter recreation enthusiasts relative to both alternatives 1 and 2. The increase in acres not designated for OSV use may alleviate some concerns expressed by non-motorized winter recreation enthusiasts related to vehicle exhaust fumes, disparities in speed, noise, and competition for fresh powder. Although the number of designated non-groomed trails is greater under alternative 3 relative to alternative 2, some OSV enthusiasts may feel that the increase in acres not designated for OSV use adversely affects their quality of life by reducing the acreage available for cross-country OSV travel relative to current management.

Under alternative 3, the Forest Service would groom OSV trails, designate trails, and designate areas for cross-country OSV use near Wilderness boundaries, Lassen Volcanic National Park, existing recreation areas, and adjacent State and Federal lands. Additionally, non-motorized and motorized enthusiasts would continue to share trailheads for access. These areas are described in detail in chapter 2 – Areas Identified for OSV Designation in the Action Alternatives. Therefore, the potential for use conflict to adversely affect quality of life would continue under alternative 3.

To minimize and mitigate the conflicts between motor vehicle use and existing or proposed recreational uses on the eight discrete OSV area designations, the following measures would be taken. This list is not all encompassing; see appendices C and D (Volume III) for a full list of mitigations to address the minimization criteria.

1. If incursions occur, patrols, kiosk information and signage in the area would be increased.
2. Prohibit by order, OSV use in areas where conflicts are found, as described by discrete area in appendices C and D (Volume III). Exceptions would include areas that are designated groomed and non-groomed trails.
3. A broad area along Almanor lakeshore and the associated non-motorized ski trails would not be designated for OSV use.
4. McGowan Cross-country Ski Trails: cross-country OSV use would not be designated in a broader area around ski trails but allow for through use of OSVs on designated non-groomed trails.
5. The majority of the area surrounding Lassen Volcanic National Park would not be designated for OSV use.

Alternative 3 would designate up to 23 OSV trails across the PCT. Approximately 85 miles of the PCT would be located within 500 feet of an area designated for public OSV use on the Lassen National Forest. This may alleviate concerns expressed by motorized enthusiasts who desire access to recreation on both sides of the PCT. However, non-motorized enthusiasts may feel any OSV use on or near the PCT adversely affects their quality of life. Alternative 3 would monitor for conflicts, if they are found to exist, cross-country OSV use would be prohibited, by order, in the same non-designated area as in the alternative 2 or alternative 5.

Environmental Justice

The reduction in acres designated for OSV use may require some OSV enthusiasts to travel farther to recreate on the forest. Though the miles of groomed trails are consistent with alternative 1, alternative 3 would increase the minimum snow depth required for snow trail grooming from 12 inches to 18 inches. This may increase the distance needed to travel to access a groomed trail. Like alternative 1, climate change may affect travel costs due to reduced precipitation and warmer winters. Low-income individuals would be disproportionately affected by changes in the cost of participating in winter recreation on the forest. Alternative 3 may affect travel costs for OSV enthusiasts.

Table 85. Socioeconomic resource indicators and measures for alternative 3 direct and indirect effects

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	Alternative 3 Direct and Indirect Effects
Economic activity	Employment, income, tax revenue	Number of jobs, amount of labor income, tax revenue	No change due to management; increased visitor use over time would increase number of jobs, labor income, and tax revenue
Quality of life	Recreation visitation	Number of recreation visits	No change due to management; visitor use expected to increase over time
Quality of life	Values, beliefs, and attitudes	Qualitative evaluation of public values, beliefs, and attitudes	70 percent increase in acres not designated for OSV use would benefit quality of life of non-motorized winter recreation enthusiasts and may adversely affect quality of life for OSV enthusiasts; potential for continued use conflict due to trails in proximity to Wilderness, national park, and shared trailheads
Environmental Justice	Low-income and minority populations	Change in cost of participating in recreation activities	Potential increase in travel costs due to fewer areas designated for OSV use and increased snow depth required for grooming; climate change may increase distances winter recreation enthusiasts must travel for adequate snow depth

Cumulative Effects – Alternative 3

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

The cumulative effects under alternative 3 would be similar to the cumulative effects described under alternative 2.

Alternative 4

Alternative 4 is described in detail in chapter 2 of this RFEIS. Alternative 4 was developed to address the motorized recreational experience issue.

Direct and Indirect Effects - Alternative 4

Economic Activity

Alternative 4 would decrease the acres designated for OSV use to 955,470 acres, a less than 1 percent reduction from current management. Alternative 4 would designate 380 miles of snow trails on NFS lands and groom 349 miles of snow trails on NFS lands and adjacent non-NFS lands. This is an increase in designated trails of 46 miles compared to alternative 2, but the miles of groomed trails are consistent with all other alternatives. As stated in the assumptions, based on observational evidence, OSV visitor use is

driven by the miles of groomed trails. Therefore, alternative 4 is not expected to change recreational visitor use compared to the other alternatives analyzed in this EIS. As a result, recreation-related employment, labor income, and tax revenue would not change relative to alternative 1.

Quality of Life

The values, beliefs, and attitudes discussion above identified several key issues related to public OSV use on the Lassen National Forest and quality of life for visitors and area residents. In particular, commenters discussed recreation opportunities and use conflict. Alternative 4 would not designate 194,560 acres for OSV use (185,990 acres are closed to OSVs under current management), which is a 5 percent increase from current management. Alternative 4 would not designate for OSV use fewer acres than the other action alternatives (alternatives 2, 3, and 5). The net effect on motorized and non-motorized quality of life is expected to be consistent with current conditions and alternative 1.

Under alternative 4, the Forest Service would groom OSV trails, designate trails, and designate areas for cross-country OSV use near Wilderness boundaries, Lassen Volcanic National Park, existing recreation areas, and adjacent State and Federal lands. Additionally, non-motorized and motorized enthusiasts would continue to share trailheads for access. These areas are described in detail in chapter 2 – Areas Identified for OSV Designation in the Action Alternatives. Therefore, the potential for use conflict to adversely affect quality of life would continue under alternative 4.

To minimize and mitigate the conflicts between motor vehicle use and existing or proposed recreational uses on the eight discrete OSV area designations, the following measures will be taken. This list is not all encompassing; see appendices C and D (Volume III) for a full list of mitigations to address the minimization criteria.

1. If incursions occur, patrols, kiosk information and signage in the area would be increased.
2. Prohibit by order, OSV use in areas where conflicts are found, as described by discrete area in appendices C and D (Volume III). Exceptions would include areas that are designated groomed and non-groomed trails.
3. A broad area along Almanor lakeshore and the associated non-motorized ski trails would not be designated for OSV use.
4. McGowan Cross-country Ski Trails: cross-country OSV use would not be designated in a broader area around the McGowan ski trails, but allow for through use of OSVs on designated non-groomed trails.
5. The majority of the area surrounding Lassen Volcanic National Park would not be designated for OSV use.

Alternative 4 would designate up to 28 OSV trails across the PCT, but unlike the modified proposed action, it would also designate areas within 500 feet of the PCT for OSV use. This may alleviate concerns expressed by motorized enthusiasts who desire access to recreation on both sides of the PCT. However, non-motorized enthusiasts may feel any OSV use on or near the PCT adversely affects their quality of life. Alternative 4 would monitor for conflicts, if they are found to exist, cross-country OSV use would be prohibited, by order, in the same non-designated area as in alternative 2 or alternative 5.

Environmental Justice

Alternative 4 would decrease acres designated for OSV use by less than 1 percent. Therefore, management actions are not expected to affect the travel costs of motorized winter recreation enthusiasts relative to current conditions. Additionally, snow depth requirements are lowered to, “depth necessary to avoid resource damage,” which may reduce the distances that OSV enthusiasts must travel to recreate on the forest relative to other action alternatives. Like the no-action alternative, climate change may affect travel costs due to reduced precipitation and warmer winters. Low-income individuals would be disproportionately affected by changes in the cost of participating in winter recreation on the forest. Overall, alternative 4 is expected to have a minor effect on recreation travel costs.

Table 86. Socioeconomic resource indicators and measures for alternative 4 direct and indirect effects

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	Alternative 4 Direct and Indirect Effects
Economic activity	Employment, income, tax revenue	Number of jobs, amount of labor income, tax revenue	No change due to management; increased visitor use over time would increase number of jobs, labor income, and tax revenue
Quality of life	Recreation visitation	Number of recreation visits	No change due to management; increased visitor use over time would increase number of jobs, labor income, and tax revenue
Quality of life	Values, beliefs, and attitudes	Qualitative evaluation of public values, beliefs, and attitudes	No net change in quality of life relative to current conditions; use conflict may increase due to population growth and increased visitor use
Environmental Justice	Low-income and minority populations	Change in cost of participating in recreation activities	Minor change due to management, snow depth reductions may decrease the distance that OSV enthusiasts must travel relative to other action alternatives; climate change may increase distances winter recreation enthusiasts must travel for adequate snow depth

Cumulative Effects – Alternative 4

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

The cumulative effects under alternative 4 would be similar to the cumulative effects described under alternative 2.

Alternative 5

Alternative 5 is described in detail in chapter 2 of this RFEIS. Alternative 5 was developed to address the non-motorized recreational experience significant issue.

Direct and Indirect Effects - Alternative 5

Economic Activity

Alternative 5 would decrease the acres designated for OSV use to 634,400 acres, a 34 percent reduction from current management. Alternative 5 would designate 393 miles of snow trails on NFS lands and groom 350 miles of snow trails on NFS lands and adjacent non-NFS lands. This is a 59-mile increase in designated trails compared to alternative 2, but the miles of groomed trails are consistent with all other alternatives. As stated in the assumptions, based on observational evidence, OSV visitor use is driven by the miles of groomed trails. Therefore, alternative 5 is not expected to change recreational visitor use

compared to alternative 1. As a result, recreation-related employment, labor income, and tax revenue would not change relative to alternative 1.

Quality of Life

The values, beliefs, and attitudes discussion above identified several key issues related to public OSV use on the Lassen National Forest and quality of life for visitors and area residents. In particular, commenters discussed recreation opportunities and use conflict. Alternative 5 would not designate 517,620 acres for OSV use (185,990 acres are not designated for OSVs use under current management), which would be a 178 percent increase from current management and greater than any other alternative. Therefore, alternative 5 would improve quality of life for non-motorized winter recreation enthusiasts on the Lassen National Forest who prefer to have areas separated from OSV enthusiasts. The increase in acres not designated for OSV use may alleviate some concerns expressed by non-motorized winter recreation enthusiasts related to vehicle exhaust fumes, disparities in speed, noise, and competition for fresh powder. Although the miles of groomed OSV trails would not change significantly relative to current conditions, some OSV enthusiasts may feel that the reduction in acres designated for OSV use adversely affects their quality of life by reducing the acreage available for cross-country OSV travel relative to existing conditions.

Under alternative 5, the Forest Service would groom OSV trails, designate trails, and designate areas for cross-country OSV use near Wilderness boundaries, Lassen Volcanic National Park, existing recreation areas, and adjacent State and Federal lands. Additionally, non-motorized and motorized enthusiasts would continue to share trailheads for access. These areas are described in detail in chapter 2 – Areas Identified for OSV Designation in the Action Alternatives. Therefore, the potential for use conflict to adversely affect quality of life would continue under alternative 5.

To minimize and mitigate the conflicts between motor vehicle use and existing or proposed recreational uses on the eight discrete OSV area designations, the following measures will be taken. This list is not all encompassing; see appendices C and D (Volume III) for a full list of mitigations to address the minimization criteria.

1. If incursions occur, patrols, kiosk information and signage in the area would be increased.
2. Prohibit by order, OSV use in areas where conflicts are found, as described by discrete area in appendices C and D (Volume III). Exceptions would include areas that are designated groomed and non-groomed trails.
3. A broad area along Almanor lakeshore and the associated non-motorized ski trails would not be designated for OSV use.
4. McGowan Cross-country Ski Trails: cross-country OSV use would not be designated in a broader area around the McGowan ski trails but allow for through use of OSVs on designated non-groomed trails.
5. The majority of the area surrounding Lassen Volcanic National Park would not be designated for OSV use.

Alternative 5 would designate up to 12 OSV trails across on the PCT. Like alternative 2, alternative 5 would not designate areas for OSV use within 500 feet of the PCT. This may alleviate concerns expressed by both non-motorized enthusiasts who feel restricting OSV enthusiasts at the trailhead only is not adequate, and motorized enthusiasts who desire access to recreation on both sides of the PCT. However,

some OSV enthusiasts feel they should be able to cross the trail at any location, and other OSV enthusiasts feel that any restriction to PCT use adversely affects their quality of life. Additionally, some non-motorized enthusiasts may feel any OSV use on or near the PCT adversely affects their quality of life, this concern is mitigated by not designating any areas within 500 feet of either side of the PCT for OSV use.

Environmental Justice

Alternative 5 would not designate areas below 3,500 feet in elevation for OSV use and would reduce acres designated for OSV relative to alternatives 1 and 2. These changes may require some OSV enthusiasts to travel farther to recreate on the forest. However, miles of groomed trails would not change significantly from alternative 1, so the effect of the closures on travel costs is expected to be minor. The snow depth required for grooming would remain 12 inches, which is the same as alternative 1. And, like alternative 1, climate change may affect travel costs due to reduced precipitation and warmer winters. Low-income individuals would be disproportionately affected by changes in the cost of participating in winter recreation on the forest. Overall, alternative 5 may increase travel costs associated with OSV use on the forest.

Table 87. Socioeconomic resource indicators and measures for alternative 5 direct and indirect effects

Resource Element	Resource Indicator (Quantify if possible)	Measure (Quantify if possible)	Alternative 5 Direct and Indirect Effects
Economic activity	Employment, income, tax revenue	Number of jobs, amount of labor income, tax revenue	No change due to management; increased visitor use over time would increase number of jobs, labor income, and tax revenue
Quality of life	Recreation visitation	Number of recreation visits	No change due to management; visitor use expected to increase over time
Quality of life	Values, beliefs, and attitudes	Qualitative evaluation of public values, beliefs, and attitudes	175 percent increase in acres not designated for OSV use would benefit quality of life of non-motorized winter recreation enthusiasts and may adversely affect OSV enthusiasts; potential for continued use conflict due to trails in proximity to Wilderness, national park, and shared trailheads
Environmental Justice	Low-income and minority populations	Change in cost of participating in recreation activities	Travel costs may increase because the Forest Service would not designate OSV use below 3,500 feet in elevation, resulting in reduced designated acres; climate change may increase distances winter recreation enthusiasts must travel for adequate snow depth

Cumulative Effects – Alternative 5

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

The cumulative effects under alternative 5 would be similar to the cumulative effects described under alternative 2.

Summary

Table 88 displays a comparison of each alternative's socioeconomic consequences.

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

Alternative 1 would not be in compliance with Subpart C of the Travel Management Regulations, which requires designation of trails and areas on NFS lands to provide for OSV use.

The alternatives 2, 3, 4, and 5 would be in compliance with Subpart C of the Travel Management Regulations. These alternatives would also be in compliance with the forest plan direction to provide diverse off-highway and winter recreation opportunities.

Table 88. Summary comparison of environmental effects to socioeconomic resources

Resource Element	Indicator/ Measure	Alternative 1 (no-action)	Alternative 2} (proposed action)	Alternative 3 (non-motorized experience)	Alternative 4 (motorized experience)	Alternative 5 (non-motorized, issue)
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	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	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; use conflict may increase due to population growth and increased visitor use	24 percent increase in acres not designated for OSV use would benefit quality of life of non-motorized winter recreation enthusiasts and may adversely affect quality of life for OSV enthusiasts; potential for continued use conflict due to trails in proximity to Wilderness, national park, and shared trailheads	70 percent increase in acres not designated for OSV use would benefit quality of life of non-motorized winter recreation enthusiasts and may adversely affect quality of life for OSV enthusiasts; potential for continued use conflict due to trails in proximity to Wilderness, national park, and shared trailheads	No net change in quality of life relative to current conditions; use conflict may increase due to population growth and increased visitor use	178 percent increase in acres not designated for OSV use would benefit quality of life of non-motorized winter recreation enthusiasts and may adversely affect OSV enthusiasts; potential for continued use conflict due to trails in proximity to Wilderness, national park, and shared trailheads

Resource Element	Indicator/ Measure	Alternative 1 (no-action)	Alternative 2} (proposed action)	Alternative 3 (non-motorized experience)	Alternative 4 (motorized experience)	Alternative 5 (non-motorized, issue)
Environmental Justice	Low-income and minority populations	No change due to management; climate change may increase distances winter recreation enthusiasts must travel for adequate snow depth	Minor change in travel costs due to fewer areas designated for OSV use; climate change may increase distances winter recreation enthusiasts must travel for adequate snow depth	Potential increase in travel costs due to fewer areas designated for OSV use and increased snow depth required for grooming; climate change may increase distances winter recreation enthusiasts must travel for adequate snow depth	Minor change due to management; climate change may increase distances winter recreation enthusiasts must travel for adequate snow depth	Potential increase in travel costs because the Forest Service would not designate OSV use below 3,500 feet in elevation, resulting in reduced designated acres; climate change may increase distances winter recreation enthusiasts must travel for adequate snow depth

Hydrologic Resources

This section analyzes the impacts of OSVs on hydrologic resources resulting from the designation of trails and areas for OSV use and the identification of snow trails to be groomed for OSV use on the Lassen National Forest. The focus is on water quality and quantity changes that may result from the use of OSVs. OSV use could impact water and watersheds in several ways including chemical contamination, ground surface disturbance, runoff timing, or altering streamside vegetation.

The Forest Service adheres to a variety of laws, regulations and policy that provide standards and guidelines for managing OSV impacts. Consistency of OSV use with water-related laws, regulations, and policy such as the Lassen National Forest Land and Resource Management Plan (LRMP) and the Clean Water Act will be determined. This analysis will determine the direct, indirect, and cumulative effects of OSV use on hydrologic resources potentially resulting from implementation of this management strategy.

Management decisions to designate areas for cross-country OSV travel, add new trails and areas to the national forest transportation system, and make changes to the existing national forest transportation system must consider effects on watershed hydrologic function. Protection of water quantity and quality is an important part of the mission of the Forest Service (Forest Service Strategic Plan for 2007 to 2012, July 2007). Management activities on NFS lands must be planned and implemented to protect hydrologic function and water quality of forest watersheds, including the volume, timing, and quality of stream flow. The use of designated trails and areas on national forests for public operation of OSVs could affect these hydrologic functions through runoff changes and changes in water quality. This analysis considers these potential effects, determines the likelihood of these actions resulting in changes, and if likely, the intensity of these changes and their consequences.

The affected environment and an analysis of management strategy alternatives will be described for water resources. This analysis will describe the area potentially affected by the alternatives and existing resource conditions within watersheds in the analysis area. Measurement indicators are used to describe the existing conditions for watersheds within the analysis area. The measurement indicators are also used in the analysis to compare, quantify, and describe how each alternative addresses resource concerns as they pertain to hydrologic resources. The hydrologic analysis includes all aquatic resources that could be affected by OSVs, which includes perennial and seasonal streams, lakes, ponds, meadows, and springs.

Relevant Laws, Regulations, and Policy

Regulatory Framework

Land and Resource Management Plan

The LRMP provides standards and guidelines for water-related concerns. The following list of standards and guidelines are a subset of all applicable LRMP direction, and this management strategy must be analyzed for consistency to all applicable LRMP standards and guidelines for hydrology (table 89).

Table 89. Lassen National Forest LRMP (1992) guidelines relevant to watershed resources

Page	Guidelines
Forestwide	
Ch. 4, Sec. E, p. 4-31, WR a. (1-2)	<p>a. Provide water of sufficient quality and quantity to meet current needs. Meet additional future demand where compatible with other resource needs.</p> <p>(1) Implement Best Management Practices (BMP) (LRMP Appendix Q) to meet water quality objectives stated in 22.c. below, and maintain and improve the quality of surface waters on the Lassen National Forest. Identify methods for applying the BMPs during environmental analysis of proposed projects, and incorporate them into project planning documents.</p> <p>(2) Provide water for Lassen National Forest 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.</p>
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 [Forest Plan] FEIS Glossary under "sensitive watershed lands."
Ch. 4, Sec. E, p. 4-32, WR c. (1-2)	<p>c. Comply with Federal, State, regional, and local water quality regulations, requirements and standards.</p> <p>(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.</p> <p>(2) Take immediate remedial action if activities under Forest Service management violate water quality standards.</p>
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.
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.
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.

Sierra Nevada Forest Plan Amendment

The 2004 Sierra Nevada Framework established for the first time a comprehensive aquatic and riparian conservation strategy for all of the national forest lands in the Sierra Nevada Mountains. Key components of this strategy include riparian buffer zones, critical refuges for threatened and endangered aquatic species, special management for large meadows, and a watershed analysis process.

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

The framework's standards and guidelines for riparian conservation areas are intended to minimize the risk of activity-related sediment entering aquatic systems. The framework established riparian conservation area widths for all national forests in the Sierra Nevada Mountains: 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 (table 90).

Table 90. Riparian conservation areas adjacent to aquatic features as designated by the Sierra Nevada Forest Plan Amendment Record of Decision (USDA Forest Service 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)

Wheeled Vehicles or Snowmobiles

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 OHV 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 (RCOs 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 (table 90).

Riparian Conservation Objective 1

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

Riparian Conservation Objective 2:

Maintain or restore: (1) the geomorphic and biological characteristics of special aquatic features, including lakes, meadows, bogs, fens, 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 mitigations and short-term restoration actions needed to prevent further declines or cause an upward trend in conditions. Evaluate required long-term restoration actions and implement them according to their status among other restoration needs.

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

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

Riparian Conservation Objective 5:

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

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

Riparian Conservation Objective 6:

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

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

State Laws

The California Water Code consists of a comprehensive body of law that incorporates all state laws related to water, including water rights, water developments, and water quality. The laws related to water quality (CWC §§ 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 Control 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's 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 (SWRCB) and Regional Water Quality Control Boards (RWQCBs) entered into agreements with the Forest Service to control nonpoint source discharges by implementing best management practices (BMPs). These BMPs, which are set forth in the Forest Service Pacific Southwest Region guidance document, "Water Quality Management for National 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 BMPs related to OSV use, and to road construction and maintenance. The implementation and effectiveness of the BMPs are reviewed annually. In recent years, the Forest Service has emphasized monitoring in national forests to ensure the implemented projects follow approved control measures (USDA Forest Service 2000, 2004).

Pacific Southwest Region Best Management Practices and National Core Best Management Practices

The State and Regional Water Quality Control Boards entered into agreements with the Forest Service to control non-point-source discharges by implementing control actions certified by the State Water Quality Control Board and the Environmental Protection Agency as best management practices (USDA Forest Service R5 FSH 2509.22 - soil and water conservation handbook, 2011). These are designed to protect and maintain water quality and prevent adverse effects to beneficial uses, both on-site and downstream. Further, the Forest Service has generated National Core BMPs that include the BMPs listed below for OSV use.

Through the execution of a formal Management Agency Agreement with the Forest Service in 1981, the SWRCB 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 RWQCBs in California. The BMPs most relevant to the OSV Program pertain to snow removal and monitoring and include the following:

BMP 2-25 (USFS R5 FSH 2509.22 - soil and water conservation handbook, 2011): Snow Removal Controls to Avoid Resource Damage

Objective: To minimize the impact of snowmelt runoff on road surfaces and embankments and to consequently reduce the probability of sediment production resulting from snow removal operations.

Explanation: This would be a preventative measure used to protect resources and indirectly to protect water quality. Forest roads are sometimes used throughout winter for a variety of reasons. For such roads the following measures would be employed to meet the objectives of this practice.

The contractor will be responsible for snow removal in a manner which will protect roads and adjacent resources.

- Rocking or other special surfacing and drainage measures will be necessary before the operator would be allowed to use the roads.
- Snow berms will be removed where they result in an accumulation or concentration of snowmelt runoff on the road and erosive fill slopes.
- Snow berms will be installed where such placement will preclude concentration of snowmelt runoff and serve to rapidly dissipate melt water. If the road surface is damaged during snow removal, the purchaser or contractor will be required to replace lost surface material with similar quality of material and repair structures damaged in snow removal operations as soon as practical unless otherwise agreed to in writing.

Implementation: Project location and detailed mitigation will be developed by the IDT [interdisciplinary team] during environmental analysis and incorporated into the project management strategy and/or contracts. Project crew leaders and supervisors will be responsible for implementing force account projects to construction specifications and project criteria.

BMP 4-7 (USFS 2000): Water Quality Monitoring of off-highway vehicle (and OSV) Use According to a Developed Plan

Objective: To provide a systematic process to determine when and to what extent off-highway vehicle use will cause or is causing adverse effects on water quality.

Explanation: Each Forest's off-highway vehicle plan [Travel Management Plan and LRMP] will:

- Identify areas or routes where off-highway vehicle use could cause degradation of water quality.
- Establish baseline water quality data for normal conditions as a basis from which to measure change.
- Identify water quality standards and the amount of change acceptable.
- Establish monitoring measures and frequency.
- Identify controls and mitigation appropriate in management of off-highway vehicles.
- Restrict off-highway vehicles to designated routes.

Implementation: Monitoring results would be evaluated against the off-highway vehicle plan objectives for water quality and the LRMP objectives for the area. These results would be documented along with actions necessary to correct identified problems. If considerable adverse effects are occurring, or would be likely to occur, immediate corrective action would be taken. Corrective actions may include, but would not limited to, reduction in the amount of off-highway vehicle use, signing, or barriers to redistribute use, partial closure of areas, rotation of use on areas, closure to causative vehicle type(s), total closure, and structural solutions such as culverts and bridges.

National Core BMP Rec-7. Over-snow Vehicle Use

Reference: FSM 7718

Objective: Avoid, minimize or mitigate adverse effects to soil, water quality and riparian resources from over-snow vehicle use.

Explanation: An over-snow vehicle is a motor vehicle that is designed for use over snow and that runs on a track or tracks and/or a ski or skis, while in use over snow. Over-snow vehicles include snowmobiles, snowcats, and snow grooming machines. Snowmobiles and snowcats are used for access and for recreational activities. Snow grooming machines are used to prepare snow on trails for downhill or cross-country skiing or snowmobile use.

An over-snow vehicle traveling over snow results in different impacts to soil and water resources than motor vehicles traveling over the ground. Unlike other motor vehicles traveling cross-country, over-snow vehicles generally do not create a permanent trail or have direct impact on soil and ground vegetation when snow depths are sufficient to protect the ground surface. Emissions from over-snow vehicles, particularly two-stroke engines on snowmobiles, release pollutants like ammonium, sulfate, benzene, polycyclic aromatic hydrocarbons, 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 water bodies. In addition, over-snow vehicles that fall through thin ice can pollute water bodies.

Use of National Forest System lands and/or trails by over-snow vehicles may be allowed, restricted or prohibited at the discretion of the local line officer.

Practices:

Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using state BMPs, Forest Service regional guidance, Forest or Grassland Plan direction, BMP monitoring information, and professional judgment:

- Use suitable public relations and information tools, and enforcement measures to encourage the public to conduct cross-country over-snow vehicle use and on trails in a manner that will avoid, minimize or mitigate adverse effects to soil, water quality, and riparian resources.
- Provide information on the hazards of running over-snow vehicles on thin ice.
- Provide information on effects of over-snow vehicle emissions on air quality and water quality.
- Use applicable practices of BMP Rec-4 (Motorized and Non-motorized Trails) when locating, designing, constructing, and maintaining trails for over-snow vehicle use.
- Allow over-snow vehicle use cross-country or on trails when snow depths are sufficient to protect the underlying vegetative cover and soil or trail surface.
- Specify the minimum snow depth for each type or class of over-snow vehicle to protect underlying resources as part of any restrictions or prohibitions on over-snow use.
- Specify season-of-use to be at times when the snowpack would be expected to be of suitable depth.
- Specify over-snow vehicle class suitable for the expected snowpack and terrain or trail conditions.
- Use closure orders to mitigate effects when adverse effects to soil, water quality, or riparian resources are occurring.
- Use applicable practices of BMP Rec-2 (Developed Recreation Sites) when constructing and operating over-snow vehicle trailheads, parking, and staging areas.
- Use suitable measures to trap and treat pollutants from over-snow vehicle emissions in snowmelt runoff or locate the staging area at a sufficient distance from nearby water bodies to provide adequate pollutant filtering.

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 as non-governmental 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 the public's use of OSVs on trails and areas designated for OSV use and on groomed trails. 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

Data on OSV trails and uses were compiled from geographic information systems data obtained from the Lassen National Forest, or from communication with forest recreation personnel or other specialists on the forest. Available scientific literature combined with an assessment of local conditions was used to assess snowmobile effects on the project area.

Affected Environment

Hydrology

The OSV project area on the Lassen National Forest would be 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 project area. Many water bodies are directly accessed or crossed by the OSV trails and many more can be accessed by OSVs going cross-country in areas designated for OSV use.

Table 91 summarizes the affected environment for water resources, which includes watershed areas on National Forest System lands. 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 have the

potential to adversely affect a watershed's condition. Management activity effects are influenced in part by the local terrain, the precipitation regime, and other factors.

Table 91. Hydrologic characteristics of the OSV analysis area within the Lassen National Forest

Hydrologic Characteristics	
Landscape	<p>Sierra Nevada Mountains (northern end of range) and Cascade Mountains (southern end of range)</p> <p>Elevation ranges between 2,000 feet (foothills near Tehama State Wildlife Refuge) and 7,800 feet (unnamed butte north of Caribou Wilderness).</p>
Climate	<p>Highly variable across the Lassen NF due to elevation and rain shadow effect of Lassen Peak and Sierra Nevada Mountain Range.</p> <p>Mediterranean climate, whereby most precipitation occurs between November and April.</p> <p>Winter precipitation below 3,500 feet is primarily rain and above 3,500 feet is primarily snow.</p> <p>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.</p>
Aquatic features	<p>514 miles of perennial streams.</p> <p>1,442 miles of intermittent streams.</p> <p>1,057 lakes with total acreage of 6,207 acres, ranging between <0.01 acres to 1,407 acres (McCoy Flat Reservoir).</p> <p>1,086 meadows with total acreage of 321,752 acres, ranging between <0.01 acres to 1380 acres.</p>
Beneficial Uses^a	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^b	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).
Watersheds^c	<p>124 sixth-field watersheds on the Lassen National Forest within the affected environment.</p> <p>Average size of entire watersheds (includes all ownerships): 34,526 acres</p> <p>Average watershed acreage within affected environment: 8,649 acres</p>

^aSource: Cal EPA LRWQCB 2010; ^bSource: Cal EPA LRWQCB 2010; ^cDoes 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.

Table 92. Compliance with beneficial uses of water on 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	637.20	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								
Feather River	520.3		x								x				x							x	

1, 2 Cal EPA LRWQCB 2010.

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. The hydrology of the project area is dynamic and evolving. There can be large annual variations in water availability and quality, seasonal flow rates, and water temperatures (table 91).

Table 93. Major waterbodies accessible by OSVs in the project area

National Forest OSV Trail System	Major Water body
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

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, 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 water bodies 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. Water flowing from the forest in creeks and streams is vital for its fisheries and downstream uses. Other notable streams include Battle Creek, Antelope Creek, Deer Creek, Mill Creek, and Butte Creek. These streams support anadromous fish and flow unimpaired all the way to the Sacramento River downstream of Shasta reservoir.

Surface water quality

Located in high elevations of the Cascades, the project activities occur on snowpack forming the headwaters of many watersheds. These elevations generally produce surface water of excellent quality. Contaminant levels in most waters meet State standards and the fishable and swimmable objectives of the Federal CWA. 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 (USDA Forest Service 2001).

Quality of surface water is affected by the integrity of the fluvial system. Some concerns exist for watersheds where watershed impacts have affected water quality and stream channel potential, including riparian conditions and streambank stability. These effects would be in limited locations, and changes in management could improve existing conditions.

Section 305(b) of the CWA requires states to prepare and submit every two years a water quality summary report to the U.S. Environmental Protection Agency (EPA). In addition, CWA Section 303(d) requires states to submit to the EPA lists of water bodies that meet 303(d) listing criteria. This list identifies water quality-limited water bodies. 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 water quality-limited water bodies 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, North Fork Feather River downstream of Lake Almanor for mercury and temperature, and Pit River for nutrients (table 91).

Surface water uses

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

Table 94. Impaired waterbodies on or adjacent to the Lassen National Forest¹

Impaired waterbodies
<p><u>Eagle Lake</u></p> <ul style="list-style-type: none"> • <i>Phosphorous and Nitrogen Sources:</i> 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.
<p><u>Susan River</u></p> <ul style="list-style-type: none"> • Mercury from unknown source. • Unknown toxicity from unknown source. • Headwaters are located within analysis area.
<p><u>NF Feather River below Lake Almanor</u></p> <ul style="list-style-type: none"> • 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.
<p><u>Pit River</u></p> <ul style="list-style-type: none"> • 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.

¹State of California, Water Quality Control Board 2006

Table 95. 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: <div style="display: flex; justify-content: space-between;"> <div> For natural turbidity between: 0 and 5 NTUs 5 and 50 NTUs 50 and 100 NTUs Greater than 100 NTUs </div> <div> Increases shall not exceed 1 NTU 20 percent 10 NTUs 10 percent. </div> </div>	All

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.

BMPs have been adopted to protect water quality in compliance with the CWA. BMPs cover a wide variety of land management actions on NFS lands, including watershed management, timber, transportation and facilities, pesticide-use, recreation, minerals, fish and wildlife habitat, 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 overwintering 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

In this analysis, 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 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 wetter than those of surrounding areas. 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 (U.S. 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 stream flow.

Fish depend upon healthy riparian areas to provide stable channels, sustained water supply, clean and cool water, food, and streambank cover. 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.

Many animals visit and live in riparian areas. Benefits provided by riparian areas include food, cover, and nesting habitat for birds. They come for water, food, cover, and temperature moderation. Riparian areas often provide sheltered upstream and downstream transportation corridors for wildlife to other habitats.

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.

Environmental Consequences

The NFMA and the CWA provide direction for evaluating the direct, indirect and cumulative effects of proposed alternatives. NFMA requires that “soil, slope, or other watershed conditions would not be irreversibly damaged;” and that protection is provided for streams, stream banks, shorelines, lakes, wetlands, and other bodies of water from detrimental changes in water temperature or chemical composition, blockages of water courses, or deposits of sediment likely to seriously and adversely affect water conditions or fish habitat.

The CWA declares a policy to “restore and maintain” clean water and directs each state to adopt anti-degradation policies. The State’s anti-degradation policy (as described in the RWQCB’s basin plans and in waste discharge requirements) and implementation of BMPs would safeguard existing water uses.

Analysis Assumptions

Assumptions used for the analysis are based on published literature and the hydrologist’s professional judgement based on experience with the USDA Forest Service. These sources of information framed the key indicators (table 96, page 271) 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 the analysis of all alternatives.

Assumption 1: Snow Plowing and Removal

Snow removal at trailhead parking areas has been occurring for decades. Snow plowing and removal occurs on paved surfaces in snow parks and does not cause soil disturbance, alter existing drainage patterns, or affect soil permeability. This is because BMPs would be applied that ensure that snowmelt from snow storage areas does not result in erosion or impair quality of surface waters.

With implementation of BMPs, snow removal would not cause noticeable or measureable impacts from erosion. High runoff rates are uncommon from snow storage areas. The thaw rate in snow storage areas is typically slow, and snow is placed where the runoff percolates into the soil. As a result erosion or siltation from snow storage runoff is minimal.

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. This is mitigated because snow is removed to designated storage areas where the snow melt can percolate into the soil and sheet flow across parking areas is avoided. This snow disposal and storage method also allows avoidance of direct discharge into surface water. As a result, the potential for water quality impacts associated with contaminants in the snow from plow equipment use is considered minimal.

Snow removal operations are subject to BMPs, which ensure compliance with Federal CWA requirements. Consequently, project activities including snow removal are consistent with Lassen National Forest LRMP watershed management standards and guidelines and management prescriptions.

This activity is not included in the proposed action, but is an on-going and reasonably foreseeable future action that would be considered for cumulative effects.

Assumption 2: Trail Grooming

Trail grooming does not cause substantial impacts to water quality, perennial, intermittent or ephemeral streams, wetlands, or in other bodies of water. This is because the direct project activities of trail grooming occur on snow trails overlying an existing road and trail network and do not alter landforms or result in significant soil disturbance that would change water flow patterns or quantities of surface water runoff. Consequently, project activities including snow removal, trail grooming, and OSV travel on groomed trails are consistent with Lassen National Forest LRMP watershed management standards and guidelines and management prescriptions.

Assumption 3: OSV Use on Trails

For this analysis, OSVs include snowmobiles, snowcats, and other tracked vehicles designed for use over snow. Most OSV trails overlie 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 largest source of potential non-point source pollution. Fine-grained sediment from roads and trails that reaches water bodies can potentially impair water quality.

However, this use would not impair water quality because much of the OSV use under this management strategy would occur on groomed trails where design features call for adequate snow cover, negligible potential for contact with bare soil, and practically no disturbance of underlying trail and road surfaces. OSV use on the groomed trail system given adequate snow coverage would not cause substantial impacts to water quality in perennial, intermittent, or ephemeral streams, in wetlands, or in other bodies of water.

Assumption 4: Cross-country Off-trail Riding by OSVs

Some researchers have found that snowmobiles can contribute to erosion of trails and steep slopes. The degree of potential erosion is dependent on site-specific factors such as slope, aspect, elevation, adjacent vegetation, level of use, and weather conditions. Olliff et al. (1999) found that if steep slopes are intensively used, snow may be removed and the ground surface exposed to extreme weather conditions and increased erosion by continued snowmobile traffic. Similar results could occur when snowmobiles use exposed southern exposures. OSV use in designated off-trail OSV riding areas where there is minimal snow cover or bare patches of ground could result in destruction of vegetation, soil compaction, and erosion in areas of repeated and concentrated use.

However, with adequate snow depths, cross-country use of OSVs would have a negligible effect on ground disturbance that could lead to erosion and sedimentation in streams or other water bodies, and a negligible effect on vegetation, especially along streams and other water bodies.

This is because 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 management strategy would result in no more than incidental and localized soil erosion, and therefore, would not create water quality impacts to streams or water bodies by introducing sediment in water runoff.

Cross-country OSV use could 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, vegetation trampling from snowmobiles

and potential impacts to riparian resources from OSV use would be considered negligible with adequate snowpack coverage.

Widespread snow compaction from cross-country OSV use can affect melt patterns, and in turn, the hydrologic regime. Studies have found delayed snowmelt in areas compacted by snowmobiles versus areas of un-compacted 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. However, 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 use are consistent with the Lassen National Forest LRMP, including RCOs, watershed management standards and guidelines, and management prescriptions.

Assumption 5: Exhaust Emissions

Exhaust emissions deposited in the snowpack in the amounts anticipated on the Lassen National Forest from grooming equipment or OSVs on trails or OSVs traveling cross-country would be considered minor and currently do not functionally impair water quality of adjacent water bodies. In addition to exhaust emissions, grooming equipment and OSVs could leave behind unburned fuel, lubrication oil, and other compounds on the top layers of snow. Some of the unburned hydrocarbons could accumulate on the snow surface and 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 Zielinsky 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 possible risk to aquatic life from snowmobile emissions, but that the risk could not be quantified because of a current lack of water quality data. Adams (1975) showed that high concentrations of lead and hydrocarbons were found in pond water adjacent to snowmobile trails during the weeks following ice melt. The study also found that juvenile brook trout had increased hydrocarbon intake and reduced stamina, from surface water and food chain feeding.

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 the 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 1999).

A study in Yellowstone National Park analyzed snowmelt from four test locations adjacent to roadways and parking lots heavily used by OSVs between Yellowstone's West Entrance at West Yellowstone, Montana, and the Old Faithful visitor area. No cross-country OSV use was allowed, and OSVs were concentrated on one main trail in to the park. The purpose of the study was to evaluate whether increased snowmobile use within the Park was creating increased potential for emissions to enter pristine surface waters. Specific objectives were to (1) examine snowmelt runoff for the presence of specific volatile organic compounds (VOCs), (2) determine if concentrations of any VOCs exceed safe drinking water criteria, and (3) predict the potential for impacts by VOCs on the fauna of streams near roads heavily used

by snowmobiles in the park. In spring 2003 and 2004, water samples were collected and tested. In situ water quality measurements (temperature, dissolved oxygen, pH, specific conductance, and turbidity) were collected; all were found within acceptable limits. Five VOCs were detected (benzene, ethylbenzene, m- and p-xylene, o-xylene, and toluene). The very low concentrations were found to be below EPA criteria and guidelines for the VOCs analyzed and were below levels that would adversely impact aquatic ecosystems (Arnold and Koel 2006).

The number of snowmobiles entering 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 management strategy would not adversely affect water quality of snowmelt. Therefore, due to very low concentrations of pollutants from OSV use, operation of OSVs on system trails and cross-country would be consistent with water quality objectives in the Lassen National Forest LRMP, including RCOs, watershed management standards and guidelines, and management prescriptions.

Assumption 6: Monitoring Would Occur as Prescribed

Although there would be no indicated adverse damage caused by OSV use to water resources, further monitoring and, if needed, implementing other protective measures would further 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.

The annual OSV monitoring would include monitoring of 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) would be followed for monitoring guidelines.

Assumption 7: Other Hydrologic Impacts

The management strategy would 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. The management strategy would not expose people or property to a risk of flooding nor increase the risk of flooding for existing development in floodplains in the project area. The management strategy would not place housing or other structures within a flood hazard area. The management strategy would not involve a change in water use, affect a private or public water supply, nor affect the quantity or quality of groundwater recharge, aquifer volume or cause a lowering of the local groundwater table level. The management strategy would not involve an increase in impervious surfaces. The management strategy would not involve discharges of storm water or wastewater.

Assumption 8: Equivalent Roaded Area Model not Appropriate

The equivalent roaded area (ERA) 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 ERA model would not show any detectable differences between alternatives for this management strategy and is not appropriate for this scale of analysis, which covers nearly a million acres.

The ERA model is beneficial at demonstrating changes in ERA for management strategies that intend to disturb hundreds to thousands of acres for fuels reduction, travel management, or timber harvest plans; or to show cumulative effects of wildfires. This management strategy would not create a new disturbance on the landscape for any alternative. Changing the overall acreage of areas designated for OSVs would not lead to increases or decreases in ground disturbance as long as OSVs are managed appropriately. Finally, the ERA method would not show any detectable differences within the sixth field watersheds in this analysis.

Assumption 9: Global Climate Change

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 would reduce the proportion of precipitation that falls as snow and increase the proportion that falls as rain. This shift would result in higher peak flows, more frequent flooding, increased erosion, reduced summer base flows, more frequent droughts, and increased summertime stream temperatures.

These expected changes have several implications for OHV use effects on water resources on national forests:

- As floods become more frequent and of greater magnitude, roads and trails would likely be subjected to greater stresses from higher runoff. Erosion of route surfaces and route/stream crossings would become more common. Ephemeral channels would 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) would likely 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 base flows would 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 trails may need to be modified as precipitation and temperature patterns change.

Assumption 10: 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 96) chosen to measure potential effects, the analysis area, timeframe, methods used, and assumptions made for the effects analysis of all action alternatives on water resources.

We used key indicators (table 96) 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, LRMP consistency, and consistency with the Federal Clean Water Act and the Porter-Cologne Water Quality Control Act.

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 snowmobile impacts on hydrology at specific sites. Lassen National Forest recreation staff monitor snowmobile 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.

Table 96. Indicators used for the hydrologic analyses

Resource Indicator	Usefulness of Indicator Measure	Geographic Scales for Each Indicator Measure
Designated use area for OSV use	Impacts are widely dispersed and differences in alternatives are minor	Lassen National Forest
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	
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	
Number of snowmobiles 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	
Consistency with Riparian Conservation Objectives (RCOs) 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 would be no additional routes proposed for addition to the national forest transportation system within CARs in the analysis area. Consequently, consistency with the RCOs is an indicator to ensure that goals of Aquatic Management Strategy would be met (USDA Forest Service 2004: 32). The RCO Analysis is on page 285 of this EIS.

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 would be generally up to 1 year in duration, and long-term effects would be more than 1 year in duration.

Effects Common to All Alternatives

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 would not have a measurable impact on hydrology. Only the effects of motorized OSV activities are considered in the Environmental Consequences section.

For all alternatives, including the no-action alternative, portions of the project area would be designated for OSV use. A comparison of alternatives based on trails and areas designated for OSV use, and minimum snow depth for OSV use on trails and cross-country is shown in table 97. Effects common to all alternatives from OSV use 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 97. Alternative comparisons

OSV Management	Alternative 1 Current Management	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Minimum snow depth for public OSV use on snow trails (inches)	12	6 inches on snow trails overlying roads and trails 12 inches on trails not overlying roads or trails	6 inches where site review determines there would be no damage to underlying resources	Depth necessary to avoid resource damage	12
Minimum snow depth for public, cross-country OSV use (inches)	12	12	12	Depth necessary to avoid resource damage	12
Minimum snow depth for snow trail grooming to occur (inches)	12	12*	18	12	12
OSV trail grooming season	12/26 – 3/31	12/26 – 3/31	12/26 – 3/31	12/26 – 3/31	12/26 – 3/31

*The originally scoped 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" (California OSV Program Final EIR, page 2-12).

Alternative 1 – No Action

Measurements of indicators for the range of alternatives for the alternative 1 are shown in table 98. Indicators focus on use levels and required snow depths needed for OSV use under the alternatives. Effects of the alternatives depend in part on the amount of use by OSVs, and the effectiveness of required snow depths as a mitigation for anticipated effects of OSV use.

Table 98. Hydrology resource indicators and measures for alternative 1, no action

Resource Indicator	Usefulness of Indicator	Alternative 1 Measure
Land area designated for OSV use	Impacts are widely dispersed and differences in alternatives are minor	964,030 acres
Minimum snow depth for public OSV use on snow trails (inches)	Minimum snow depths on trails can be evaluated for effectiveness in protecting the trail surface	No Minimum
Minimum snow depth for public cross-country OSV use (inches)	Minimum snow depths for cross-country travel can be evaluated for effectiveness in protecting the ground surface and vegetation	No Minimum
Number of snowmobiles 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 1,2,4,5,6

Direct and Indirect Effects

Current OSV use would continue on 964,030 acres under alternative 1. Minimum snow depths would be enough snow to protect from resource damage for both groomed trails and for cross-country OSV use.

Incidental direct effects including ground disturbance in low-snow areas could 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 snowpack 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.

However, much of the OSV use under this alternative currently occurs on groomed trails where the management strategy calls for 12 inches of snow cover before grooming can occur and low potential for contact with bare soil and practically no disturbance of underlying trail and road surfaces.

For OSV use on the OSV trail system, the minimum snow depth to protect from resource damage, standard snow coverage is likely to be adequate to mitigate and eliminate substantial water quality impacts such as stream sedimentation in perennial, intermittent, or ephemeral streams, in wetlands, or in 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 water bodies by increasing sediment in water runoff.

Cross-country OSV use in designated riding areas where there would be minimal snow cover or bare patches of ground could result in direct effects including destruction of vegetation, soil compaction, and erosion in areas of repeated and concentrated use. However, with adequate snow depths, cross-country use of OSVs would have a negligible effect on ground disturbance leading to erosion and sedimentation in streams or other water bodies, and a negligible effect on vegetation, especially along streams and other water bodies.

There has been and would continue to be incidental and isolated ground contact in areas where OSVs operating cross-country would contact the ground surface due to variations in snow depths such as on high wind-exposed ridges, and southern-facing slopes. 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 water bodies by introducing sediment in water runoff.

Cross-country OSV use could directly affect woody riparian species by trampling, including bending and breaking of branches by OSVs running over the branches. This could directly affect shade along streams by reducing vegetation cover. However, direct effects to vegetation probably do occur under current conditions, but the effects are limited by requiring adequate snow cover before allowing OSV use.

As a result, vegetation trampling from snowmobiles 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 alternative 1. 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. However, 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 gauge water quality effects. About 10,000 OSVs per year are currently using forest trails and would have access to cross-country use areas. OSV enthusiasts would be spread over several trailheads, so actual use 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 have not resulted in impaired water quality, it follows that the OSV use in the project area for this alternative would not adversely affect water quality of snowmelt.

Unauthorized 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 being abandoned in lakes or other open water. This could increase effects to water quality from lubricants leaking into surface water, which can also affect aquatic biota. Similarly, during spring break-up, snowmobiles could cross open streams and other water bodies where snow cover is not present, which could result in the deposition of pollutants directly in stream courses and water bodies.

However, the authorized operation of OSVs occurs over a protective layer of snow, and direct and indirect effects to hydrology are isolated and incidental. Furthermore, for existing minimum operating snow depths, this alternative would not result in more than incidental soil erosion, and therefore, would not create water quality impacts to streams or water bodies by introducing sediment in to water runoff. Therefore, with adequate snow depths, OSV use on trails would be consistent with the Lassen National Forest LRMP, including RCOs, 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. As a result, current operation of OSVs on system trails and cross-country would be consistent with water quality objectives in the Lassen National Forest LRMP, including RCOs 1, 2, 4, 5, and 6, watershed management standards and guidelines, and management prescriptions.

The RCOs apply to all routes that pass through RCAs and meadows. Under alternative 1, groomed and non-groomed OSV trails and areas for cross-country OSV travel would be allowed within RCAs, but because of the layer of snowpack protecting the ground surface, there is currently a very low resource damage potential. Although no restrictions on OSVs in riparian areas, frozen lakes, or meadows are currently in place, no adverse impacts to these areas have been observed or monitored.

Consistency with Riparian Conservation Objectives

RCO 1 and 6: Under alternative 1, beneficial uses of water bodies would be protected and enhanced. There would be no changes in water storage, seasonal availability, or quality.

RCO 2, 4 and 5: Under alternative 1, the geomorphic and biological characteristics of meadows, streams and RCAs would be protected. Because there would be no sedimentation, there would likely be no changes to aquatic primary productivity. Growing season water availability would remain unchanged and would not affect ecosystem integrity.

Cumulative Effects- Alternative 1

Past, present, and reasonably foreseeable future projects in the project area include vegetation management, livestock grazing, prescribed burns, and recreation. There are many past, ongoing, and reasonably foreseeable future projects identified in the Lassen National Forest that may be ground-disturbing and could potentially add sediment or other pollutants to surface waters within the forest. The Forest Service uses BMPs in compliance with the CWA to minimize water quality impacts. The Forest Service monitors trails used by OSVs and implements BMPs 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 or other direct and indirect effects. As a result, there would be no change to cumulative watershed effects or equivalent roaded acres (ERA) calculations for any watersheds under this alternative.

There would be negligible effects from exhaust emissions stored in snowpack. This alternative would not implement the recommended project design criteria and mitigations, and would designate the largest amount of land area to OSVs. However, this alternative would provide adequate snow cover to protect soils and water resources, and to protect vegetation in riparian areas. This alternative would be consistent with Lassen National Forest LRMP 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 would be similar to the current use in terms of effects to hydrology. It would restrict OSV use to 920,260 acres of Lassen National Forest, and would require at least 6 inches of snow on OSV trails that overlie existing roads and trails. It would require a minimum of 12 inches of snow cover for cross-country OSV use and on designated trails not underlain by existing roads and trails. The minimum snow depth before snow trail grooming for OSV use could occur would be 12 inches (table 99).

Table 99. Hydrology 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	920,260 acres
Minimum snow depth for OSV use on designated trails underlain by roads or trails	Minimum snow depths on trails can be evaluated for effectiveness in protecting the trail surface	6 inches
Minimum snow depth for cross-country OSV use	Minimum snow depths for cross-country travel can be evaluated for effectiveness in protecting the ground surface and vegetation	12 inches
Number of snowmobiles 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 1,2,4,5,6

Direct and Indirect Effects

The effects of alternative 2 would be similar to alternative 1, except for slightly lower number of acres designated for OSVs and the snow depth requirement for use of OSV trails underlain by roads or trails. Under this alternative, about 40,000 acres less NFS land (table 98) would be designated for OSV use. Because direct and indirect effects of this alternative would be negligible, having less acreage designated for OSVs would lead to no 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 alternative 2. One substantial difference in this alternative would be the minimum 6 inches of snow depth required for the use of designated trails (table 99) underlain by roads and trails. Because minimum snow levels under alternative 2 would be lower than the current conditions on designated trails, there would be 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 underlying road or trail surfaces, potentially 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 enthusiast web forums usually suggest about 6 inches as a minimum snow amount needed before snowmobile use (Snowmobile Forum 2008). Snowmobilers hesitate to operate machines on soil because it could damage their machines.

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 would be 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, this alternative would not result in more than incidental soil erosion, and therefore, would not create water quality impacts to streams or water bodies by introducing sediment in to water runoff.

With adequate snow depths, OSV use on trails would be consistent with the Lassen National Forest LRMP, including RCOs, watershed management standards and guidelines, and management prescriptions. Although adverse effects would not be expected, periodic monitoring would be required consistent with BMP 4-7 as a mitigation in areas with a 6-inch minimum snow depth to ensure there would not be 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 alternative 2 would occur on groomed trails where the management strategy calls for 12 inches of snow cover before grooming can occur. This would result in negligible potential for contact with bare soil and practically no disturbance of underlying trail and road surfaces. For OSV use on the groomed OSV trail system, the 12-inch requirement would be adequate to protect trail surfaces. The 6-inch minimum snow depth standard snow coverage for OSV trails overlying established roads and trails would likely be adequate to mitigate and eliminate substantial indirect water quality impacts such as stream sedimentation in perennial, intermittent, or ephemeral streams; in wetlands; or in other bodies of water.

As in alternative 1, for the 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 water bodies by increasing sediment in water runoff. There would continue to be incidental and isolated ground contact in areas where OSVs operating cross-country could potentially contact the ground surface due to variations in snow depths, such as on high wind-exposed ridges and southern-facing slopes. However, off-trail OSV use would be generally dispersed and would not result in a high concentration of ground disturbance from OSV use on bare soil. With adequate minimum snow levels, current conditions would result in no more than incidental surface disturbance and soil erosion and therefore, would not create water quality impacts to streams or water bodies 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 could directly affect shade along streams by reducing vegetation cover. Direct effects to vegetation probably would occur under alternative 2, but the effects would be limited by requiring adequate snow cover before allowing OSV use.

As a result, vegetation trampling from snowmobiles and 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 snowmobiles on vegetation.

The direct effect of widespread snow compaction from cross-country OSV use 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 cross-country snowmobile use would heavily compact snow over large areas. Because the areal extent of snow compaction from cross-country OSV use combined with compacted snow on groomed trails would not be extensive on a watershed scale, measureable changes in hydrologic relationships would not be expected.

As described in the assumptions for this alternative, 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 would be consistent with water quality objectives in the Lassen National Forest LRMP, including RCOs 1, 2, 4, 5, and 6, watershed management standards and guidelines, and management prescriptions.

The RCOs apply to all routes that pass through RCAs and meadows. Under alternative 2, groomed and non-groomed OSV trails and areas for cross-country OSV use would be designated within RCAs, but because of the layer of snowpack protecting the ground surface, there would be negligible resource damage potential. Although 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.

Consistency with Riparian Conservation Objectives

RCO 1 and 6: Under alternative 2, beneficial uses of water bodies would be protected and enhanced. There would be no changes in water storage, seasonal availability, or quality.

RCO 2, 4 and 5: Under alternative 2, the geomorphic and biological characteristics of meadows, streams, and RCAs would be protected. Because there would be no sedimentation, there would likely be no changes to aquatic primary productivity. Growing season water availability would remain unchanged and would not affect ecosystem integrity.

Required Monitoring

For the 6-inch minimum snow depths allowed on trails, operation of OSVs should be monitored periodically when use would be allowed at every site where the 6-inch standard would be applied when snow would be less than 12 inches deep. Monitoring would 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, OSV 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 snowmobile use.

Cumulative Effects – Alternative 2

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

The Forest Service uses BMPs in compliance with the CWA to minimize water quality impacts. In 2008, the Lassen National Forest BMPs were rated and implemented 92 percent of the time and effective 90 percent of the time for 77 site evaluations. Projects whose BMP 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 would be negligible. As a result of the 12-inch minimum snow depth for cross-country use, there would continue to be only incidental ground disturbance. As a result, there would be no change to equivalent roaded acres (ERA) calculations for any watersheds under this alternative, and no change in detrimental cumulative watershed effects. There would be negligible effects from exhaust emissions stored in snowpack, and low risk of damage to vegetation or other direct and indirect effects. This alternative would implement the recommended project design criteria and mitigations, and would designate the second highest amount of land area for OSVs. This alternative would provide adequate snow cover to protect soils and water resources, and to protect vegetation in riparian areas. Alternative 2 would be consistent with Lassen National Forest LRMP standards and guidelines. This alternative would not result in irreversible or irretrievable effects to soil, water, or riparian resources.

Alternative 3

Alternative 3 would be similar to alternative 2 in terms of effects to hydrology. It would restrict OSV use to 833,280 acres of NFS land, and would recommend 12 inches of snow cover trails before OSV use, or at least 6 inches of snow on OSV trails as long as site review determines there is no damage to underlying surface resources. It would require a 12-inch minimum snow cover for cross-country OSV use, and a minimum of 18 inches of snow cover before trail grooming could occur (table 100).

Table 100. Hydrology 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	833,280 acres
Minimum snow depth for OSV use on designated trails	Minimum snow depths on trails can be evaluated for effectiveness for protecting the trail surface	6 inches where site review determines there would be no damage to underlying resources
Minimum snow depth for cross-country OSV use	Minimum snow depths for cross-country travel can be evaluated for effectiveness for protecting the ground surface and vegetation	12 inches
Number of snowmobiles 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 1,2,4,5,6

Direct and Indirect Effects – Alternative 3

The direct and indirect effects of alternative 3 would be the same alternative 2. There would be fewer acres designated for OSVs, however. Under this alternative, about 87,000 acres less NFS land would be designated for OSV use.

Because direct and indirect effects of this alternative would be negligible, this would result in minimal direct or indirect effects on hydrology. As in alternative 2, incidental direct effects including ground disturbance in low-snow areas could occur under alternative 3. As in alternative 2, this alternative requires a minimum 12 inches of snow depth for cross-country OSV use and for grooming of OSV trails, and a recommended 12 inches of snow depth for trails, with a 6-inch snow depth for the use of designated trails as long as site reviews indicate protection of the trail surface (table 99).

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

The RCOs apply to all routes that pass through RCAs and meadows. Under alternative 3, groomed and non-groomed OSV trails and areas for cross-country OSV travel would be designated within RCAs, but because of the layer of snowpack protecting the ground surface, there is negligible resource damage potential. Although 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.

Consistency with Riparian Conservation Objectives

RCO 1 and 6: Under alternative 3, beneficial uses of water bodies would be protected and enhanced. There would be no changes in water storage, seasonal availability, or quality.

RCO 2, 4 and 5: Under alternative 3, the geomorphic and biological characteristics of meadows, streams, and RCAs would be protected. Because there would be no sedimentation, there would likely be no changes to aquatic primary productivity. Growing season water availability would remain unchanged and would not affect ecosystem integrity.

Required Monitoring

For the 6-inch minimum snow depths allowed on trails, operation of OSVs would be monitored periodically when use would be allowed at every site where the 6-inch standard would be applied when snow would be less than 12 inches deep. Monitoring would be consistent with BMP 4-7, 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, OSV 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 snowmobile use.

Cumulative Effects – Alternative 3

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

The risks of cumulative effects from this alternative would be negligible. As a result of the 12-inch minimum snow depth for cross-country use, there would continue to be only incidental ground disturbance. As a result, there would be no change to equivalent roaded acres (ERA) calculations for any watersheds under this alternative, and no change in detrimental cumulative watershed effects.

There would be negligible effects from exhaust emissions stored in snowpack, and low risk of damage to vegetation or other direct and indirect effects. This alternative would implement the recommended project design criteria and mitigations, and would designate the smallest amount of land area for OSVs. This alternative would provide adequate snow cover to protect soils and water resources, and to protect vegetation in riparian areas. This alternative would be consistent with Lassen National Forest LRMP standards and guidelines. This alternative would not result in irreversible or irretrievable effects to soil, water, or riparian resources.

Alternative 4

Alternative 4 would be similar to alternative 2 in terms of effects to hydrology. It would differ slightly in that it would increase areas designated for OSV use to 955,470 acres of NFS land, and would require the minimum amount of snow depth necessary to avoid resource damage on designated OSV trails. It would require the minimum amount of snow depth to avoid resource damage snow cover minimum for cross-country OSV use, and 12 inches of snow cover before trail grooming could occur (table 101).

Table 101. Hydrology 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	955,470 acres
Minimum snow depth for OSV use on designated trails	Minimum snow depths on trails can be evaluated for effectiveness for protecting the trail surface	Depth necessary to avoid resource damage
Minimum snow depth for cross-country OSV use	Minimum snow depths for cross-country travel can be evaluated for effectiveness for protecting the ground surface and vegetation	Depth necessary to avoid resource damage
Number of snowmobiles 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 1,2,4,5,6

Direct and Indirect Effects – Alternative 4

The direct and indirect effects of alternative 4 would be similar as alternative 2. A higher number of acres would be designated for OSVs. Under this alternative, about 35,000 acres more NFS land would be designated for OSV use. Because direct and indirect effects of this alternative would be negligible, having slightly more acreage designated for OSVs would not lead to more direct or indirect effects on hydrology. As in alternative 2, incidental direct effects including isolated and incidental ground disturbance in low snow areas could potentially occur under this alternative. As in alternative 2, this alternative would require a minimum 12 inches of snow depth for grooming of OSV trails. Unlike alternative 2, it would require a “no resource damage” minimum snow depth for the use of designated OSV trails and for cross-country use. As in alternative 2, implementation of this alternative would have a risk for causing minor ground disturbance.

Although adverse direct, indirect, or cumulative effects would be not expected, periodic monitoring would be required consistent with BMP 4-7 as a mitigation in areas with a depth necessary to avoid resource damage minimum snow depth to ensure there would not be impacts to the trail surface that could lead to stream sedimentation. Further, it would be recommended that the depth necessary to avoid resource damage minimum snow depth when applied on trails be applied on well-surfaced trails such as

graveled or paved roads. Further, as a result, during low-snow conditions, monitoring would be required of trail conditions before OSV use would be allowed. Monitoring should include assessment of snow conditions at every OSV entry point onto the forest to assure adequate snow depth, especially in “shoulder” seasons during lower snowpack conditions.

The RCOs apply to all routes that pass through RCAs and meadows. Under alternative 4, groomed and non-groomed OSV trails and areas for cross-country OSV travel would be designated within RCAs, but because of the required layer of snowpack protecting the ground surface, there is a very low resource damage potential. Although 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.

Consistency with Riparian Conservation Objectives

RCO 1 and 6: Under alternative 4, beneficial uses of water bodies would be protected and enhanced. There would be no changes in water storage, seasonal availability, or quality.

RCO 2, 4 and 5: Under alternative 4, the geomorphic and biological characteristics of meadows, streams and RCAs would be protected. Because there would be no sedimentation, there would likely be no changes to aquatic primary productivity. Growing season water availability would remain unchanged and would not affect ecosystem integrity.

Alternative 5

Alternative 5 would be similar to alternative 2 in terms of overall effects to hydrology. It would differ in that it would decrease areas designated for OSV use to 632,400 acres of NFS land, and would require at least 12 inches of snow on designated OSV trails. It would require a 12-inch snow cover minimum for cross-country OSV use, and 12 inches of snow cover before trail grooming could occur (table 102).

Table 102. Hydrology resource indicators, alternative 5

Resource Indicator	Usefulness of Indicator	Alternative 5 Measure
Designated use area for OSV use	Impacts are widely dispersed and differences in alternatives are minor	632,400 acres
Minimum snow depth for OSV use on designated trails	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	Minimum snow depths for cross-country travel can be evaluated for effectiveness for protecting the ground surface and vegetation	12 inches
Number of snowmobiles 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 1,2,4,5,6

Direct and Indirect Effects – Alternative 5

The direct and indirect effects of alternative 5 would be similar as for alternative 2; however, the approach for alternative 5 is more conservative in that fewer acres are designated, and deeper snow cover is required before OSV trail use. Under this alternative, about 332,000 acres less NFS land would be designated for OSV use. Because direct and indirect effects of this alternative would be negligible, having less acreage designated for OSVs under this alternative would decrease further any risk of direct or

indirect effects on hydrology. As in alternative 2, incidental direct effects may occur such as isolated ground disturbance in low-snow areas under alternative 5. Also, as in alternative 2, this alternative would require a minimum 12 inches of snow depth for cross-country OSV use and for grooming of OSV trails. However, unlike alternative 2, it would require a 12-inch minimum snowpack for OSV use on all trails.

As in alternative 2, although adverse direct, indirect, or cumulative effects would be not expected, periodic monitoring would be required consistent with BMP 4-7 as a mitigation in areas with a depth necessary to avoid resource damage minimum snow depth to ensure there would not be impacts to the trail surface that could lead to stream sedimentation. Further, it would be recommended that the snow depth necessary to avoid resource damage when applied on trails be applied on well-surfaced trails such as graveled or paved roads.

The RCOs apply to all routes that pass through RCAs and meadows. Under alternative 5, groomed and non-groomed OSV trails and areas for cross-country OSV travel would be designated within RCAs, but because of the layer of snowpack protecting the ground surface, there is a very low resource damage potential. Although 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.

Consistency with Riparian Conservation Objectives

RCO 1 and 6: Under alternative 5, beneficial uses of water bodies would be protected and enhanced. There would be no changes in water storage, seasonal availability, or quality.

RCO 2, 4 and 5: Under alternative 5, the geomorphic and biological characteristics of meadows, streams and RCAs would be protected. Because there would be no sedimentation, there would likely be no changes to aquatic primary productivity. Growing season water availability would remain unchanged and would not affect ecosystem integrity.

Required Monitoring

For the 12-inch minimum snow depths allowed on trails, operation of OSVs would be monitored periodically when use would be allowed at every site where the 12-inch standard would be applied. Monitoring would be consistent with BMP 4-7, 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, OSV 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 snowmobile use.

Cumulative Effects – Alternative 5

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

The risks of cumulative effects from this alternative would be negligible. As a result of the 12-inch minimum snow depth for cross-country use, there would continue to be only incidental ground disturbance. As a result, there would be no change to equivalent roaded acres (ERA) calculations for watersheds under this alternative, and no change in detrimental cumulative watershed effects.

There would be negligible effects from exhaust emissions stored in snowpack, and low risk of damage to vegetation or other direct and indirect effects. This alternative would implement the recommended project

design criteria and mitigations, and would designate the highest amount of land area for OSVs. This alternative would provide adequate snow cover to protect soils and water resources, and to protect vegetation in riparian areas. This alternative would be consistent with Lassen National Forest LRMP standards and guidelines. This alternative would not result in irreversible or irretrievable effects to soil, water, or riparian resources.

Conclusions

All alternatives would protect water resources, including alternative 1.

Alternative 5 would best protect water resources:

For OSV use on the OSV trail system and cross-country uses, the non-groomed 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, in wetlands, or in other bodies of water. Alternative 5 has fewer acres designated for OSV use than the other alternatives. The primary emphasis is that this alternative calls for a consistent 12-inch minimum snow depth for trails and cross-country uses, which would help ensure adequate snow cover for OSV use.

These alternatives would have a negligible impact on water quality as a result of hydrocarbon emissions from OSVs. Alternatives 1 and 5 would be consistent with the Clean Water Act and Porter-Cologne Water Quality Control Act, as water quality would not be impaired and beneficial uses would be protected.

There would be no watersheds with an increased 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 1, 2, 3, and 4 would do the second best job at protecting water resources:

For OSV use on the OSV trail system, the non-groomed 6-inch minimum snow depth standard and 12-inch minimum cross-country snow coverage in alternatives 2 and 3, if carefully enforced, would be adequate to mitigate and eliminate substantial water quality impacts such as stream sedimentation in perennial, intermittent, or ephemeral streams, in wetlands, or in other bodies of water. Alternative 4 requires snowpack adequate to avoid resource damage. Alternatives 1 and 4 would require additional monitoring to determine suitable snow depths to avoid resource damage. Snow cover assessments would be particularly more important to do early and late in the OSV season. Consistent and timely monitoring would be needed for all alternatives as a mitigation to ensure that damage to trails or cross-country areas would not occur.

These alternatives would have a negligible impact on water quality as a result of hydrocarbon emissions from OSVs. Beneficial uses of water bodies would be protected under these alternatives. As a result, alternatives 1, 2, 3, and 4 would be consistent with the Clean Water Act and Porter-Cologne Water Quality Control 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 these alternatives would be consistent with applicable RCOs in the 2004 Sierra Nevada Forest Plan Amendment.

Riparian Conservation Objectives Analysis

The Sierra Nevada Forest Plan Amendment (USDA Forest Service 2004) 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 (AMS) would be met (USDA Forest Service 2004: 32).

For this management strategy, allowing use of OSVs when the ground would be covered with a protective layer of snow would have a negligible effect on RCAs because direct and indirect effects would be negligible, and OSV use would result in negligible effects to RCAs. Hydrocarbon pollution derived from OSVs and grooming equipment would have a negligible effect on water quality under this management strategy.

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 RCOs 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 AMS would be met (USDA Forest Service 2004: 32).

Indicator: Consistency with Riparian Conservation Objectives 1, 2, 4 and 5 (Alternative 1)

The RCOs apply to all routes that pass through RCAs and meadows. Over-snow vehicles would traverse meadows and streams in areas designated for cross-country OSV use with no restriction, and OSV trails in some areas would be located in RCAs.

RCO 1: Under alternative 1, beneficial uses of water bodies would be protected. OSV use would not impact beneficial uses of water bodies, 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, have been identified in table 92. OSV use would not impact CWA 303(d) water bodies.

RCO 2: Under alternative 1, the geomorphic and biological characteristics of meadows, perennial streams, and RCAs would be protected under this management strategy. 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 management strategy, 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 alternative 1, management activities within RCAs would enhance or maintain physical and biological characteristics associated with aquatic and riparian-dependent species. For this management strategy, criteria for establishing consistency are that OSV use does not degrade the water quality of hydrologically connected systems, and that OSV use does not modify channel morphology of streams.

RCO 5: Under alternative 1, efforts would be made to preserve, restore, or enhance special aquatic features, such as meadows, lakes, ponds, bogs, fens, and wetlands, to provide the ecological conditions and processes needed to recover or enhance the viability of species that rely on these areas.

Indicator: consistency with Riparian Conservation Objectives 1, 2, 4 and 5 (Alternatives 2, 3, 4, and 5)

The RCOs apply to all routes that pass through RCAs and meadows. Over-snow vehicles would traverse meadows and streams in areas designated for cross-country OSV use with no restriction. Snow cover would protect these resources, and OSV trails in some areas would be located in RCAs.

RCO 1: Under alternatives 2, 3, 4, and 5, beneficial uses of water bodies would be protected. OSV use would not impact beneficial uses of water bodies, 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, have been identified in table 92. OSV use would not impact CWA 303(d) water bodies.

RCO 2: Under alternatives 2, 3, 4, and 5, the geomorphic and biological characteristics of meadows, perennial streams and RCAs would be protected. Under this 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 these alternatives, 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 alternatives 2, 3, 4, and 5, management activities within RCAs would enhance or maintain physical and biological characteristics associated with aquatic and riparian-dependent species. For these alternatives, criteria for establishing consistency are that OSV use does not degrade the water quality of hydrologically connected systems, and that OSV use does not modify channel morphology of streams.

RCO 5: Under alternatives 2, 3, 4, and 5, efforts would be made to preserve, restore, or enhance special aquatic features, such as meadows, lakes, ponds, bogs, fens, and wetlands, to provide the ecological conditions and processes needed to recover or enhance the viability of species that rely on these areas.

Consistency with Lassen National Forest LRMP and Other Relevant Laws, Regulations, Policies and Plans

All alternatives would comply with the Lassen National Forest Land and Resource Management Plan (LRMP), which provides standards and guidelines for water-related concerns. The 2004 Sierra Nevada Forest Plan Amendment modified the LRMP guidance.

All alternatives would be consistent with the Clean Water Act and Porter-Cologne Water Quality Control Act as water quality and beneficial uses would be protected. The alternatives would be consistent with all applicable RCOs in the Sierra Nevada Forest Plan Amendment once mitigations have been implemented. Beneficial uses of water bodies and water quality would be protected for all alternatives. Physical and biological properties of RCAs would be protected for all alternatives.

All alternatives would comply with the 2004 Sierra Nevada Forest Plan Amendment. The RCOs apply to all routes that pass through RCAs and meadows. Under all alternatives, groomed and non-groomed OSV trails and areas for cross-country OSV travel would be designated within RCAs, but because of the layer of snowpack protecting the ground surface, there would be very low resource damage potential. Although 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.

Consistency with Riparian Conservation Objectives

RCO 1 and 6: Under all alternatives, beneficial uses of water bodies would be protected and enhanced. There would be no changes in water storage, seasonal availability, or quality.

RCO 2, 4 and 5: Under all alternatives, the geomorphic and biological characteristics of meadows, streams and RCAs would be protected. Because there would be no sedimentation, there would likely be no changes to aquatic primary productivity. Growing season water availability would remain unchanged and would not affect ecosystem integrity.

This project would comply with the Clean Water Act as enforced through the Porter-Cologne Water-Quality Act for the State of California.

Listed and Sensitive Botanical Species

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

Travel Management Regulations – Subpart C: “Use by Over-snow Vehicles”

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

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

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

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

Snow Trail Grooming

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:

3. Analyze ancillary activities such as the plowing of related parking lots and trailheads as part of the effects analysis;
4. Consider a range of alternative actions that would result in varying levels of snowmobile use; and
5. Consider an alternative submitted by Plaintiffs and/or Intervenors 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 Intervenors provide the Forest Service with a detailed description of that alternative during the scoping period for the NEPA analysis.

Botany Biological Evaluation/Biological Assessment

Because OSV use and snow trail grooming may have potential to harm Threatened, Endangered, Proposed or Sensitive (TEPS) species, this analysis will evaluate the direct, indirect, and cumulative effects of the alternatives on these botanical resources that could result from the following proposed actions:

- Designating trails and areas for Over-Snow Vehicle (OSV) use
- Identification of snow trails for grooming for OSV use

Effects to Northwest Forest Plan Survey and Manage plants, Special Interest plants, Research Natural Areas, Special Interest Areas, and Noxious Weeds are addressed in a separate Botany Specialist Report.

Relevant Laws, Regulations, and Policy

Federal Law and Policy

Endangered Species Act (ESA). The Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.) requires that any action authorized by a Federal agency not be likely to jeopardize the continued existence of a threatened or endangered (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 U.S. Fish and Wildlife Service 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 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 (project record).

Forest Service Manual and Handbooks (FSM/H 2670). Forest Service Sensitive species are plant species identified by the Regional Forester for which population viability is a concern. The Forest Service develops and implements management practices to ensure that rare plants and animals do not become threatened or endangered and ensure their continued viability on national forests. It is Forest Service policy to analyze impacts to Sensitive species to ensure management activities do not create a significant trend toward Federal listing or loss of viability. This assessment is documented in a biological evaluation (project record).

Forest Service Manual 2670.32 (USDA Forest Service 2005) directs the Forest to avoid or minimize impacts to species whose viability has been identified as a concern, and therefore listed as Sensitive by the Regional Forester. If impacts cannot be avoided then the forest must analyze the significance of the potential adverse effects on the population or its habitat within the area of concern and on the species as a whole. Impacts may be allowed but the decision must not result in a trend toward Federal listing.

Land and Resource Management Plan

The Lassen National Forest Land and Resource Management Plan (LRMP 1993) provides standards and guidelines for the following botanical resources:

TEPS plants (LRMP p. 4-36)

- a. Maintain habitat and viable populations to contribute to eventual de-listing of Sensitive plants that are found on the Forest.
 1. Identify, preserve, or enhance Sensitive plant populations.
 2. Restrict vegetative or soil disturbance in areas occupied by Sensitive plants, unless manipulation is needed to perpetuate the species.
 3. Within the planning period, develop Species Management Guides for Sensitive plants that identify population goals and compatible management activities.
- b. Manage Sensitive plants to insure that species do not become Threatened or Endangered because of Forest Service actions.
 1. Evaluate all proposed projects for potential Sensitive plant habitat. Conduct surveys at the correct time of year for species identification if potential habitat exists in a project area.
 2. If Sensitive plants are found in a proposed project, modify the project or take mitigative action as necessary to protect the habitat.

Sierra Nevada Forest Plan Amendment (SNFPA). The Record of Decision (ROD) for the 2004 Sierra Nevada Forest Plan Amendment includes the following direction applicable to motorized travel management and TEPS plants:

- Bog and Fen Habitat (SNFPA ROD page 65, S&G #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.
- Sensitive Plant Surveys (Corrected Errata, April 19, 2005): Conduct field surveys for TEPS plant species early enough in project planning process that the project can be designed to conserve or enhance TEPS plants and their habitat. Conduct surveys according to procedures outlined in the Forest Service Handbook (FSH 2609.25.11). If additional field surveys are to be conducted as part of project implementation, survey results must be documented in the project file. (Management Standard & Guideline 125). The standards and guidelines provide direction for conducting field surveys, minimizing or eliminating direct and indirect impacts from management activities, and adherence to the Regional Native Plant Policy (USDA Forest Service 2004).

Desired Condition

One goal of the Lassen National Forest Botany Program is to maintain viable populations of TEPS plants.

Topics and Issues Addressed in This Analysis

Issues

OSV uses may cause direct and indirect effects to TEPS plants, but are most likely to affect those that have living tissues present within the snow column each season (such as trees or shrubs). Several public comments were received that raise concerns about the effects of OSV use on general vegetation and rare species. Possible effects may be either direct by damage or death to individual plants from OSV (stem

breaking, crushing, etc.), or indirect by increasing the opportunity for pathogens to attack damaged plant tissues or by altering habitat. Possible effects include but are not limited to: physical damage to plants and habitats; reduced seed production; decreased plant vigor; changes in hydrology; changes to soils, especially erosion and sedimentation; changes in physiological responses; and increases in risk of weed introduction and spread. These effects become much more likely if OSV use occurs where or when there is inadequate snow depth.

Some TEPS plants emerge from the ground very early in the growing season and subsequent snowfall may accumulate enough afterward to allow authorized OSV use. In these cases, OSV use may impact living plant tissues. Compaction of snow may lead to changes in plant composition and habitat suitability. Weed seeds may be transported into areas designated for OSV use. When snow cover is not adequate, OSV use on and off established trails could affect some TEPS plants and their habitats. The proposed minimum snow depth requirements are presumed to be sufficient to protect the majority of plant species from damage.

Resource Indicators and Measures

Table 103. TEPS plant indicators and measures for assessing effects

Resource Element	Resource Indicator	Measure	Used to address: P/N, or key issue?	Source (LRMP S/G; law or policy, BMPs, etc.)?
Vegetation	Species presence	Acres of TEPS plant occurrences within designated OSV use areas.	No	FSM 2670
		Acres of TEPS plant occurrences within 100 feet of designated OSV trails.		
Vegetation	Qualitative discussion of species' responses to proposed activities	Determination category.	No	FSM 2670

Methodology

This analysis uses ArcMap and relevant Geographic Information System (GIS) data layers from the Lassen National Forest and the California Natural Diversity Database (CDFG CNDDDB 2017). The GIS layers of proposed OSV designations and groomed trails were overlain with the botanical resource layers to identify areas of potential effects.

A full list of plant species was considered for possible effects from the proposed action and alternatives. Table 104 lists Fish and Wildlife Service threatened, endangered or proposed plants and their critical habitats, as well as Region 5 Sensitive plants that may be present or are known within the planning area. The possibility of effects to each species were evaluated based on growth form, timing of important life cycle elements (i.e., emergence, flowering, seed production, germination, etc.), identified threats, important habitat components, and the expected interaction with disturbances associated with OSV use and snow trail grooming.

The biological evaluation/biological assessment (project record) reviews the proposed action and alternatives in sufficient detail to determine the level of effect that would occur to federally listed plants and Region 5 sensitive plant species. One of three possible determinations is chosen based on the available literature, a thorough analysis of the potential effects of the project, and the professional

judgment of the botanist who completed the evaluation. The three possible determinations (from FSM 2672.42) are:

- No impact
- 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, and is likely to result in a trend toward Federal listing or loss of viability in the planning area

Similar categories for federally listed threatened and endangered species are:

- No effect
- May affect, not likely to adversely affect
- May affect, likely to adversely affect

Information Sources

Information used in this analysis includes pertinent scientific literature, project-specific botanical data, results of surveys and site revisits, local knowledge of Lassen National Forest botanists, and Geographic Information System (GIS) layers of the following data: project boundary, actions by alternative, Lassen National Forest TEPS plant occurrences, California Natural Diversity Database (CDFG CNDDDB 2017), and critical habitat information from the U.S. Fish and Wildlife Service.

Incomplete and Unavailable Information

There is little research and information available regarding the responses of each plant species or whole plant communities from OSV uses, including indirect effects from snow compaction and vehicle emissions during the winter.

Assumptions specific to the botanical resources analysis:

- Plants are unlikely to be directly affected by authorized OSV use when their living tissues are not present above ground. Even with the specified snow depth requirements there is still a restriction that does not allow damage to underlying resources. Therefore, only shrub or tree species are likely to be directly affected by authorized OSV use.
- Indirect effects, such as those possibly resulting from snow compaction and vehicle emissions, are likely to be concentrated in the areas immediately adjacent to designated OSV trails (groomed or ungroomed). Therefore, an area within 100 feet of designated OSV trails is reasonably foreseeable to be affected by snow compaction, emissions, or other contamination. Areas designated for OSV use outside these concentrated use trails and areas are much less likely to experience measurable indirect effects.
- Over-snow vehicles, towing vehicles, or trailers may carry mud or other debris containing weed seeds from infested areas to trailheads and possibly into any areas designated for OSV use.
- Only authorized OSV uses will be analyzed. Concerns arising from unauthorized uses would be addressed as law enforcement issues and may prompt corrective actions.
- Resource monitoring would identify unexpected types or levels of impacts to botanical resources, and may also prompt corrective actions as warranted.

Spatial and Temporal Context for Effects Analysis

The project area boundary serves as the analysis boundary for direct, indirect, and cumulative effects. Effects to vegetation would be expected to have occurred or become evident within one or two years of

disturbance and this constitutes the short term. Effects that linger beyond 2 years are considered long-term effects, and may extend to decades or centuries. Such long-term effects beyond 20 years become increasingly difficult to predict due to unknown interactions and the many environmental variables with numerous possible outcomes.

Direct/Indirect Effects Boundaries

The spatial boundary for analyzing the direct and indirect effects to these botanical resources is the project area boundary, because all expected effects relevant to these resources would occur and remain within this area.

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.

Affected Environment

Existing Condition

Threatened, Endangered, and Proposed Plants

Official species lists for this project were obtained on February 20, 2018, from the Klamath Falls, Sacramento, Yreka, and Nevada Field Offices of the U.S. Department of the Interior, Fish and Wildlife Service (USDI Fish and Wildlife Service 2018a, b, c, and d). The lists identify six plant species to consider, because they may be present within the project area:

- *Chamaesyce hooveri* (Threatened)
- *Fritillaria gentneri* (Endangered)
- *Limnanthes floccosa* ssp. *californica* (Endangered)
- *Orcuttia tenuis* (Threatened)
- *Pinus albicaulis* (Candidate)
- *Tuctoria greenei* (Endangered)

The candidate species *Pinus albicaulis* (Whitebark pine) is addressed as a Region 5 sensitive species in this analysis and it occurs at some higher elevations on the forest.

Chamaesyce hooveri (Hoover's spurge) occurs in vernal pools from Tehama to Merced Counties below 1,000 feet in elevation. Designated critical habitat does not occur on the Lassen National Forest (USDI FWS 2003a), and suitable habitat for the species is also not present.

Fritillaria gentneri (Gentner's fritillary) is endemic and grows in grassland and chaparral habitats primarily in Jackson and Josephine Counties in southwestern Oregon. It also occurs in northern California very close to the Oregon border, and all occurrences are within about a 30-mile radius of Jacksonville, Oregon (USDI Fish and Wildlife Service 2003b). The Lassen National Forest is well outside the suspected distributional range for this species.

Limnanthes floccosa ssp. *californica* (Butte County meadowfoam) has not been found here and does not have designated critical habitat on the forest (USDI Fish and Wildlife Service 2003a). The project area is

outside the range for this species, which is known only to valley and foothill grasslands of the lower elevations of Butte County.

Orcuttia tenuis (Slender Orcutt grass) and *Tuctoria greenei* (Greene's tuctoria) are the only listed or proposed plant species whose range or critical habitat is present on the Lassen National Forest. Critical habitat has been designated for *Orcuttia tenuis* and *Tuctoria greenei* including approximately 25,000 acres located within or adjacent to the boundaries of the Lassen National Forest (USDI Fish and Wildlife Service 2003a).

Region 5 Sensitive Plants

There are currently 48 Region 5 Sensitive plant species known or suspected to occur within or near the project area. See table 104 for the complete list and evaluation of species and habitat presence.

Species Considered in the Analysis

Species or critical habitat that may occur in the project area or be affected by activities associated with the proposed action and alternatives were evaluated (table 104). The species and critical habitat in the table below were evaluated for potential presence in the action area. Species that are not known or suspected to occur in areas that may be designated for OSV use are not carried forward into the effects analysis.

Table 104. TEPS plant species considered

Scientific Name Common Name	Habitat	Species present?	Habitat present?	Effects analysis needed?
Threatened Plants				
<i>Chamaesyce hooveri</i> Hoover's spurge	Vernal pools, typically on alluvial fans or terraces of ancient rivers or streams, along the eastern margin of California's Central Valley, from Tehama County to Merced County. Below 1,000 ft. Flowers July-October. Annual herb.	No	No	No. No Effect. Habitat does not exist on Lassen National Forest.
<i>Chamaesyce hooveri</i> designated critical habitat	Critical habitat is designated in Tehama, Butte, Stanislaus, Merced, and Tulare Counties.	No	No	No. No Effect. Critical habitat does not exist on the Lassen National Forest.
<i>Orcuttia tenuis</i> Slender Orcutt grass	Vernal pools, in oak and/or pine woodlands. Below 5,800 ft. Flowers May-July. Annual grass. Species occurs on Lassen National Forest.	Yes	Yes	Yes
<i>Orcuttia tenuis</i> designated critical habitat	Critical habitat units are designated in Siskiyou, Modoc, Shasta, Lassen, Tehama, Plumas, Lake, and Sacramento Counties. 23,317 acres of critical habitat occurs on the Lassen National Forest.	Yes	Yes	Yes
Endangered Plants				
<i>Fritillaria gentneri</i> Gentner's Fritillary	Grassland and chaparral habitats within, or on the edges of, dry, open, mixed-species woodlands at elevations below 1,544 meters (5,064 feet). The species is highly localized within about a 30-mile radius of Jacksonville, Oregon (USFWS 2003a).	No	No	No. No Effect. Habitat does not exist on Lassen National Forest.

Scientific Name Common Name	Habitat	Species present?	Habitat present?	Effects analysis needed?
<i>Limnanthes floccosa</i> ssp. <i>Californica</i> Butte County Meadowfoam	Vernal pools in valley and foothill grasslands of Butte County, below about 3,000 feet. Flowers March-May. Annual herb. It is known or suspected to occur in Butte, Glenn, and Tehama Counties. Habitat does not occur on Lassen National Forest.	No	No	No. No Effect. Habitat does not exist on Lassen National Forest.
<i>Limnanthes floccosa</i> ssp. <i>Californica</i> designated critical habitat	Critical habitat is designated in Tehama and Butte Counties. No critical habitat exists on the Lassen National Forest.	No	No	No. No Effect. Critical habitat does not exist on the Lassen National Forest.
<i>Tuctoria greenei</i> Greene's tuctoria	Vernal Pools. On private land at Murken Lake. 3,500 ft. and below. Flowers May-July. Annual grass. No known occurrences exist on the Lassen National Forest, but suitable habitat is present.	No	Yes	Yes
<i>Tuctoria greenei</i> designated critical habitat	Critical habitat is designated in Shasta, Tehama, Butte, Stanislaus, Tuolumne, Merced, Mariposa, and Madera Counties. 1,551 acres of critical habitat occurs on the Lassen National Forest.	Yes	Yes	Yes
Sensitive Plants				
<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> Suksdorf's milk- vetch	Sandy volcanic soils in sagebrush or pine within a 25-mile radius of Mt. Lassen; Pine Creek Valley and near Bogard Buttes; 4,500-6,500 ft. Flowers May-Aug., Perennial herb.	Yes	Yes	Yes
<i>Boechea constancei</i> Constance's rockcress	Habitat of serpentine soils or rock outcrops; 3,500-6,750 ft. Flowers May-June. Perennial herb.	Yes	Yes	Yes
<i>Botrychium ascendens</i> Upswept moonwort	Perennially wet springs, seeps, and streambanks in mixed coniferous forests; 5,200-6,240 ft. Flowers July-Aug. Perennial herb.	Yes	Yes	Yes
<i>Botrychium crenulatum</i> Scalloped moonwort	Perennially wet springs, seeps, and streambanks in mixed coniferous forests well-surveyed; 5,040-6,000 ft. Flowers June-July. Perennial herb.	Yes	Yes	Yes
<i>Botrychium lunaria</i> Common moonwort	Habitat of moist subalpine meadows, stream banks, springs or seeps; 7,000-10,000 ft. Flowers July-Aug. Perennial herb.	No	Possible	Yes
<i>Botrychium minganense</i> Mingan moonwort	Perennially wet springs, seeps, and streambanks in mixed coniferous forests; 5,240-6,250 ft. Flowers July-Aug. Perennial herb.	Yes	Yes	Yes
<i>Botrychium montanum</i> Western goblin	Perennially wet springs, seeps, and streambanks in mixed coniferous forests; 5,200-6,250 ft. Flowers July-Aug. Perennial herb.	Yes	Yes	Yes

Scientific Name Common Name	Habitat	Species present?	Habitat present?	Effects analysis needed?
<i>Botrychium pedunculosum</i> Stalked moonwort	Springs, seeps or streambanks in upper montane conifer forest. Flowers in August. Perennial herb.	No	Possible	Yes
<i>Botrychium pinnatum</i> Northwestern moonwort	Perennially wet springs and streambanks in mixed coniferous forests; 5,200-6,250 ft. Flowers July-Oct. Perennial herb.	Yes	Yes	Yes
<i>Bruchia bolanderi</i> Bolander's bruchia	Habitat of bare soil along westside montane stream banks in mixed conifer forests; One occurrence reported, but unconfirmed. 3,800-8,200 ft. Bryophyte, Moss (perennial).	No	Possible	Yes
<i>Buxbaumia viridis</i> Green bug-on-a-stick	Habitat of highly decayed logs, peaty soil or humus in westside, moist, shaded conditions. Bryophyte, Moss (perennial).	No	Possible	Yes
<i>Calochortus longebarbatus</i> var. <i>longebarbatus</i> Long haired star tulip	Habitat of eastside seasonally wet meadows north of Highway 299; 4,000-6,300 ft. Flowers June-July. Perennial herb.	Yes	Yes	Yes
<i>Clarkia gracilis</i> ssp. <i>Albicaulis</i> White-stemmed clarkia	Habitat of low-elevation westside foothill open areas; 500-3,600 ft. Flowers May-July. Annual herb.	Yes	Yes	Yes
<i>Clarkia mildrediae</i> ssp. <i>Mildrediae</i> Mildred's clarkia	Habitat of sandy, often granitic or disturbed soils in lower montane mixed conifer forests; 1500-5200 ft. Flowers June-July. Annual herb.	Yes	Yes	Yes
<i>Collomia larsenii</i> Talus collomia	Loose volcanic gravel on talus slopes of alpine fell-fields; 7,250-11,500 ft. Flowers July-Oct. Perennial herb. The single known occurrence on LNF is within the Thousand Lakes Wilderness.	No	No	No. No Impact. Not suspected to occur in areas proposed for OSV use.
<i>Cryptantha crinita</i> Silky cryptantha	Habitat of foothill gray pine forest and blue oak woodlands near the Ishi Wilderness; below 3,700 ft. Flowers April-May. Annual herb.	Yes	Yes	Yes
<i>Cypripedium fasciculatum</i> Clustered lady's-slipper	Habitat of mid to late seral westside mixed conifer forest south of Lake Almanor; 2,000-6,000 ft. Flowers March-July. Perennial herb.	Yes	Yes	Yes
<i>Cypripedium montanum</i> Mountain lady's-slipper	Habitat of moist mixed coniferous forest and riparian areas with high canopy cover, north of Burney (Hat Creek RD); 2,800-6,000 ft. Flowers March-July. Perennial herb.	Yes	Yes	Yes
<i>Eremogone cliftonii</i> Clifton's eremogone	Chaparral and coniferous forests, on granitic sand of road cutbanks and forest openings. Flowers April-Aug. Perennial herb.	Yes	Yes	Yes
<i>Eriastrum tracyi</i> Tracy's eriastrum	Chaparral and cismontane woodland, in gravelly clay, in open areas. 1,200-5,300 ft. Flowers June-July. Annual herb.	Yes	Yes	Yes

Scientific Name Common Name	Habitat	Species present?	Habitat present?	Effects analysis needed?
<i>Eriogonum prociduum</i> Prostrate buckwheat	Habitat of eastside juniper woodland or low sage flats; Harvey Valley; 4,200-8,900 ft. Flowers June-July. Perennial mat/subshrub.	Yes	Yes	Yes
<i>Eriogonum spectabile</i> Barron's buckwheat	Habitat of glaciated andesite soil in open red fir/lodgepole forest south of Lassen Volcanic NP; 6,600-6,640 ft. Flowers July- Aug. Shrub	Yes	Yes	Yes
<i>Frangula purshiana</i> ssp. <i>Ultramafica</i> Caribou coffeeberry	On substrates of serpentized peridotite in the Bucks Lake area, Red Hill. 2,700-5,150 ft. Flowers May-July. Shrub.	Yes	Yes	Yes
<i>Fritillaria eastwoodiae</i> Butte County fritillary	Habitat of lower westside mixed conifer or brushy areas; 100-4,000 ft. One occurrence reported in Indian Creek RNA, but is unconfirmed. Flowers March-June. Perennial herb.	Yes	Yes	Yes
<i>Helodium blandowii</i> Blandow's bog moss	Habitat of wet meadows, seeps or fens in westside subalpine coniferous forest or alpine; 6,000-8,100 ft. Bryophyte, Moss (perennial).	No	Possible	Yes
<i>Juncus leiospermus</i> var. <i>leiospermus</i> Red Bluff dwarf rush	Habitat of lower elevation vernal pool or seasonally wet flats north of Hwy 299; 175- 3,300 ft. Flowers April-June. Perennial herb.	Yes	Yes	Yes
<i>Juncus luciensis</i> <i>Santa Lucia</i> dwarf rush	Wet, sandy soils of seeps, meadows, vernal pools, streams, and roadsides. 985- 6,695 ft. Flowers April-July. Perennial herb. One reported occurrence at Papoose Meadows has not been relocated.	No	Possible	Yes
<i>Lewisia kelloggii</i> ssp. <i>hutchisonii</i> Hutchison's lewisia	Ridge tops or relatively high elevations in Sierran or Klamath mountains; 5,100-7,000 ft. Flowers July-Aug. Perennial herb.	Yes	Yes	Yes
<i>Limnanthes floccosa</i> ssp. <i>bellingermaniana</i> Bellinger's meadowfoam	Seasonally wet areas in oak or oak/juniper woodlands north of Highway 299, below 3,600 ft. Flowers April-June. Annual herb.	Yes	Yes	Yes
<i>Lomatium roseanum</i> Adobe parsley	Shallow, rocky soil on open, wind-swept ridge tops, Diamond Mountains. 5,880- 7,280 ft. Flowers April-May. Perennial herb.	Yes	Yes	Yes
<i>Meesia uliginosa</i> Broad-nerved hump moss	Habitat of logs in westside fens; 4,300- 8,200 ft. Bryophyte, Moss (perennial).	Yes	Yes	Yes
<i>Mimulus evanescens</i> Ephemeral monkeyflower	Seasonal lake margins or vernal wet areas in sagebrush/ juniper zone. 3,900- 5,580 ft. Flowers June-Aug. Annual herb.	Yes	Yes	Yes
<i>Monardella follettii</i> Follett's monardella	Habitat of serpentine soil; 2,800-5,500 ft. Flowers June-Aug. Sub-shrub.	Yes	Yes	Yes

Scientific Name Common Name	Habitat	Species present?	Habitat present?	Effects analysis needed?
<i>Oreostemma elatum</i> Plumas aster	Habitat of westside wet meadows and fens; 3,800-6,200 ft. Flowers in August. Perennial herb. One occurrence reported but unconfirmed.	No	Possible	Yes
<i>Packera eurycephala</i> var. <i>lewisrosei</i> Cut-leaved ragwort	Habitat of serpentine soil; 1,000-6,200 ft. Flowers April-June. Perennial herb.	Yes	Yes	Yes
<i>Peltigera gowardia</i> Veined water lichen	Habitat of cool, clear and shallow spring-fed westside streams. Aquatic jelly lichen.	Yes	Yes	Yes
<i>Penstemon personatus</i> Closed-throated beardtongue	North-facing slopes in upper mixed conifer forest, southern Almanor RD; 4,500-6,500 ft. Flowers July-Sept. Perennial herb.	Yes	Yes	Yes
<i>Penstemon sudans</i> Susanville beardtongue	Open, rocky volcanic soils in yellow pine forest or juniper woodlands near Susanville; 3,900-5,600 ft. Flowers June-July. Perennial herb.	Yes	Yes	Yes
<i>Phacelia inundata</i> Playa phacelia	Habitat of eastside subalkaline flats; 5,000-6,600 ft. Flowers May-July. Annual herb.	Yes	Yes	Yes
<i>Pinus albicaulis</i> Whitebark pine	Upper red fir forest to timberline. 6,560-12,140 ft. Coniferous tree.	Yes	Yes	Yes
<i>Poa sierra</i> Sierra bluegrass	Steep, shady, rocky slopes in lower montane conifer forest. 1,195-3,805 ft. Flowers April-June. Perennial grass (herb).	No	Possible	Yes
<i>Pyrrocoma lucida</i> Sticky pyrrocoma	Spring-wet, alkaline, clay soils below 6,000 ft., especially in sagebrush-meadow ecotone. Flowers July-Oct. Perennial herb.	Yes	Yes	Yes
<i>Rorippa columbiae</i> Columbia yellow cress	Habitat of large, open, seasonally wet eastside flats (playas); 4,000-5,950 ft. Flowers May-July. Perennial herb.	Yes	Yes	Yes
<i>Rupertia hallii</i> Hall's rupertia	Lower westside mixed conifer forest in Campbellville/Butte Meadows area; below 4,800 ft. Flowers June-Aug. Perennial herb.	Yes	Yes	Yes
<i>Scheuchzeria palustris</i> American scheuchzeria	Habitat of floating sphagnum fens in cold, moderately high elevation lakes; 3,000-9,000 ft. Flowers July. Perennial herb.	Yes	Yes	Yes
<i>Sedum albomarginatum</i> Feather River stonecrop	Habitat of serpentine rock outcrops; 1,500-6,400 ft. Flowers June. Perennial herb.	Yes	Yes	Yes
<i>Silene occidentalis</i> ssp. <i>longistipitata</i> Long-stiped campion	Openings in mid-elevation, westside mixed coniferous forests south of Highway 36. 3,300-6,100 ft. Flowers July-Aug. Perennial herb.	Yes	Yes	Yes

Scientific Name Common Name	Habitat	Species present?	Habitat present?	Effects analysis needed?
<i>Thelypodium howellii</i> ssp. <i>Howellii</i> Howell's thelypody	Alkaline meadows, seeps and pastures, sagebrush/rabbitbrush scrub. One occurrence at Dow Butte reported, but unconfirmed. 4,100-6,700 ft. Flowers May-June. Perennial herb.	No	Possible	Yes

Most species that have no known occurrences in the planning area are omitted from detailed analysis because it is unknown whether the species could exist on the Lassen National Forest and there is considerable uncertainty about whether suitable habitats are present. The exception is for two Sensitive *Botrychium* species, which are more likely to occur due to their tendency to occur together with other *Botrychium* species that are known on the Lassen National Forest. Their small size also makes them very easy to overlook.

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 Plants

Chamaesyce hooveri

Chamaesyce hooveri designated critical habitat

Fritillaria gentneri

Limnanthes floccosa ssp. *californica*

Limnanthes floccosa ssp. *californica* designated critical habitat

Sensitive Plants

Collomia larsenii

Listed Species and Critical Habitat Information

Orcuttia tenuis (Slender Orcutt grass)

Habitat Description

Orcuttia tenuis is a small, annual grass that occupies portions of drying and dried beds of relatively deep vernal pools or vernal pool type habitat with clay soils. The main habitat requirement for *Orcuttia tenuis* is standing water of sufficient quantity and duration to drown out most competition and supply *Orcuttia tenuis*' physiological requirements for prolonged inundation, followed by a period of gradual (becoming total) desiccation (USDA Forest Service and USDI BLM 2012).

Status and Distribution

Orcuttia tenuis was listed as threatened by the Fish and Wildlife Service on March 26, 1997, along with other members of the Orcuttiae grass tribe and two vernal pool herbs (USDI Fish and Wildlife Service 1997).

Orcuttia tenuis is endemic to northern California, with the majority of occurrences in Tehama and Shasta Counties, mostly found on private lands, but it also extends into the Modoc Plateau. It is currently known from 82 occurrences, of which 76 are presumed to be extant (USDI Fish and Wildlife Service 2005). The

21 occurrences of *Orcuttia tenuis* on the Lassen National Forest (totaling 74 acres) are known from all three ranger districts. Seven of these are not found within designated critical habitat.

Life History

Orcuttia tenuis seeds germinate in the spring while under water, and plants send up long, floating leaves. As the pool dries, plants produce shorter terrestrial leaves, and then flowering stalks. *Orcuttia tenuis* plants generally mature later than other vernal pool annuals, so often they are the only vegetation still green by mid-summer on the vernal pool bed. As an annual, *Orcuttia tenuis* depends on seed production to replenish the seed bank for continued survival. Population sizes can fluctuate dramatically with differing amounts of precipitation each year.

Threats

Habitat loss and fragmentation is the largest threat to the survival and recovery of listed vernal pool plants (USFWS 2005). Habitat loss generally is a result of urbanization, agricultural conversion, and mining. The principal threats to Modoc-Cascades occurrences of *Orcuttia tenuis* are associated with human-related hydrologic alterations, livestock activity, recreational/OHV use, and vegetative competition (USDA Forest Service and USDI BLM 2012). Nine of the 21 occurrences on the Lassen National Forest have been at least partially fenced to protect them from livestock and OHV impacts (USDA Forest Service and USDI BLM 2012).

When wheeled vehicles are driven through vernal pools, they may impair hydrological functions by displacing soil, causing erosion, or damaging the swale or riparian connectivity, thus resulting in hydrological changes to these systems. In addition, poorly designed trail and roads systems near vernal pools may cause additional erosion and result in siltation of the vernal pool, which may inhibit germination of listed plant species. Impacts from trampling of plants by OHVs may reduce the reproductive output of vernal pool species, and plants may be crushed or killed (USDI FWS 2005). All of these impacts may have occurred to *Orcuttia tenuis* and its habitat (Sanger 2010) before cross-country travel was discontinued on the Lassen National Forest in 2010 (USDA FS 2010), and some of their effects may be persisting to the present day.

Existing Conservation Documents/Agreements

- ***Orcuttia tenuis* Species Management Guide (USDA Forest Service and USDI BLM 1989):** (1) All populations will be protected from direct disturbance by Forest Service management activities. Disturbance here includes excessive grazing, vehicle traffic within vernal pools, and hydrologic manipulation within pools. When necessary, fencing will be the primary method of protection. (2) Vernal pool hydrology of all pools containing *Orcuttia tenuis* will be maintained by designing all earth-moving projects within the drainage area to allow unchanged drainage into the vernal pools.
- **Conservation Strategy for *Orcuttia tenuis* on Federal Lands of the Southern Cascades and Modoc Plateau (USDA Forest Service and USDI BLM 2012):** (1) Protect all occurrences of *O. tenuis* from direct disturbance by Forest Service management activities. Disturbance as defined here may include, for example, vehicle impacts or hydrologic manipulations that negatively affect vernal pool habitat. When necessary, fencing will be the primary method of protection. (2) During project design, identify any sources of potentially detrimental hydrologic impacts to vernal pools, such as borrow pits or stream headcuts. If needed, identify measures to restore vernal pool hydrology at sites where *O. tenuis* habitat has been degraded by hydrologic alteration. (3) During project planning, evaluate existing recreational impacts to vernal pool areas, and incorporate measures to eliminate these impacts, where possible. If necessary, fence or use barriers to eliminate impacts.

Orcuttia tenuis Designated Critical Habitat

Critical habitat was designated in 2003, with the Primary Constituent Elements (PCEs) including (USFWS 2003b):

1. Vernal pools, swales, and other ephemeral wetlands and depressions of appropriate sizes and depths and the adjacent upland margins of these depressions that sustain *Orcuttia tenuis* germination, growth and reproduction, including but not limited to, Northern Volcanic Ashflow and Northern Volcanic Mudflow vernal pools with iron-silica and bedrock hardpan impervious layers, and that typically become inundated during winter rains, but are dry during the summer and do not necessarily fill with water every year.
2. The associated watershed(s) and hydrologic features, including the pool basin, swales, and surrounding uplands (which may vary in extent depending on pool size and depth, soil type and depth, hardpan or claypan type and extent, topography, and climate) that contribute to the filling and drying of the vernal pool or ephemeral wetland, and that maintain suitable periods of pool inundation, water quality, and soil moisture for *Orcuttia tenuis* germination, growth and reproduction, and dispersal, but not necessarily every year.

Eleven of the 21 critical habitat units occur on the Lassen National Forest, with a total of 22,258 acres. The threats to *Orcuttia tenuis* critical habitat on the Lassen National Forest are also human-related hydrologic alterations, livestock activity, recreational/OHV use, and vegetative competition (USDA Forest Service and USDI BLM 2012).

Tuctoria greenei (Greene's tuctoria)

Habitat Description

Similar to *Orcuttia tenuis*, *Tuctoria greenei* is a summer annual grass that grows in vernal pool habitats. *Tuctoria greenei* is partially differentiated from Orcutt grasses by the spiral arrangement of spikelets and lack of floating juvenile leaves. *Tuctoria greenei* adults are unable to tolerate prolonged periods of inundation. Thus, *Tuctoria greenei* in the Central Valley tends to occur in relatively small, early-drying pools. When *Tuctoria greenei* is found in larger pools, these are either the shallow playa type or the species is restricted to the shallow pool margins.

Status and Distribution

In 1997, *Tuctoria greenei*, Greene's tuctoria, was federally listed as endangered (USFWS 1997) and it is State-listed as rare. There are currently 44 known occurrences, but only 23 are presumed to be extant. Within the administrative boundary of the Lassen National Forest, there is one known occurrence of *Tuctoria greenei*, found on private lands within the Murken Lake Vernal Pool. This occurrence is disjunct from the other populations within the Central Valley and two occurrences recently found in Modoc County. Despite numerous surveys within vernal wet areas across the forest, no occurrences have been found on Lassen National Forest lands.

Life History

Tuctoria greenei seeds do not germinate while the vernal pool is still full, but only after they are exposed to light, when the water is almost completely evaporated (USFWS 2005). Germination occurs about 2 months following inundation. During the warm growing season, plants grow and produce seeds for the next year. Individual plants die at the end of the growing season.

Threats

Habitat loss and fragmentation is the largest threat to the survival and recovery of listed vernal pool plants (USFWS 2005). Habitat loss generally is a result of urbanization, agricultural conversion, and mining. Specific threats to *Tuctoria greenei* are agricultural conversion, urbanization, inappropriate livestock grazing, small population sizes, and herbivory by grasshoppers (USFWS 2005). The Murken Lake Vernal Pool was completely fenced from livestock and OHV in 2010.

Tuctoria greenei Designated Critical Habitat

In 2003, the Fish and Wildlife Service designated 12 critical habitat units for *Tuctoria greenei* (USDI FWS 2003a). One of the 12 units is located partially on the Lassen National Forest. In the Murken Lake area, 1,702 acres of critical habitat was designated on both Lassen National Forest and private lands; however, only the Murken Lake Vernal Pool itself is believed to contain the primary constituent elements needed to support this species within this critical habitat unit. The Lassen National Forest has approximately 1,551 acres of critical habitat for this species, which includes all Forest Service lands within and adjacent to Murken Lake. The large area of unoccupied habitat was included in the unit to provide protection of the hydrologic processes supporting the species (USDI FWS 2003a).

The Primary Constituent Elements (PCEs) of designated *Tuctoria greenei* critical habitat include (USFWS 2003b):

1. Vernal pools, swales, and other ephemeral wetlands and depressions of appropriate sizes and depths and the adjacent upland margins of these depressions that sustain *Tuctoria greenei* germination, growth and reproduction, including but not limited to, Northern Claypan, Northern Hardpan, and Northern Basalt flow vernal pools that typically become inundated during winter rains, but are dry during the summer and do not necessarily fill with water every year.
2. The associated watershed(s) and hydrologic features, including the pool basin, swales, and surrounding uplands (which may vary in extent depending on pool size and depth, soil type and depth, hardpan or claypan type and extent, topography, and climate) that contribute to the filling and drying of the vernal pool or ephemeral wetland, and that maintain suitable periods of pool inundation, water quality, and soil moisture for *Tuctoria greenei* germination, growth and reproduction, and dispersal, but not necessarily every year.

The threats to *Tuctoria greenei* critical habitat on the Lassen National Forest include human-related hydrologic alterations, livestock activity, recreational/OHV use, and vegetative competition from invasive species.

Sensitive Species Information

Grouping Species for Analysis of Effects

Because OSV effects to various plant species are expected to be most similar according to their life form and growth habits, the species considered in this analysis are grouped into the following categories:

- **Trees, shrubs, or sub-shrub species**, whose living tissues may be present above or within the snow column, and thus may experience direct effects from OSV uses (physical damage or immediate exposure to exhaust).
- **Perennial herbaceous species**, including grasses and mosses, whose living tissues are at or below the soil surface, and thus, are unlikely to experience direct effects, but they will be evaluated for

impacts by exhaust contaminants trapped by the snow cover or by possible effects from snow compaction.

- **Annual plant species** are generally not growing during the period of authorized OSV use, and thus, would not experience direct effects. This group is the least likely to be impacted by the indirect effects of exhaust contaminants and snow compaction.
- **Aquatic plant species** grow underwater and would not be directly affected by OSV use. If an occurrence is located within 100 feet of OSV trails, it is possible that snowpack contaminants could reach the occupied aquatic habitat when the snow melts. Snow compaction is not expected to affect aquatic habitats in any meaningful or predictable manner.

Environmental Consequences

Project Design Features

Project design features have been developed to reduce or eliminate adverse impacts from project activities and are incorporated as an integrated part of all action alternatives. Project design features are based upon standard practices and operating procedures used and proven effective in similar circumstances and conditions.

The following project design features for various other resources would reduce or eliminate the potential for adverse effects to botanical resources:

- To prevent substantial impacts to soil resources, areas designated for public, cross-country OSV use would be clearly delineated and marked in the field, where practical.
- Areas would be protected from substantial impacts to resources resulting from overuse by closing or managing designated OSV areas to mitigate adverse effects to soil, water quality, and riparian resources, or changing season-of use periods as necessary to allow rehabilitation of an area, particularly hill-climb areas.
- Watershed resources would be protected by designating equipment maintenance and refueling sites to ensure that they are located on gentle slopes, on uplands, and outside of riparian conservation areas 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. (Soil and Water Resources)
- 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. (Soil and Water Resources)
- 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. (Soil and Water Resources)
- Prohibit OSV use on lakes, reservoirs, ponds and any open surface water. (Aquatic Species and Habitat)

- 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. (Administration, Enforcement and Public Safety)
- 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. (Administration, Enforcement and Public Safety)

Required Monitoring

Once a decision is made on OSV use designation via the record of decision, the implementation phase would begin. “Monitoring” in this sense, consists of both systematic monitoring and informal observations made during the course of annually conducted fieldwork by forest staff. We anticipate that an implementation plan, with a monitoring component, would be developed at that time. However, the analysis assumes the following monitoring procedures would be implemented:

6. 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 areas where motorized use is prohibited, OSV use near or damage of sensitive plant and wildlife sites, and low-snow areas subject to erosion concerns.
7. Wilderness boundaries and other areas where OSV use is prohibited near groomed snow trails and areas designated for OSV use would be monitored for OSV incursions. We would coordinate and implement increased education or enforcement actions as needed.
8. Trailheads and groomed trail areas would be monitored for use conflicts and public safety concerns, coordinating and 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).
9. Areas where OSV use is restricted to designated trails would be monitored to ensure public OSV use is restricted to designated trails and is not encroaching away from the designated trail in areas where such use is not designated.
10. Monitoring that would occur during implementation of all alternatives includes effectiveness monitoring, based on available resources. Monitoring would ensure that:
 - i. Resource damage is not occurring when there is less than the prescribed minimum snow depth with certain exceptions as described in the description of alternative 4. Snow depth 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;
 - ii. Where resource damage is suspected due to public OSV use on less than the prescribed minimum snow depth, monitoring would occur to help inform the responsible official if damage is occurring, the extent of the damage, and what steps need to be taken to address the issue;
 - iii. Public OSV use is not damaging sensitive resource locations, in consultation with forest resource specialists;
 - iv. Public OSV use is not occurring in prohibited areas; and
 - v. Public OSV use restricted to designated trails is not encroaching away from the trail into areas not designated for OSV use.

Implementation monitoring includes the following for vegetation:

11. Damage to vegetation would be addressed by monitoring in consultation with forest biologists to minimize damage to vegetation by ensuring that public OSV use is not damaging sensitive resource locations. In particular, OSV use would be monitored 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 would include prohibiting public, cross-country OSV use in this area.
12. Damage to vegetation would be addressed by monitoring public OSV use in designated Forest Plan botanical special interest areas (SIAs) to determine if damage is occurring. If adverse impacts are observed and it is determined that public 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 public OSV use would be considered, or other appropriate protective measures taken, in consultation with a forest botanist. Considerations would include prohibiting public, cross-country OSV use in these SIAs or restricting OSV use to designated trails only.

As a result of biological monitoring efforts, if OSV use is found to be causing damage to TEPS plant species or habitats, corrective actions may be required, including, but not limited to, area closures and signage to protect the sensitive resources.

Previous Monitoring

Botanists on the Lassen National Forest have monitored TEPS plants relative to their proximity or sensitivity to designated OSV trails. Three plant species associated with several areas designated for cross-country OSV use (*Orcuttia tenuis*, *Eriogonum spectabile*, and *Rorippa columbiae*) were previously monitored in relation to OSV trails on the forest, and no impacts were found related to OSV use (California OHMR Division 2010). During routine site revisits for all TEPS plants on the Lassen National Forest, there have been no observations of impacts from OSV use (Sanger pers. comm. 2015).

Effects common to all alternatives

The most applicable effects are described in this section because the alternatives are very similar, with the same activities proposed, and the differences are mainly the spatial extent of OSV use. The varying areas of authorized OSV use would result in mostly small differences in degree of potential effects. Therefore, each alternative's effects analyses will mainly summarize the extent of botanical resources affected, and provide the basis for determinations. A summary comparison of alternatives will follow, providing the decision-maker a quick reference for evaluating the alternatives along with the other resources that need to be considered. Detailed results of botanical resource measures for each alternative, by species, is presented in table 112 (page 322), followed by a list of species that occur in or along each designated area or trail, by alternative (table 113 through table 117, beginning on page 327).

Effects discussions for TEPS plants are presented in categories of plant life forms because the greatest possible impacts from OSV activities are dependent upon the presence of their living tissues within the snow or above the snow surface, and whether each species is biologically active during the times that direct and indirect effects may occur. Effects to each life form category are presented after an introduction of direct and indirect effects.

Direct Effects 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 Forest Service 2014). OSV use and grooming of OSV trails can damage vegetation through direct contact with plant tissues that are present above the snow or within the snow column that is compacted by the vehicles. Because woody species (trees, shrubs, and sub-shrubs) are the only plants present within the snow, they are the only plants that may be directly damaged. All other plant life forms are not expected to be directly affected by OSV use because minimum snow depths are expected to prevent direct effects to vegetation at ground level.

It is generally recognized that disturbance to soil and vegetation by OSV use is reduced as snowpack depths increase. Damage to soil and low-growing vegetation is much more likely when OSV use occurs under low-snow conditions (Greller et al. 1974, Fahey and Wardle 1998). Thus, the minimum snow depth requirements of all alternatives are expected to prevent or minimize damage to soil and vegetation.

In a study on Niwot Ridge in the Front Range of the Colorado Rocky Mountains, repeated snowmobile use occurred on snow-covered and snow-free areas between two weather stations, and the effects of this use were evaluated (Greller et al. 1974). General conclusions included: (1) In communities that are snow-free in winter, damage by snowmobiles was severe to lichens, *Selaginella*, and to relatively prominent, rigid cushion-plants. Part of the damage to these communities may have been due to the manual removal of rocks, necessary for the operation of snowmobiles in snow-free areas. (2) *Kobresia*, present in isolated tussocks in a cushion-plant community, absorbed the major portion of snowmobile impact. As *Kobresia* is thought to form the climatic climax community in this ecosystem, differential damage to it could seriously retard succession. (3) Snowmobile travel in uniform, closed *Kobresia* meadows inflicted much less damage to most plants, including *Kobresia* itself, than did similar travel on a sparsely vegetated community. (4) Plants best able to survive the heaviest snowmobile impact were those with small stature and little woodiness, or with buds well-protected at or below the soil surface. (5) Snowmobile traffic should be carefully restricted to snow-covered areas. Whenever this is not feasible, the least destructive and easiest alternative is travel on mature, well-vegetated *Kobresia* meadows or similar well-drained plant communities.

On the Lassen National Forest, OSV travel on snow-free areas is prohibited in the current and proposed scenarios.

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. Three specific topics of indirect effects were identified: snow compaction, pollutants, and invasive plant species. Potential effects from snow compaction and pollutants are described below, and a discussion of potential invasive plant effects will follow in its own section because it is a required analysis topic itself.

Snow Compaction

Snow is compacted by all types of OSVs, including snowmobiles, snowcats, and snow grooming equipment. Snow compaction mechanically alters snow grains and redistributes them. This mechanical disturbance breaks off the small points of new snow crystals, destroying the weak existing bonds between them, and bringing the new grains into much closer contact than occurs naturally. Snow metamorphism is artificially accelerated, and snow density and hardness are increased. In addition, the layered structure of the snowpack is changed (Fahey and Wardle 1998). All this has both thermal and hydrological implications, resulting in lower soil temperatures (Fahey and Wardle 1998, Eagleston and Rubin 2012) and delayed snowmelt (Keddy et al. 1979, Fahey and Wardle 1998, Davenport and Switalski 2006, Gage and Cooper 2013). The thermal conductivity of compacted snow is greater than undisturbed snow, and

can reduce the buffering effect against temperature extremes and fluctuations. Thermal conductivity of compacted snow was 11.7 times greater than non-compacted snow (Neumann and Merriam 1972).

Keddy and others (1979) studied the effects of snowmobile use on snow compaction, vegetation composition, and soil temperatures on an abandoned farm in Nova Scotia. They found that snow melted later in areas with compacted snow and that some species showed differences in cover between treatments. Considering the multitude of possible effects and the variety of plant structures and life histories, they were not surprised to find no overall trend for species composition changes. They also noted that the first pass by a snowmobile caused the greatest increase in snow compaction – roughly 75 percent of that observed after 5 sequential passes. While some species composition changes were observed in old field vegetation, they found no changes in species composition in a marsh area, possibly because of solid ice cover during the winter.

In a study of the impact of snowshoe/cross-country ski compaction and snowmelt erosion on groomed trails, Eagleston and Rubin (2012) reported that these non-motorized uses caused snow to remain on the compacted areas an average of 5 days longer than non-compacted areas. They also found that the compacted snow caused increased erosion. Soil under compacted snow stayed frozen for 3 days longer, and, averaged over the entire winter season, remained 0.1 degree Celsius colder than soil under non-compacted snow.

Fahey and Wardle (1998) examined the effects of snow grooming for downhill ski areas in subalpine and alpine environments. They found that the compacted snow increased frost penetration and delayed snow melt.

However, research does not always support the generalization of lower soil temperatures and delayed snowmelt due to snow compaction. In a study of snow compaction effects from snowmobiles on fens on the Routt National Forest, Gage and Cooper (2013) found no statistically significant differences in the temperature of peat soils between compacted and non-compacted areas. They also found no differences in timing of snow melt, biomass production, or plant phenology. From additional, unpublished data from the Telluride Ski Area, where intense compaction occurred daily, they observed a delayed snowmelt and thawing of the soil of about one month in compacted areas. They noted that the continuous influx of groundwater in fens may limit freezing and maintain more constant soil thermal conditions. They found no evidence conclusively linking snowmobile compaction to impairment of fen function.

Different plants have different levels of vulnerability and ability to recover from the effects of snow compaction. The characteristics that determine their vulnerability are the timing of flowering, and growth form and size (Fahey and Wardle 1998). Prolonged snow lie may adversely affect early spring flowering plants because they could have a shorter growing season, and thus, possibly reduced seed production due to delayed phenology and perhaps a misalignment of timing with their preferred pollinators. Due to snow compaction, early spring growth of some plant species may be retarded or may not occur under an OSV trail; however, the current and proposed OSV trails are underlain by existing roads and trails that 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 (McNamara 2017).

In summary, the available research supports the assumption that more intensive snow compaction occurring along groomed or heavily used trails would have considerably greater effect on soil temperatures and delayed snowmelt than the compaction caused by dispersed uses in areas designated for

cross-country OSV use. Due to the intensive, repetitive, and predictable compaction of snow along designated OSV trails (groomed or not), these areas are much more likely and reasonably foreseeable to have a degree of compaction that could influence vegetation. Therefore, in this analysis, areas within 100 feet of designated OSV trails are assumed to be at greater risk from the effects of snow compaction. However, assumptions regarding areas of high, moderate, and low potential for OSV use have also been identified away from the designated OSV trails, and this is considered in the analysis of effects for those species present in those identified areas.

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.

Pollutants emitted from exhaust can cause a variety of impacts on vegetation. Carbon dioxide may function as a fertilizer and cause changes in plant species composition (Bazzaz and Garbutt 1998); nitrogen oxides also may function as fertilizers, producing similar effects along roadsides (Falkengren-Grerup 1986). Sulfur dioxide, which can be taken up by vegetation, may result in altered photosynthetic processes (Winner and Atkison 1986, Mooney et al. 1988). Other toxic compounds may result in reduced metabolism or retarded growth.

Some of the airborne pollutants would enter the snowpack and be released during snowmelt. Similar responses can be assumed to occur in plants that ingest these compounds from snowmelt, although the compounds may undergo chemical changes while in the snowpack, confounding the predictability of effects.

Airborne pollutants can enter the snowpack from both local and regional sources, including but not limited to vehicle emissions, dust storms, and smog. The concentrations of basic cations and acidic anions in the snowpack can be altered and, when released quickly during snow melt, can temporarily lower the pH of surface waters in a process known as “episodic acidification” (Blanchard et al. 1988). Soil acidification and vegetation changes were examined in southern Sweden, where Falkengren-Grerup (1986) found that increased nitrogen deposition and the increased acidity in the humus layer may have caused changes in plant cover, with some species increasing and some species decreasing.

Demonstrating that snowpack chemistry can be used as a quantifiable indicator of airborne pollutants from vehicular traffic, a correlation was shown between pollutant levels and vehicle traffic in Yellowstone National Park (Ingersoll et al. 1997). Ammonium and sulfate levels were consistently higher for the in-road snow compared to off-road snow, but nitrate concentrations did not decrease within a distance of 100 meters from the emission source; thus, the nitrate ion may be used to distinguish between local and regional emission sources (Ingersoll et al. 1997). Studying snow chemistry in Yellowstone National Park, Ingersoll (1998) found that concentrations of ammonium, nitrate, sulfate, benzene, and toluene were positively correlated with snowmobile use. Concentrations of ammonium were up to three times higher for the in-road snow compared to off-road snow. Concentrations decreased rapidly with distance from roadways.

Arnold and Koel (2006) also examined volatile organic compounds in Yellowstone National Park, and found that the snow in heavily used areas contained higher levels of benzene, ethylbenzene, m- and p-xylene, o-xylene, and toluene compared with a control site only 100 meters from the traveled roadways. Even at the most heavily used area (Old Faithful) they found that the concentrations of volatile organic

compounds were considerably below the EPA's water quality criteria for these compounds. In situ water quality measurements (temperature, dissolved oxygen, pH, specific conductance, and turbidity) were collected; all were found within acceptable limits. Five volatile organic compounds were detected (benzene, ethylbenzene, m- and p-xylene, o-xylene, and toluene). The concentrations were found below EPA criteria and guidelines for the volatile organic compounds analyzed and were below levels that would adversely impact aquatic ecosystems (Arnold and Koel 2006).

Studying air quality and snow chemistry effects from snowmobiles in the Snowy Range, Wyoming, Musselman and Korfmacher (2007) found that heavier snowmobile use resulted in higher levels of nitrogen oxides and carbon monoxide, but ozone and particulate matter were not significantly different. When compared with air quality during the summer, they found that carbon monoxide levels were higher in the winter, but nitrogen oxides and particulate matter were higher in the summer. Air pollutants were well-dispersed and diluted by winds, and air quality was not perceived as being significantly affected by snowmobile emissions. Pollutant concentrations were generally low in both winter and summer. These results differ from those studies examining air pollution from snowmobiles in Yellowstone National Park. However, snow chemistry observations did agree with studies from Yellowstone National Park. Compared with off-trail snow, the snow sampled from snowmobile trails was more acidic with higher amounts of sodium, ammonium, calcium, magnesium, fluoride, and sulfate. Snowmobile activity apparently had no effect on nitrate levels in the snow.

In the winter, plant metabolic rates are drastically reduced. Airborne compounds would only be taken up by respiring woody plants. Airborne pollutants normally disperse quickly in mountain environments that are prone to windy conditions, such as the Sierra Nevada. Different plants may have different responses to the different pollutants in the snowpack, including damage from toxic, volatile compounds and possibly some benefits from additional nutrients and trace minerals. The levels of OSV exhaust contaminants on the Lassen National Forest (considerably less than those observed in Yellowstone National Park) are not expected to impair water quality (McNamara 2017).

In a natural plant community with many species competing for resources, and very little research done on each species' responses to OSV emissions or the competitive interactions that may be affected, it is nearly impossible to predict what changes, if any, would occur. It can only be reasonably assumed that there may be some changes in plant species cover and composition. The uptake of harmful pollutants is not expected to result in the death of any individual plants. On the Lassen National Forest, no mortality of roadside TES plants due to vehicle pollutants has been observed, even considering year-round vehicle uses. Therefore, the level of effect to TES plants from OSV pollutants is expected to be minimal, and would not result in loss of individuals.

The available research on OSV pollutants (both airborne and in the snowpack) indicate that some effects to vegetation may occur in the immediate vicinity of heavy use areas. Pollutants that become trapped in the snowpack are also concentrated in areas of heavy OSV use. Therefore, in this analysis, areas within 100 feet of designated OSV trails (groomed or not) are assumed to be reasonably at risk from the effects of OSV pollutants. Away from the designated OSV trails, dispersed OSV travel is much less likely to contribute harmful contaminants with high enough levels and repetition to measurably or predictably affect ground vegetation, and therefore, is not considered in this analysis as a reasonably foreseeable source of indirect effects.

Relative Potential Effects to Plant Life Forms

Considering the combination of direct and indirect effects described above, and the minimum snow depth requirements of all the current alternatives, the effects of proposed OSV uses can be broken down into

relative categories of potential damage to the major plant life forms. From the most likely to least likely to experience measurable effects:

- Evergreen trees and shrubs – most likely to be directly affected, due to mechanical damage; indirect effects are reasonably foreseeable if the species occurs near designated OSV trails. Effects may occur in all areas designated for OSV use.
- Deciduous trees and shrubs – somewhat less likely, due to winter dormancy; indirect effects are reasonably foreseeable if the species occurs near designated OSV trails. Effects may occur in all areas designated for OSV use.
- Sub-shrubs (low-growing woody species) – less likely due to less exposure to direct effects (but still reasonably foreseeable); indirect effects may be reasonably foreseeable if the species occurs near designated OSV trails. Effects may occur in all areas designated for OSV use.
- Perennial herbaceous species – direct effects are unlikely (not reasonably foreseeable) due to minimum snow depth requirements and a legal restriction that does not allow damage to underlying resources; indirect effects may be reasonably foreseeable if the species occurs in high use areas such as those near trailheads and along designated OSV trails.
- Annual species – direct effects are highly unlikely (not reasonably foreseeable) due to minimum snow depth requirements; indirect effects might be reasonably foreseeable if the species occurs near designated OSV trails and spring flowering could be altered by persistent compacted snow. Indirect effects may occur near trailheads and along designated OSV trails, but are not likely in areas without high levels of OSV use.
- Aquatic species – direct effects would not occur because OSV use is not allowed over open water; indirect effects from pollutants might be reasonably foreseeable if the species occurs near designated OSV trails. Effects may occur along designated OSV trails, but are not likely in areas designated for cross-country OSV use.

Threatened and Endangered Plants

Orcuttia tenuis

OSV uses are not likely to affect vernal pool habitats. Population monitoring on the Lassen National Forest has not revealed any adverse effects to these habitats from OSV use in previous years. The main populations of *Orcuttia tenuis* on the Lassen NF are fenced, mainly to exclude OHVs and other impacts of recreational use. These fences also effectively prevent OSV use within the vernal pools unless snow depth is over 4 or 5 feet. Although recreational or OHV uses in vernal pools may affect these habitats and *Orcuttia tenuis* plants during the drier seasons, OSV use during the winter would not result in habitat disturbance. The minimum snow depth described in each alternative would be sufficient to prevent damage to underlying resources.

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 *Orcuttia tenuis*, seed germination occurs when the vernal pools are filled with water, usually well after the majority of snowmelt in the pools. The short delay of snowmelt and colder soil temperatures from OSV-compacted snow would not likely delay or reduce germination of *Orcuttia tenuis*. The effects of snow compaction and OSV emissions are concentrated in areas of heavy use, such as along designated OSV trails. For the purpose of preventing or reducing OHV and other recreation impacts, fencing or barriers are present at two of the three sites near OSV trails. One of these occurrences has also been monitored for three

consecutive seasons and no evidence of OSV effects has been observed; therefore, it is anticipated that there would be no measurable or predictable indirect effects to *Orcuttia tenuis*.

Because living plants are not present during the period of OSV use, *Orcuttia tenuis* would not be directly affected. Indirect effects are also unlikely to affect the species or alter its habitat, as described above. With no direct or indirect effects expected, there would be no cumulative effects to this species. Therefore, the Lassen OSV Designation project would have no effect on *Orcuttia tenuis*.

Orcuttia tenuis Critical Habitat

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 2017). Water quality is also not expected to be affected in the vernal pools, and the composition of vegetation, including invasive plant species, is not expected to be altered by OSV use. Because the primary constituent elements of *Orcuttia tenuis* critical habitat would be unaffected by OSV use, the Lassen OSV Designation project would have no effect on *Orcuttia tenuis* critical habitat.

Tuctoria greenei

OSV uses are not likely to affect vernal pool habitats. Population monitoring on the Lassen National Forest has not revealed any adverse effects to these habitats from OSV use in previous years. Because *Tuctoria greenei* is not known to occur on the Lassen National Forest, there would be no direct effects to individuals from OSV use on these lands. The indirect effects of snow compaction and OSV emissions are concentrated in areas of heavy use, such as along designated OSV trails. No *Tuctoria greenei* 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.

With no direct or indirect effects expected, there would be no cumulative effects to this species. Therefore, the Lassen OSV Designation project would have no effect on *Tuctoria greenei*.

Tuctoria greenei Critical Habitat

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 2017). Water quality is also not expected to be measurably affected in the vernal pools, and the composition of vegetation, including invasive plant species, is not expected to be altered by OSV use. Because the primary constituent elements of *Tuctoria greenei* critical habitat would be unaffected by OSV use, the Lassen OSV Designation project would have no effect on *Tuctoria greenei* critical habitat.

Sensitive Plants

Trees, shrubs, or sub-shrub species

Direct Effects

Snowmobile activities may damage vegetation on and along trails and in areas designated for cross-country OSV use. The most commonly observed effect from snowmobiles was the physical damage to shrubs, saplings, and other vegetation (Neumann and Merriam 1972, Wanek 1971). Winter Wildland Alliance (WWA) analyzed the Gallatin National Forest regeneration survey data collected between 1983 and 1996 in areas that were harvested and replanted. That survey data indicated snowmobiles had damaged between 12 and 720 trees per acre (WWA 2009). Damage to vegetation has been observed in the

Greater Yellowstone Area that is caused by winter recreational activities that occur off trail. For example, branches of willows (*Salix* spp.) and sagebrush (*Artemisia* spp.) have been broken, and leaders have been removed from conifers (Stangl 1999). Neumann and Merriam (1972) found that rigid woody stems up to one inch in diameter were very susceptible to damage. Stems were snapped off in surface packed or crusted snow. Neumann and Merriam (1972) also observed that compacted snow conditions caused twigs and branches to bend sharply and break. Stems that were more pliable bent and sprang back although the snowmobile track often removed bark from the stems' upper surfaces. Sub-zero temperatures make stems more prone to snapping rather than bending. Direct mechanical effects by snowmobiles on vegetation at and above snow surface can be severe. After only a single pass by a snowmobile, more than 78 percent of the saplings on a trail were damaged, and nearly 27 percent of them were damaged seriously enough to cause a high probability of death (Neumann and Merriam 1972). Young conifers were found to be extremely susceptible to damage from snowmobiles. Broken stems of any woody species would provide places for pathogens to enter the plant tissues and would reduce the integrity of developing stems or trunks, both of which could lead to additional damage or death of individuals. These direct effects are expected to be localized and not result in loss of entire occurrences.

On the Lassen National Forest, OSV use may directly damage individuals of the Region 5 Sensitive species *Eriogonum prociduum*, *Eriogonum spectabile*, *Frangula purshiana* ssp. *ultramafica*, *Monardella follettii*, and *Pinus albicaulis*.

Indirect Effects

Airborne pollutants from OSVs would be concentrated along OSV trails. Because deciduous trees and shrubs lose their leaves in the winter months, they cannot photosynthesize during fall and winter. Thus respiration is dramatically reduced for deciduous trees and shrubs. Although evergreen trees and shrubs retain their leaves and are thus capable of photosynthesis and respiration during winter, these processes are also considerably reduced during the cold season. Reduced respiration during the winter means that smaller amounts of the airborne pollutants would be ingested through gas exchange. For low-growing woody species that are generally covered by snow when OSV use would occur (*Eriogonum prociduum*, *Eriogonum spectabile*, and *Monardella follettii*), the exposure to airborne pollutants would be negligible.

It is expected that pollutant concentrations would be low enough that water quality would not be impaired, and thus, it is likely that woody plant responses, if any, would not be noticeable.

Snow compaction could result in adverse effects to short individuals present within the snow column, including shrubs and whitebark pine seedlings or saplings, by allowing exposure to colder temperatures for longer periods of time. The effects could include damage to plant tissues or death of individuals.

Perennial herbaceous species (including bryophytes)

Direct Effects

With minimum snow depth requirements providing protection of the soil surface and ground vegetation, perennial herbaceous species (which die back each year to buds at or below the soil surface) would not be directly affected by current or proposed OSV uses.

Indirect Effects

Compacted snow may alter the timing of new foliage emergence in the spring, due to delayed snowmelt and colder soil temperatures. This is expected to have minimal effects to perennial herbaceous plants because they are assumed to be adapted to a wide variety of natural snowmelt times. While they are also generally adapted to sub-freezing temperatures, because their living tissues are present at or near the

ground surface, colder temperatures from compacted snow could result in freeze damage to some individuals.

Airborne pollutants would not affect perennial herbaceous species because the snow layers would prevent the pollutants from reaching their foliage, that is, if foliage were to even be living during OSV season. It is expected that pollutant concentrations would be low enough that water quality would not be impaired, and thus, it is likely that plant responses, if any, would not be noticeable.

Annual plant species

Direct Effects

Plant species that complete their life cycle within one growing season would not be directly affected by current or proposed OSV uses because they are generally not growing during the authorized period of OSV use.

Indirect Effects

Compacted snow may alter the timing of seed germination and plant growth in the spring, due to delayed snowmelt and colder soil temperatures. Snowmelt in compacted areas may be delayed by up to 3 to 4 weeks. Annual plants must be adapted to a wide variety of natural snowmelt times in mountainous regions, due the variability of snowpack, temperature, and precipitation. Annual plants would not yet be growing in an area at the same time when the snowpack is sufficient to allow OSV use.

Airborne pollutants would not affect annual species because the new generation of plants (seeds) would still be dormant under the snow. It is expected that pollutant concentrations in the snowpack would be low enough that water quality would not be impaired, and thus, it is likely that plant responses, if any, would not be noticeable. Pollutant effects are not expected to occur outside areas of concentrated OSV use, such as trailheads and snow trails. Annual sensitive plant species are not known to occur within identified high-use areas, and these plants, due to their annual life cycle, are not likely to be affected by OSV use.

Aquatic species

Direct Effects

Aquatic plant species would not be directly affected by current or proposed OSV uses because OSVs are not authorized to operate over aquatic habitats.

Indirect Effects

Delayed snow melt and transfer of sub-freezing temperatures from snow compaction is not expected to affect aquatic plant species. Airborne pollutants would not affect aquatic species because the plants grow underwater. It is expected that pollutant concentrations would be low enough that water quality would not be impaired, and thus, it is likely that plant responses, if any, would not be noticeable.

Invasive Species

On the Lassen National Forest, 30 invasive plant species are documented; however, there have been no observations of weed introductions or spread specifically tied to OSV use (Sanger pers. comm. 2015). Roadside weed infestations are routinely treated during their active growing season each year. Given the uncertainties described above and overall lack of evidence of OSV use contributing to weed infestations, the risk of weed increases due to OSV use is expected to be very low for all alternatives (Davidson 2017).

Cumulative Effects

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

Past activities are considered part of the existing condition and are discussed within the Affected Environment section. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed to those effects.

Snow plowing at the established OSV trailheads is an ancillary activity associated with the Lassen National Forest OSV Designation project, and is not analyzed as a part of the proposal. Snow plowing is not expected to affect botanical resources, other than providing an additional vector for the possible transport of noxious or invasive weed species. Other ongoing and foreseeable future actions include livestock grazing, recreation, timber harvest, fuels reduction, woodcutting activities, wildfire suppression, and other activities. These activities may affect TEPS plants individually, but no trends toward Federal listing or loss of species viability are expected due to protective measures deemed necessary during environmental analysis and implemented as required.

Dutch Fire Salvage and Tamarack Fire Salvage are identified ongoing/future projects in the Hat Creek area. Beyond the effects of these wildfires, additional impacts may occur to *Astragalus inversus* because known sites are present in the Dutch Fire Salvage area.

Threatened and Endangered Plants

Since there would be no direct or indirect effects to *Orcuttia tenuis* or *Tuctoria greenei* or their associated critical habitat, there would be no cumulative effects to consider for these species.

Sensitive Plants

The effects of present and future projects on TEPS 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. When the minimal effects from other projects and activities are combined with the effects from the current proposal, there would be no loss of viability for any plant species and none would trend toward Federal listing, for all alternatives.

Alternative 1 – No Action

Alternative 1 Effects to TEPS plants

Detailed indicators and measures for botanical resources are presented in table 112 (page 322), and species that are known to exist in particular designated areas and near (within 100 feet of) snow trails are presented in table 113 through table 117 (beginning on page 327). Table 105 summarizes these same measures by the main plant status categories.

Table 105. TEPS plant indicators and measures for alternative 1

Plant Status	Total acres on Lassen National Forest	Acres within 100 feet of OSV trails	Acres in areas designated for OSV use
Threatened and endangered plants	78	11	76
Threatened and endangered plant critical habitats	23,840	13	21,992
Sensitive plants	2,543	123	1,756

There are no additional effects to TEPS plants beyond those described in Effects Common to All Alternatives that are specific to alternative 1. This alternative would generally have the greatest potential for direct effects to these botanical resources due to the larger areas designated for OSV use.

Threatened and Endangered Plants

As described above in Effects Common to All Alternatives, there would be no direct, indirect, or cumulative effects to *Orcuttia tenuis*, *Tuctoria greenei*, or their critical habitats.

Sensitive Plants

Sensitive plant species in the various plant life form categories would be affected differently, as described above in Effects Common to All Alternatives. Trees, shrubs, and sub-shrubs (woody plants) may be directly damaged by OSVs where they occur in areas designated for OSV use, and they may also experience indirect effects where they occur near designated OSV trails or in other high use areas. Perennial herbaceous species, annual species and aquatic species would not be directly affected, but they too may experience indirect effects if they occur near designated OSV trails or in other high-use areas.

Sensitive Plant Determinations for Alternative 1:

For the five sensitive woody plant species, *Eriogonum prociduum*, *Eriogonum spectabile*, *Frangula purshiana* ssp. *ultramafica*, *Monardella follettii*, and *Pinus albicaulis*, due to the potential for direct damage and indirect effects where they occur in areas designated for OSV use, alternative 1 of 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.

For five of the sensitive perennial herbaceous plant species, *Astragalus pulsiferae* var. *suksdorfii*, *Botrychium crenulatum*, *Botrychium minganense*, *Botrychium montanum*, and *Silene occidentalis* ssp. *longistipitata*, due to the potential for indirect effects to occurrences within 100 feet of designated OSV trails, alternative 1 of 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.

For all seven sensitive annual plant species, *Clarkia gracilis* ssp. *albicaulis*, *Clarkia mildrediae* ssp. *mildrediae*, *Cryptantha crinita*, *Eriastrum tracyi*, *Limnanthes floccosa* ssp. *bellingeriana*, *Mimulus evanescens*, and *Phacelia inundata*, because living plants are not present during the period of OSV use and they do not occur within 100 feet of designated OSV trails, alternative 1 of the Lassen OSV Designation project would have no impact to these species.

For the sensitive aquatic plant species, *Peltigera gowardii*, due to the potential for indirect effects from pollutants in the snowpack to occurrences within 100 feet of designated OSV trails, alternative 1 of 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.

For all other sensitive plants not specifically mentioned above, because they are not present within areas designated for OSV use, alternative 1 of the Lassen OSV Designation project would have no impact to these species.

Alternative 2 – Proposed Action

Alternative 2 Effects to Botanical Resources

Detailed indicators and measures for botanical resources are presented in table 112 (page 322), and species that are known to exist in particular designated areas and near (within 100 feet of) snow trails are

presented in table 113 through table 117 (beginning on page 327). Table 106 summarizes these same measures by the main plant status categories.

Table 106. TEPS plant indicators and measures for alternative 2

Plant Status	Total acres on Lassen National Forest	Acres within 100 feet of OSV trails	Acres in areas designated for OSV use
Threatened and endangered plants	78	0	70
Threatened and endangered plant critical habitats	23,840	21	21,161
Sensitive plants	2,543	86	1,626

There are no additional kinds of effects to TEPS plants beyond those described in Effects Common to All Alternatives that are specific to alternative 2. This alternative would generally have less potential for direct and indirect effects to these resources, mostly due to smaller areas designated for OSV use. Approximately 80 percent of the NFS land within the Lassen National Forest would be designated for cross-country OSV use, compared to 84 percent currently open—a reduction of 42,850 acres.

Threatened and Endangered Plants

As described above in Effects Common to All Alternatives, there would be no direct, indirect, or cumulative effects to *Orcuttia tenuis*, *Tuctoria Greenei*, or their critical habitats.

Sensitive Plants

The area of potentially affected sensitive plant occurrences in designated areas would be reduced by 130 acres, and near designated OSV trails reduced by 37 acres. Sensitive plant species in the various plant life form categories would be affected differently, as described above in Effects Common to All Alternatives. Trees, shrubs, and sub-shrubs (woody plants) may be directly damaged by OSVs where they occur in areas designated for OSV use, and they may also experience indirect effects where they occur near designated OSV trails. Perennial herbaceous species, annual species and aquatic species would not be directly affected, but they too may also experience indirect effects if they occur near designated OSV trails or in other high use areas.

Sensitive Plant Determinations for Alternative 2:

For the five sensitive woody plant species, *Eriogonum prociduum*, *Eriogonum spectabile*, *Frangula purshiana* ssp. *ultramafica*, *Monardella follettii*, and *Pinus albicaulis*, due to the potential for direct damage and indirect effects where they occur in areas designated for OSV use, alternative 2 of 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.

For three of the sensitive perennial herbaceous plant species, *Astragalus pulsiferae* var. *suksdorfii*, *Botrychium minganense*, and *Silene occidentalis* ssp. *longistipitata*, due to the potential for indirect effects to occurrences within 100 feet of designated OSV trails, alternative 2 of 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.

For all seven sensitive annual plant species, *Clarkia gracilis* ssp. *albicaulis*, *Clarkia mildrediae* ssp. *mildrediae*, *Cryptantha crinita*, *Eriastrum tracyi*, *Limnanthes floccosa* ssp. *bellingieriana*, *Mimulus evanescens*, and *Phacelia inundata*, because living plants are not present during the period of OSV use

and they do not occur within 100 feet of designated OSV trails, alternative 2 of the Lassen OSV Designation project would have no impact to these species.

For the sensitive aquatic plant species, *Peltigera gowardii*, due to the potential for indirect effects from pollutants in the snowpack to occurrences within 100 feet of designated OSV trails, alternative 2 of 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.

For all other sensitive plants not specifically mentioned above, because they are not present within areas designated for OSV use, alternative 2 of the Lassen OSV Designation project would have no impact to these species.

Alternative 3

Alternative 3 Effects to Botanical Resources

Detailed indicators and measures for botanical resources are presented in table 112 (page 322). Table 107 summarizes these same measures by the main plant status categories.

Table 107. TEPS plant indicators and measures for alternative 3

Plant Status	Total acres on Lassen National Forest	Acres within 100 feet of OSV trails	Acres in areas designated for OSV use
Threatened and endangered plants	78	11	49
Threatened and endangered plant critical habitats	23,840	13	19,664
Sensitive plants	2,543	123	1,535

There are no additional types of effects to TEPS plants beyond those described in Effects Common to All Alternatives that are specific to alternative 3. This alternative would have a lower potential for direct effects to botanical resources due to fewer acres designated for OSV use.

Threatened and Endangered Plants

As described above in Effects Common to All Alternatives, there would be no direct, indirect, or cumulative effects to *Orcuttia tenuis*, *Tuctoria greenii*, or their critical habitats.

Sensitive Plants

The area of potentially affected sensitive plant occurrences in designated areas would be reduced by 221 acres, and near designated OSV trails would remain the same as alternative 1. Sensitive plant species in the various plant life form categories would be affected differently, as described above in Effects Common to All Alternatives. Trees, shrubs, and sub-shrubs (woody plants) may be directly damaged by OSVs where they occur in areas designated for OSV use, and they may also experience indirect effects where they occur near designated OSV trails. Perennial herbaceous species, annual species and aquatic species would not be directly affected, but they also may experience indirect effects if they occur near designated OSV trails.

Sensitive Plant Determinations for Alternative 3:

For the five sensitive woody plant species, *Eriogonum prociduum*, *Eriogonum spectabile*, *Frangula purshiana* ssp. *ultramafica*, *Monardella follettii*, and *Pinus albicaulis*, due to the potential for direct damage where they occur in areas designated for OSV use and indirect effects to occurrences within

100 feet of designated OSV trails, alternative 3 of 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.

For five of the sensitive perennial herbaceous plant species, *Astragalus pulsiferae* var. *suksdorfii*, *Botrychium crenulatum*, *Botrychium minganense*, *Botrychium montanum*, and *Silene occidentalis* ssp. *longistipitata*, due to the potential for indirect effects to occurrences within 100 feet of designated OSV trails, alternative 3 of 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.

For all seven sensitive annual plant species, *Clarkia gracilis* ssp. *albicaulis*, *Clarkia mildrediae* ssp. *mildrediae*, *Cryptantha crinita*, *Eriastrum tracyi*, *Limnanthes floccosa* ssp. *bellingeriana*, *Mimulus evanescens*, and *Phacelia inundata*, because living plants are not present during the period of OSV use and they do not occur within 100 feet of designated OSV trails, alternative 3 of the Lassen OSV Designation project would have no impact to these species.

For the sensitive aquatic plant species, *Peltigera gowardii*, due to the potential for indirect effects from pollutants in the snowpack to occurrences within 100 feet of designated OSV trails, alternative 2 of 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.

For all other sensitive plants not specifically mentioned above, because they are not present within 100 feet of designated OSV trails, alternative 2 of the Lassen OSV Designation project would have no impact to these species.

Alternative 4

Alternative 4 Effects to Botanical Resources

Detailed indicators and measures for botanical resources are presented in table 112 (page 322). The following table summarizes these same measures by the main plant status categories.

Table 108. TEPS plant indicators and measures for alternative 4

Plant Status	Total acres on Lassen National Forest	Acres within 100 feet of OSV trails	Acres in areas designated for OSV use
Threatened and endangered plants	78	11	76
Threatened and endangered plant critical habitats	23,840	13	4,662
Sensitive plants	2,543	123	1,720

There are no additional types of effects to TEPS plants beyond those described in Effects Common to All Alternatives that are specific to alternative 4. This alternative carries nearly as much potential (second greatest among all alternatives) for effects to TEPS plants as alternative 1, due to similar areas designated for OSV use.

Threatened and Endangered Plants

As described above in Effects Common to All Alternatives, there would be no direct, indirect, or cumulative effects to *Orcuttia tenuis*, *Tuctoria greenei*, or their critical habitats.

Sensitive Plants

The area of potentially affected sensitive plant occurrences in designated areas would be reduced by 36 acres, and near designated OSV trails would remain the same as alternative 1. Sensitive plant species in the various plant life form categories would be affected differently, as described above in Effects Common to All Alternatives. Trees, shrubs, and sub-shrubs (woody plants) may be directly damaged by OSVs where they occur in areas designated for OSV use, and they may also experience indirect effects where they occur near designated OSV trails. Perennial herbaceous species, annual species, and aquatic species would not be directly affected, but they too may also experience indirect effects if they occur near designated OSV trails.

Sensitive Plant Determinations for Alternative 4:

For the five sensitive woody plant species, *Eriogonum prociduum*, *Eriogonum spectabile*, *Frangula purshiana* ssp. *ultramafica*, *Monardella follettii*, and *Pinus albicaulis*, due to the potential for direct damage where they occur in areas designated for OSV use and indirect effects to occurrences within 100 feet of designated OSV trails, alternative 4 of 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.

For five of the sensitive perennial herbaceous plant species, *Astragalus pulsiferae* var. *suksdorfii*, *Botrychium crenulatum*, *Botrychium minganense*, *Botrychium montanum*, and *Silene occidentalis* ssp. *longistipitata*, due to the potential for indirect effects to occurrences within 100 feet of designated OSV trails, alternative 4 of 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.

For all seven sensitive annual plant species, *Clarkia gracilis* ssp. *albicaulis*, *Clarkia mildrediae* ssp. *mildrediae*, *Cryptantha crinita*, *Eriastrum tracyi*, *Limnanthes floccosa* ssp. *bellingneriana*, *Mimulus evanescens*, and *Phacelia inundata*, because living plants are not present during the period of OSV use and they do not occur within 100 feet of designated OSV trails, alternative 4 of the Lassen OSV Designation project would have no impact to these species.

For the sensitive aquatic plant species, *Peltigera gowardii*, due to the potential for indirect effects from pollutants in the snowpack to occurrences within 100 feet of designated OSV trails, alternative 4 of 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.

For all other sensitive plants not specifically mentioned above, because they are not present within 100 feet of designated OSV trails, alternative 4 of the Lassen OSV Designation project would have no impact to these species.

Alternative 5

Alternative 5 Effects to Botanical Resources

Detailed indicators and measures for botanical resources are presented in table 112 (page 322). Table 109 summarizes these same measures by the main plant status categories.

Table 109. TEPS plant indicators and measures for alternative 5

Plant Status	Total acres on Lassen National Forest	Acres within 100 feet of OSV trails	Acres in areas designated for OSV use
Threatened and endangered plants	78	11	22
Threatened and endangered plant critical habitats	23,840	13	14,966
Sensitive plants	2,543	126	1,357

There are no additional types of effects to TEPS plants beyond those described in Effects Common to All Alternatives that are specific to alternative 5. This alternative would generally have the least potential for direct effects to botanical resources due to the fewest acres being designated for OSV use.

Threatened and Endangered Plants

As described above in Effects Common to All Alternatives, there would be no direct, indirect, or cumulative effects to *Orcuttia tenuis*, *Tuctoria greeniei*, or their critical habitats.

Sensitive Plants

The area of potentially affected sensitive plant occurrences in designated areas would be reduced by 398 acres, and near designated OSV trails would increase by 3 acres. Sensitive plant species in the different plant life form categories would be affected differently, as described above in Effects Common to All Alternatives. Trees, shrubs, and sub-shrubs (woody plants) may be directly damaged by OSVs where they occur in areas designated for OSV use, and they may also experience indirect effects where they occur near designated OSV trails. Perennial herbaceous species, annual species and aquatic species would not be directly affected, but they too may also experience indirect effects if they occur near designated OSV trails.

Sensitive Plant Determinations for Alternative 5:

For four of the five sensitive woody plant species, *Eriogonum spectabile*, *Frangula purshiana* ssp. *ultramafica*, *Monardella follettii*, and *Pinus albicaulis*, due to the potential for direct damage where they occur in areas designated for OSV use and indirect effects to occurrences within 100 feet of designated OSV trails, alternative 5 of 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.

For five of the sensitive perennial herbaceous plant species, *Astragalus pulsiferae* var. *suksdorfii*, *Botrychium crenulatum*, *Botrychium minganense*, *Botrychium montanum*, and *Silene occidentalis* ssp. *longistipitata*, due to the potential for indirect effects to occurrences within 100 feet of designated OSV trails, alternative 5 of 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.

For all seven sensitive annual plant species, *Clarkia gracilis* ssp. *albicaulis*, *Clarkia mildrediae* ssp. *mildrediae*, *Cryptantha crinita*, *Eriastrum tracyi*, *Limnanthes floccosa* ssp. *bellingieriana*, *Mimulus evanescens*, and *Phacelia inundata*, because living plants are not present during the period of OSV use and they do not occur within 100 feet of designated OSV trails, alternative 5 of the Lassen OSV Designation project would have no impact to these species.

For the sensitive aquatic plant species, *Peltigera gowardii*, due to the potential for indirect effects from pollutants in the snowpack to occurrences within 100 feet of designated OSV trails, alternative 5 of 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.

For all other Sensitive plants not specifically mentioned above, because they are not present within 100 feet of designated OSV trails, alternative 5 of the Lassen OSV Designation project would have no impact to these species.

Summary of Effects

Degree to Which the Alternatives Address the Issues

Table 110. Relative comparison of alternatives by TEPS plant issue topics

Analysis Topic	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Threatened and endangered plants	All alternatives equal (issue sufficiently addressed – no effects)	All alternatives equal	All alternatives equal	All alternatives equal	All alternatives equal
Threatened and endangered plant critical habitats	All alternatives equal (issue sufficiently addressed – no effects)	All alternatives equal	All alternatives equal	All alternatives equal	All alternatives equal
Sensitive plants	All alternatives equal (issue sufficiently addressed – minor potential effects)	All alternatives equal	All alternatives equal	All alternatives equal	All alternatives equal

Summary of TEPS Plant Measures and Determinations

Table 111. TEPS plant summary of measures for all alternatives

Analysis Topic	Total acres on Lassen National Forest	Acres within 100 feet of OSV trails	Acres in areas designated for OSV use
Threatened and endangered plants	78	11 Alt. 1 0 Alt. 2 11 Alt. 3 11 Alt. 4 11 Alt. 5	76 Alt. 1 70 Alt. 2 49 Alt. 3 76 Alt. 4 22 Alt. 5
Threatened and endangered plant critical habitats	23,840	13 Alt. 1 21 Alt. 2 13 Alt. 3 13 Alt. 4 13 Alt. 5	21,992 Alt. 1 21,161 Alt. 2 19,664 Alt. 3 4,662 Alt. 4 14,966 Alt. 5
Sensitive plants	2,543	123 Alt. 1 86 Alt. 2 123 Alt. 3 123 Alt. 4 126 Alt. 5	1,756 Alt. 1 1,626 Alt. 2 1,535 Alt. 3 1,720 Alt. 4 1,357 Alt. 5

Threatened and Endangered Plants

Although occurrences and critical habitat for *Orcuttia tenuis* and critical habitat for *Tuctoria greenei* are located within the Lassen National Forest OSV Designation project, proposed activities are not expected to affect the critical habitats or occurrences of any proposed or listed species because authorized activities would occur at a time of year when the plants are not growing, occurrences are located greater than 100 feet from OSV trails, and OSV use on the required minimum snow depths is not expected to result in any changes to vegetation or hydrology of their vernal pool habitats. Therefore, it is determined that the

Lassen National Forest OSV Designation project would have no effect on *Orcuttia tenuis* or critical habitats for *Orcuttia tenuis* and *Tuctoria greenei* on the Lassen National Forest.

Sensitive Plants

Sensitive woody plant species may be directly affected by crushing, breaking, or abrasion of stems and evergreen foliage where they occur in any areas designated for OSV use. Plants of other life form categories would not be directly affected because their living tissues are not present above ground, and would not be directly damaged by OSVs. Any of the Sensitive plants may be indirectly affected by snow compaction and/or OSV emissions containing pollutants where they occur in close proximity to areas of concentrated use (within 100 feet of designated OSV trails). Thus, these plant species are reasonably at risk to some level of effects, dependent on their life forms, timing of growth, and proximity to heavy OSV use. Potential indirect effects are expected to be minor, and all effects would be minimized by the required minimum snow depths proposed. Although some individuals may be severely damaged and may eventually die from intensive OSV damage (*Pinus albicaulis* is the most likely species to be damaged to this extent), OSV use is not expected to result in a trend toward Federal listing or loss of viability for any Sensitive plants.

Sensitive Plant Determinations:

For the four sensitive woody plant species, *Eriogonum spectabile*, *Frangula purshiana* ssp. *ultramafica*, *Monardella follettii*, and *Pinus albicaulis*, due to the potential for direct damage where they occur in areas designated for OSV use and indirect effects to occurrences within 100 feet of designated OSV trails, all alternatives of the Lassen OSV Designation project may affect individuals, but are not likely to result in a trend toward Federal listing or loss of viability in the planning area.

For the sensitive woody plant, *Eriogonum prociduum*, because no known occurrences would be present in any areas designated for OSV use, alternative 5 of the Lassen OSV Designation project would have no impact. For alternatives 1 through 4, due to the potential for direct damage where they occur in areas designated for OSV use and indirect effects to occurrences within 100 feet of designated OSV trails, all alternatives of the Lassen OSV Designation project may affect individuals, but are not likely to result in a trend toward Federal listing or loss of viability in the planning area.

For five of the sensitive perennial herbaceous plant species, *Astragalus pulsiferae* var. *suksdorfii*, *Botrychium crenulatum*, *Botrychium minganense*, *Botrychium montanum*, and *Silene occidentalis* ssp. *longistipitata*, due to the potential for indirect effects to occurrences within 100 feet of designated OSV trails, alternatives 1, 3, 4, and 5 of the Lassen OSV Designation project may affect individuals, but are not likely to result in a trend toward Federal listing or loss of viability in the planning area.

For three of the above sensitive perennial herbaceous plant species *Astragalus pulsiferae* var. *suksdorfii*, *Botrychium minganense*, and *Silene occidentalis* ssp. *longistipitata*, due to the potential for indirect effects to occurrences within 100 feet of designated OSV trails, alternative 3 of the Lassen OSV Designation project may affect individuals, but are not likely to result in a trend toward Federal listing or loss of viability in the planning area.

For all seven sensitive annual plant species, *Clarkia gracilis* ssp. *albicaulis*, *Clarkia mildrediae* ssp. *mildrediae*, *Cryptantha crinita*, *Eriastrum tracyi*, *Limnanthes floccosa* ssp. *bellingneriana*, *Mimulus evanescens*, and *Phacelia inundata*, because living plants are not present during the period of OSV use and they do not occur within 100 feet of designated OSV trails or other identified areas of high use, all alternatives of the Lassen OSV Designation project would have no impact to these species.

For the sensitive aquatic plant species, *Peltigera gowardii*, due to the potential for indirect effects from pollutants in the snowpack to occurrences within 100 feet of designated OSV trails, all alternatives of 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.

For all other sensitive plants not specifically mentioned above, because they are not present within 100 feet of designated OSV trails, the Lassen OSV Designation project would have no impact to these species.

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

All alternatives would comply with the Endangered Species Act because no federally listed or proposed species would be affected. With the biological evaluation/biological assessment (project record), the proposed project effects on TEPS plants have been evaluated and measures taken to ensure that sensitive plants do not become threatened or endangered because of Forest Service actions. All alternatives would maintain viable populations of all native and desired nonnative plants, and the proposed activities were reviewed for potential effects on rare species, and thus would be compliant with Forest Service Manual direction. All alternatives would also comply with the Lassen National Forest Land and Resource Management Plan (LRMP) and the Sierra Nevada Forest Plan Amendment because Sensitive plant populations would remain viable and their habitats would be maintained.

Unavoidable Adverse Effects

As described in Effects Common to All Alternatives, sensitive woody plants and other sensitive plants near OSV trails may be affected by OSV use.

Irreversible and Irretrievable Commitments of Resources

Although some adverse effects to sensitive plants may occur, these plants are a renewable resource, and thus, there would be no irreversible commitments of the resource. Excessive damage to individuals could cause mortality and thus, may constitute an irretrievable commitment.

Indicators, Measures, and Effects to TEPS Plants

Table 112. TEPS plants detailed indicators, measures, and effects

Species	Acres within 100 feet of OSV trails	Acres in areas designated for cross-country OSV use	Determination
Threatened or Endangered Plants			
<i>Chamaesyce hooveri</i> Hoover's spurge	0 all alternatives	0 all alternatives	No Effect, because species is not present (all alternatives)
<i>Chamaesyce hooveri</i> designated critical habitat	0 all alternatives	0 all alternatives	No Effect, because designated critical habitat is not present (all alternatives)
<i>Fritillaria gentneri</i> Gentner's Fritillary	0 all alternatives	0 all alternatives	No Effect, because species is not present (all alternatives)

Species	Acres within 100 feet of OSV trails	Acres in areas designated for cross-country OSV use	Determination
<i>Limnanthes floccosa</i> ssp. <i>Californica</i> Butte County meadowfoam	0 all alternatives	0 all alternatives	No Effect, because species is not present (all alternatives)
<i>Limnanthes floccosa</i> ssp. <i>Californica</i> designated critical habitat	0 all alternatives	0 all alternatives	No Effect, because designated critical habitat is not present (all alternatives)
<i>Orcuttia tenuis</i> Slender Orcutt grass	11 Alt. 1 0 Alt. 2 11 Alt. 3 11 Alt. 4 22 Alt. 5	76 Alt. 1 70 Alt. 2 49 Alt. 3 76 Alt. 4 22 Alt. 5	No Effect, because OSV use would not impact or cause changes to the species or habitat (all alternatives)
<i>Orcuttia tenuis</i> designated critical habitat	13 Alt. 1 21 Alt. 2 13 Alt. 3 13 Alt. 4 13 Alt. 5	21,078 Alt. 1 20,240 Alt. 2 18,838 Alt. 3 4,662 Alt. 4 14,961 Alt. 5	No Effect, because Primary Constituent Elements would remain unaffected (all alternatives)
<i>Tuctoria greenei</i> Greene's tuctoria	0 all alternatives	0 all alternatives	No Effect, because species is not present (all alternatives)
<i>Tuctoria greenei</i> designated critical habitat	0 all alternatives	921 Alt. 1 921 Alt. 2 826 Alt. 3 0 Alt. 4 0 Alt. 5	No Effect, because Primary Constituent Elements would remain unaffected (all alternatives)
Sensitive Plants			
Trees, Shrubs, and Sub-shrubs			
<i>Eriogonum prociduum</i> prostrate buckwheat	0 all alternatives	5.7 Alt. 1 5.7 Alt. 2 5.7 Alt. 3 5.7 Alt. 4 0 Alt. 5	May Affect, no trend toward Federal listing (Alts. 1, 2, 3, and 4) No Impact (Alt. 5)
<i>Eriogonum spectabile</i> Barron's buckwheat	0 all alternatives	1.8 all alternatives	May Affect, no trend toward Federal listing (all alternatives)
<i>Frangula purshiana</i> ssp. <i>Ultramafica</i> caribou coffeeberry	0 all alternatives	30 all alternatives	May Affect, no trend toward Federal listing (all alternatives)
<i>Monardella follettii</i> Follett's monardella	0 all alternatives	137 all alternatives	May Affect, no trend toward Federal listing (all alternatives)
<i>Pinus albicaulis</i> whitebark pine	0 all alternatives	7.1 all alternatives	May Affect, no trend toward Federal listing (all alternatives)

Species	Acres within 100 feet of OSV trails	Acres in areas designated for cross-country OSV use	Determination
Perennial Herbaceous Plants			
<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> Suksdorf's milk-vetch	60 Alt. 1 52 Alt. 2 59 Alt. 3 60 Alt. 4 62 Alt. 5	236 Alt. 1 236 Alt. 2 235 Alt. 3 236 Alt. 4 235 Alt. 5	May Affect, no trend toward Federal listing (all alternatives)
<i>Boechea constancei</i> Constance's rockcress	0 all alternatives	13 all alternatives	No Impact (all alternatives)
<i>Botrychium ascendens</i> upswept moonwort	0 all alternatives	10 Alt. 1 10 Alt. 2 5.6 Alt. 3 10 Alt. 4 3.5 Alt. 5	No Impact (all alternatives)
<i>Botrychium crenulatum</i> scalloped moonwort	0.7 Alt. 1 0 Alt. 2 0.7 Alt. 3 0.7 Alt. 4 0.7 Alt. 5	21 Alt. 1 21 Alt. 2 10 Alt. 3 19 Alt. 4 7.6 Alt. 5	No Impact (alternative 2) May Affect, no trend toward Federal listing (alternatives 1, 3, 4, and 5)
<i>Botrychium lunaria</i> common moonwort	0 all alternatives	0 all alternatives	No Impact (all alternatives)
<i>Botrychium minganense</i> Mingan moonwort	5.2 Alt. 1 1.7 Alt. 2 5.2 Alt. 3 5.2 Alt. 4 5.2 Alt. 5	45 Alt. 1 45 Alt. 2 28 Alt. 3 41 Alt. 4 28 Alt. 5	May Affect, no trend toward Federal listing (all alternatives)
<i>Botrychium montanum</i> western goblin	0.7 Alt. 1 0 Alt. 2 0.7 Alt. 3 0.7 Alt. 4 0.7 Alt. 5	38 Alt. 1 38 Alt. 2 22 Alt. 3 35 Alt. 4 22 Alt. 5	No Impact (alternative 2) May Affect, no trend toward Federal listing (alternatives 1, 3, 4, and 5)
<i>Botrychium pedunculatum</i> stalked moonwort	0 all alternatives	0 all alternatives	No Impact (all alternatives)
<i>Botrychium pinnatum</i> northwestern moonwort	0 all alternatives	2.1 all alternatives	No Impact (all alternatives)
<i>Bruchia bolanderi</i> Bolander's bruchia	0 all alternatives	0 all alternatives	No Impact (all alternatives)
<i>Buxbaumia viridis</i> green bug-on-a-stick	0 all alternatives	0 all alternatives	No Impact (all alternatives)
<i>Calochortus longebarbatus</i> var. <i>longebarbatus</i> long haired star tulip	0 all alternatives	6.8 Alt. 1 6.8 Alt. 2 6.8 Alt. 3 6.8 Alt. 4 0 Alt. 5	No Impact (all alternatives)
<i>Collomia larsenii</i> talus collomia	0 all alternatives	0 all alternatives	No Impact (all alternatives)
<i>Cypripedium fasciculatum</i> clustered lady's-slipper	0 all alternatives	2.7 all alternatives	No Impact (all alternatives)

Species	Acres within 100 feet of OSV trails	Acres in areas designated for cross-country OSV use	Determination
<i>Cypripedium montanum</i> mountain lady's-slipper	0 all alternatives	7.2 Alt. 1 7.2 Alt. 2 5.6 Alt. 3 7.2 Alt. 4 0 Alt. 5	No Impact (all alternatives)
<i>Eremogone cliftonii</i> Clifton's eremogone	0 all alternatives	8.6 all alternatives	No Impact (all alternatives)
<i>Fritillaria eastwoodiae</i> Butte County fritillary	0 all alternatives	0.6 Alt. 1 0.6 Alt. 2 0 Alt. 3 0.6 Alt. 4 0 Alt. 5	No Impact (all alternatives)
<i>Helodium blandowii</i> Blandow's bog moss	0 all alternatives	0 all alternatives	No Impact (all alternatives)
<i>Juncus leiospermus</i> var. <i>leiospermus</i> Red Bluff dwarf rush	0 all alternatives	13 Alt. 1 13 Alt. 2 13 Alt. 3 13 Alt. 4 0 Alt. 5	No Impact (all alternatives)
<i>Juncus luciensis</i> Santa Lucia dwarf rush	0 all alternatives	0 all alternatives	No Impact (all alternatives)
<i>Lewisia kelloggii</i> ssp. <i>hutchisonii</i> Hutchison's lewisia	0 all alternatives	10 all alternatives	No Impact (all alternatives)
<i>Lomatium roseanum</i> adobe parsley	0 all alternatives	88 Alt. 1 88 Alt. 2 88 Alt. 3 88 Alt. 4 1.1 Alt. 5	No Impact (all alternatives)
<i>Meesia uliginosa</i> broad-nerved hump moss	0.7 all alternatives	13 Alt. 1 13 Alt. 2 13 Alt. 3 13 Alt. 4 9.2 Alt. 5	May Affect, no trend toward Federal listing (all alternatives)
<i>Oreostemma elatum</i> Plumas aster	0 all alternatives	0 all alternatives	No Impact (all alternatives)
<i>Packera eurycephala</i> var. <i>lewisrosei</i> cut-leaved ragwort	0 all alternatives	533 all alternatives	No Impact (all alternatives)
<i>Penstemon personatus</i> closed-throated beardtongue	0 all alternatives	60 all alternatives	No Impact (all alternatives)
<i>Penstemon sudans</i> Susanville beardtongue	47 Alt. 1 27 Alt. 2 47 Alt. 3 47 Alt. 4 47 Alt. 5	160 Alt. 1 160 Alt. 2 134 Alt. 3 160 Alt. 4 123 Alt. 5	May Affect, no trend toward Federal listing (all alternatives)
<i>Poa sierra</i> Sierra bluegrass	0 all alternatives	0 all alternatives	No Impact (all alternatives)
<i>Pyrrocoma lucida</i> sticky pyrrocoma	0 all alternatives	5.9 all alternatives	No Impact (all alternatives)

Species	Acres within 100 feet of OSV trails	Acres in areas designated for cross-country OSV use	Determination
<i>Rorippa columbiae</i> Columbia yellow cress	0 all alternatives	28 all alternatives	No Impact (all alternatives)
<i>Rupertia hallii</i> Hall's rupertia	0 all alternatives	67 Alt. 1 27 Alt. 2 29 Alt. 3 67 Alt. 4 29 Alt. 5	No Impact (all alternatives)
<i>Scheuchzeria palustris</i> American scheuchzeria	0 all alternatives	20 all alternatives	No Impact (all alternatives)
<i>Sedum albomarginatum</i> Feather River stonecrop	0 all alternatives	17 all alternatives	No Impact (all alternatives)
<i>Silene occidentalis</i> ssp. <i>longistipitata</i> long-stiped campion	6.2 Alt. 1 2.1 Alt. 2 6.2 Alt. 3 6.2 Alt. 4 6.2 Alt. 5	18 all alternatives	May Affect, no trend toward Federal listing (all alternatives)
<i>Thelypodium howellii</i> ssp. <i>Howellii</i> Howell's thelypody	0 all alternatives	0 all alternatives	No Impact (all alternatives)
Annual Plants			
<i>Clarkia gracilis</i> ssp. <i>Albicaulis</i> white-stemmed clarkia	0 all alternatives	5.5 Alt. 1 0 Alt. 2 0.7 Alt. 3 5.5 Alt. 4 0 Alt. 5	No Impact (all alternatives)
<i>Clarkia mildrediae</i> ssp. <i>Mildrediae</i> Mildred's clarkia	0 all alternatives	0.7 all alternatives	No Impact (all alternatives)
<i>Cryptantha crinita</i> silky cryptantha	0 all alternatives	84 Alt. 1 0 Alt. 2 0.7 Alt. 3 0.7 Alt. 4 0 Alt. 5	No Impact (all alternatives)
<i>Eriastrum tracyi</i> Tracy's eriastrum	0 all alternatives	3.7 Alt. 1 3.6 Alt. 2 2.2 Alt. 3 3.7 Alt. 4 0.1 Alt. 5	No Impact (all alternatives)
<i>Limnanthes floccosa</i> ssp. <i>bellingiana</i> Bellinger's meadowfoam	0 all alternatives	2.1 Alt. 1 2.1 Alt. 2 1.4 Alt. 3 2.1 Alt. 4 0 Alt. 5	No Impact (all alternatives)
<i>Mimulus evanescens</i> ephemeral monkeyflower	0 all alternatives	23 Alt. 1 23 Alt. 2 23 Alt. 3 23 Alt. 4 1.4 Alt. 5	No Impact (all alternatives)

Species	Acres within 100 feet of OSV trails	Acres in areas designated for cross-country OSV use	Determination
<i>Phacelia inundata</i> playa phacelia	0 all alternatives	29 Alt. 1 29 Alt. 2 27 Alt. 3 1.5 Alt. 4 0 Alt. 5	No Impact (all alternatives)
Aquatic Plants			
<i>Peltigera gowardia</i> veined water lichen	3.1 all alternatives	3.1 all alternatives	May Affect, no trend toward Federal listing (all alternatives)

TEPS Plants in Designated Areas and near Snow Trails

Table 113. TEPS plants in alternative 1

Designated Area or Snow Trail Name/Number	Species present (number of occurrences) Alternative 1
Ashpan Designated Area	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> (3 within designated area, 2 of these are within 100 feet of trails 32N25 and 33N16) <i>Pinus albicaulis</i> (1)
Bogard Designated Area	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> (12 within designated area, 5 of these are within 100 feet of trails 32N07 and 32N08) <i>Botrychium minganense</i> (2) <i>Botrychium montanum</i> (1) <i>Eriastrum tracyi</i> (5) <i>Eriogonum prociduum</i> (1) <i>Mimulus evanescens</i> (5) <i>Orcuttia tenuis</i> (10) <i>Phacelia inundata</i> (2) <i>Rorippa columbiae</i> (1)
Fall River Designated Area	<i>Cypripedium fasciculatum</i> (2) <i>Eriastrum tracyi</i> (1) <i>Fritillaria eastwoodiae</i> (1) <i>Juncus leiospermus</i> var. <i>leiospermus</i> (5) <i>Limnanthes floccosa</i> ssp. <i>bellingermana</i> (3) <i>Orcuttia tenuis</i> (4)
Fredonyer Designated Area	<i>Botrychium minganense</i> (2) <i>Botrychium montanum</i> (1) <i>Lomatium roseanum</i> (4) <i>Penstemon sudans</i> (17 within designated area, 11 of these are near designated OSV trails 29N03, 29N46, and 29N20Y) <i>Pyrrocoma lucida</i> (1)

Designated Area or Snow Trail Name/Number	Species present (number of occurrences) Alternative 1
Jonesville Designated Area	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> (1) <i>Boechea constancei</i> (3) <i>Botrychium ascendens</i> (7) <i>Botrychium crenulatum</i> (7 within designated area, 1 of these is near designated OSV trail 27N06) <i>Botrychium minganense</i> (16 within designated area, 2 of these are near designated OSV trail 27N11) <i>Botrychium montanum</i> (15) <i>Clarkia mildrediae</i> ssp. <i>mildrediae</i> (1) <i>Cypripedium fasciculatum</i> (3) <i>Eremogone cliftonii</i> (3) <i>Frangula purshiana</i> (3) <i>Lewisia kelloggii</i> ssp. <i>hutchisonii</i> (7) <i>Meesia uliginosa</i> (9 within designated area, 1 of these is near designated OSV trail 27N11) <i>Monardella follettii</i> (4) <i>Orcuttia tenuis</i> (2) <i>Packera eurycephala</i> var. <i>lewisrosei</i> (5) <i>Penstemon personatus</i> (2) <i>Rupertia hallii</i> (2) <i>Sedum albomarginatum</i> (2) <i>Silene occidentalis</i> ssp. <i>longistipitata</i> (4)
Morgan Summit Designated Area	<i>Botrychium ascendens</i> (1) <i>Botrychium crenulatum</i> (9) <i>Botrychium minganense</i> (18 within designated area, 3 of these are near designated OSV trails 29N60, 29N67, and 31N17)) <i>Botrychium montanum</i> (17 within designated area, 1 of these is near designated OSV trail 31N17) <i>Botrychium pinnatum</i> (2) <i>Clarkia gracilis</i> ssp. <i>albicaulis</i> (6) <i>Cryptantha crinita</i> (9) <i>Meesia uliginosa</i> (1) <i>Rupertia hallii</i> (10) <i>Scheuchzeria palustris</i> ssp. <i>Americana</i> (2) <i>Silene occidentalis</i> ssp. <i>longistipitata</i> (5 within designated area, 3 of these are near designated OSV trail 29N48)
Shasta Designated Area	<i>Calochortus longebarbatus</i> ver. <i>Longebarbatus</i> (1) <i>Cypripedium montanum</i> (1) <i>Orcuttia tenuis</i> (1)
Swain Mountain Designated Area	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> (4) <i>Botrychium ascendens</i> (2) <i>Botrychium minganense</i> (8 within designated area, 2 of these are near designated OSV trail 32N10) <i>Botrychium montanum</i> (8) <i>Botrychium pinnatum</i> (1) <i>Eriogonum spectabile</i> (3) <i>Meesia uliginosa</i> (2) <i>Orcuttia tenuis</i> (3 within designated area, 1 of these is near designated OSV trail 30N07) <i>Peltigera gowardii</i> (1 within designated area, and it is also near designated OSV trail 29N55) <i>Penstemon sudans</i> (9) <i>Rorippa columbiae</i> (1) <i>Scheuchzeria palustris</i> ssp. <i>Americana</i> (1)
Snow trails outside designated areas	No occurrences along snow trails outside designated areas

Table 114. TEPS plants in alternative 2

Designated Area or Snow Trail Name/Number	Species present (number of occurrences) Alternative 2
Ashpan Designated Area	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> (3 within designated area, 2 of these are within 100 feet of trails 32N25 and 33N16) <i>Pinus albicaulis</i> (1)
Bogard Designated Area	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> (11 within designated area, 3 of these are within 100 feet of trail 32N07) <i>Botrychium minganense</i> (2) <i>Botrychium montanum</i> (1) <i>Eriastrum tracyi</i> (4) <i>Eriogonum prociduum</i> (1) <i>Mimulus evanescens</i> (5) <i>Orcuttia tenuis</i> (10) <i>Phacelia inundata</i> (2) <i>Rorippa columbiae</i> (1)
Fall River Designated Area	<i>Cypripedium montanum</i> (2) <i>Eriastrum tracyi</i> (1) <i>Juncus leiospermus</i> var. <i>leiospermus</i> (5) <i>Limnanthes floccosa</i> ssp. <i>bellingiana</i> (3) <i>Orcuttia tenuis</i> (4)
Fredonyer Designated Area	<i>Botrychium minganense</i> (2) <i>Botrychium montanum</i> (1) <i>Lomatium roseanum</i> (4) <i>Penstemon sudans</i> (15 within designated area, 8 of these are near designated OSV trails 29N03, 29N46, and 29N20Y) <i>Pyrrocoma lucida</i> (1)
Jonesville Designated Area	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> (1) <i>Boechea constancei</i> (3) <i>Botrychium ascendens</i> (7) <i>Botrychium crenulatum</i> (9) <i>Botrychium minganense</i> (16) <i>Botrychium montanum</i> (15) <i>Clarkia mildrediae</i> ssp. <i>mildrediae</i> (1) <i>Cypripedium fasciculatum</i> (3) <i>Eremogone cliftonii</i> (3) <i>Frangula purshiana</i> (3) <i>Lewisia kelloggii</i> ssp. <i>hutchisonii</i> (7) <i>Meesia uliginosa</i> (9) <i>Monardella follettii</i> (4) <i>Orcuttia tenuis</i> (1) <i>Packera eurycephala</i> var. <i>lewisrosei</i> (5) <i>Penstemon personatus</i> (2) <i>Rupertia hallii</i> (2) <i>Sedum albomarginatum</i> (2) <i>Silene occidentalis</i> ssp. <i>longistipitata</i> (4)
Morgan Summit Designated Area	<i>Botrychium ascendens</i> (1) <i>Botrychium crenulatum</i> (9) <i>Botrychium minganense</i> (18 within designated area, 1 of these is near designated OSV trail 29N67) <i>Botrychium montanum</i> (17) <i>Botrychium pinnatum</i> (2) <i>Meesia uliginosa</i> (1) <i>Rupertia hallii</i> (2) <i>Scheuchzeria palustris</i> ssp. <i>Americana</i> (2) <i>Silene occidentalis</i> ssp. <i>longistipitata</i> (5 within designated area, 2 of these are near designated OSV trail 29N48)

Designated Area or Snow Trail Name/Number	Species present (number of occurrences) Alternative 2
Shasta Designated Area	<i>Calochortus longebarbatus</i> var. <i>longebarbatus</i> (1) <i>Cypripedium montanum</i> (1) <i>Orcuttia tenuis</i> (1)
Swain Mountain Designated Area	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> (4) <i>Botrychium ascendens</i> (2) <i>Botrychium crenulatum</i> (2) <i>Botrychium minganense</i> (8 within designated area, 1 of these is near designated OSV trail 32N10) <i>Botrychium montanum</i> (8) <i>Botrychium pinnatum</i> (1) <i>Eriogonum spectabile</i> (3) <i>Meesia uliginosa</i> (2) <i>Orcuttia tenuis</i> (3) <i>Peltigera gowardii</i> (1 within designated area, and it is also near designated OSV trail 29N55) <i>Penstemon sudans</i> (9) <i>Rorippa columbiae</i> (1) <i>Scheuchzeria palustris</i> ssp. <i>Americana</i> (1)
Snow trails outside designated areas	No occurrences along snow trails outside designated areas

Table 115. TEPS plants in alternative 3

Designated Area or Snow Trail Name/Number	Species present (number of occurrences) Alternative 3
Ashpan Designated Area	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> (3 within designated area, 2 of these are within 100 feet of trails 32N25 and 33N16) <i>Pinus albicaulis</i> (1)
Bogard Designated Area	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> (11 within designated area, 5 of these are within 100 feet of trails 32N07 and 32N08) <i>Botrychium minganense</i> (2) <i>Botrychium montanum</i> (1) <i>Eriastrum tracyi</i> (4) <i>Eriogonum prociduum</i> (1) <i>Mimulus evanescens</i> (5) <i>Orcuttia tenuis</i> (10) <i>Rorippa columbiae</i> (1)
Fall River Designated Area	<i>Limnanthus floccosa</i> ssp. <i>bellingeriana</i> (2)
Fredonyer Designated Area	<i>Botrychium minganense</i> (2) <i>Botrychium montanum</i> (1) <i>Lomatium roseanum</i> (4) <i>Penstemon sudans</i> (15 within designated area, 11 of these are near designated OSV trails 29N03, 29N46, and 29N20Y) <i>Pyrocoma lucida</i> (1)

Designated Area or Snow Trail Name/Number	Species present (number of occurrences) Alternative 3
Jonesville Designated Area	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> (1) <i>Boechea constancei</i> (3) <i>Botrychium ascendens</i> (5) <i>Botrychium crenulatum</i> (8) <i>Botrychium minganense</i> (14 within designated area, 2 of these are near designated OSV trails 27N06 and 27N11) <i>Botrychium montanum</i> (12) <i>Clarkia mildrediae</i> ssp. <i>mildrediae</i> (1) <i>Cypripedium fasciculatum</i> (3) <i>Eremogone cliftonii</i> (3) <i>Frangula purshiana</i> (3) <i>Lewisia kelloggii</i> ssp. <i>hutchisonii</i> (7) <i>Meesia uliginosa</i> (9 within designated area, 1 of these is near designated OSV trail 27N11) <i>Monardella follettii</i> (4) <i>Orcuttia tenuis</i> (1) <i>Packera eurycephala</i> var. <i>lewisrosei</i> (5) <i>Penstemon personatus</i> (2) <i>Rupertia hallii</i> (2) <i>Sedum albomarginatum</i> (2) <i>Silene occidentalis</i> ssp. <i>longistipitata</i> (4)
Morgan Summit Designated Area	<i>Botrychium ascendens</i> (1) <i>Botrychium crenulatum</i> (4) <i>Botrychium minganense</i> (11 within designated area, 3 of these are near designated OSV trails 29N60, 29N67, and 31N17) <i>Botrychium montanum</i> (8 within designated area, 1 of these is near designated OSV trail 31N17) <i>Botrychium pinnatum</i> (2) <i>Meesia uliginosa</i> (1) <i>Rupertia hallii</i> (2) <i>Scheuchzeria palustris</i> ssp. <i>Americana</i> (2) <i>Silene occidentalis</i> ssp. <i>longistipitata</i> (5 within designated area, 3 of these are near designated OSV trail 29N48)
Shasta Designated Area	<i>Calochortus longebarbatus</i> var. <i>longebarbatus</i> (1) <i>Cypripedium montanum</i> (1) <i>Orcuttia tenuis</i> (1)
Swain Mountain Designated Area	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> (3) <i>Botrychium ascendens</i> (1) <i>Botrychium minganense</i> (6 within designated area, 2 of these are near designated OSV trail 32N10) <i>Botrychium montanum</i> (6) <i>Botrychium pinnatum</i> (1) <i>Eriogonum spectabile</i> (3) <i>Meesia uliginosa</i> (2) <i>Orcuttia tenuis</i> (2 within designated area, 1 of these is near designated OSV trail 30N07) <i>Peltigera gowardii</i> (1 within designated area, and it is also near designated OSV trail 29N55) <i>Rorippa columbiae</i> (1) <i>Scheuchzeria palustris</i> ssp. <i>Americana</i> (1)
Snow trails outside designated areas	No occurrences along snow trails outside designated areas

Table 116. TEPS plants in alternative 4

Designated Area or Snow Trail Name/Number	Species present (number of occurrences) Alternative 4
Ashpan Designated Area	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> (4 within designated area, 2 of these are within 100 feet of trails 32N25 and 33N16) <i>Pinus albicaulis</i> (1)
Bogard Designated Area	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> (12 within designated area, 5 of these are within 100 feet of trails 32N07, 32N08, and LA 105) <i>Botrychium minganense</i> (2) <i>Botrychium montanum</i> (1) <i>Eriastrum tracyi</i> (1) <i>Mimulus evanescens</i> (3) <i>Orcuttia tenuis</i> (4) <i>Rorippa columbiae</i> (1)
Fredonyer Designated Area	<i>Botrychium minganense</i> (1) <i>Botrychium montanum</i> (1) <i>Lomatium roseanum</i> (1) <i>Penstemon sudans</i> (17 within designated area, 11 of these are near designated OSV trails 29N03, 29N46, and 29N20Y) <i>Pyrrocoma lucida</i> (1)
Jonesville Designated Area	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> (1) <i>Boechea constancei</i> (3) <i>Botrychium ascendens</i> (3) <i>Botrychium crenulatum</i> (4) <i>Botrychium minganense</i> (13 within designated area, 1 of these is near designated OSV trail 27N11) <i>Botrychium montanum</i> (7) <i>Clarkia mildrediae</i> ssp. <i>mildrediae</i> (1) <i>Cypripedium fasciculatum</i> (3) <i>Eremogone cliftonii</i> (3) <i>Frangula purshiana</i> (3) <i>Lewisia kelloggii</i> ssp. <i>hutchisonii</i> (7) <i>Meesia uliginosa</i> (8 within designated area, 1 of these is near designated OSV trail 27N11) <i>Monardella follettii</i> (4) <i>Orcuttia tenuis</i> (2) <i>Packera eurycephala</i> var. <i>lewisrosei</i> (5) <i>Penstemon personatus</i> (2) <i>Rupertia hallii</i> (2) <i>Sedum albomarginatum</i> (2) <i>Silene occidentalis</i> ssp. <i>longistipitata</i> (4)
Morgan Summit Designated Area	<i>Botrychium ascendens</i> (1) <i>Botrychium crenulatum</i> (6) <i>Botrychium minganense</i> (14 within designated area, 3 of these are near designated OSV trails 29N60, 29N67, and 31N17)) <i>Botrychium montanum</i> (12) <i>Botrychium pinnatum</i> (2) <i>Meesia uliginosa</i> (1) <i>Rupertia hallii</i> (4) <i>Scheuchzeria palustris</i> ssp. <i>Americana</i> (2) <i>Silene occidentalis</i> ssp. <i>longistipitata</i> (5 within designated area, 3 of these are near designated OSV trail 29N48)

Designated Area or Snow Trail Name/Number	Species present (number of occurrences) Alternative 4
Swain Mountain Designated Area	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> (3) <i>Botrychium ascendens</i> (1) <i>Botrychium minganense</i> (6 within designated area, 2 of these are near designated OSV trail 32N10) <i>Botrychium montanum</i> (6) <i>Botrychium pinnatum</i> (1) <i>Eriogonum spectabile</i> (3) <i>Meesia uliginosa</i> (2) <i>Orcuttia tenuis</i> (2 within designated area, 1 of these is near designated OSV trail 30N07) <i>Peltigera gowardii</i> (1 within designated area, and it is also near designated OSV trail 29N55) <i>Rorippa columbiae</i> (1) <i>Scheuchzeria palustris</i> ssp. <i>Americana</i> (1)
Snow trails outside designated areas	No occurrences along snow trails outside designated areas

Table 117. TEPS plants in alternative 5

Designated Area or Snow Trail Name/Number	Species present (number of occurrences)
Ashpan Designated Area	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> (4 within designated area, 2 of these are within 100 feet of trails 32N25 and 33N16) <i>Pinus albicaulis</i> (1)
Bogard Designated Area	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> (12 within designated area, 5 of these are within 100 feet of trails 32N07, 32N08, and LA 105) <i>Botrychium minganense</i> (2) <i>Eriastrum tracyi</i> (1) <i>Mimulus evanescens</i> (3) <i>Orcuttia tenuis</i> (4) <i>Rorippa columbiae</i> (1)
Fredonyer Designated Area	<i>Botrychium minganense</i> (1) <i>Botrychium montanum</i> (1) <i>Lomatium roseanum</i> (1) <i>Penstemon sudans</i> (17 within designated area, 11 of these are near designated OSV trails 29N03, 29N46, and 29N20Y) <i>Pyrrocoma lucida</i> (1)

Designated Area or Snow Trail Name/Number	Species present (number of occurrences)
Jonesville Designated Area	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> (1) <i>Boechera constancei</i> (3) <i>Botrychium ascendens</i> (3) <i>Botrychium crenulatum</i> (4) <i>Botrychium minganense</i> (13 within designated area, 1 of these is near designated OSV trail 27N11) <i>Botrychium montanum</i> (7) <i>Clarkia mildrediae</i> ssp. <i>mildrediae</i> (1) <i>Cypripedium fasciculatum</i> (3) <i>Eremogone cliftonii</i> (3) <i>Frangula purshiana</i> (3) <i>Lewisia kelloggii</i> ssp. <i>hutchisonii</i> (7) <i>Meesia uliginosa</i> (8 within designated area, 1 of these is near designated OSV trail 27N11) <i>Monardella follettii</i> (4) <i>Orcuttia tenuis</i> (1) <i>Packera eurycephala</i> var. <i>lewisrosei</i> (5) <i>Penstemon personatus</i> (2) <i>Rupertia hallii</i> (2) <i>Sedum albormarginatum</i> (2) <i>Silene occidentalis</i> ssp. <i>longistipitata</i> (4)
Morgan Summit Designated Area	<i>Botrychium ascendens</i> (1) <i>Botrychium crenulatum</i> (6) <i>Botrychium minganense</i> (14 within designated area, 3 of these are near designated OSV trails 29N60, 29N67, and 31N17)) <i>Botrychium montanum</i> (12) <i>Botrychium pinnatum</i> (2) <i>Meesia uliginosa</i> (1) <i>Rupertia hallii</i> (4) <i>Scheuchzeria palustris</i> ssp. <i>Americana</i> (2) <i>Silene occidentalis</i> ssp. <i>longistipitata</i> (5 within designated area, 3 of these are near designated OSV trail 29N48)
Swain Mountain Designated Area	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> (3) <i>Botrychium ascendens</i> (1) <i>Botrychium minganense</i> (6 within designated area, 2 of these are near designated OSV trail 32N10) <i>Botrychium montanum</i> (6) <i>Botrychium pinnatum</i> (1) <i>Eriogonum spectabile</i> (3) <i>Meesia uliginosa</i> (2) <i>Orcuttia tenuis</i> (2 within designated area, 1 of these is near designated OSV trail 30N07) <i>Peltigera gowardii</i> (1 within designated area, and it is also near designated OSV trail 29N55) <i>Rorippa columbiae</i> (1) <i>Scheuchzeria palustris</i> ssp. <i>Americana</i> (1)
Trail 27N06 (outside designated areas)	<i>Botrychium crenulatum</i> (1) <i>Botrychium minganense</i> (1)

Other Botanical Resources

Survey and Manage and Special Interest Plants

Because OSV use and snow trail grooming may have potential to harm survey and manage plants and special interest plants, this analysis will evaluate the direct, indirect, and cumulative effects of the alternatives on these botanical resources that could result from the following proposed actions:

- Designating trails and areas for over-snow vehicle (OSV) use
- Identifying snow trails for grooming for OSV use

Effects to threatened, endangered, proposed, or sensitive plant species are addressed in a separate botany biological evaluation/biological assessment (project record).

Noxious Weeds

Noxious or invasive weeds sections present the weed species that are present and contain an analysis of effects from weeds and a determination of each alternative's risk of introducing and/or spreading weed species in the project area.

Other Botanical Resources

In addition, an evaluation of designated areas pertaining to botanical resources, such as research natural areas (RNAs) and special interest areas (SIAs) is presented in Other Botanical Resources sections.

Relevant Laws, Regulations, and Policy

Federal Law and Policy

Forest Service Manual 2670.22 (USDA Forest Service 2005) directs national forests to “maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands.” To comply with this direction, Forests are encouraged to track and evaluate effects to additional species that may be of concern even though they are not currently listed as Sensitive. Such plant species are referred to as Special Interest or watch list species.

Forest Service Manual 2900 (USDA Forest Service 2011) contains national direction for noxious weed management. Specific policies included in FSM 2900 include:

- Determine the risk of introducing, establishing, or spreading invasive species associated with any proposed action, as an integral component of project planning and analysis, and where necessary provide for alternatives or mitigation measures to reduce or eliminate that risk prior to project approval.
- Ensure that all Forest Service management activities are designed to minimize or eliminate the possibility of establishment or spread of invasive species on the National Forest System, or to adjacent areas. Integrate visitor use strategies with invasive species management activities on aquatic and terrestrial areas of the National Forest System. At no time are invasive species to be promoted or used in site restoration or re-vegetation work, watershed rehabilitation projects, planted for bio-fuels production, or other management activities on national forests and grasslands.

- Use contract and permit clauses to require that the activities of contractors and permittees are conducted to prevent and control the introduction, establishment, and spread of aquatic and terrestrial invasive species. For example, where determined to be appropriate, use agreement clauses to require contractors or permittees to meet Forest Service-approved vehicle and equipment cleaning requirements/standards prior to using the vehicle or equipment in the National Forest System.

Executive Order 13112 (USDA Forest Service 1999) was signed on February 3, 1999, establishing the National Invasive Species Council to ensure that Federal programs and activities to prevent and control invasive species are coordinated, effective, and efficient. EO 13112 defines an invasive species as "...an alien (or non-native) species whose introduction does, or is likely to cause economic or environmental harm or harm to human health."

Land and Resource Management Plan

The Lassen National Forest Land and Resource Management Plan (LRMP 1993) provides standards and guidelines for the following botanical resources:

Noxious and Invasive Weeds (LRMP p. 4-25)

- a. Reduce impacts of forest pests on all resources to acceptable levels through integrated pest management.
 1. Use an integrated pest management (IPM) approach to managing pests during the planning and implementation of all activities that influence vegetation. Consider a full range of pest management alternatives for each project. Select treatment methods through an environmental analysis process that considers the environmental effects, treatment efficacy, and cost effectiveness of each alternative. Determine monitoring and enforcement plans during this site-specific process. Also use pest detection, surveillance, evaluation, prevention, suppression and post-action evaluation as integral components of this IPM approach.
 2. Cooperate with the State and counties in control of noxious weeds and predation.

Survey and Manage Species

Forestwide standards and guidelines for "Survey & Manage" old-growth associated species were revised in January 2001 and described in the 2001 Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures, Standards and Guidelines (2001 ROD) (USDA Forest Service and USDI BLM 2001). Category A and C species that are considered to be within the California Klamath Province require pre-disturbance field survey prior to implementing management actions that could significantly, negatively affect the species' habitat or persistence of the species on the site. Pre-disturbance surveys are not required if delay in implementation of a proposed action to perform surveys would result in an unacceptable environmental risk. The adopted standards and guidelines for Survey and Manage species only applies within the area of the Northwest Forest Plan (NWFP), which, on the Lassen National Forest, encompasses approximately 41,893 acres in the northwestern portion of the Hat Creek Ranger District.

Sierra Nevada Forest Plan Amendment (SNFPA). The Record of Decision (ROD) for the 2004 Sierra Nevada Forest Plan Amendment includes the following direction applicable to motorized travel management and noxious weeds:

- Goals for noxious weed management are to manage weeds using an integrated weed management approach. Priority 1 is to prevent the introduction of new invaders. Priority 2 is to conduct early treatment of new infestations. Priority 3 is to contain and control established infestations (SNFPA ROD page 36). Applicable Standards and Guidelines for noxious weed management (SNFPA ROD pages 54-55, #36-41, 47-49) are listed below.
 36. Inform forest users, local agencies, special use permittees, groups, and organizations in communities near national forests about noxious weed prevention and management.
 37. Work cooperatively with California and Nevada State agencies and individual counties (for example, Cooperative Weed Management Areas) to: (1) prevent the introduction and establishment of noxious weed infestations and (2) control existing infestations.
 38. As part of project planning, conduct a noxious weed risk assessment to determine risks for weed spread (high, moderate, or low) associated with different types of proposed management activities. Refer to weed prevention practices in the Regional Noxious Weed Management.
 39. When recommended in project-level noxious weed risk assessments, consider requiring off-road equipment and vehicles (both Forest Service and contracted) used for project implementation to be weed free. Refer to weed prevention practices in the Regional Noxious Weed Management Strategy.
 40. Minimize weed spread by incorporating weed prevention and control measures into ongoing management or maintenance activities that involve ground disturbance or the possibility of spreading weeds. Refer to weed prevention practices in the Regional Noxious Weed Management Strategy.
 41. Conduct follow-up inspections of ground disturbing activities to ensure adherence to the Regional Noxious Weed Management Strategy.
 47. Complete noxious weed inventories, based on regional protocol. Review and update these inventories on an annual basis.
 48. As outlined in the Regional Noxious Weed Management Strategy, when new, small weed infestations are detected, emphasize eradication of these infestations while providing for the safety of field personnel.
 49. Routinely monitor noxious weed control projects to determine success and to evaluate the need for follow-up treatments or different control methods. Monitor known weed infestations, as appropriate, to determine changes in weed population density and rate of spread.

Special Area Designations

RNAs and SIAs may have specific management objectives for unique botanical features or other features of interest. On the Lassen National Forest, no management plans are available for RNAs or SIAs.

The Lassen LRMP (1993, pp. 4-99 to 4-102) contains a prescription for special areas, including Experimental Forests, RNAs, SIAs, and Wild and Scenic Rivers. The purpose of the prescription is to preserve areas with unusual historical, geological, botanical, zoological, paleontological, or other special characteristics for public enjoyment and research. These areas are managed primarily to produce benefits other than timber, range, forage, minerals, and other commodities. Off-road vehicle use is not allowed in RNAs (per forest plan direction), and so these areas should be excluded from OSV use. Restricted off-road vehicle use is allowable in other types of special areas. This prescription applies to both designated and proposed special areas. Standards and Guidelines are also described for these special areas, and those that apply to OSV use are presented below:

- Manage recreation according to the designated recreation opportunity spectrum classes.
- Prohibit motorized vehicles within research natural areas.

Desired Condition

One goal of the Lassen National Forest Botany Program is to maintain viable populations of survey and manage plants and special interest plants. In addition, it is desired that invasive weed species are reduced by a combination of control methods along with prevention practices including education and requirements for weed-free materials and equipment.

Topics and Issues Addressed in This Analysis

Issues

OSV uses may cause direct and indirect effects to survey and manage plants, special interest plants, and invasive plants, but are most likely to affect those that have living tissues present within the snow column each season (such as trees or shrubs). Several public comments have been received that raise concerns about the effects of OSV use on general vegetation and rare species. Potential effects may be either direct by damage or death to individual plants from OSV (stem breaking, crushing, etc.), or indirect by increasing the opportunity for pathogens to attack damaged plant tissues or by altering habitat. Possible effects include but are not limited to: physical damage to plants and habitats; reduced seed production; decreased plant vigor; changes in hydrology; changes to soils, especially erosion and sedimentation; changes in physiological responses; and increases in risk of weed introduction and spread. These potential effects become much more likely if OSV use occurs where/when there is inadequate snow depth.

Some plant species emerge from the ground very early in the growing season and subsequent snowfall may accumulate enough afterward to allow authorized OSV use. In these cases, living plant tissues may also be impacted by OSV use. Compaction of snow may lead to changes in plant composition and habitat suitability. Weed seeds may be transported into areas designated for OSV use. When snow cover is not adequate, OSV use on and off established trails has potential to affect some Survey and Manage plants, special interest plants, and their habitats. The proposed minimum snow depth requirements are presumed to be sufficient to protect the majority of plant species from damage.

Possible effects from invasive plant species will be addressed. The proposal and alternatives will also be evaluated for appropriate management and Forest Plan consistency for RNAs and those SIAs with a focus on botanical resources.

Resource Indicators and Measures

Table 118. Botanical resources indicators and measures for assessing effects

Resource Element	Resource Indicator	Measure	Used to address: P/N, or key issue?	Source (LRMP S/G; law or policy, BMPs, etc.)?
Vegetation	Species presence	Acres of Survey and Manage and Special Interest plant occurrences within areas designated for OSV use. Acres of Survey and Manage and Special Interest plant occurrences within 100 feet of designated OSV trails.	No	FSM 2670
Vegetation	Qualitative discussion of species' responses to proposed activities	Survey and Manage and Special Interest plants statement of effects.	No	FSM 2670
Vegetation	Noxious/invasive weed presence	Acres of weed infestations within areas designated for OSV use. Acres of weed infestations within 100 feet of designated OSV trails.	No	FSM 2900
Vegetation	Noxious/invasive weed response to proposed activities	Level of risk (high, moderate, low) for the project introducing or spreading weeds.	No	FSM 2900
Vegetation	Presence of designated botanical resource areas (RNAs, SIAs)	Acres of botanical resource areas within areas designated for OSV use. Acres of botanical resource areas within 100 feet of designated OSV trails.	No	LRMP pp. 4-99 to 4-102

Methodology

This analysis uses ArcMap and relevant Geographic Information System (GIS) data layers from the Lassen National Forest and the California Natural Diversity Database (CDFG CNDDDB 2017). The GIS layers of proposed OSV designations and groomed trails were overlain with the botanical resource layers to identify areas of potential effects.

Survey and manage plants considered in this analysis are presented in table 119. Special interest plants that are known to occur within the planning area are presented in table 120. The possibility of effects to each special interest species were evaluated based on growth form, timing of important life cycle elements (i.e., emergence, flowering, seed production, germination, etc.), identified threats, important habitat components, and the expected interaction with disturbances associated with OSV use and snow trail grooming.

Information Sources

Information used in this analysis includes pertinent scientific literature, project-specific botanical data, results of surveys and site revisits, local knowledge of Lassen National Forest botanists, and GIS layers of the following data: project boundary, actions by alternative, Lassen National Forest TEPS plant occurrences, and the California Natural Diversity Database (CDFG CNDDB 2017).

Incomplete and Unavailable Information

There is little research and information available regarding the responses of each plant species or whole plant communities to OSV uses, including indirect effects from snow compaction and vehicle emissions during the winter.

Assumptions specific to the botanical resources analysis:

- Plants are unlikely to be directly affected by authorized OSV use (with the specified snow depth requirements) when their living tissues are not present above ground. Therefore, only shrub or tree species are likely to be directly affected by OSV use.
- Indirect effects, such as those possibly resulting from snow compaction and vehicle emissions, are likely to be concentrated along designated OSV trails (groomed or ungroomed). Therefore, an area within 100 feet of designated OSV trails is reasonably foreseeable to be affected by snow compaction, emissions, or other contamination. Areas designated for OSV use away from these designated trails are much less likely to experience measurable indirect effects.
- Over-snow vehicles, towing vehicles, or trailers may carry mud or other debris containing weed seeds from infested areas to trailheads and possibly into any areas designated for OSV use.
- Only authorized OSV uses will be analyzed. Concerns arising from unauthorized uses would be addressed as law enforcement issues and may prompt corrective actions.
- Resource monitoring would identify unexpected types or levels of impacts to botanical resources, and may also prompt corrective actions as warranted.

Spatial and Temporal Context for Effects Analysis

The project area boundary serves as the analysis boundary for direct, indirect, and cumulative effects. Effects to vegetation would be expected to have occurred or become evident within one or two years of disturbance and this constitutes the short term. Effects that linger beyond 2 years are considered long-term effects, and may extend to decades or centuries. Such long-term effects beyond 20 years become increasingly difficult to predict due to unknown interactions and the many environmental variables with numerous possible outcomes.

Direct and Indirect Effects Boundaries

The spatial boundary for analyzing the direct and indirect effects to these botanical resources is the project area boundary, because all expected effects relevant to these resources would occur and remain within this area.

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.

Affected Environment

Existing Condition

Survey and Manage Plants

Manage Known Sites Requirement

The 2001 ROD requires management of known sites of any Category A, B, or E species and high-priority sites of Category C or D species. High-priority sites are those that are needed to provide for reasonable assurance of species persistence. No high-priority sites are located on the Lassen National Forest.

Category A, C, and E species

Currently, six species requiring pre-disturbance surveys are considered to have suitable habitat within the Lassen National Forest.

Table 119. Survey and manage plant species, Categories A, C, and E

Scientific Name Common Name	Habitat	Known sites within NWFP portion of project?	Potential habitat present?
<i>Botrychium minganense</i> Mingan moonwort Category A	Edge of willow thickets in coniferous forest. No known sites in NWFP area. Also a Region 5 Sensitive species.	No	Yes
<i>Botrychium montanum</i> Western goblin Category A	Edge of willow thickets in coniferous forest. No known sites in NWFP area. Also a Region 5 Sensitive species.	No	Yes
<i>Buxbaumia viridis</i> Green bug-on-a-stick Category E	Large decay class 3 or 4 logs in streams in coniferous forest. No known sites in NWFP area. Also a Region 5 Sensitive species.	No	Yes
<i>Cypripedium fasciculatum</i> Clustered lady's-slipper Category C	Mesic conifer and/or hardwood forest, especially riparian zones. No known sites in NWFP area. Also a Region 5 Sensitive species.	No	Yes
<i>Cypripedium montanum</i> Mountain lady's-slipper Category C	Mesic conifer and/or hardwood forest, especially riparian zones. One site known in NWFP area. Also a Region 5 Sensitive species.	Yes	Yes
<i>Ptilidium californicum</i> California fuzzwort Category A	Lower tree trunks of large-diameter fir or white fir, 3,000 to 5,000 feet.	Yes	Yes

There are known sites for *Cypripedium montanum* and *Ptilidium californicum* within the NWFP portion of the Lassen National Forest. Because *Cypripedium montanum* is also a Region 5 Sensitive species, it is also being addressed forestwide in the Biological Assessment/Biological Evaluation for the Lassen OSV Designation Project.

Category B species

The 2001 ROD provides direction to perform equivalent effort (project level) field surveys for all Category B survey and manage fungi in old-growth habitat where province-wide strategic surveys

(broad scale) have not been completed by September 30, 2010, when ground-disturbing actions are proposed. In 2001, there were 124 Category B fungi on the survey and manage list. Strategic survey requirements have been met for 66 of these species, leaving 58 species that call for equivalent effort surveys prior to completion of NEPA analysis. These species are listed in table 120.

Table 120. Survey and manage Category B fungi with equivalent effort survey requirement

Survey and manage Category B fungi		
<i>Albatrellus caeruleoporus</i>	<i>Gyromitra californica</i>	<i>Ramaria maculatipes</i>
<i>Albatrellus ellisii</i>	<i>Helvella elastica</i>	<i>Ramaria rainierensis</i>
<i>Albatrellus flettii</i> , In Washington and California	<i>Hydnотrya inordinata</i> (<i>Hydnотrya</i> sp. nov. #Trappe 787, 792)	<i>Ramaria rubribrunnescens</i>
<i>Alpova olivaceotinctus</i>	<i>Hydropus marginellus</i> (<i>Mycena marginella</i>)	<i>Ramaria stuntzii</i>
<i>Balsamia nigrens</i> (<i>Balsamia nigra</i>)	<i>Hypomyces luteovirens</i>	<i>Ramaria verlotensis</i>
<i>Chamonixia caespitosa</i> (<i>Chamonixia pacifica</i> sp. nov. #Trappe #12768)	<i>Leucogaster microsporus</i>	<i>Rhizopogon abietis</i>
<i>Choiromyces venosus</i>	<i>Marasmius applanatipes</i>	<i>Rhizopogon brunneiniger</i>
<i>Chrysomphalina grossula</i>	<i>Martellia fragrans</i>	<i>Rhizopogon chamaleontinus</i> (<i>Rhizopogon</i> sp. nov. #Trappe 9432)
<i>Clavariadelphus ligula</i>	<i>Martellia idahoensis</i>	<i>Rhizopogon ellipsosporus</i> (<i>Alpova</i> sp. nov. # Trappe 9730)
<i>Clavariadelphus subfastigiatus</i>	<i>Octavianina cyanescens</i> (<i>Octavianina</i> sp. nov. #Trappe 7502)	<i>Rhizopogon evadens</i> var. <i>subalpinus</i>
<i>Cortinarius boulderensis</i>	<i>Otidea smithii</i>	<i>Rhizopogon exiguus</i>
<i>Cortinarius cyanites</i>	<i>Phaeocollybia californica</i>	<i>Rhizopogon flavofibrillosus</i>
<i>Cudonia monticola</i>	<i>Phaeocollybia piceae</i>	<i>Rhodocybe speciosa</i>
<i>Destuntzia fusca</i>	<i>Phaeocollybia scatesiae</i>	<i>Rickenella swartzii</i> (<i>Rickenella setipes</i>)
<i>Destuntzia rubra</i>	<i>Phaeocollybia sipei</i>	<i>Sarcodon fuscoindicus</i>
<i>Entoloma nitidum</i> (<i>Rhodocybe nitida</i>)	<i>Podostroma alutaceum</i>	<i>Sedecula pulvinata</i>
<i>Gastroboletus ruber</i>	<i>Polyozellus multiplex</i>	<i>Tricholomopsis fulvescens</i>
<i>Gastroboletus vividus</i> (<i>Gastroboletus</i> sp. nov. #Trappe 2897; <i>Gastroboletus</i> sp. nov. #Trappe 7515)	<i>Ramaria aurantiiscescens</i>	<i>Tuber asa</i> (<i>Tuber</i> sp. nov. #Trappe 2302)
<i>Gastrosuillus umbrinus</i> (<i>Gastroboletus</i> sp. nov. #Trappe 7516)	<i>Ramaria coulterae</i>	
<i>Gymnopilus punctifolius</i> , In California	<i>Ramaria cyaneigranosa</i>	

The following seven Category B fungi are known to occur within the NWFP portion of the Lassen National Forest:

- *Alpova olivaceotinctus*
- *Bondarzewia mesenterica*
- *Clavariadelphus truncatus*
- *Mythicomycetes comeipes*
- *Ramaria rubrievanescens*
- *Rhizopogon truncatus*
- *Spathularia flavida*

As an alternative to equivalent effort surveys at the project level, proposed actions may incorporate project design features that meet the management recommendations for conserving fungi habitat in the following ways (derived from Castellano et al. 1999, Castellano et al. 2003, and USDA Forest Service and USDI BLM 1994):

- retention of overstory canopy cover to maintain shade and soil moisture
 - 50 percent or higher canopy cover will be maintained in all thinning units
- retention of a component of older overstory host trees specific to each fungi species to provide for nutrient transfer
 - the largest/oldest trees in each unit will be retained, as well as trees with large cavities and other types of deformities
- retention of a component of forest floor organic matter to provide nutrients and fungal diversity, and maintain soil moisture for decomposition processes
 - soil productivity standards require maintenance of 50 percent+ fine organic matter cover and at least 5 logs per acre in a range of decay classes
- retention of large, woody debris on the forest floor to provide nutrients and fungal recruitment diversity
 - all snags 19 inches or larger in diameter and an average of 5 tons of logs per acre will be retained

Special Interest Plants

Often referred to as “watch list” species, special interest plants are species that do not meet all of the criteria to be included on the Regional Forester’s Sensitive Plant List, but are of sufficient concern that we need to consider them in the planning process. These include species that are locally rare, are of public concern, occur as disjunct populations, are newly described taxa, or lack sufficient information on population size, threats, trend or distribution. To better identify these species, forests have been encouraged to develop watch lists for these special interest species. These watch lists are dynamic and updated as the need arises to reflect changing conditions and new information. Such species make an important contribution to forest biodiversity and are addressed as appropriate through the NEPA process. Effects to these species are evaluated when they are known to occur in project areas. Seventy-seven plant special interest plants are known to occur on the Lassen National Forest. Species not known to occur in areas that may be designated for OSV use are not included in this analysis. See table 121.

Table 121. Special Interest plant species considered

Scientific Name Common Name	Habitat	Life Form
<i>Allium sanbornii</i> var. <i>sanbornii</i> Sanborn's onion	Granite, volcanic, or serpentine outcrops. West of Mineral, Battle Creek. Flowers May-Sept.	Perennial herb
<i>Anthoxanthum nitens</i> ssp. <i>nitens</i> Vanilla grass	Meadows or under lodgepole. Bunchgrass Valley and Brokeoff Meadows. 4,900-6,200 ft. Flowers April-July.	Perennial grass
<i>Arnica fulgens</i> Hillside arnica	Eastside meadows. Open damp depressions in sagebrush scrub or grasslands. Clover/Grays Val. Flowers May-Aug.	Perennial herb
<i>Artemisia tripartita</i> ssp. <i>tripartita</i> Threetip sagebrush	Upper montane coniferous forest, in rock, volcanic openings. 7,200-8,500 ft. Flowers in August.	Shrub
<i>Asplenium septentrionale</i> Northern spleenwort	Dacite rock outcrops or cliffs. LVNP, Manzanita Chutes & Christie Hill. Flowers Jul-Aug.	Perennial herb
<i>Astragalus inversus</i> Susanville milk-vetch	Plains and sparsely wooded hills in sagebrush scrub and yellow pine forests. Frequent. Flowers May-Sept.	Perennial herb
<i>Astragalus pauperculus</i> Depauperate milk-vetch	Blue oak woodland and chaparral, or rocky grassland areas. Indian Creek RNA. Flowers March-May.	Perennial herb
<i>Betula glandulosa</i> Bog birch	Boggy meadows. Bridge Creek, Big Springs, Humbug Valley. Flowers April-June.	Deciduous Tree/Shrub
<i>Botrychium simplex</i> Yosemite moonwort	Wet meadows. Uncommon. LT Creek, Milkhouse Flat, Magee Lake. Flowers July-Sept.	Perennial herb
<i>Brasenia schreberi</i> Watershield	Wetlands, Lakes, Fens. Domingo, Wilson, Shotoverin and Cameron Lakes. Flowers June-Sept.	Aquatic, perennial
<i>Calystegia atriplicifolia</i> ssp. <i>buttensis</i> Butte Co. morning glory	Open dry slopes in pine or oak and pine forests. Graham Pinery RNA. 2,000-4,000 ft. Flowers May-July.	Perennial herb
<i>Cardamine bellidifolia</i> var. <i>pachyphylla</i> Alpine bittercress	Rocky outcrops and scree slopes. 7,100-9,200 ft. Flowers June-Aug.	Perennial herb
<i>Carex davyi</i> Davy's sedge	Dry, often sparse meadows and slopes. 4,595-10,830 ft. Flowers May-Aug.	Perennial herb
<i>Carex geyeri</i> Geyer's sedge	Dry slopes and open woods. Cornelia Lott Sank Memorial Spring. Flowers May-June.	Perennial herb
<i>Carex lasiocarpa</i> Woolly-fruited sedge	Pond edges and fens. Willow Lake, Domingo Lake, Cooper Swamp, Hay Meadows. Flowers June-July.	Perennial herb
<i>Carex limosa</i> Mud sedge	Fens. Willow & Domingo Lakes, Cooper Swamp, Green Island Lake. Flowers June-Aug.	Perennial herb
<i>Carex petasata</i> Liddon's sedge	Meadows, lower montane conifer forests. Patterson Flat. Halls Flat and Burgess Springs. Flowers June-July.	Perennial herb
<i>Caulanthus major</i> var. <i>nevadensis</i> Wlender jewel-flower	Juniper woodland, open rocky areas. Dow Butte (location uncertain). Flowers June-July.	Perennial herb
<i>Claytonia palustris</i> Marsh claytonia	Montane marshes and swamps; Jonesville, Colby, etc. Flowers June-Aug.	Perennial herb
<i>Crataegus castlegarensis</i> Castlegar hawthorn	Riparian woodland in moist rocky loam. Elevation less than 9,595 feet. Flowers May-June.	Tree/shrub
<i>Dimeresia howellii</i> Doublet	Dry volcanic areas. North of Sheepshead. Flowers May-July.	Annual herb

Scientific Name Common Name	Habitat	Life Form
<i>Drosera anglica</i> English sundew	Cold bogs in yellow pine or fir forests. Willow Lake, Domingo Lake, Big Springs. Flowers July-Aug.	Perennial herb
<i>Erigeron inornatus</i> var. <i>calidipetris</i> Hot rock daisy	Sandy, volcanic soils. Frequent. Flowers June-Sept.	Perennial herb
<i>Erigeron nivalis</i> Northern daisy	Subalpine lava outcrops. Lassen Peak, Mt. Harkness, Mt. Shasta; Bogard Buttes. Flowers July-Aug.	Perennial herb
<i>Erigeron petrophilus</i> var. <i>sierrensis</i> Northern Sierra daisy	Rocky foothills to forests, sometimes on serpentine. Near Middle Camp. Flowers June-Sept.	Perennial herb
<i>Eriogonum ovalifolium</i> var. <i>depressum</i> Depressed wild buckwheat	Low mounds around playas. 5,700 ft. Windy Hollow. Flowers June-Aug.	Perennial herb/ subshrub
<i>Eriogonum pyrolifolium</i> var. <i>pyrolifolium</i> Pyrola-leaved buckwheat	High-elevation volcanic talus. Red Cinder (Caribou) and LNVP. Known site on Forest but not mapped in GIS. 5,200-10,800 ft. Flowers July-Sept.	Perennial herb/ subshrub
<i>Eriogonum tripodum</i> Tripod buckwheat	Gravelly soil of drainages, often on serpentine. Flowers May-July.	shrub
<i>Eriophorum gracile</i> Cotton grass	Fens and wet meadows in upper conifer forests. Almanor Fens. Flowers May-Sept.	Perennial herb
<i>Gratiola heterosepala</i> Boggs Lake hedge-hyssop	Vernal pools and wet edges of lakes and reservoirs. Conservation Strategy 1994. Flowers Apr-Aug.	Annual herb
<i>Hackelia amethystina</i> Amethyst stickseed	Openings in forest and meadows, dry slopes. Diamond Mts. Flowers June-July.	Perennial herb
<i>Hackelia cusickii</i> Cusick's stickseed	Under large old-growth junipers. Ebey Lake area. Flowers Apr-July.	Perennial herb
<i>Hesperocyparis bakeri</i> Baker cypress	Dry volcanic or serpentine soil, in chaparral or yellow pine forests. Cub Ck, Burney Mtn, and Timbered Crater areas. Flowers all seasons.	Conifer tree
<i>Hulsea nana</i> Little hulsea	High elevation Cascade peaks. LVNP, Burney Mt., and Magee Peak in 1000 Lakes Wilderness. Flowers July-Aug.	Perennial herb
<i>Iliamna bakeri</i> Baker's globe mallow	Volcanic loam or lava beds, especially post-fire. Juniper woodland, chaparral. 3200-8200 ft. Flowers July-Aug.	Perennial herb
<i>Juncus hemiendytus</i> var. <i>abjectus</i> Center Basin rush	Damp or vernal wet open areas. Flowers June-July.	Perennial herb
<i>Lilium humboldtii</i> ssp. <i>humboldtii</i> Humboldt lily	Chaparral and lower montane conifer forests on dry forest floor or dry brushy slopes. Near Deer Creek (Barkley Fire). Flowers May-July.	Perennial herb
<i>Limnanthes floccosa</i> ssp. <i>floccosa</i> Woolly meadowfoam	Vernal pools, drainages, etc. in woodlands. Cayton; Finley Lake, etc. Flowers Mar-June.	Annual herb
<i>Lupinus dalesiae</i> Quincy lupine	Dry, often rocky slopes in mixed conifer forest on slate soil. 2,500-6,500 ft. Flowers May-July.	Perennial herb
<i>Lycopus uniflorus</i> Northern bugleweed	Fens, marshes, swamps. Willow Lake and Willow Creek, Domingo Lake. Flowers July-Sept.	Perennial herb
<i>Lysimachia thyrsiflora</i> Tufted loosestrife	Lake and stream margins, meadows. Willow Lake. 2,625-5,495 ft. Flowers May-August.	Perennial herb

Scientific Name Common Name	Habitat	Life Form
<i>Meesia triquetra</i> 3-ranked hump-moss	Fens and seeps, South of Lassen National Park, Big Springs, Little Grizzly Creek. Flowers any season.	Bryophyte, moss (perennial herb)
<i>Mimulus glaucescens</i> Shield-bracted monkeyflower	Wet places in foothill woodland, grassland. Front Country. Frequent. Flowers Mar-May.	Annual herb
<i>Mimulus pygmaeus</i> Egg Lake monkeyflower	Moist soil in open meadows, drainages or edges of pools, in open woods, sage. Flowers May-June.	Annual herb
<i>Muhlenbergia jonesii</i> Jones' muhly	Moist soil in open meadows, drainages or edges of pools, in open woods, sage. Flowers June-Aug.	Perennial grass
<i>Navarretia subuligera</i> Awl-leaved navarretia	Rocky plains and slopes, foothill woodland, yellow pine forest. Indian Creek RNA. Flowers Apr-Aug.	Annual herb
<i>Nemophila breviflora</i> Basin nemophila	Streambanks, meadows, thickets. Ponds south of Soldier Mt. 4,000-7,910 ft. Flowers May-July.	Annual herb
<i>Packera indecora</i> Rayless mountain butterweed	Meadows and seeps, Type locality near Pine Creek. Flowers July-Aug.	Perennial herb
<i>Penstemon cinicola</i> Ash beardtongue	Dry or moist volcanic sands, yellow pine or lodgepole forests. Caribou, Butte Ck. Flowers June-Aug.	Perennial herb
<i>Penstemon heterodoxus</i> var. <i>shastensis</i> Shasta beardtongue	Meadowy, open grassy sites in yellow pine to red fir. Flowers June-Aug.	Perennial herb
<i>Penstemon janishiae</i> Janish's beardtongue	Rocky areas or openings in sagebrush or juniper. Diamond Mt. Flowers May-July.	Perennial herb
<i>Phlox muscoides</i> Moss phlox	Rocky alpine slopes. Lassen, Loomis Pk. Flowers July-Aug.	Perennial herb
<i>Piperia colemanii</i> Coleman's rein orchid	Chaparral, duff in lower montane coniferous forest, often shaded. 3,600-7,000 ft. Flowers June-Aug.	Perennial herb
<i>Pogogyne floribunda</i> Profuse-flowered pogogyne	Vernal pools and similar habitat on Modoc Plateau. 3,200-5,000 ft. Flowers June-Aug.	Annual herb
<i>Polystichum fremontii</i> var. <i>fremontii</i> Fremont's combleaf	Vernally moist depressions. Government Lake and Pine Creek. 3,200-6,800 ft. Flowers May-June.	Perennial herb
<i>Polygonum bidwelliae</i> Bidwell's knotweed	Open areas in pine or pine and oak forests. Cayton Valley area, and Indian Creek RNA. Flowers Apr-June.	Annual herb
<i>Polystichum kruckebergii</i> Kruckeberg's swordfern	Cliff crevices and talus slopes, mid to high elevation. Humboldt Pk, Mt. Harkness (LVNP). Green Island Lake RNA. Flowers July-Aug.	Perennial herb
<i>Polystichum lonchitis</i> Northern hollyfern	Subalpine and upper montane conifer forests/ granitic or carbonate. Green Island Lake RNA. 5400-7800 ft. Flowers June-Sept.	Perennial herb
<i>Potamogeton robbinsii</i> Robbins's pondweed	Deep water. Saucer Lake (Green Island Lake RNA). 4,985-11,485 ft. Flowers July-Aug.	Aquatic perennial herb
<i>Potamogeton praelongus</i> White-stemmed pondweed	Deep water. Willow Lake. Flowers July-Aug.	Aquatic perennial herb
<i>Potentilla newberryi</i> Newberry's cinquefoil	Seasonally flooded flats. Butte Creek Pit and Huckleberry Meadows. Flowers May-Aug.	Perennial herb
<i>Rhynchospora alba</i> White beaked-rush	Fens, freshwater marshes in yellow pine, mixed conifer, or fir. Willow Lake. Flowers July-Aug.	Perennial herb

Scientific Name Common Name	Habitat	Life Form
<i>Schoenoplectus heterochaetus</i> Slender bulrush	Lake margins and marshes. Wilson Lake only known location in CA. Flowers in August.	Aquatic perennial herb
<i>Schoenoplectus subterminalis</i> Water bulrush	Fen and montane lake margins. Near Wilson Lake, Hay Mdns, Cameron Meadows & Philbrook Reservoir. Flowers July-Aug.	Aquatic perennial herb
<i>Scutellaria galericulata</i> Marsh skullcap	Marshes, swamps. Fall River; Lake Almanor near Last Chance. Flowers June-Sept.	Perennial herb
<i>Senecio hydrophiloides</i> Sweet marsh ragwort	Wet meadows in eastside pine or lodgepole. Flowers May-July.	Perennial herb
<i>Silene occidentalis</i> ssp. <i>occidentalis</i> Western campion	Montane coniferous forest, open dry sites, chaparral. Flowers June-Aug.	Perennial herb
<i>Sparganium natans</i> Small bur-reed	Fens and lake margins, cooler places. Green Island Lake; Bear Flat, etc. Flowers in Aug.	Perennial herb
<i>Stellaria longifolia</i> Long-leaved starwort	Fens, wet meadows and riparian zones. Jonesville, Goose Valley, Philbrook Res., Last Chance and Mill Creeks. Flowers May-Aug.	Perennial herb
<i>Stellaria obtusa</i> Obtuse starwort	Moist soil in red fir or yellow pine forests. Frequent. Flowers June-Aug.	Perennial herb
<i>Stenotus lanuginosus</i> Woolly stenotus	Meadow margins or low sage; shallow rocky soil. Flowers May-July.	Perennial herb
<i>Streptanthus longisiliquus</i> Long-fruit jewelflower	Broadleaf upland and lower montane conifer forests. Rattlesnake Creek. Flowers Apr-Sept.	Perennial herb
<i>Stuckenia filiformis</i> ssp. <i>alpina</i> Slender-leaved pondweed	Shallow freshwater marshes and swamps. Green Island Lake RNA. 985-7,055 ft. Flowers May-July.	Aquatic perennial herb
<i>Subularia aquatica</i> ssp. <i>americana</i> Water awlwort	Lake margins and streambanks in upper montane conifer forests. On LNF, but location unmapped. 5,700-9,300 ft. Flowers July-Sept.	Aquatic annual herb
<i>Thermopsis californica</i> var. <i>argentata</i> Silvery false-lupine	Somewhat alkaline flats, yellow pine forests. Many locations on district. Flowers Apr-Aug.	Perennial herb
<i>Trifolium andersonii</i> ssp. <i>andersonii</i> Anderson's clover	Open eastside pine, sandy soil. Elysian Valley. 3,000-8,000 ft. Flowers June-July.	Perennial herb
<i>Trillium ovatum</i> ssp. <i>oettingeri</i> Salmon Mtns wakerobin	Damp, shaded mixed conifer forests at the edge of wet or moist drainages. Screwdriver area and Mill Ck. below LVNP. Flowers Feb-July.	Perennial herb
<i>Utricularia intermedia</i> Flat-leaved bladderwort	Shallow water/fens. Boundary Fen, Willow Lake, Last Chance Marsh, lake near Hay Mdw, near Snag Lake. Flowers July-Aug.	Aquatic perennial herb
<i>Utricularia minor</i> Lesser bladderwort	Shallow water/fens and marshes. Coon Hollow, Papoose Meadows, and Green Island, Willow, and Wilson Lakes. Flowers in July.	Aquatic perennial herb
<i>Utricularia ochroleuca</i> Cream-flowered bladderwort	Shallow water, lake margins. Last Chance Marsh (per Rondeau), Boundary Fen, Willow and Little Willow Lks. Flowers June-July.	Aquatic perennial herb

Special Interest Species Information

Aggregating Species for Analysis of Effects

Because OSV effects to various plant species are expected to be most similar according to their life form and growth habits, the species considered in this analysis are grouped into the following categories:

- **Trees, shrubs, or sub-shrub species**, whose living tissues may be present above or within the snow column, and thus, may experience direct effects from OSV uses (physical damage or immediate exposure to exhaust).
- **Perennial herbaceous species**, including grasses and mosses, whose living tissues are at or below the soil surface, and thus are unlikely to experience direct effects, but they would be evaluated for impacts by exhaust contaminants trapped by the snow cover or by possible effects from snow compaction.
- **Annual plant species** are generally not growing during the period of authorized OSV use, and thus would not experience direct effects. This group is the least likely to be impacted by the indirect effects of exhaust contaminants and snow compaction.
- **Aquatic plant species** grow underwater and would not be directly affected by OSV use. If an occurrence is located within 100 feet of OSV trails, it is possible that snowpack contaminants could reach the occupied aquatic habitat when the snow melts. Snow compaction is not expected to affect aquatic habitats in any meaningful or predictable manner.

Other Botanical Resources

Special Interest Areas (SIAs)

All three SIAs designated as botanical areas are currently and proposed designated for OSV use.

- Montgomery Creek Grove Botanical Area, 5 acres
- Murken Botanical Area, 480 acres
- Willow Lake Bog Botanical Area, 60 acres

Research Natural Areas (RNAs)

Off-road OSV use is prohibited in the following designated and proposed RNAs per the Lassen LRMP (1983):

- Blacks Mountain
- Cub Creek
- Graham Pinery (proposed)
- Green Island Lake (proposed)
- Indian Creek (proposed)
- Mayfield (proposed)
- Soda Ridge (proposed)
- Timbered Crater (proposed)

Environmental Consequences

Proposed Action and Alternatives

The Forest Service developed five alternatives: No action, the modified proposed action, and three additional action alternatives generated in response to significant issues. Complete details of the alternatives, including project design criteria, are found in chapter 2.

Project Design Features

Project design features have been developed to reduce or eliminate adverse impacts from project activities and are incorporated as an integrated part of all action alternatives. Project design features are based upon standard practices and operating procedures used and proven effective in similar circumstances and conditions.

The following project design features for various other resources would reduce or eliminate the potential for adverse effects to botanical resources:

- To prevent substantial impacts to soil resources, areas designated for public, cross-country OSV use would be clearly delineated and marked in the field, where practical.
- Areas would be protected from substantial impacts to resources resulting from overuse by closing or managing designated OSV areas to mitigate adverse effects to soil, water quality, and riparian resources, or changing season-of use periods as necessary to allow rehabilitation of an area, particularly hill-climb areas.
- Watershed resources would be protected by designating equipment maintenance and refueling sites to ensure that they are located on gentle slopes, on uplands, and outside of riparian conservation areas 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. (Soil and Water Resources)
- 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. (Soil and Water Resources)
- 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. (Soil and Water Resources)
- Prohibit OSV use on lakes, reservoirs, ponds and any open surface water. (Aquatic Species and Habitat)
- 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. (Administration, Enforcement and Public Safety)
- Encourage public awareness and education regarding locations of non-motorized trails or areas where OSV use is not designated; consider additional signage or other methods to minimize OSV encroachment in these areas. (Administration, Enforcement and Public Safety)

Required Monitoring

Once a decision is made on OSV use designation via the record of decision, the implementation phase would begin. “Monitoring” in this sense, consists of both systematic monitoring and informal observations made during the course of annually-conducted fieldwork by forest staff. We anticipate that an implementation plan, with a monitoring component, would be developed at that time. However, the analysis assumes the following monitoring procedures would be implemented:

13. 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 areas where motorized use is not designated, OSV use near or damage of sensitive plant and wildlife sites, and low snow areas subject to erosion concerns.
14. Wilderness boundaries and other areas where motorized use is prohibited near groomed snow trails and areas designated for OSV use would be monitored for OSV incursions. We would coordinate and implement increased education or enforcement actions as needed.
15. Trailheads and groomed trail areas would be monitored for use conflicts and public safety concerns, coordinating and 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).
16. Areas where OSV use is restricted to designated trails would be monitored to ensure public OSV use is restricted to designated trails and is not encroaching away from the designated trail in areas where such use is not designated.
17. Monitoring that would occur during implementation of all alternatives includes effectiveness monitoring, based on available resources. Monitoring would ensure that:
 - i. Resource damage is not occurring when there is less than the prescribed minimum snow depth with certain exceptions as described in the description of alternative 4. Snow depth 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;
 - ii. Where resource damage is suspected due to public OSV use on less than the prescribed minimum snow depth, monitoring would occur to help inform the responsible official if damage is occurring, the extent of the damage, and what steps need to be taken to address the issue;
 - iii. Public OSV use is not damaging sensitive resource locations, in consultation with forest resource specialists;
 - iv. Public OSV use is not occurring in prohibited areas; and
 - v. Public OSV use restricted to designated trails is not encroaching away from the trail into areas not designated for OSV use.

Implementation monitoring includes the following for vegetation:

18. Damage to vegetation would be addressed by monitoring in consultation with forest biologists to minimize damage to vegetation by ensuring that public OSV use is not damaging sensitive resource locations. In particular, OSV use would be monitored 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 would include not designating this area for public, cross-country OSV use.

19. Damage to vegetation would be addressed by monitoring public OSV use in designated Forest Plan botanical special interest areas (SIAs) to determine if damage is occurring. If adverse impacts are observed and it is determined that public 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 public OSV use would be considered, or other appropriate protective measures taken, in consultation with a forest botanist. Considerations would include not designating these SIAs for public, cross-country OSV use or restricting OSV use to designated trails only.

As a result of biological monitoring efforts, if OSV use is found to be causing damage to special interest plant species, habitats, or other botanical resources, corrective actions may be required, including, but not limited to, area closures and signage to protect the sensitive resources.

Previous Monitoring

During routine site revisits for all Special Interest plants on the Lassen National Forest, there have been no observations of impacts from OSV use (Sanger pers. comm. 2015).

Effects common to all alternatives

Because the alternatives are very similar, with the same activities proposed, and the differences are mainly the spatial extent of OSV use, most of the effects are described in this section. The varying areas of authorized OSV use would result in mostly small differences in degree of potential effects. Therefore, each alternative's effects analysis will mainly summarize the extent of botanical resources affected, and provide the basis for determinations. A summary comparison of alternatives will follow, providing the decision-maker a quick reference for evaluating the alternatives along with the other resources that need to be considered. Detailed results of botanical resource measures for each alternative, by species, is presented in table 129 (page 374), and followed by a list of species that occur in/along each designated area/trail, by alternative (table 130 through table 134, beginning on page 386).

Survey and Manage Species

Because the proposed action and alternatives would not produce ground-disturbing impacts, there would be no negative direct effects on survey and manage species or their persistence within the project area; therefore, field surveys and site management for these species are not required. Without the loss of overstory canopy cover, specific host trees, forest floor organic matter, or large woody debris, habitat characteristics would be retained for conserving survey and manage fungi.

Occurrences of *Cypripedium montanum* would not be directly affected because the species is dormant and underground when OSV uses take place. Occurrences of *Ptilidium californicum* would not be affected because the species grows low on the bases of large trees and minimum snow depths would prevent impacts as well as the fact that OSV operators avoid making contact with large trees for safety reasons and to prevent damage to their vehicles.

Special Interest Plants

Effects discussions for Special Interest plants are presented in categories of plant life forms because the greatest possible impacts from OSV activities are dependent upon the presence of their living tissues within the snow or above the snow surface and whether each species is biologically active during the times that direct and indirect effects may occur. Effects to each life form category are presented after an introduction of direct and indirect effects.

Separate sections follow for invasive plant species and other botanical resources (SIAs and RNAs).

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). OSV use and grooming of OSV trails can damage vegetation through direct contact with plant tissues that are present above the snow or within the snow column that is compacted by the vehicles. Because woody species (trees, shrubs, and sub-shrubs) are the only plants present within the snow, they are the only plants that may be directly damaged. All other plant life forms are not expected to be directly affected by OSV use because minimum snow depths are expected to prevent direct effects to vegetation at ground level.

It is generally recognized that disturbance to soil and vegetation by OSV use is reduced as snowpack depths increase. Damage to soil and low-growing vegetation is much more likely when OSV use occurs under low snow conditions (Greller et al. 1974, Fahey and Wardle 1998). Thus, the minimum snow depth requirements of all alternatives are expected to prevent or minimize damage to soil and vegetation.

In a study on Niwot Ridge in the Front Range of the Colorado Rocky Mountains, repeated snowmobile use occurred on snow-covered and snow-free areas between two weather stations, and the effects of this use were evaluated (Greller et al. 1974). General conclusions included: 1) in communities that are snow-free in winter, damage by snowmobiles was severe to lichens, *Selaginella*, and to relatively prominent, rigid cushion-plants. Part of the damage to these communities may have been due to the manual removal of rocks, necessary for the operation of snowmobiles in snow-free areas. 2) *Kobresia*, present in isolated tussocks in a cushion-plant community, absorbed the major portion of snowmobile impact. As *Kobresia* is thought to form the climatic climax community in this ecosystem, differential damage to it could seriously retard succession. 3) Snowmobile travel in uniform, closed *Kobresia* meadows inflicted much less damage to most plants, including *Kobresia* itself, than did similar travel on a sparsely vegetated community. 4) Plants best able to survive the heaviest snowmobile impact were those with small stature and little woodiness, or with buds well-protected at or below the soil surface. 5) Snowmobile traffic should be carefully restricted to snow-covered areas. Whenever this is not feasible, the least destructive and easiest alternative is travel on mature, well-vegetated *Kobresia* meadows or similar well-drained plant communities.

On the Lassen National Forest, OSV travel on snow-free areas is prohibited in the current and proposed scenarios. By not allowing OSV use when and where there is less than 12 inches snow depth, the Lassen National Forest minimizes the possibility of direct damage to soils and ground vegetation.

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. Three specific topics of indirect effects were identified: snow compaction, pollutants, and invasive plant species. Potential effects from snow compaction and pollutants are described below, and a discussion of potential invasive plant effects will follow in its own section because it is a required analysis topic itself.

Snow Compaction

Snow is compacted by all OSVs, including snowmobiles, snow cats, and snow grooming equipment. Snow compaction mechanically alters snow grains and redistributes them. This mechanical disturbance breaks off the small points of new snow crystals, destroying the weak existing bonds between them, and bringing the new grains into much closer contact than occurs naturally. Snow metamorphism is artificially accelerated, and snow density and hardness are increased. In addition, the layered structure of the snowpack is changed (Fahey and Wardle 1998). All this has both thermal and hydrological implications, resulting in lower soil temperatures (Fahey and Wardle 1998, Eagleston and Rubin 2012) and delayed snowmelt (Keddy et al. 1979, Fahey and Wardle 1998, Davenport and Switalski 2006, Gage and Cooper 2013). The thermal conductivity of compacted snow is greater than undisturbed snow, and can reduce the buffering effect against temperature extremes and fluctuations. Thermal conductivity of compacted snow was 11.7 times greater than non-compacted snow (Neumann and Merriam 1972).

Keddy and others (1979) studied the effects of snowmobile use on snow compaction, vegetation composition, and soil temperatures on an abandoned farm in Nova Scotia. They found that snow melted later in areas with compacted snow and that some species showed differences in cover between treatments. Considering the multitude of possible effects and the variety of plant structures and life histories, they were not surprised to find no overall trend for species composition changes. They also noted that the first pass by a snowmobile caused the greatest increase in snow compaction – roughly 75 percent of that observed after 5 sequential passes. While some species composition changes were observed in old field vegetation, they found no changes in species composition in a marsh area, possibly because of solid ice cover during the winter.

In a study of the impact of snowshoe/cross-country ski compaction and snowmelt erosion on groomed trails, Eagleston and Rubin (2012) reported that these non-motorized uses caused snow to remain on the compacted areas an average of 5 days longer than non-compacted areas. They also found that the compacted snow caused increased erosion. Soil temperatures under compacted snow stayed frozen for 3 days longer, and, averaged over the entire winter season, remained 0.1 degree Celsius colder than soil under non-compacted snow.

Fahey and Wardle (1998) examined the effects of snow grooming for downhill ski areas in subalpine and alpine environments. They found that the compacted snow increased frost penetration and delayed snow melt.

However, research does not always support the generalization of lower soil temperatures and delayed snowmelt due to snow compaction. In a study of snow compaction effects from snowmobiles on fens on the Routt National Forest, Gage and Cooper (2013) found no statistically significant differences in the temperature of peat soils between compacted and non-compacted areas. They also found no differences in timing of snow melt, biomass production, or plant phenology. From additional, unpublished data from the Telluride Ski Area, where intense compaction occurred daily, they observed a delayed snowmelt and thawing of the soil of about one month in compacted areas. They noted that the continuous influx of groundwater in fens may limit freezing and maintain more constant soil thermal conditions. They found no evidence conclusively linking snowmobile compaction to impairment of fen function.

Different plants have different levels of vulnerability and ability to recover from the effects of snow compaction. The characteristics which determine their vulnerability are the timing of flowering, and growth form and size (Fahey and Wardle 1998). Prolonged snow lie may adversely affect early spring flowering plants because they could have a shorter growing season and thus possibly reduced

seed production due to delayed phenology and perhaps a misalignment of timing with their preferred pollinators. Due to snow compaction, early spring growth of some plant species may be retarded or may not occur under an OSV trail; however, the current and proposed OSV trails are underlain by existing roads and trails which are already compacted and/or disturbed and little, if any, additional impacts are expected to the vegetation.

Trail grooming on the 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 (McNamara 2017).

In summary, the available research supports the assumption that more intensive snow compaction occurring along groomed or heavily used trails would have considerably greater effect on soil temperatures and delayed snowmelt than the compaction caused by dispersed uses in areas designated for cross-country OSV use. Due to the intensive, repetitive, and predictable compaction of snow along designated OSV trails (groomed or not), these areas are much more likely and reasonably foreseeable to have a degree of compaction that could influence vegetation. Therefore, in this analysis, areas within 100 feet of designated OSV trails are assumed to be at risk from the effects of snow compaction. Away from the designated OSV trails, dispersed OSV travel is much less likely to compact snow with enough intensity and repetition to measurably or predictably affect ground vegetation, and therefore is not considered in this analysis as a reasonably foreseeable source of indirect effects.

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.

Pollutants emitted from exhaust can cause a variety of impacts on vegetation. Carbon dioxide may function as a fertilizer and cause changes in plant species composition (Bazzaz and Garbutt 1998); nitrogen oxides also may function as fertilizers, producing similar effects along roadsides (Falkengren-Grerup 1986). Sulfur dioxide, which can be taken up by vegetation, may result in altered photosynthetic processes (Winner and Atkison 1986, Mooney et al. 1988). Other toxic compounds may result in reduced metabolism or retarded growth.

Some of the airborne pollutants would enter the snowpack and be released during snowmelt. Similar responses can be assumed to occur in plants that ingest these compounds from snowmelt, although the compounds may undergo chemical changes while in the snowpack, confounding the predictability of effects.

Airborne pollutants can enter the snowpack from both local and regional sources, including but not limited to vehicle emissions, dust storms, and smog. The concentrations of basic cations and acidic anions in the snowpack can be altered and, when released quickly during snow melt, can temporarily lower the pH of surface waters in a process known as “episodic acidification” (Blanchard et al. 1988). Soil acidification and vegetation changes were examined in southern Sweden, where Falkengren-Grerup (1986) found that increased nitrogen deposition and the increased acidity in the

humus layer may have caused changes in plant cover, with some species increasing and some species decreasing.

Demonstrating that snowpack chemistry can be used as a quantifiable indicator of airborne pollutants from vehicular traffic, a correlation was shown between pollutant levels and vehicle traffic in Yellowstone National Park (Ingersoll et al. 1997). Ammonium and sulfate levels were consistently higher for the in-road snow compared to off-road snow, but nitrate concentrations did not decrease within a distance of 100 meters from the emission source; thus, the nitrate ion may be used to distinguish between local and regional emission sources (Ingersoll et al. 1997). Studying snow chemistry in Yellowstone National Park, Ingersoll (1998) found that concentrations of ammonium, nitrate, sulfate, benzene, and toluene were positively correlated with snowmobile use. Concentrations of ammonium were up to three times higher for the in-road snow compared to off-road snow. Concentrations decreased rapidly with distance from roadways.

Arnold and Koel (2006) also examined volatile organic compounds in Yellowstone National Park, and found that the snow in heavily used areas contained higher levels of benzene, ethylbenzene, m- and p-xylene, o-xylene, and toluene compared with a control site only 100 meters from the traveled roadways. Even at the most heavily used area (Old Faithful) they found that the concentrations of volatile organic compounds were considerably below U. S. Environmental Protection Agency's water quality criteria for these compounds. In situ water quality measurements (temperature, dissolved oxygen, pH, specific conductance, and turbidity) were collected; all were found within acceptable limits. Five volatile organic compounds were detected (benzene, ethylbenzene, m- and p-xylene, o-xylene, and toluene). The concentrations were found below EPA criteria and guidelines for the volatile organic compounds analyzed and were below levels that would adversely impact aquatic ecosystems (Arnold and Koel 2006).

Studying air quality and snow chemistry effects from snowmobiles in the Snowy Range, Wyoming, Musselman and Korfmacher (2007) found that heavier snowmobile use resulted in higher levels of nitrogen oxides and carbon monoxide, but ozone and particulate matter were not significantly different. When compared with air quality during the summer, they found that carbon monoxide levels were higher in the winter, but nitrogen oxides and particulate matter were higher in the summer. Air pollutants were well-dispersed and diluted by winds, and air quality was not perceived as being significantly affected by snowmobile emissions. Pollutant concentrations were generally low in both winter and summer. These results differ from those studies examining air pollution from snowmobiles in Yellowstone National Park. However, snow chemistry observations did agree with studies from Yellowstone National Park. Compared with off-trail snow, the snow sampled from snowmobile trails was more acidic with higher amounts of sodium, ammonium, calcium, magnesium, fluoride, and sulfate. Snowmobile activity apparently had no effect on nitrate levels in the snow.

In the winter, plant metabolic rates are drastically reduced. Airborne compounds would only be taken up by respiring woody plants. Airborne pollutants normally disperse quickly in mountain environments that are prone to windy conditions, such as the Sierra Nevada. Different plants may have different responses to the different pollutants in the snowpack, including damage from toxic, volatile compounds and possibly some benefits from additional nutrients and trace minerals. The levels of OSV exhaust contaminants on the Lassen National Forest (considerably less than those observed in Yellowstone National Park) are not expected to impair water quality (McNamara 2017).

In a natural plant community with many species competing for resources, and very little research done on each species' responses to OSV emissions or the competitive interactions that may be affected, it is nearly impossible to predict what changes, if any, would occur. It can only be

reasonably assumed that there may be some changes in plant species cover and composition. The uptake of harmful pollutants is not expected to result in the death of any individual plants. On the Lassen National Forest, no mortality of roadside TES plants due to vehicle pollutants has been observed, even considering year-round vehicle uses. Therefore, the level of effect to TES plants from OSV pollutants is expected to be minimal, and would not result in loss of individuals.

The available research on OSV pollutants (both airborne and in the snowpack) indicate that some effects to vegetation may occur in the immediate vicinity of heavy use areas. Pollutants that become trapped in the snowpack are also concentrated in areas of heavy OSV use. **Therefore, in this analysis, areas within 100 feet of designated OSV trails (groomed or not) are assumed to be reasonably at risk from the effects of OSV pollutants.** Away from the designated OSV trails, dispersed OSV travel is much less likely to contribute harmful contaminants with high enough levels and repetition to measurably or predictably affect ground vegetation, and therefore is not considered in this analysis as a reasonably foreseeable source of indirect effects.

Relative Potential Effects to Plant Life Forms

Considering the combination of direct and indirect effects described above, and the minimum snow depth requirements of all the current alternatives, the effects of proposed OSV uses can be broken down into relative categories of potential damage to the major plant life forms. From the most likely to least likely to experience measurable effects:

- Evergreen trees and shrubs – most likely to be directly affected, due to mechanical damage; indirect effects are reasonably foreseeable if the species occurs near designated OSV trails. Effects may occur in all areas designated for OSV use.
- Deciduous trees and shrubs – somewhat less likely, due to winter dormancy; indirect effects are reasonably foreseeable if the species occurs near designated OSV trails. Effects may occur in all areas designated for OSV use.
- Sub-shrubs (low-growing woody species) – less likely due to less exposure to direct effects (but still reasonably foreseeable); indirect effects may be reasonably foreseeable if the species occurs near designated OSV trails. Effects may occur in all areas designated for OSV use.
- Perennial herbaceous species – direct effects are unlikely (not reasonably foreseeable) due to minimum snow depth requirements; indirect effects may be reasonably foreseeable if the species occurs near designated OSV trails. Effects may occur along designated OSV trails, but are not likely in areas designated for cross-country OSV use.
- Annual species – direct effects are highly unlikely (not reasonably foreseeable) due to minimum snow depth requirements; indirect effects might be reasonably foreseeable if the species occurs near designated OSV trails and spring flowering could be altered by persistent compacted snow. Effects may occur along designated OSV trails, but are not likely in areas designated for cross-country OSV use.
- Aquatic species – direct effects would not occur because OSV use is not allowed over open water; indirect effects from pollutants might be reasonably foreseeable if the species occurs near designated OSV trails. Effects may occur along designated OSV trails, but are not likely in areas designated for cross-country OSV use.

Trees, shrubs, or sub-shrub species

Direct Effects

Snowmobile activities may damage vegetation on and along trails and in areas designated for cross-country OSV use. The most commonly observed effect from snowmobiles was the physical damage to shrubs, saplings, and other vegetation (Neumann and Merriam 1972, Wanek 1971). Winter Wildland Alliance (WWA) analyzed the Gallatin National Forest regeneration survey data collected between 1983 and 1996 in areas that were harvested and replanted. That survey data indicated snowmobiles had damaged between 12 and 720 trees per acre (WWA 2009). Damage to vegetation has been observed in the Greater Yellowstone Area that is caused by winter recreational activities that occur off trail. For example, branches of willows (*Salix* spp.) and sagebrush (*Artemisia* spp.) have been broken, and leaders have been removed from conifers (Stangl 1999). Neumann and Merriam (1972) found that rigid woody stems up to one inch in diameter were very susceptible to damage. Stems were snapped off in surface packed or crusted snow. Neumann and Merriam (1972) also observed that compacted snow conditions caused twigs and branches to bend sharply and break. Stems that were more pliable bent and sprang back although the snowmobile track often removed bark from the stems' upper surfaces. Sub-zero temperatures make stems more prone to snapping rather than bending. Direct mechanical effects by snowmobiles on vegetation at and above snow surface can be severe. After only a single pass by a snowmobile, more than 78 percent of the saplings on a trail were damaged, and nearly 27 percent of them were damaged seriously enough to cause a high probability of death (Neumann and Merriam 1972). Young conifers were found to be extremely susceptible to damage from snowmobiles. Broken stems of any woody species would provide places for pathogens to enter the plant tissues and would reduce the integrity of developing stems or trunks, both of which could lead to additional damage or death of individuals. These direct effects are expected to be localized and not result in loss of entire occurrences.

On the Lassen National Forest, OSV use may directly damage individuals of the Lassen National Forest Special Interest plants *Artemisia tripartita* ssp. *tripartita*, *Betula glandulosa*, *Eriogonum ovalifolium* var. *depressum*, *Eriogonum pyrolifolium* var. *pyrolifolium*, and *Hesperocyparis bakeri*.

Indirect Effects

Airborne pollutants from OSVs would be concentrated along OSV trails. Because deciduous trees and shrubs lose their leaves in the winter months, they cannot photosynthesize during fall and winter. Thus respiration is dramatically reduced for deciduous trees and shrubs. Although evergreen trees and shrubs retain their leaves and are thus capable of photosynthesis and respiration during winter, these processes are also considerably reduced during the cold season. Reduced respiration during the winter means that smaller amounts of the airborne pollutants would be ingested through gas exchange. For low-growing woody species that are generally covered by snow when OSV use would occur (*Eriogonum ovalifolium* var. *depressum* and *Eriogonum pyrolifolium* var. *pyrolifolium*, *Eriogonum tripodum*), the exposure to airborne pollutants would be negligible.

Pollutants which are trapped and then released during snowmelt may (or may not) have some adverse and some beneficial effects, however the extent and direction of specific effects is unknown. It is expected that pollutant concentrations would be low enough that water quality would not be impaired, and thus it is likely that plant responses, if any, would not be noticeable.

Perennial herbaceous species (including bryophytes)

Direct Effects

With minimum snow depth requirements providing protection of the soil surface and ground vegetation, perennial herbaceous species (which die back each year to buds at or below the soil surface) would not be directly affected by current or proposed OSV uses.

Indirect Effects

Compacted snow may alter the timing of new foliage emergence in the spring, due to delayed snowmelt and colder soil temperatures. This is expected to have minimal effects to perennial herbaceous plants because they are assumed to be adapted to a wide variety of natural snowmelt times. While they are also generally adapted to sub-freezing temperatures, because their living tissues are present at or near the ground surface, colder temperatures from compacted snow could result in freeze damage to some individuals.

Airborne pollutants would not affect perennial herbaceous species because the snow layers would prevent the pollutants from reaching their foliage, that is, if foliage were to even be living during OSV season. It is expected that pollutant concentrations would be low enough that water quality would not be impaired, and thus it is likely that plant responses, if any, would not be noticeable.

Annual plant species

Direct Effects

Plant species that complete their life cycle within one growing season would not be directly affected by current or proposed OSV uses because they are generally not growing during the authorized period of OSV use.

Indirect Effects

Compacted snow may alter the timing of seed germination and plant growth in the spring, due to delayed snowmelt and colder soil temperatures. Snowmelt in compacted areas may be delayed by up to 3 to 4 weeks. Annual plants must be adapted to a wide variety of natural snowmelt times in mountainous regions, due the variability of snowpack, temperature, and precipitation. Annual plants would not yet be growing in an area at the same time when the snowpack is sufficient to allow OSV use.

Airborne pollutants would not affect annual species because the new generation of plants (seeds) would still be dormant under the snow. It is expected that pollutant concentrations in the snowpack would be low enough that water quality would not be impaired, and thus it is likely that plant responses, if any, would not be noticeable. Pollutant effects are not expected to occur outside areas of concentrated OSV use, such as trailheads and snow trails. Annual Sensitive plant species are not known to occur within identified high use areas, and these plants, due to their annual life cycle, are not likely to be affected by OSV use.

Aquatic Species

Direct Effects

Aquatic plant species would not be directly affected by current or proposed OSV uses because OSVs are not authorized to operate over aquatic habitats.

Indirect Effects

Delayed snow melt and transfer of sub-freezing temperatures from snow compaction is not expected to affect aquatic plant species. Airborne pollutants would not affect aquatic species because the plants grow underwater. It is expected that pollutant concentrations would be low enough that water quality would not be impaired, and thus it is likely that plant responses, if any, would not be noticeable.

Invasive Species

On the Lassen National Forest, 33 invasive plant species are documented. Table 129 (page 374) includes a list of each species and their acreage of presence near OSV trails and in areas designated for OSV use.

Although seed dispersal by vehicles is a major vector for weed invasions (Ouren et al. 2007, Von der Lippe and Kowarik 2007, Taylor et al. 2011), no literature or observational evidence was found to support the idea that invasive plants are spread by OSV use or grooming activities. However, it is possible that some weed introduction or expansion could result from these uses. OSVs could bring weed seeds into the project area, especially if the OSVs and/or their trailers are stored outside near weed infestations. Throughout the seasons of non-use (spring, summer, and fall), weed species are actively growing and producing seed, which may get deposited on OSVs and trailers that are stored outside, particularly during windy conditions or if weeds are growing in close proximity. Weed introductions are most likely to occur at trailheads, where seeds may be brought into the area on trailers, towing vehicles, and OSVs. The movement and jarring of this equipment during unloading may dislodge soil and other debris containing weed seeds. Less likely, but still possible, is that weed seeds may be deposited by the OSVs as they travel along designated trails and through areas designated for cross-country travel, although it is unknown whether weed seeds deposited on the snow surface would remain viable and germinate when spring arrives. It is possible that the majority of weed seeds that may be brought into the area would be eaten by birds, mice, or other animals before spring conditions arrive.

Weeds usually gain a foothold in natural communities where soil disturbance has provided suitable conditions for weed seed germination, where ground vegetation is disturbed and unable to outcompete the invaders, and (in forested areas) where tree canopy removal or thinning has allowed additional sunlight to reach the forest floor. Aside from the possible introduction of weed seeds described above, none of the other typical factors promoting weed infestations are expected with OSV use.

As with the other indirect effects described above, the most likely places for possible weed introductions is in areas of concentrated OSV use. OSV trailheads are also accessible by wheeled vehicles during the summer seasons, so the presence of weeds does not necessarily indicate that they were brought to the sites as a result of OSV activities. Although there are some differences in designated OSV trails in each alternative, the locations and uses of five OSV trailheads would be the same for all alternatives. The following weed species have been found at the OSV trailheads:

- Ashpan – no weeds documented
- Fredonyer – *Lepidium latifolium* and *Leucanthemum vulgare*
- Jonesville – no weeds documented
- Morgan Summit – *Centaurea solstitialis*
- Swain Mountain – *Lepidium latifolium* and *Hypericum perforatum*

On the Lassen National Forest, there have been no observations of weed introductions or spread specifically tied to OSV use (Sanger pers. comm. 2015). Roadside weed infestations are routinely treated during their active growing season each year. Given the uncertainties described above and overall lack of evidence of OSV use contributing to weed infestations, the risk of weed increases due to OSV use is expected to be very low for all alternatives.

Other Botanical Resources

Special Interest Areas

The purpose of this SIA analysis is to determine compliance with the intended focus of each of the three areas that are established as a Botanical Special Interest Area.

Montgomery Creek Grove Botanical Area is approximately 5 acres in size, and is heavily forested. Although the area is designated for OSV use, recreational OSV enthusiasts would not likely visit the area due to the difficulty in maneuvering snow machines through the dense forest. Therefore, OSV use is not expected to alter any of the vegetation and habitat characteristics for which the Special Interest Area was established.

At 480 acres, the Murken Botanical Area is the largest of the three botanical SIAs, and is easily accessible. With the minimum snow depth requirements for all alternatives, OSV use is not expected to alter any of the vegetation and habitat characteristics for which the Special Interest Area was established.

Willow Lake Bog Botanical Area encompasses 60 acres, most of which is open water. OSVs would not be authorized to operate over lakes, so the area would receive little OSV use. Due to the restrictions on OSV use on lakes, and minimum snow depth requirements, OSV use is not expected to alter any of the vegetation and habitat characteristics for which the Special Interest Area was established.

Research Natural Areas

The purpose of the RNA analysis is to determine compliance with the Lassen LRMP direction. Because off-road vehicle use is prohibited in RNAs, per the Lassen LRMP, no OSV uses are allowed off designated trails in these areas, and the current OSV Designation proposal and subsequent decision would not overrule the existing LRMP direction. No OSV trails are currently existing or proposed in RNAs. However, some RNAs are at least partially designated for OSV use in each alternative, as currently defined by the project's spatial data. The extent of these designated areas will be described under each alternative. It is assumed that the intent of the Lassen OSV Designation project is to avoid designating OSV use within all RNAs, and would thus result in no OSV effects occurring in RNAs.

Cumulative Effects

Past activities are considered part of the existing condition and are discussed within the Affected Environment section. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed to those effects.

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 botanical resources, other than providing an additional vector for the possible transport of noxious/invasive weed species. Other ongoing and foreseeable future actions include livestock grazing, recreation, timber harvest, fuels reduction, woodcutting activities, wildfire suppression, and other activities.

Survey and Manage and Special Interest Plants

The effects of present and future projects on survey and manage and special interest plants would likely be minimal because all projects are analyzed and mitigation measures are designed for those species for which viability is a concern, on a project-by-project basis.

Invasive Plants

Invasive plants are also analyzed for each project, and design features are typically incorporated into project plans where ground disturbance may occur. In addition, weeds are routinely treated each year as part of the Lassen National Forest weeds program. The very low weed risk of the Lassen National Forest OSV Designation project would add minimal risk to the ongoing and foreseeable actions in the planning area.

Special Interest Areas

Because OSV use would not have direct or indirect effects to special interest areas, there would be no cumulative effects from OSV use.

Research Natural Areas

With no vehicle uses permitted within RNAs, there would be no cumulative effects from the OSV uses as proposed in this analysis. With an expected correction to the associated spatial data for the final analysis, there would be no OSV use in RNAs, and thus, no cumulative effects.

Alternative 1 – No Action

Alternative 1 Effects to Botanical Resources

Detailed indicators and measures for botanical resources are presented in table 129 (page 374). The following table summarizes these same measures by the major analysis topics.

Table 122. Botanical resources indicators and measures for alternative 1

Analysis Topic	Total acres on Lassen National Forest	Acres within 100 feet of OSV trails	Acres in areas designated for OSV use
Survey and Manage Plants and Fungi	8.4 (NWFP area only)	0	8.4
Special Interest plants	5,789	58	5,362
Invasive plants	8,040	50	7,306
Special Interest Areas	544	0	544
Research Natural Areas	14,154	0	1,109

There are no additional types of effects to botanical resources beyond those described in Effects Common to All Alternatives that are specific to alternative 1. This alternative would generally have the greatest potential for direct effects to these botanical resources due to its larger areas designated for OSV use.

Survey and Manage Species

As described in Effects Common to All Alternatives, because no ground-disturbing actions are proposed, there would be no negative effects on survey and manage species or their habitats within the project area.

Special Interest Plants

Special interest plant species in the various plant life form categories would be affected differently, as described above in Effects Common to All Alternatives. Trees, shrubs, and sub-shrubs (woody plants) may be directly damaged by OSVs where they occur in areas designated for OSV use, and they may also experience indirect effects where they occur near designated OSV trails or in other high-use areas. Perennial herbaceous species, annual species, and aquatic species would not be directly affected, but they too may also experience indirect effects if they occur near designated OSV trails.

Because there is potential for direct damage where they occur in areas designated for OSV use and indirect effects to occurrences in high use areas, five of the seven special interest woody plant species: *Artemisia tripartita* ssp. *tripartita*, *Betula glandulosa*, *Eriogonum ovalifolium* var. *depressum*, *Eriogonum tripodum*, and *Hesperocyparis bakeri*, may be affected by alternative 1 of the Lassen OSV Designation project, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester's Sensitive Plant List.

Because there is potential for indirect effects to occurrences within 100 feet of designated OSV trails, 12 of the special interest perennial herbaceous plant species: *Astragalus inversus*, *Carex davyi*, *Carex petasata*, *Claytonia palustris*, *Erigeron inornatus* var. *calidipetris*, *Hackelia amethystina*, *Juncus hemiendytus* var. *abjectus*, *Muhlenbergia jonesii*, *Penstemon cinicola*, *Penstemon heterodoxus* var. *shastensis*, *Piperia colemanii*, and *Stellaria obtusa*, and one of the annual plant species, *Mimulus pygmaeus*, may be affected by alternative 1 of the Lassen OSV Designation project, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester's Sensitive Plant List.

For all other special interest plants not specifically mentioned above, because they are not present within 100 feet of designated OSV trails or other high-use areas, alternative 1 of the Lassen OSV Designation project would not affect these species.

Invasive Plants

As described above in Effects Common to All Alternatives, the risk of weed introduction and/or spread due to OSV use is very low.

Special Interest Areas

As described above in Effects Common to All Alternatives, some botanical special interest areas would remain designated for OSV use, but this use is not expected to alter any of the characteristics for which each special interest area was established.

Research Natural Areas

There are no designated OSV trails in RNAs. Blacks Mountain RNA (521 acres) is currently designated for OSV use according to the project spatial data, but the area is managed as a closed area per LRMP direction. The portion (472 acres) of Indian Creek RNA outside the Ishi Semi-Primitive Non-Motorized area is also mapped as designated for OSV use. Furthermore, due to spatial mapping disagreements along the edges of Cub Creek and Timbered Crater RNAs, 116 additional acres are mapped as designated for OSV use; however, these areas are clearly intended to exclude OSV use. Graham Pinery, Green Island Lake, Mayfield, and Soda Ridge RNAs would remain not designated for OSV use. If 1,109 acres of RNA would become designated for OSV use, alternative 1 would not comply with the Lassen LRMP. However, it is not expected that the current OSV Designation proposal and subsequent decision would overrule the current LRMP direction, and OSV use within RNAs would be managed as areas not designated for OSV use, thus complying with the Lassen LRMP.

Alternative 2 – Proposed Action

Alternative 2 Effects to Botanical Resources

Detailed indicators and measures for botanical resources are presented in table 129 (page 374). The following table summarizes these same measures by the major analysis topics.

Table 123. Botanical resources indicators and measures for alternative 2

Analysis Topic	Total acres on Lassen National Forest	Acres within 100 feet of OSV trails	Acres in areas designated for OSV use
Survey and Manage Plants and Fungi	8.4 (NWFP area only)	0	8.4
Special Interest plants	5,789	52	5,231
Invasive plants	8,040	16	4,872
Special Interest Areas	544	0	544
Research Natural Areas	14,154	0	113

There are no additional types of effects to botanical resources beyond those described in Effects Common to All Alternatives that are specific to alternative 2. This alternative would generally have less potential for direct and indirect effects to these resources, mostly due to smaller areas designated for OSV use. Approximately 80 percent of the NFS land within the Lassen National Forest would be designated for cross-country OSV use, compared to 84 percent currently open – a reduction of 42,850 acres.

Survey and Manage Species

As described in Effects Common to All Alternatives, because no ground-disturbing actions are proposed, there would be no negative effects on survey and manage species or their habitats within the project area.

Special Interest Plants

The area of potentially affected special interest plant occurrences in designated areas would be reduced by 131 acres, and near trails reduced by 6 acres. Special interest plant species in the various plant life form categories would be affected differently, as described above in Effects Common to All Alternatives. Trees, shrubs, and sub-shrubs (woody plants) may be directly damaged by OSVs where

they occur in areas designated for OSV use, and they may also experience indirect effects where they occur near designated OSV trails or other high-use areas. Perennial herbaceous species, annual species, and aquatic species would not be directly affected, but they too may also experience indirect effects if they occur near designated OSV trails or other high use areas. All OSV effects to these species are expected to very minor or even undetectable.

Because there is potential for direct damage and indirect effects where they occur in areas designated for OSV use, five of the seven special interest woody plant species: *Artemisia tripartita* ssp. *tripartita*, *Betula glandulosa*, *Crataegus castlegarensis*, *Eriogonum ovalifolium* var. *depressum*, and *Hesperocyparis bakeri*, may be affected by alternative 2, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester's Sensitive Plant List.

Because there is potential for indirect effects to occurrences in high use areas near trails, twelve of the Special Interest perennial herbaceous plant species, *Astragalus inversus*, *Carex davyi*, *Carex petasata*, *Claytonia palustris*, *Erigeron inornatus* var. *calidipetris*, *Hackelia amethystina*, *Juncus hemiendytus* var. *abjectus*, *Muhlenbergia jonesii*, *Penstemon cinicola*, *Penstemon heterodoxus* var. *shastensis*, *Piperia colemanii*, and *Stellaria obtusa*, and one of the annual plant species, *Mimulus pygmaeus*, may be affected by alternative 2 of the Lassen OSV Designation project, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester's Sensitive Plant List.

For all other special interest plants not specifically mentioned above, because they are not present within 100 feet of designated OSV trails or other high use areas, alternative 2 will not affect these species.

Invasive Plants

As described above in Effects Common to All Alternatives, the risk of weed introduction and/or spread due to OSV use is very low.

Special Interest Areas

Five hundred forty-four acres of botanical special interest areas would remain designated for OSV use, but this use is not expected to alter any of the characteristics for which each special interest area was established.

Research Natural Areas

There are no designated OSV trails in RNAs. Blacks Mountain RNA would not be designated for OSV use. Indian Creek RNA would also not be designated for OSV use, in part due to it being in the area below 3,500 feet. Due to spatial mapping disagreements along the edges of Cub Creek and Timbered Crater RNAs, 113 acres would be designated for OSV use; however, these areas are clearly intended to exclude OSV use. Graham Pinery, Green Island Lake, Mayfield, and Soda Ridge RNAs would remain not designated for OSV use. If these 113 acres of RNA would become designated for OSV use, alternative 2 would not comply with the Lassen Land and Resource Management Plan. However, it is not expected that the current OSV Designation proposal and subsequent decision would overrule the current LRMP direction, and OSV use within RNAs would be managed as areas not designated for OSV use, thus complying with the Lassen LRMP.

Alternative 3

Alternative 3 Effects to Botanical Resources

Detailed indicators and measures for botanical resources are presented in table 129 (page 374). The following table summarizes these same measures by the major analysis topics.

Table 124. Botanical resources indicators and measures for alternative 3

Analysis Topic	Total acres on Lassen National Forest	Acres within 100 feet of OSV trails	Acres in areas designated for OSV use
Survey and Manage Plants and Fungi	8.4 (NWFP area only)	0	8.4
Special Interest plants	5,789	52	5,033
Invasive plants	8,040	50	4,153
Special Interest Areas	544	0	486
Research Natural Areas	14,154	0	116

There are no additional kinds of effects to these botanical resources beyond those described in Effects Common to All Alternatives that are specific to alternative 3. This alternative would have a lower potential for direct effects to botanical resources due to fewer acres designated for OSV use.

Survey and Manage Species

As described in Effects Common to All Alternatives, because no ground-disturbing actions are proposed, there would be no negative effects on Survey and manage species or their habitats within the project area.

Special Interest Plants

The area of potentially affected special interest plant occurrences in designated areas would be reduced by 329 acres, and near trails reduced by 6 acres. Special interest plant species in the various plant life form categories would be affected differently, as described above in Effects Common to All Alternatives. Trees, shrubs, and sub-shrubs (woody plants) may be directly damaged by OSVs where they occur in areas designated for OSV use, and they may also experience indirect effects where they occur near designated OSV trails. Perennial herbaceous species, annual species, and aquatic species would not be directly affected, but they also may experience indirect effects if they occur near designated OSV trails.

Because there is potential for direct damage and indirect effects where they occur in areas designated for OSV use, four of the seven special interest woody plant species: *Artemisia tripartita* ssp. *tripartita*, *Betula glandulosa*, *Eriogonum ovalifolium* var. *depressum*, and *Hesperocyparis bakeri*, may be affected by alternative 3, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester's Sensitive Plant List.

Because there is potential for indirect effects to occurrences within 100 feet of designated OSV trails and other areas of high use, 12 of the special interest perennial herbaceous plant species: *Astragalus inversus*, *Carex davyi*, *Carex petasata*, *Claytonia palustris*, *Erigeron inornatus* var. *calidipetris*, *Hackelia amethystina*, *Juncus hemiendytus* var. *abjectus*, *Muhlenbergia jonesii*, *Penstemon cinicola*, *Penstemon heterodoxus* var. *shastensis*, *Piperia colemanii*, and *Stellaria obtusa*, and one of the annual plant species, *Mimulus pygmaeus*, may be affected by alternative 3, but the possible effects

would not contribute to a downward trend or the species being added to the Regional Forester's Sensitive Plant List.

For all other special interest plants not specifically mentioned above, because they are not present within 100 feet of designated OSV trails or other areas of high use, alternative 3 will not affect these species.

Invasive Plants

As described above in Effects Common to All Alternatives, the risk of weed introduction and/or spread due to OSV use is very low.

Special Interest Areas

Four hundred eighty-six acres of botanical special interest areas would remain designated for OSV use (a reduction of 58 acres), but this use is not expected to alter any of the characteristics for which each special interest area was established.

Research Natural Areas

There are no designated OSV trails in RNAs. As with alternative 2, Blacks Mountain RNA would not be designated for OSV use and Indian Creek RNA would also not be designated for OSV use, in part due to it being in the area below 3,500 feet. Due to spatial mapping disagreements along the edges of Cub Creek and Timbered Crater RNAs, 116 acres would be designated for OSV use; however, these areas are clearly intended to exclude OSV use. Graham Pinery, Green Island Lake, Mayfield, and Soda Ridge RNAs would remain not designated for OSV use. If these 116 acres of RNA would become designated for OSV use, alternative 3 would not comply with the Lassen LRMP. However, it is not expected that the current OSV Designation proposal and subsequent decision would overrule the current LRMP direction, and OSV use within RNAs would be managed as areas not designated for OSV use, thus complying with the Lassen LRMP.

Alternative 4

Alternative 4 Effects to Botanical Resources

Detailed indicators and measures for botanical resources are presented in table 129 (page 374). The following table summarizes these same measures by the major analysis topics.

Table 125. Botanical resources indicators and measures for alternative 4

Analysis Topic	Total acres on Lassen National Forest	Acres within 100 feet of OSV trails	Acres in areas designated for OSV use
Survey and Manage Plants and Fungi	8.4 (NWFP area only)	0	8.4
Special Interest plants	5,789	67	5,326
Invasive plants	8,040	50	7,237
Special Interest Areas	544	0	544
Research Natural Areas	14,154	0	588

There are no additional kinds of effects to botanical resources beyond those described in Effects Common to All Alternatives that are specific to alternative 4. This alternative carries nearly as much potential (second greatest among all alternatives) for effects to botanical resources as alternative 1, due to similar areas being designated for OSV use.

Survey and Manage Species

As described in Effects Common to All Alternatives, because no ground-disturbing actions are proposed, there would be no negative effects on survey and manage species or their habitats within the project area.

Special Interest Plants

The area of potentially affected special interest plant occurrences in designated areas would be reduced by 44 acres, and near trails increased by 9 acres. Special interest plant species in the various plant life form categories would be affected differently, as described above in Effects Common to All Alternatives. Trees, shrubs, and sub-shrubs (woody plants) may be directly damaged by OSVs where they occur in areas designated for OSV use, and they may also experience indirect effects where they occur near designated OSV trails. Perennial herbaceous species, annual species, and aquatic species would not be directly affected, but they too may experience indirect effects if they occur near designated OSV trails.

Because there is potential for direct damage where they occur in areas designated for OSV use and indirect effects to occurrences within 100 feet of designated OSV trails, six of the seven special interest woody plant species: *Artemisia tripartita* ssp. *tripartita*, *Betula glandulosa*, *Crataegus castlegarensis*, *Eriogonum ovalifolium* var. *depressum*, *Eriogonum tripodum*, and *Hesperocyparis bakeri*, may be affected by alternative 4 of the Lassen OSV Designation project, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester's Sensitive Plant List.

Because there is potential for indirect effects to occurrences within 100 feet of designated OSV trails, 12 of the special interest perennial herbaceous plant species: *Astragalus inversus*, *Carex davyi*, *Carex petasata*, *Claytonia palustris*, *Erigeron inornatus* var. *calidipetris*, *Hackelia amethystina*, *Juncus hemiendytus* var. *abjectus*, *Muhlenbergia jonesii*, *Penstemon cinicola*, *Penstemon heterodoxus* var. *shastensis*, *Piperia colemanii*, and *Stellaria obtusa*, and one of the annual plant species, *Mimulus pygmaeus*, may be affected by alternative 4, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester's Sensitive Plant List.

For all other special interest plants not specifically mentioned above, because they are not present within 100 feet of designated OSV trails, alternative 4 will not affect these species.

Invasive Plants

As described above in Effects Common to All Alternatives, the risk of weed introduction and/or spread due to OSV use is very low.

Special Interest Areas

Five hundred forty-four acres of botanical special interest areas would remain designated for OSV use, but this use is not expected to alter any of the characteristics for which each special interest area was established.

Research Natural Areas

There are no designated OSV trails in RNAs. Blacks Mountain RNA would not be designated for OSV use. Because the area below 3,500 feet would be designated for OSV use, the portion of Indian Creek RNA outside the Ishi Semi-Primitive Non-Motorized area (472 acres) would be designated for OSV use. Graham Pinery, Green Island Lake, Mayfield, and Soda Ridge RNAs would remain not designated for OSV use. As with all other alternatives, due to spatial mapping disagreements along

the edges of Cub Creek and Timbered Crater RNAs, 115 acres would be designated for OSV use; however, these areas are clearly intended to exclude OSV use. If these 588 acres of RNA would become designated for OSV use, alternative 4 would not comply with the Lassen LRMP. However, it is not expected that the current OSV Designation proposal and subsequent decision would overrule the current LRMP direction, and OSV use within RNAs would be managed as areas not designated for OSV use, thus complying with the Lassen LRMP.

Alternative 5

Alternative 5 Effects to Botanical Resources

Detailed indicators and measures for botanical resources are presented in table 129 (page 374). The following table summarizes these same measures by the major analysis topics.

Table 126. Botanical resources indicators and measures for alternative 5

Analysis Topic	Total acres on Lassen National Forest	Acres within 100 feet of OSV trails	Acres in areas designated for OSV use
Survey and Manage Plants and Fungi	8.4 (NWFP area only)	0	0
Special Interest plants	5,789	67	4,091
Invasive plants	8,040	51	2,640
Special Interest Areas	544	0	63
Research Natural Areas	14,154	0	0

There are no additional kinds of effects to botanical resources beyond those described in Effects Common to All Alternatives that are specific to alternative 5. This alternative would generally have the least potential for direct effects to botanical resources due to the fewest acres being designated for OSV use.

Survey and Manage Species

As described in Effects Common to All Alternatives, because no ground-disturbing actions are proposed, there would be no negative effects on survey and manage species or their habitats within the project area.

Special Interest Plants

The area of potentially affected special interest plant occurrences in designated areas would be reduced by 1,271 acres, and near trails increased by 9 acres. Special interest plant species in different life form categories would be affected differently, as described above in Effects Common to All Alternatives. Trees, shrubs, and sub-shrubs (woody plants) may be directly damaged by OSVs where they occur in areas designated for OSV use, and they may also experience indirect effects where they occur near designated OSV trails. Perennial herbaceous species, annual species, and aquatic species would not be directly affected, but they too may experience indirect effects if they occur near designated OSV trails.

Because there is potential for direct damage where they occur in areas designated for OSV use and indirect effects to occurrences within 100 feet of designated OSV trails, four of the seven special interest woody plant species: *Artemisia tripartita* ssp. *tripartita*, *Betula glandulosa*, *Eriogonum ovalifolium* var. *depressum*, and *Hesperocyparis bakeri*, may be affected by alternative 5, but the

possible effects would not contribute to a downward trend or the species being added to the Regional Forester's Sensitive Plant List.

Because there is potential for indirect effects to occurrences within 100 feet of designated OSV trails, 12 of the special interest perennial herbaceous plant species: *Astragalus inversus*, *Carex davyi*, *Carex petasata*, *Claytonia palustris*, *Erigeron inornatus* var. *calidipetris*, *Hackelia amethystina*, *Juncus hemiendytus* var. *abjectus*, *Muhlenbergia jonesii*, *Penstemon cinicola*, *Penstemon heterodoxus* var. *shastensis*, *Piperia colemanii*, and *Stellaria obtusa*, and one of the annual plant species, *Mimulus pygmaeus*, may be affected by alternative 5, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester's Sensitive Plant List.

For all other special interest plants not specifically mentioned above, because they are not present within 100 feet of designated OSV trails, alternative 5 of the Lassen OSV Designation project will not affect these species.

Invasive Plants

As described above in Effects Common to All Alternatives, the risk of weed introduction and/or spread due to OSV use is very low.

Special Interest Areas

Only 63 acres of botanical special interest areas would remain designated for OSV use (a reduction of 481 acres), and this use is not expected to alter any of the characteristics for which each special interest area was established.

Research Natural Areas

There are no designated OSV trails in RNAs. In this alternative, RNAs are completely absent from areas designated for OSV use, thus complying with the Lassen LRMP.

Summary of Effects

Degree to Which the Alternatives Address the Issues

Table 127. Relative comparison of alternatives by botanical resource issue topics

Analysis Topic	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Survey and Manage plants	All alternatives equal (issue sufficiently addressed)	All alternatives equal	All alternatives equal	All alternatives equal	All alternatives equal
Special Interest plants	All alternatives equal (issue sufficiently addressed – minor potential effects)	All alternatives equal	All alternatives equal	All alternatives equal	All alternatives equal
Invasive plants	All alternatives equal (issue sufficiently addressed – very low risk)	All alternatives equal	All alternatives equal	All alternatives equal	All alternatives equal
Special Interest Areas	All alternatives equal (issue sufficiently addressed)	All alternatives equal	All alternatives equal	All alternatives equal	All alternatives equal
Research Natural Areas	Compliant with LRMP per existing management direction and expected OSV use management	Compliant with LRMP per existing management direction and expected OSV use management	Compliant with LRMP per existing management direction and expected OSV use management	Compliant with LRMP per existing management direction and expected OSV use management	Compliant with LRMP per existing management direction and expected OSV use management (<i>GIS data in agreement</i>)

Summary of Botanical Resource Measures

Table 128. Botanical resources summary of measures for all alternatives

Analysis Topic	Total acres on Lassen National Forest	Acres within 100 feet of OSV trails	Acres in areas designated for OSV use
Survey and Manage Plants and Fungi	8.4 (NWFP area only)	0 all alternatives	8.4 Alt. 1 8.4 Alt. 2 8.4 Alt. 3 8.4 Alt. 4 0 Alt. 5
Special Interest plants	5,789	58 Alt. 1 52 Alt. 2 52 Alt. 3 67 Alt. 4 67 Alt. 5	5,362 Alt. 1 5,231 Alt. 2 5,033 Alt. 3 5,326 Alt. 4 4,091 Alt. 5
Invasive plants	8,040	50 Alt. 1 16 Alt. 2 50 Alt. 3 50 Alt. 4 51 Alt. 5	7,306 Alt. 1 4,872 Alt. 2 4,153 Alt. 3 7,237 Alt. 4 2,640 Alt. 5
Special Interest Areas	545	0 all alternatives	545 Alt. 1 545 Alt. 2 486 Alt. 3 545 Alt. 4 63 Alt. 5
Research Natural Areas	14,154	0 all alternatives	1,109 Alt. 1 113 Alt. 2 116 Alt. 3 588 Alt. 4 0 Alt. 5

Survey and Manage Species

For all alternatives, no OSV trails are proposed in the NWFP portion of the Lassen National Forest, so none of the known survey and manage sites are within 100 feet of OSV trails. However, all of the survey and manage sites are in areas designated for cross-country OSV travel in alternatives 1, 2, 3, and 4. The NWFP portion of the Lassen National Forest would not be designated for OSV uses in alternative 5.

Because the proposed action and alternatives would not produce ground-disturbing impacts, there would be no negative effects on survey and manage species or their persistence within the project area; therefore, field surveys and site management for these species are not required. Without the loss of overstory canopy cover, specific host trees, forest floor organic matter, or large woody debris, habitat characteristics would be retained for conserving survey and manage fungi. Occurrences of *Cypripedium montanum* would not be affected because the species is dormant and underground when OSV uses take place. Occurrences of *Psilidium californicum* would not be affected because the species grows on the bases of large trees and minimum snow depths would prevent impacts as well as the fact that OSV operators avoid impacting large trees for safety reasons.

Special Interest Plants

Special Interest woody plant species may be directly affected by crushing, breaking, or abrasion of stems and evergreen foliage where they occur in any areas designated for OSV use. Plants of other life form categories would not be directly affected because their living tissues are not present above

ground, and would not be directly damaged by OSVs. Any of the special interest plants may be indirectly affected by snow compaction and/or OSV emissions containing pollutants where they occur in close proximity to areas of concentrated use (within 100 feet of designated OSV trails). Thus, these plant species are reasonably at risk to some level of effects, dependent on their life forms, timing of growth, and proximity to heavy OSV use. Potential indirect effects are expected to be minor, and all effects would be minimized by the required minimum snow depths proposed. Although some individuals may be severely damaged and may eventually die from intensive OSV damage, OSV use is not expected to result in a trend toward Federal listing or loss of viability for any special interest plants.

Special Interest Plant Determinations:

Because there is potential for direct damage where they occur in areas designated for OSV use and indirect effects to occurrences within 100 feet of designated OSV trails, four of the five special interest woody plant species: *Artemisia tripartita* ssp. *tripartita*, *Betula glandulosa*, *Eriogonum ovalifolium* var. *depressum*, *Eriogonum pyrolifolium* var. *pyrolifolium*, and *Hesperocyparis bakeri*, may be affected by all alternatives, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester's Sensitive Plant List.

Because there is potential for indirect effects to occurrences within 100 feet of designated OSV trails, eleven of the special interest perennial herbaceous plant species: *Asplenium septentrionale*, *Astragalus inversus*, *Carex davyi*, *Carex petasata*, *Claytonia palustris*, *Erigeron inornatus* var. *calidipetris*, *Juncus hemiendytus* var. *abjectus*, *Muhlenbergia jonesii*, *Penstemon cinicola*, *Penstemon heterodoxus* var. *shastensis*, and *Piperia colemanii*, and one of the annual plant species, *Mimulus pygmaeus*, may be affected by all alternatives of the Lassen OSV Designation project, but the possible effects would not contribute to a downward trend or the species being added to the Regional Forester's Sensitive Plant List.

For all other special interest plants not specifically mentioned above, because they are not present within 100 feet of designated OSV trails, all alternatives will not affect these species.

Invasive Plants

Thirty-three invasive plant species are documented in the project area, and most infestations along roadsides are treated each year. There is some potential for weeds to be introduced to OSV trailheads and into areas designated for OSV use (possibly transported on trailers, towing vehicles, or OSVs), but the other typical factors promoting the spread and establishment of weeds (soil disturbance and vegetation cover reductions) are not expected to occur with the proposed OSV uses. There have been no observations or literature found that point to OSV use causing introduction or spread of invasive plants, but it may be possible, especially at trailheads, where vehicle use is concentrated. Given these uncertainties and the overall lack of evidence of OSV use contributing to weed infestations, the risk of weed increases due to OSV use is expected to be very low for all alternatives.

Special Interest Areas

For all alternatives, the vegetation and habitat characteristics for which each of the three botanical areas (Montgomery Creek Grove, Murken, and Willow Lake Bog) were established would be maintained. The required minimum snow depths for OSV use and design features that prohibit OSV use from operating over open water would protect these resources from damage.

Research Natural Areas

The purpose of the RNA analysis is to determine compliance with the Lassen LRMP direction. Because off-road vehicle use is prohibited in RNAs, no OSV uses are allowed off designated trails. No OSV trails are currently existing or proposed in any of the RNAs. Graham Pinery, Green Island Lake, Mayfield, and Soda Ridge RNAs are excluded from OSV uses in all alternatives.

However, some RNAs are at least partially designated for OSV use in each alternative, as currently defined by the project's spatial data. Although the management of OSV uses on the ground excludes these uses within RNAs per the LRMP, according to the current project's spatial data, Blacks Mountain RNA (521 acres) is currently designated for OSV use, but would be excluded in alternatives 2, 3, 4, and 5. Due to spatial mapping disagreements along the edges of Cub Creek and Timbered Crater RNAs, 116 additional acres would be designated for OSV use in all alternatives; however, these areas are clearly intended to exclude OSV use. The portion (472 acres) of Indian Creek RNA outside the Ishi Semi-Primitive Non-Motorized area is also currently designated for OSV use, and would be designated for OSV use in alternatives 2, 3, and 4, but would not be designated in alternative 5.

If any RNA areas would actually become designated for OSV use, they would not be in compliance with the Lassen LRMP. However, it is not expected that the current OSV Designation proposal and subsequent decision would overrule the current LRMP direction, and OSV use within RNAs is expected to be managed as areas not designated for OSV use, thus complying with the Lassen LRMP.

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

Because the proposed action and alternatives do not involve ground disturbance, and would not affect survey and manage plants or fungi, the actions are in compliance with the Northwest Forest Plan as amended by the 2001 ROD.

All alternatives would maintain viable populations of all native and desired nonnative plants, and the proposed activities were reviewed for potential effects on special interest species, and thus, would be compliant with Forest Service Manual direction. In addition, noxious or invasive weeds were evaluated for effects from the proposed actions and suitable prevention measures taken, thus complying with the Lassen LRMP and Forest Service Manual direction, as well as Executive Order 13112.

Special interest areas with a botanical focus would be managed to preserve the characteristics for which the areas were established, and thus, would comply with the Lassen LRMP.

In the Lassen LRMP, research natural areas are specifically excluded from off-road vehicles uses. This management of RNAs is expected to continue, and it is not the intent of the Lassen OSV Designation project to overrule the LRMP with respect to allowing off-trail OSV uses in these areas. Thus, the proposed action and alternatives are assumed to be in compliance with LRMP direction.

Unavoidable Adverse Effects

As described in Effects Common to All Alternatives, Special Interest woody plants and other special interest plants near OSV trails may be affected by OSV use. Without placing restrictions in areas where these species occur, there could be unavoidable adverse effects to some individuals.

Irreversible and Irretrievable Commitments of Resources

Although some adverse effects to special interest plants may occur, these plants are a renewable resource and thus, there would be no irreversible commitments of the resource. To a small extent, excessive damage to individuals could cause mortality and thus, may constitute an irretrievable commitment for special interest plant species.

Botanical Resource Indicators, Measures and Effects

Table 129. Botanical resources detailed indicators, measures, and effects

Species/Area	Acres within 100 feet of OSV trails	Acres in areas designated for cross-country OSV use according to GIS data	Determination
Survey and Manage Plants and Fungi			
<i>Botrychium minganense</i> Mingan moonwort Category A	0 all alternatives	0 all alternatives	No impacts (all alternatives)
<i>Botrychium montanum</i> Western goblin Category A	0 all alternatives	0 all alternatives	No impacts (all alternatives)
<i>Buxbaumia viridis</i> Green bug-on-a-stick Category E	0 all alternatives	0 all alternatives	No impacts (all alternatives)
<i>Cypripedium fasciculatum</i> Clustered lady's-slipper Category C	0 all alternatives	0 all alternatives	No impacts (all alternatives)
<i>Cypripedium montanum</i> Mountain lady's-slipper Category C	0 all alternatives	0.08 (Alts 1, 2, 3, and 4) 0 Alt. 5	No impacts (all alternatives)
<i>Ptilidium californicum</i> California fuzzwort Category A	0 all alternatives	2.9 (Alts 1, 2, 3, and 4) 0 Alt. 5	No impacts (all alternatives)
<i>Alpova olivaceotinctus</i> Category B Fungi	0 all alternatives	0.1 (Alts 1, 2, 3, and 4) 0 Alt. 5	No impacts (all alternatives)
<i>Bondarzewia mesenterica</i> Category B Fungi	0 all alternatives	0.1 (Alts 1, 2, 3, and 4) 0 Alt. 5	No impacts (all alternatives)
<i>Clavariadelphus truncatus</i> Category B Fungi	0 all alternatives	0.2 (Alts 1, 2, 3, and 4) 0 Alt. 5	No impacts (all alternatives)
<i>Mythicomycetes comeipes</i> Category B Fungi	0 all alternatives	0.3 (Alts 1, 2, 3, and 4) 0 Alt. 5	No impacts (all alternatives)
<i>Ramaria rubrievanescens</i> Category B Fungi	0 all alternatives	0.1 (Alts 1, 2, 3, and 4) 0 Alt. 5	No impacts (all alternatives)
<i>Rhizopogon truncatus</i> Category B Fungi	0 all alternatives	0.2 (Alts 1, 2, 3, and 4) 0 Alt. 5	No impacts (all alternatives)
<i>Spathularia flavida</i> Category B Fungi	0 all alternatives	0.6 (Alts 1, 2, 3, and 4) 0 Alt. 5	No impacts (all alternatives)

Species/Area	Acres within 100 feet of OSV trails	Acres in areas designated for cross-country OSV use according to GIS data	Determination
Special Interest Plants			
Trees, Shrubs, and Sub-shrubs			
<i>Artemisia tripartita</i> ssp. <i>tripartita</i> Threetip sagebrush	0 all alternatives	0.3 all alternatives	May be affected, not contributing to a downward trend (all alternatives)
<i>Betula glandulosa</i> Bog birch	0 all alternatives	1.7 all alternatives	May be affected, not contributing to a downward trend (all alternatives)
<i>Crataegus castlegarensis</i> Castlegar hawthorn	0 all alternatives	0 Alt. 1 0.3 Alt. 2 0 Alt. 3 0.3 Alt. 4 0 Alt. 5	May be affected, not contributing to a downward trend (alternatives 2 and 4) Not affected (alternatives 1, 3, and 5)
<i>Eriogonum ovalifolium</i> var. <i>depressum</i> Depressed wild buckwheat	0 all alternatives	40 all alternatives	May be affected, not contributing to a downward trend (all alternatives)
<i>Eriogonum pyrolifolium</i> var. <i>pyrolifolium</i> Pyrola-leaved buckwheat	Unknown (unmapped location)	Unknown (unmapped location)	Not affected (all alternatives)
<i>Eriogonum tripodum</i> Tripod buckwheat	0 all alternatives	6.9 Alt. 1 0 Alt. 2 0 Alt. 3 6.9 Alt. 4 0 Alt. 5	May be affected, not contributing to a downward trend (alternatives 1 and 4) Not affected (alternatives 2, 3, and 5)
<i>Hesperocyparis bakeri</i> Baker cypress	0 all alternatives	608 all alternatives	May be affected, not contributing to a downward trend (all alternatives)
Perennial Herbaceous Plants			
<i>Allium sanbornii</i> var. <i>sanbornii</i> Sanborn's onion	0 all alternatives	0.3 all alternatives	Not affected (all alternatives)
<i>Anthoxanthum nitens</i> ssp. <i>nitens</i> Vanilla grass	0 all alternatives	2.1 all alternatives	Not affected (all alternatives)
<i>Arnica fulgens</i> Hillside arnica	0 all alternatives	20 all alternatives	Not affected (all alternatives)
<i>Asplenium septentrionale</i> Northern spleenwort	0 all alternatives	18 Alt. 1 18 Alt. 2 7.2 Alt. 3 7.2 Alt. 4 7.2 Alt. 5	Not affected (all alternatives)

Species/Area	Acres within 100 feet of OSV trails	Acres in areas designated for cross-country OSV use according to GIS data	Determination
<i>Astragalus inversus</i> Susanville milk-vetch	3.6 all alternatives	892 Alt. 1 892 Alt. 2 865 Alt. 3 892 Alt. 4 600 Alt. 5	May be affected, not contributing to a downward trend (all alternatives)
<i>Astragalus pauperculus</i> Depauperate milk-vetch	0 all alternatives	31 Alt. 1 0 Alt. 2 12 Alt. 3 31 Alt. 4 0 Alt. 5	Not affected (all alternatives)
<i>Botrychium simplex</i> Yosemite moonwort	0 all alternatives	9.6 Alt. 1 9.6 Alt. 2 3.3 Alt. 3 9.6 Alt. 4 9.3 Alt. 5	Not affected (all alternatives)
<i>Calystegia atriplicifolia</i> ssp. <i>buttensis</i> Butte Co. morning glory	0 all alternatives	0.3 Alt. 1 0 Alt. 2 0.3 Alt. 3 0.3 Alt. 4 0.3 Alt. 5	Not affected (all alternatives)
<i>Cardamine bellidifolia</i> var. <i>pachyphylla</i> Alpine bittercress	0 all alternatives	1.5 all alternatives	Not affected (all alternatives)
<i>Carex davyi</i> Davy's sedge	1.7 Alt. 1 0.6 Alt. 2 0.6 Alt. 3 0.6 Alt. 4 0.6 Alt. 5	11 Alt. 1 9.6 Alt. 2 11 Alt. 3 11 Alt. 4 9.6 Alt. 5	May be affected, not contributing to a downward trend (all alternatives)
<i>Carex geyeri</i> Geyer's sedge	0 all alternatives	1.5 all alternatives	Not affected (all alternatives)
<i>Carex lasiocarpa</i> Woolly-fruited sedge	0 all alternatives	60 all alternatives	Not affected (all alternatives)
<i>Carex limosa</i> Mud sedge	0 all alternatives	8.8 all alternatives	Not affected (all alternatives)
<i>Carex petasata</i> Liddon's sedge	0.8 Alt. 1 0.5 Alt. 2 0.5 Alt. 3 0.8 Alt. 4 0.8 Alt. 5	171 Alt. 1 160 Alt. 2 160 Alt. 3 160 Alt. 4 24 Alt. 5	May be affected, not contributing to a downward trend (all alternatives)
<i>Caulanthus major</i> var. <i>nevadensis</i> Slender jewel-flower	0 all alternatives	0 all alternatives	Not affected (all alternatives)
<i>Claytonia palustris</i> Marsh claytonia	0.2 all alternatives	48 Alt. 1 39 Alt. 2 30 Alt. 3 39 Alt. 4 19 Alt. 5	May be affected, not contributing to a downward trend (all alternatives)
<i>Drosera anglica</i> English sundew	0 all alternatives	16 all alternatives	Not affected (all alternatives)

Species/Area	Acres within 100 feet of OSV trails	Acres in areas designated for cross-country OSV use according to GIS data	Determination
<i>Erigeron inornatus</i> var. <i>calidipetris</i> Hot rock daisy	33 all alternatives	423 Alt. 1 423 Alt. 2 423 Alt. 3 423 Alt. 4 421 Alt. 5	May be affected, not contributing to a downward trend (all alternatives)
<i>Erigeron nivalis</i> Northern daisy	0 all alternatives	35 Alt. 1 35 Alt. 2 25 Alt. 3 35 Alt. 4 25 Alt. 5	Not affected (all alternatives)
<i>Erigeron petrophilus</i> var. <i>sierrensis</i> Northern Sierra daisy	0 all alternatives	88 all alternatives	Not affected (all alternatives)
<i>Eriophorum gracile</i> Cotton grass	0 all alternatives	5.4 Alt. 1 5.4 Alt. 2 5.4 Alt. 3 5.4 Alt. 4 5.3 Alt. 5	Not affected (all alternatives)
<i>Hackelia amethystina</i> Amethyst stickseed	2.2 all alternatives	50 Alt. 1 50 Alt. 2 50 Alt. 3 50 Alt. 4 3.5 Alt. 5	May be affected, not contributing to a downward trend (all alternatives)
<i>Hackelia cusickii</i> Cusick's stickseed	0 all alternatives	67 Alt. 1 67 Alt. 2 67 Alt. 3 67 Alt. 4 60 Alt. 5	Not affected (all alternatives)
<i>Hulsea nana</i> Little hulsea	0 all alternatives	0.2 all alternatives	Not affected (all alternatives)
<i>Iliamna bakeri</i> Baker's globe mallow	0 all alternatives	333 Alt. 1 333 Alt. 2 332 Alt. 3 333 Alt. 4 327 Alt. 5	Not affected (all alternatives)
<i>Juncus hemiendytus</i> var. <i>abjectus</i> Center Basin rush	2.8 all alternatives 2.6 Alt. 2 2.6 Alt. 3 2.6 Alt. 4 2.6 Alt. 5	88 Alt. 1 88 Alt. 2 88 Alt. 3 88 Alt. 4 86 Alt. 5	May be affected, not contributing to a downward trend (all alternatives)
<i>Lilium humboldtii</i> ssp. <i>humboldtii</i> Humboldt lily	0 all alternatives	0.9 Alt. 1 0 Alt. 2 0 Alt. 3 0.9 Alt. 4 0 Alt. 5	Not affected (all alternatives)
<i>Lupinus dalesiae</i> Quincy lupine	0 all alternatives	27 all alternatives	Not affected (all alternatives)
<i>Lycopus uniflorus</i> Northern bugleweed	0 all alternatives	12 all alternatives	Not affected (all alternatives)
<i>Lysimachia thyrsiflora</i> Tufted loosestrife	0 all alternatives	0 all alternatives (150? CNDDB?)	Not affected (all alternatives)

Species/Area	Acres within 100 feet of OSV trails	Acres in areas designated for cross-country OSV use according to GIS data	Determination
<i>Meesia triquetra</i> 3-ranked hump-moss	0 all alternatives	24 Alt. 1 24 Alt. 2 20 Alt. 3 24 Alt. 4 16 Alt. 5	Not affected (all alternatives)
<i>Muhlenbergia jonesii</i> Jones' muhly	0.3 all alternatives	3.6 all alternatives	May be affected, not contributing to a downward trend (all alternatives)
<i>Packera indecora</i> Rayless mountain butterweed	0 all alternatives	0.05 all alternatives	Not affected (all alternatives)
<i>Penstemon cinicola</i> Ash beardtongue	1.2 all alternatives	74 Alt. 1 74 Alt. 2 66 Alt. 3 74 Alt. 4 58 Alt. 5	May be affected, not contributing to a downward trend (all alternatives)
<i>Penstemon heterodoxus</i> var. <i>shastensis</i> Shasta beardtongue	0.1 all alternatives	105 Alt. 1 105 Alt. 2 92 Alt. 3 105 Alt. 4 63 Alt. 5	May be affected, not contributing to a downward trend (all alternatives)
<i>Penstemon janishiae</i> Janish's beardtongue	0 all alternatives	27 Alt. 1 27 Alt. 2 27 Alt. 3 27 Alt. 4 0 Alt. 5	Not affected (all alternatives)
<i>Phlox muscoides</i> Moss phlox	0 all alternatives	4.8 Alt. 1 4.8 Alt. 2 4.8 Alt. 3 4.8 Alt. 4 0.4 Alt. 5	Not affected (all alternatives)
<i>Piperia colemanii</i> Coleman's rein orchid	0.3 all alternatives	6.2 Alt. 1 6.2 Alt. 2 2.2 Alt. 3 6.2 Alt. 4 1.9 Alt. 5	May be affected, not contributing to a downward trend (all alternatives)
<i>Polyctenium fremontii</i> var. <i>fremontii</i> Fremont's combleaf	0 all alternatives	0.3 all alternatives	Not affected (all alternatives)
<i>Polystichum kruckebergii</i> Kruckeberg's swordfern	0 all alternatives	Unknown (population sizes unknown)	Not affected (all alternatives)
<i>Polystichum lonchitis</i> Northern hollyfern	0 all alternatives	0 all alternatives	Not affected (all alternatives)
<i>Potentilla newberryi</i> Newberry's cinquefoil	0 all alternatives	2.0 all alternatives	Not affected (all alternatives)
<i>Rhynchospora alba</i> White beaked-rush	0 all alternatives	6.8 all alternatives	Not affected (all alternatives)
<i>Scutellaria galericulata</i> Marsh skullcap	0 all alternatives	6.7 all alternatives	Not affected (all alternatives)

Species/Area	Acres within 100 feet of OSV trails	Acres in areas designated for cross-country OSV use according to GIS data	Determination
<i>Senecio hydrophiloides</i> Sweet marsh ragwort	0 all alternatives	273 Alt. 1 273 Alt. 2 269 Alt. 3 273 Alt. 4 253 Alt. 5	Not affected (all alternatives)
<i>Silene occidentalis</i> ssp. <i>occidentalis</i> Western campion	0 all alternatives	0.9 all alternatives	Not affected (all alternatives)
<i>Sparganium natans</i> Small bur-reed	0 all alternatives	2.3 Alt. 1 2.3 Alt. 2 2.0 Alt. 3 2.3 Alt. 4 1.4 Alt. 5	Not affected (all alternatives)
<i>Stellaria longifolia</i> Long-leaved starwort	0 all alternatives	4.7 all alternatives	Not affected (all alternatives)
<i>Stellaria obtusa</i> Obtuse starwort	3.3 all alternatives	124 Alt. 1 124 Alt. 2 123 Alt. 3 124 Alt. 4 123 Alt. 5	May be affected, not contributing to a downward trend (all alternatives)
<i>Stenotus lanuginosus</i> Woolly stenotus	0 all alternatives	110 Alt. 1 110 Alt. 2 110 Alt. 3 110 Alt. 4 89 Alt. 5	Not affected (all alternatives)
<i>Streptanthus longisiliquus</i> Long-fruit jewelflower	0 all alternatives	68 Alt. 1 64 Alt. 2 64 Alt. 3 66 Alt. 4 0 Alt. 5	Not affected (all alternatives)
<i>Thermopsis californica</i> var. <i>argentata</i> Silvery false-lupine	0 all alternatives	577 Alt. 1 575 Alt. 2 531 Alt. 3 577 Alt. 4 342 Alt. 5	Not affected (all alternatives)
<i>Trifolium andersonii</i> ssp. <i>Andersonii</i> Anderson's clover	0 all alternatives	1.6 Alt. 1 1.6 Alt. 2 1.6 Alt. 3 1.6 Alt. 4 0 Alt. 5	Not affected (all alternatives)
<i>Trillium ovatum</i> ssp. <i>oettingeri</i> Salmon Mtns wakerobin	0 all alternatives	36 Alt. 1 31 Alt. 2 36 Alt. 3 36 Alt. 4 1.8 Alt. 5	Not affected (all alternatives)
Annual Plants			
<i>Dimeresia howellii</i> Doublet	0 all alternatives	0.1 all alternatives	Not affected (all alternatives)
<i>Gratiola heterosepala</i> Boggs Lake hedge-hyssop	0 all alternatives	19 Alt. 1 18 Alt. 2 19 Alt. 3 19 Alt. 4 0.2 Alt. 5	Not affected (all alternatives)

Species/Area	Acres within 100 feet of OSV trails	Acres in areas designated for cross-country OSV use according to GIS data	Determination
<i>Limnanthes floccosa</i> ssp. <i>floccosa</i> Woolly meadowfoam	0 all alternatives	90 Alt. 1 83 Alt. 2 20 Alt. 3 90 Alt. 4 0.7 Alt. 5	Not affected (all alternatives)
<i>Mimulus glaucescens</i> Shield-bracted monkeyflower	0 all alternatives	12 Alt. 1 2.4 Alt. 2 2.0 Alt. 3 10 Alt. 4 1.5 Alt. 5	Not affected (all alternatives)
<i>Mimulus pygmaeus</i> Egg Lake monkeyflower	8.4 Alt. 1 4.3 Alt. 2 4.3 Alt. 3 19 Alt. 4 19 Alt. 5	497 Alt. 1 489 Alt. 2 486 Alt. 3 497 Alt. 4 483 Alt. 5	May be affected, not contributing to a downward trend (all alternatives)
<i>Navarretia subuligera</i> Awl-leaved navarretia	0 all alternatives	3.4 Alt. 1 0 Alt. 2 0 Alt. 3 3.4 Alt. 4 0 Alt. 5	Not affected (all alternatives)
<i>Nemophila breviflora</i> Basin nemophila	0 all alternatives	0 all alternatives	Not affected (all alternatives)
<i>Pogogyne floribunda</i> Profuse-flowered pogogyne	0 all alternatives	83 Alt. 1 83 Alt. 2 77 Alt. 3 83 Alt. 4 58 Alt. 5	Not affected (all alternatives)
<i>Polygonum bidwelliae</i> Bidwell's knotweed	0 all alternatives	14 Alt. 1 3.1 Alt. 2 1.0 Alt. 3 14 Alt. 4 0 Alt. 5	Not affected (all alternatives)
Aquatic Plants			
<i>Brasenia schreberi</i> Watershield	0 all alternatives	17 Alt. 1 0.3 Alt. 2 0.3 Alt. 3 17 Alt. 4 0.3 Alt. 5	Not affected (all alternatives)
<i>Potamogeton robbinsii</i> Robbins's pondweed	0 all alternatives	0 all alternatives	Not affected (all alternatives)
<i>Potamogeton praelongus</i> White-stemmed pondweed	0 all alternatives	0 Alt. 1, 2, 3, 4 10 all alternatives	Not affected (all alternatives)
<i>Schoenoplectus heterochaetus</i> Slender bulrush	0 all alternatives	14 all alternatives	Not affected (all alternatives)
<i>Schoenoplectus subterminalis</i> Water bulrush	0 all alternatives	54 all alternatives	Not affected (all alternatives)
<i>Stuckenia filiformis</i> ssp. <i>alpina</i> Slender-leaved pondweed	0 all alternatives	0 all alternatives	Not affected (all alternatives)
<i>Subularia aquatica</i> ssp. <i>americana</i> Water awlwort	Unknown (unmapped location)	Unknown (unmapped location)	Not affected (all alternatives)

Species/Area	Acres within 100 feet of OSV trails	Acres in areas designated for cross-country OSV use according to GIS data	Determination
<i>Utricularia intermedia</i> Flat-leaved bladderwort	0 all alternatives	0.6 Alt. 1 0.6 Alt. 2 0.6 Alt. 3 0.6 Alt. 4 0.3 Alt. 5	Not affected (all alternatives)
<i>Utricularia minor</i> Lesser bladderwort	0 all alternatives	1.1 all alternatives	Not affected (all alternatives)
<i>Utricularia ochroleuca</i> Cream-flowered bladderwort	0 all alternatives	0.3 Alt. 1 0.3 Alt. 2 0.3 Alt. 3 0.3 Alt. 4 0 Alt. 5	Not affected (all alternatives)
Invasive Plant Species			
<i>Acroptilon repens</i> Russian knapweed	0 all alternatives	1.6 Alt. 1 1.6 Alt. 2 0.9 Alt. 3 1.6 Alt. 4 0.9 Alt. 5	Very low risk
<i>Aegilops cylindrica</i> Jointed goatgrass	0 all alternatives	4.1 Alt. 1 4.1 Alt. 2 0 Alt. 3 4.1 Alt. 4 0 Alt. 5	Very low risk
<i>Aegilops triuncialis</i> Barbed goatgrass	0 all alternatives	0.7 Alt. 1 0.7 Alt. 2 0 Alt. 3 0.7 Alt. 4 0 Alt. 5	Very low risk
<i>Ailanthus altissima</i> Tree-of-heaven	0 all alternatives	0.2 Alt. 1 0 Alt. 2 0 Alt. 3 0.2 Alt. 4 0 Alt. 5	Very low risk
<i>Bromus tectorum</i> Cheatgrass	2.9 all alternatives	206 Alt. 1 206 Alt. 2 152 Alt. 3 206 Alt. 4 151 Alt. 5	Very low risk
<i>Cardaria spp.</i> Whitetop	0 all alternatives	6.3 Alt. 1 6.0 Alt. 2 5.1 Alt. 3 6.3 Alt. 4 3.7 Alt. 5	Very low risk
<i>Carduus pycnocephalus</i> Italian thistle	0 all alternatives	0.3 Alt. 1 0 Alt. 2 0 Alt. 3 0.3 Alt. 4 0 Alt. 5	Very low risk
<i>Centaurea diffusa</i> Diffuse knapweed	0 all alternatives	1.5 Alt. 1 1.5 Alt. 2 1.5 Alt. 3 1.5 Alt. 4 1.2 Alt. 5	Very low risk

Species/Area	Acres within 100 feet of OSV trails	Acres in areas designated for cross-country OSV use according to GIS data	Determination
<i>Centaurea maculosa</i> Spotted knapweed	0 Alt. 1 0 Alt. 2 0 Alt. 3 0 Alt. 4 0.1 Alt. 5	16 Alt. 1 16 Alt. 2 7.1 Alt. 3 16 Alt. 4 7.7 Alt. 5	Very low risk
<i>Centaurea melitensis</i> Tocalote	0 all alternatives	2.7 Alt. 1 0 Alt. 2 1.4 Alt. 3 2.7 Alt. 4 1.5 Alt. 5	Very low risk
<i>Centaurea solstitialis</i> Yellow star-thistle	5.4 all alternatives	3,119 Alt. 1 1,087 Alt. 2 1,005 Alt. 3 3,088 Alt. 4 630 Alt. 5	Very low risk
<i>Centaurea squarrosa</i> Squarrose knapweed	0 all alternatives	166 Alt. 1 74 Alt. 2 106 Alt. 3 166 Alt. 4 0.6 Alt. 5	Very low risk
<i>Cirsium arvense</i> Canada thistle	0.7 Alt. 1 0.6 Alt. 2 0.9 Alt. 3 1.0 Alt. 4 1.0 Alt. 5	30 Alt. 1 30 Alt. 2 29 Alt. 3 30 Alt. 4 18 Alt. 5	Very low risk
<i>Cirsium vulgare</i> Bull thistle	0 all alternatives	136 Alt. 1 131 Alt. 2 131 Alt. 3 132 Alt. 4 45 Alt. 5	Very low risk
<i>Convolvulus arvensis</i> Field bindweed	0.2 all alternatives	4.4 Alt. 1 4.4 Alt. 2 2.2 Alt. 3 5.0 Alt. 4 1.7 Alt. 5	Very low risk
<i>Cynodon dactylon</i> Bermudagrass	0 all alternatives	0.3 all alternatives	Very low risk
<i>Cynoglossum officinale</i> Gypsyflower	0.05 all alternatives	0.05 all alternatives	Very low risk
<i>Cytisus scoparius</i> Scotch broom	0.1 Alt. 1 0 Alt. 2 0.1 Alt. 3 0.1 Alt. 4 0.1 Alt. 5	3.0 Alt. 1 2.6 Alt. 2 1.5 Alt. 3 3.0 Alt. 4 0.8 Alt. 5	Very low risk
<i>Hypericum perforatum</i> Klamathweed	8.4 Alt. 1 5.0 Alt. 2 8.4 Alt. 3 8.4 Alt. 4 9.1 Alt. 5	518 Alt. 1 454 Alt. 2 409 Alt. 3 516 Alt. 4 85 Alt. 5	Very low risk

Species/Area	Acres within 100 feet of OSV trails	Acres in areas designated for cross-country OSV use according to GIS data	Determination
<i>Isatis tinctoria</i> Dyer's woad	0.1 all alternatives	9.9 Alt. 1 9.6 Alt. 2 8.9 Alt. 3 9.9 Alt. 4 7.5 Alt. 5	Very low risk
<i>Iva axillaris</i> Povertyweed	0.01 all alternatives	0.3 all alternatives	Very low risk
<i>Lepidium latifolium</i> Perennial pepperweed	0.5 Alt. 1 0.5 Alt. 2 0.5 Alt. 3 0.8 Alt. 4 0.8 Alt. 5	18 Alt. 1 13 Alt. 2 10 Alt. 3 13 Alt. 4 8 Alt. 5	Very low risk
<i>Leucanthemum vulgare</i> Oxeye daisy	31 Alt. 1 0.4 Alt. 2 31 Alt. 3 31 Alt. 4 31 Alt. 5	126 Alt. 1 126 Alt. 2 69 Alt. 3 102 Alt. 4 98 Alt. 5	Very low risk
<i>Linaria genistifolia</i> ssp. <i>dalmatica</i> Dalmatian toadflax	0 all alternatives	0.7 Alt. 1 0.7 Alt. 2 0.7 Alt. 3 0.7 Alt. 4 0.5 Alt. 5	Very low risk
<i>Onopordum acanthium</i> Scotch thistle	0.4 all alternatives	62 Alt. 1 62 Alt. 2 44 Alt. 3 62 Alt. 4 42 Alt. 5	Very low risk
<i>Potentilla recta</i> Sulfur cinquefoil	0 all alternatives	22 Alt. 1 22 Alt. 2 0.1 Alt. 3 22 Alt. 4 0 Alt. 5	Very low risk
<i>Rubus discolor</i> Himalayan blackberry	0 all alternatives	11 Alt. 1 3.3 Alt. 2 0.6 Alt. 3 11 Alt. 4 0.6 Alt. 5	Very low risk
<i>Rubus laciniatus</i> Cutleaf blackberry	0 all alternatives	0.9 Alt. 1 0.3 Alt. 2 0.3 Alt. 3 0.9 Alt. 4 0.3 Alt. 5	Very low risk
<i>Salsola tragus</i> Russian thistle	0 all alternatives	1.2 Alt. 1 0.9 Alt. 2 0.6 Alt. 3 0.9 Alt. 4 0.6 Alt. 5	Very low risk
<i>Salvia aethiopis</i> Mediterranean sage	0 all alternatives	0.9 all alternatives	Very low risk

Species/Area	Acres within 100 feet of OSV trails	Acres in areas designated for cross-country OSV use according to GIS data	Determination
<i>Senecio jacobaea</i> Tansy ragwort	0 all alternatives	0.3 Alt. 1 0 Alt. 2 0 Alt. 3 0 Alt. 4 0 Alt. 5	Very low risk
<i>Taeniatherum caput-medusae</i> Medusahead	0 all alternatives	2,833 Alt. 1 2,612 Alt. 2 2,163 Alt. 3 2,832 Alt. 4 1,534 Alt. 5	Very low risk
<i>Ventenata dubia</i> Wiregrass	0 all alternatives	1.6 Alt. 1 1.6 Alt. 2 1.6 Alt. 3 1.6 Alt. 4 1.0 Alt. 5	Very low risk
Botanical Special Interest Areas			
Montgomery Creek Grove Botanical Area	0 all alternatives	5 all alternatives	Compliant with purpose of establishment
Murken Botanical Area	0 all alternatives	480 all alternatives	Compliant with purpose of establishment
Willow Lake Bog Botanical Area	0 all alternatives	60 all alternatives	Compliant with purpose of establishment
Research Natural Areas			
Blacks Mountain	0 all alternatives	521 Alt. 1 0 Alt. 2 0 Alt. 3 0 Alt. 4 0 Alt. 5	Per the Lassen LRMP, the intent for current and future management is for no OSV use in RNAs. All alternatives are consistent with LRMP
Cub Creek	0 all alternatives	74 Alt. 1 70 Alt. 2 73 Alt. 3 73 Alt. 4 0 Alt. 5	Per the Lassen LRMP, the intent for current and future management is for no OSV use in RNAs. All alternatives are consistent with LRMP
Graham Pinery	0 all alternatives	0 all alternatives	All alternatives are compliant with LRMP.
Green Island Lake	0 all alternatives	0 all alternatives	All alternatives are compliant with LRMP.

Species/Area	Acres within 100 feet of OSV trails	Acres in areas designated for cross-country OSV use according to GIS data	Determination
Indian Creek	0 all alternatives	472 Alt. 1 0 Alt. 2 0 Alt. 3 472 Alt. 4 0 Alt. 5	Per the Lassen LRMP, the intent for current and future management is for no OSV use in RNAs. All alternatives are consistent with LRMP
Mayfield	0 all alternatives	0 all alternatives	All alternatives are compliant with LRMP.
Soda Ridge	0 all alternatives	0 all alternatives	All alternatives are compliant with LRMP.
Timbered Crater	0 all alternatives	42 Alt. 1 42 Alt. 2 42 Alt. 3 42 Alt. 4 0 Alt. 5	Per the Lassen LRMP, the intent for current and future management is for no OSV use in RNAs. All alternatives are consistent with LRMP

Botanical Resources by OSV Designated Areas

Table 130. Botanical resources in alternative 1

Designated Area or Snow Trail Name/Number	Botanical resources present, Alternative 1
Ashpan Designated Area	11 Special Interest plant species (1,244 acres) 13 Invasive plant species (538 acres) Montgomery Creek SIA
Bogard Designated Area	22 Special Interest plant species (2,526 acres) 20 Invasive plant species (2,588 acres) Murken Botanical Area SIA Blacks Mountain RNA
Fall River Designated Area	10 Special Interest plant species (180 acres) 12 Invasive plant species (893 acres)
Fredonyer Designated Area	9 Special Interest plant species (85 acres) 11 Invasive plant species (197 acres)
Jonesville Designated Area	23 Special Interest plant species (384 acres) 14 Invasive plant species (126 acres) Cub Creek RNA
Morgan Summit Designated Area	34 Special Interest plant species (266 acres) 6 Invasive plant species (2,555 acres) Willow Lake Bog SIA Indian Creek RNA
Shasta Designated Area	6 Special Interest plant species (109 acres) 6 Invasive plant species (291 acres) Timbered Crater RNA
Swain Mountain Designated Area	29 Special Interest plant species (557 acres) 19 Invasive plant species (118 acres)

Table 131. Botanical resources in alternative 2

Designated Area or Snow Trail Name/Number	Botanical resources present, Alternative 2
Ashpan Designated Area	11 Special Interest plant species (1,244 acres) 13 Invasive plant species (538 acres) Montgomery Creek SIA
Bogard Designated Area	22 Special Interest plant species (2,511 acres) 19 Invasive plant species (2,467 acres) Murken Botanical Area SIA
Fall River Designated Area	9 Special Interest plant species (174 acres) 11 Invasive plant species (880 acres)
Fredonyer Designated Area	9 Special Interest plant species (85 acres) 11 Invasive plant species (197 acres)
Jonesville Designated Area	23 Special Interest plant species (384 acres) 13 Invasive plant species (73 acres) Cub Creek RNA
Morgan Summit Designated Area	24 Special Interest plant species (168 acres) 8 Invasive plant species (313 acres) Willow Lake Bog SIA
Shasta Designated Area	6 Special Interest plant species (109 acres) 6 Invasive plant species (291 acres) Timbered Crater RNA
Swain Mountain Designated Area	29 Special Interest plant species (557 acres) 19 Invasive plant species (112 acres)

Table 132. Botanical resources in alternative 3

Designated Area Name	Botanical resources present, Alternative 3
Ashpan Designated Area	11 Special Interest plant species (1,244 acres) 12 Invasive plant species (535 acres) Montgomery Creek SIA
Bogard Designated Area	22 Special Interest plant species (2,514 acres) 20 Invasive plant species (2,538 acres) Murken Botanical Area SIA
Fall River Designated Area	7 Special Interest plant species (62 acres) 3 Invasive plant species (217 acres)
Fredonyer Designated Area	9 Special Interest plant species (85 acres) 11 Invasive plant species (178 acres)
Jonesville Designated Area	23 Special Interest plant species (360 acres) 13 Invasive plant species (73 acres) Cub Creek RNA
Morgan Summit Designated Area	26 Special Interest plant species (161 acres) 9 Invasive plant species (281 acres) Willow Lake Bog SIA
Shasta Designated Area	5 Special Interest plant species (104 acres) 6 Invasive plant species (290 acres) Timbered Crater RNA
Swain Mountain Designated Area	28 Special Interest plant species (493 acres) 19 Invasive plant species (41 acres)

Table 133. Botanical resources in alternative 4

Designated Area or Snow Trail Name/Number	Botanical resources present, Alternative 4
Ashpan Designated Area	11 Special Interest plant species (1,244 acres) 13 Invasive plant species (538 acres) Montgomery Creek SIA
Bogard Designated Area	22 Special Interest plant species (2,514 acres) 20 Invasive plant species (2,580 acres) Murken Botanical Area SIA
Fall River Designated Area	11 Special Interest plant species (180 acres) 12 Invasive plant species (893 acres)
Fredonyer Designated Area	9 Special Interest plant species (85 acres) 12 Invasive plant species (197 acres)
Jonesville Designated Area	23 Special Interest plant species (390 acres) 13 Invasive plant species (121 acres) Cub Creek RNA
Morgan Summit Designated Area	34 Special Interest plant species (243 acres) 15 Invasive plant species (2,500 acres) Willow Lake Bog SIA Indian Creek RNA
Shasta Designated Area	6 Special Interest plant species (109 acres) 6 Invasive plant species (291 acres) Timbered Crater RNA
Swain Mountain Designated Area	29 Special Interest plant species (557 acres) 19 Invasive plant species (118 acres)

Table 134. Botanical resources in alternative 5

Designated Area or Snow Trail Name/Number	Botanical resources present, Alternative 5
Ashpan Designated Area	11 Special Interest plant species (1,244 acres) 12 Invasive plant species (535 acres) Montgomery Creek SIA
Bogard Designated Area	22 Special Interest plant species (1,953 acres) 18 Invasive plant species (1,665 acres)
Fredonyer Designated Area	3 Special Interest plant species (4 acres) 11 Invasive plant species (170 acres)
Jonesville Designated Area	21 Special Interest plant species (295 acres) 13 Invasive plant species (72 acres)
Morgan Summit Designated Area	23 Special Interest plant species (149 acres) 9 Invasive plant species (182 acres) Willow Lake Bog SIA
Swain Mountain Designated Area	28 Special Interest plant species (446 acres) 16 Invasive plant species (16 acres)

Cultural Resources

The Over-snow Vehicle Use Designation (OSV Designation) project area is located in the Lassen National Forest. Cultural resources within the OSV Designation project area are defined and regulated based on the Lassen National Forest Land and Resource Management Plan (LRMP).

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 (FSM 2360.5). These resources are not mutually exclusive and can oftentimes overlap either in time and/or 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 our 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 Part 800 (as amended), National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321-4346), Archeological and Historic Preservation Act of 1974 (16 U.S.C. 469), Federal Land Policy and Management Act of 1976 (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 (16 U.S.C. 470aa et seq.) as implemented by 36 CFR Part 296, Native American Graves Protection and Repatriation Act of 1990 as amended (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 (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 requires 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 Forest Service policy 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 (NRHP) 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 NRHP.
- Assessing potential project effects of cultural resources.

- Avoiding or mitigating effects on sites eligible for the NRHP or other significant sites.
- Follow-up monitoring to assess the effectiveness of management procedures.

In addition, the Forest Service maintains consistency with 36 CFR Part 800 on the Lassen National Forest pursuant to the *Programmatic Agreement[PA] 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

Archaeological sites are 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 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 (King 2003; Parker and King 1992). Traditional cultural properties include sacred sites, natural resource collection areas, and the occasional archaeological site associated with ancestral Native American groups. Traditional cultural properties 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 traditional cultural properties are closely associated with Native American cultures, a site need not be associated with a Native American cultural group to qualify as a Traditional cultural property 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.

Definitions Historic Properties and Cultural Resources

Historic Properties are defined in 36 CFR §800.16 (l)(1) as:

“Historic property means any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria.”

Cultural Resources are defined in Forest Service Manual 2360.5 as:

Cultural Resources. 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. In this chapter, cultural resources include the entire spectrum of resources for which the Heritage Program is responsible from artifacts to cultural landscapes without regard to eligibility for listing on the National Register of Historic Places.

Affected Environment

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

The Lassen National Forest 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 their own new time periods not only in name but in time span. This overview makes no attempt to reconcile these but rather represent general patterns.

Early Holocene/Paleoindian (prior to 7500 B.P.): This period is poorly represented on the Lassen National Forest. The earliest 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 (6000-9000 B.P.). The Western Pluvial Lakes Tradition 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. 7600 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 National Forest. This may represent the expansion of Great Basin populations into the Sierran Transition Zone, during the Tahoe Reach and Spooner Phases of 4000-8000 B.P. (Elston 1971). The earliest sites are located on mid-slope terraces and tend to be situated somewhat away from the river (Cleland 1995). 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 (Hildebrandt and King 2002; 18-21). This expansion may also be represented by the Northern Side-notched point styles on the Lassen National Forest. The western Sierra Nevada foothills and Cascade Mountain is potentially connected to the Windmill Culture of central California (Ritter 1970).

Early Archaic (5000–3500 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 3500–1500 B.P.): A substantial expansion into these mountainous areas with medium- to high-elevation areas occurred post 4,000 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 toolstone 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. Klikapudi 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 (1500–750 B.P.): During this period there seems to be a sharply increased expansion into the forest’s plateau uplands and lakes with more permanency of human occupation, an increase in population as lithic site occupation appears to reduce during this period, and intensive occupation of habitation sites continues. Some of these changes may have resulted from the warm/dry interval from 1100 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 1000 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 1000 B.P., they are larger with rich and diverse assemblages of artifacts and proliferation of house structures. Post 1000 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 breadth with procurement increasingly directed at more marginal upland habitats. In the Middle Pit River region at this time, Chatters 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. Klikapudi Side-notched points are not represented, but Klikapudi 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 (150–1000 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 National Forest (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); 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 1988) 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 1978:370)

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, four bands (dialect divisions) 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.
- Two groups comprised the Atsugewi: 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 northeastern California. The Honey Lake Paiute (Paviotso), is a Numic (Shoshonean) branch of the Uto-Aztecan stock (Miller 1966:77; Jacobsen 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 (1978:269) 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 (consisting of dairy, cattle and sheep) mostly occurred in the high mountain meadows. 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 (Owen 1984:118).

During the late 1850s, a “scorched earth” policy was implemented by Lieutenant Crook, who ran the military campaign in the area (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 1930s, forest experiment stations were set up 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.

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 NHPA of 1966, as amended, and as promulgated by 36 CFR Part 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 Part 800, the Forest Service 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, 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 OSVs with 6 to 12 inches of snow has effects similar to vehicles and OHV use on the same road.
- For existing roads that may not be paved or have a rock base, the assumption is that they were analyzed and are monitored under the forest's previous Travel Management Off-highway Vehicle (OHV) decision and followed the 2006 Motorized Recreation Programmatic Agreement guidelines if historic properties were bisected by a road or OHV trail. Therefore, the assumption is that OHV and OSV uses have similar potential impacts to historic properties. (2006 Motorized Recreation PA full title - *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*)

As a rule, any activity that causes ground disturbance (disturbance to the soil matrix that contains the cultural resource) could 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 destroys 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 Part 800) and the Regional 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 OSV trail corridors based on GIS data for the forest. Under this definition, the trail corridor is defined as the trail itself plus an area of 30 meters (100 feet) on both sides and running parallel to the trail. However, many sites that fall within the corridors are not on or adjacent to the trail and may not be directly impacted by OSV use. Sites within the area adjacent to the trail may not experience direct effects from OSV activity along the trail. Site effects would depend on the absolute proximity to the site (sites located directly adjacent to the trail are more likely to be affected than those located farther away), characteristics of OSV use on the trail 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 trails 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 trail, the trail exhibits very light OSV use, or in the case of linear site features such as railroad grades and ditches, the trail crosses the site at a single point. Sites with these characteristics are not considered to be at risk.

Methodology: We used existing data from the cultural resource site atlas, historic archives, maps, site record files, and GIS spatial layers, and information obtained from archaeological inventories of OSV trails to identify cultural resources in the area of potential effect that may be affected directly, indirectly, or cumulatively.

Types of Impacts

Impacts are considered either adverse or beneficial to 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 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, in U.S. 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.

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 sites can result from soil movement and artifact displacement.

A change in the architectural resource (i.e., building or structure) involves the change to the structure's materials, such as removal of a window or portion of siding. Adverse impacts can result from crushing of the structure under an excessive weight load or damaging of the structure through a collision or physical removal of materials.

Cultural landscapes and districts, and traditional cultural properties can be impacted in the same ways that archaeological and architectural resources can be. In addition, these resources can be impacted if the relationships and visuals of the areas in between physical landscape features, sites, and structures are changed, and if that impact changes the setting and feeling of the landscape for the people who used or are still using those areas.

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. The intensity of an impact to cultural resources is described as either negligible, minor, moderate, or major:

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. These intensity of impacts to archaeological sites can range from negligible to major, depending on the management actions taken and/or the effects resulting from the extent and depth of ground disturbance. The majority of these impacts are long-term in duration. For example, moving earth at

an archaeological site(s) with low data potential might result in a minor, adverse impact, though still an effect. The intensity of an impact to archaeological resources is described as either negligible, minor, moderate, or major:

- 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 that 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.

The intensity of impact to an architectural resource depends on the extent and visibility of the impacts and the ability to repair the impact using the same materials and construction.

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 NHPA (36 CFR Part 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.

For all cultural resources, mitigation includes avoidance during activities, and protection of archaeological features, soils, and structures 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.

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.

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 Part 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 designated for OSV use.
- Total number or miles of trails designated for use.
- Ability to mitigate impacts through the application of the Regional PA standard protection measures

Effects to Cultural Resources

Direct Effects

Over-snow vehicles can affect cultural resources in a number of ways:

- Direct contact of the skid and/or track to artifacts can cause breakage and horizontal and vertical displacement of artifacts, thus potentially impacting interpretation and eligibility to the NRHP of the site.
- Disturbance of archaeological soils through compaction and mixing if tracks and skis come in direct contact with soils. Disturbance potential increases if contact happens when an OSV is turning or starting, and when soils are not frozen.
- Creation of mud holes and gullies within or adjacent to cultural resources can alter hydrologic patterns and intensify erosion could adversely affect cultural resources.
- Architectural resources (both prehistoric and historic) can be damaged or collapsed if an OSV drives over the resource when there is not enough padding.
- Traditional cultural properties, cultural landscapes and districts often have vegetation as a major component, and some vegetation can be contributing elements to the NRHP eligibility of the area both as a feature and as part of the setting and feeling of the site. OSVs driven over these plants can significantly damage the plants by breaking branches and tops.

OSV use on designated trails and areas of NFS lands that occurs during periods of no or low snow amounts (less than 12 inches) would have the potential to break or crush artifacts, change and/or mix artifact provenance, and disperse archaeological soils and structures. OSV treads could 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 would alter site integrity. Impacts to cultural resources from soil compaction, erosion, and displacement of archaeological deposits, features, and structures can vary from negligible to major, depending on the percentage of the site impacted, the amount of subsurface damage, and the eligibility of the resource to the NRHP. Over-snow vehicles are considered one form of OHVs. All forms of OHVs have been shown to “damage soils directly through (1) disruption of the surface soil, and (2) compaction of the surface soil and subsoil (e.g., Belnap 1995, 2002; Dregne 1983:26; Webb et al. 1978:228-232). The most important long-term effect of OHV use on public lands is the accelerated erosion and the attendant inability to support natural revegetation (Webb et al. 1978:219).” In addition, “When the soil is wet, the destruction caused by the passing of a single vehicle track is more pronounced, due to increased soil compaction.” Because OSV use that occurs without snow cover often occurs when the soil is wet, OSVs have a higher potential to compact and disrupt archaeological soils. Such impacts to soils have been studied in relationship to vegetation and soils, but few studies have been undertaken to examine this in relationship to cultural resources; the correlation of these types of impacts in a natural resources context to the cultural resources context are similar.

OSV use on standing and collapsed structures could crush and displace walls and roofs, thus adversely affecting the integrity of the structure, and can range from minor to major. The Lassen National Forest has a large number of semi-collapsed structures and prehistoric rock structures and walls. These structures are often obscured in the winter by snowpack and OSV use off of established trails increases the likelihood that an OSV operator would not be able to differentiate these structures from topographic features and/or snow drifts, and would inadvertently run over these structures.

The Lassen National Forest heritage program monitors effects to cultural resources and tracks this data through our national database. To date, monitoring has looked at all potential impacts and has not focused on impacts related to travel management. Within the national database impacts from different vehicle types regulated under travel management are not separated out, i.e., both OSV and OHV are categorized as motorized impacts. Since the 2012 monitoring on the Lassen has noted disturbances to over 1,200 sites, of that, approximately 100 (8 percent) of those impacts were categorized as “Off-Highway-Vehicles, roads, and/or trails –motorized.”

OSV use also would have the potential for releasing burned and unburned fuel and lubricants into archaeological deposits.

Indirect Effects

Indirect effects of OSV use could result from 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 by water or rough terrain may have increased visitation due to OSV use across frozen lakes or smoothing of the terrain from snow compaction.

Wooden historic sites and artifacts can potentially be scavenged for burnable materials by OSV users building campfires. Scavenging of wood from historic sites is a common occurrence at summer campsites located near these types of sites, and this type of impact has been reported during winter on forests in Region 4 when OSV use occurs (personal communication Will Reed, Regional Archaeologist, Region 4).

Greller et al. (1974) found that in communities that are snow-free in winter, damage by snowmobiles was severe to lichens, *Selaginella*, due to the manual removal of rocks, necessary for operating snowmobiles in snow-free areas. This type of manual removal of rocks, if they are from a rock wall, archaeological or historic feature or are an artifact, could have an effect to the cultural resource ranging from negligible to major, depending on the feature affected.

Lyneis et al. (1980) found that OHVs enabled artifact collectors and pothunters to drive out to vast areas of public land, some of which was formerly difficult to access. Vehicles can also facilitate the inadvertent or purposeful destruction of significant cultural features (Schiffman 2005; Sowl and Poetter 2004:11-12). Denali National Park found that snowmobile “use would facilitate visitors’ ability to encounter cultural resources by bringing more people into more areas of the backcountry” and that “Winter users would mainly encounter historic buildings since archeological sites would be covered by snow” (Denali National Park and Preserve 2003; 343-344).

Summary of Environmental Consequences for Cultural Resources

Table 135. Summary of environmental consequences for cultural resources (by alternative)

Issue	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
OSV Areas Acres Designated	964,030	920,260	833,280	955,470	632,400
Acres Surveyed	768,815	741,893	673,551	762,874	540,634
% surveyed	80%	81%	81%	80%	85%
OSV Area Acres Not Designated	185,990	229,760	316,740	194,550	517,620
Sites in OSV Areas	2,762	2,617	2,347	2,739	1,819
% of all sites on the forest	82%	77%	69%	81%	54%
Snow Trails open ungroomed but not designated	2,527.1	2,509.1	2,199.9	2,534.2	1,676.9
Sites bisected by ungroomed trails	9	0	8	16	16
Sites within 30 m (100 ft.) of trails	22	0	10	37	41
Miles of groomed trails	349.5	349.7	349.4	349.4	349.7
Sites bisected by groomed trails	37	37	37	37	37
Sites within 30 m (100 ft.) of groomed trails	72	71	74	72	72
Minimum Snow Depth for OSV Use on Snow trails designated for OSV use (inches)	No minimum	6	6 where site review determines there would be no damage to underlying resources	No minimum	12
Minimum Snow Depth for OSV Use on off-trails, Cross-county Use (inches)	No minimum	12	12	No minimum	12
Minimum Snow Depth for Snow Trail Grooming to Occur	18	12	18	12	12
Grooming Season	12/26-3/31	12/26-3/31	12/26-3/31	12/26-3/31	12/26-3/31
Plowed Parking areas	5	5	5	5	5
Sites in Parking areas	3	3	3	3	3

Table 136. Summary of percentage of sites within potential use assumptions by alternative

Alternative	Potential Use	High	% moderate groomed	% moderate ungroomed	Low to No	Closed/Not Designated
1	82%	10%	7%	3%	63%	9%
2	77%	10%	7%	2%	61%	14%
3	69%	10%	7%	1%	56%	21%
4	81%	10%	7%	4%	62%	10%
5	54%	10%	7%	5%	39%	38%

All action alternatives considered designating as many as eight discrete, specifically delineated OSV use areas on the Lassen National Forest: Ashpan, Bogard, Fall River, Fredonyer, Morgan Summit, Shasta, and Swain Mountain. Not all alternatives would designate all eight areas.

Table 137. Summary of sites by OSV area

OSV Areas	Acres	Miles of Trails (Under Forest Service jurisdiction)	Sites	% of all sites on the Forest
Ashpan	82,910	16	130	2%
Bogard	331,850	27	1,919	35%
Fall River	42,440	0	178	3%
Fredonyer	30,030	44	53	1%
Jonesville	122,550	68	806	15%
Morgan Summit	125,220	62	429	8%
Shasta	56,820	0	99	2%
Swain Mountain	172,210	92	498	9%

Alternative 1

As shown in table 135 alternative 1 could directly and indirectly affect 82 percent of all sites on the forest because it has the largest area open to OSV use. These open areas expose the highest number of sites to the whole spectrum of possible direct and indirect impacts discussed above.

Alternative 2

Alternative 2 has the third largest area designated for OSV use and the third highest percentage of sites (see table 135 and table 136), in the high-use areas, and thus, has the third highest potential for direct and indirect effects from general OSV use. With the reduction of minimum snow depth to 6 inches on designated snow trails, there is a higher potential for contact of OSV treads and skids to cultural resources that are contained within the roadbed, though these designated roads are mostly engineered with the standard protection measures prescribed below, which makes the potential effect of alternative 2 to cultural resources equal to those alternatives proposing 12 inches of snow on designated snow trails.

Alternative 3

Alternative 3 has the second smallest area designated for OSV use, see table 135, and second lowest percentage of cultural resource sites within designated OSV areas, see table 135 and table 136. Therefore, this alternative has the lowest potential for direct and indirect effects from OSV use.

Alternative 4

Alternative 4 has the second largest area designated for OSV use and the second highest percentage of sites in the area of ungroomed trails. Therefore, alternative 4 has the second highest potential for direct and indirect effects from OSV use. The lack of a minimum snow depth in this alternative leads to a higher probability that OSV treads and skids would come in contact with soils and archaeological deposits. Because the vast majority of OSV recreationists are unable to differentiate archaeological deposits from general soil and geological features, the OSV recreationist could easily misinterpret their potential impacts cultural resources when crossing a snow-free area. Because this alternative does not implement a standard protection across all designated areas or site-specific protection to cultural resources, this alternative has the highest potential to affect cultural resources.

Alternative 4 would result in an adverse effect to cultural resources because it proposes no minimum snow depth.

Alternative 5

Alternative 5 has the smallest area designated for OSV use and the highest percentage of sites in the area of ungroomed trails. The small size of the OSV use designation provides the largest amount of protection to sites from possible impacts from increased use of remote areas of the forest. The larger number of sites within and near ungroomed designated trails gives alternative 5 the highest potential for cultural resources to come in contact OSV treads and skids, and thus increases potential effects. This proximity to trails also brings the greatest ability to mitigate the effects of this use. Therefore, alternative 5 has the lowest potential for direct and indirect effects from OSV use.

Summary

Alternative 4 has the potential to adversely affect cultural resources because it has no defined minimum snow depth as a protective measure. Alternative 1 has the second highest overall potential to affect cultural resources, with alternative 2 having the third highest potential to affect. Alternative 3 has the fourth highest potential to affect, while alternative 5 has the least potential to affect cultural resources.

Mitigations

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

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 snow or ice throughout the duration of undertaking activities on sites. (See discussion below)
- (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 trailed 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.

The Regional PA states “The cover must have at least 12 inches depth of compacted snow or ice throughout the duration of undertaking activities on sites.” This protection measure was developed for heavy equipment, such as loggers and skidders, conducting logging operations. Recreational OSVs are much smaller and lighter, and produce smaller pounds of pressure per square inch than the vast majority of logging machinery. Snowmobiles exert only 0.5 pound of pressure per square inch versus four-wheel-drive vehicles, which exert 30 pounds per square inch. The lower pressure allows “at least 12 inches depth of snow or ice” based on weather, Forest Service personnel and public observations, is a sufficient depth of snow and/or ice over archaeological deposits or historic features to prevent surface and subsurface impacts to historic properties. Unlike logging operations, which compact snow through repeated uses of the same location, the majority of cross-country recreational snowmobile use has limited repeat use. Repeat use is limited to group size, and if the group is coming in and out on the same path they created. The maximum repeat use occurs on trails, which are marked and have additional protections, as stated above in the assumptions section. The State Historic Preservation Officer concurred with this finding on July 15, 2016.

Monitoring

Within six months of the issuance of the Record of Decision, the Forest Service would develop and implement a cultural resource monitoring plan for the Lassen National Forest that would focus on testing the assumption that at least 12 inches depth of snow or ice based on weather, and Forest Service personnel and public observations is a sufficient depth of snow and/or ice over archaeological deposits or historic features to prevent surface and subsurface impacts to historic properties. This monitoring would focus on the potential for any effects to historic properties resulting from OSV traffic when there are at least 12 inches of snow or ice coverage on the historic property.

The Lassen National Forest heritage program manager, or qualified heritage professionals delegated by the heritage program manager, would determine schedules and requirements for monitoring. Permanent records would be completed for all monitoring events, and would be kept on file at applicable district offices.

At a minimum, the monitoring plan should include the following elements:

1. Concentrate monitoring on those historic properties within the assumed and observed areas of high, medium, and low OSV use, and on historic properties bisected by OSV trails.
 - a. Approximately 3 to 5 historic properties per level of use area.
 - b. Historic Properties to monitor will be both historic and prehistoric.
 - c. Resources will be monitored for any impacts.
 - d. Additional sites will be monitored if resource impacts are identified by Forest Service personnel.
2. Following OSV designation, historic properties would be monitored over two winter recreation seasons in which there are 12 inches or more of snow fall. In the third year, the Forest Service may reassess the need to continue monitoring.
 - a. Monitoring will occur based on weather patterns, snow depth, and expected OSV use at the sites.
 - i. Initial monitoring at each site will occur before the major storm events to establish a base line for potential future effects;
 - ii. Snow depth measurements on sites will be taken before and after major storms and before and after weekends, holidays, or expected heavy use periods;
 - iii. During periods of sustained snow, sites will be monitored on a minimum of a weekly basis;
 - iv. During periods of warm weather with no snow events or temperatures too high to retain snow, sites will be monitored on a minimum of monthly basis.
 - b. Monitoring would document:
 - v. Depth of snow and ice, measured at multiple locations within each resource as well as adjacent to the resource for comparative purposes;
 - vi. Measurements at locations of OSV use within the site boundary to include areas of OSV activity (such as tracks, turnouts, etc.) and areas where no OSV use is evident;
 - vii. Snow depth as well as a brief description of the type of snow (i.e., fresh/undisturbed; natural compaction; mechanical compaction, etc.) will be recorded;
 - viii. Impacts to soil surface and vegetation within the site boundary; and
 - ix. Impacts to archaeological artifacts, or features.
3. Where cross-country OSV use indicates effects are ongoing, the Forest Service would increase minimum snow depth to at least 18 inches of snow and ice, and continue monitoring to assess the effectiveness of 18 inch snow depth.
4. Where OSV routes and trail 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 or eliminate effects. Monitor the effectiveness of any resource or treatment measures implemented for two years. After two years, assess the need for continued monitoring.

- a. When minor effects may occur to historic properties as a result of the implementation of some protection measures (e.g., barrier installations), and it is likely that these effects would not diminish historic property NRHP values; then HPMs may approve the use of these protection measures without evaluating the properties for NRHP eligibility.
 - b. HPMs may also recommend that limited subsurface testing (as per Stipulation 7.7(h) of the Region 5 Programmatic Agreement) accompany the use of protection measures (as a form of monitoring for verification purposes) in order to confirm that the standard mitigation will only have minor effects to the historic property.
 - i. The objective of limited testing is only to verify the assumption that minor effects will not diminish property NRHP values, and not to obtain the appropriate level of information needed for NRHP determination.
 - ii. If limited testing does yield sufficient information to assess NRHP eligibility, then the Forest Service would determine NRHP eligibility.
 - iii. Limited testing would not be used to determine that properties are *not eligible* for the NRHP.
5. SHPO reporting and follow-up:
- a. Results and discussion of the monitoring efforts would be reported to SHPO in the annual PA report;
 - b. Included in the discussion will be any recommendations for administrative changes to the OSV program, such as closure areas or restrictions, minimum snow depth changes, no effect, etc.
 - c. Summaries of all studies conducted for undertakings covered by this decision, including information regarding:
 - i. management measures employed to protect any identified historic properties;
 - ii. findings from monitoring efforts;
 - iii. descriptions of any inadvertent effects or unanticipated discoveries, and steps taken to resolve effects; and
 - iv. other available information to clarify the effects to historic properties from OSV recreation undertakings that the Regions or the SHPO request be incorporated into Annual Reports.

Process for Alternative 4 – Finding of Adverse Effect

A finding of Adverse Effect obligates the Lassen to resolve the effect pursuant to 36CFR §800.6. This process is:

§ 800.6 Resolution of adverse effects.

(a) *Continue consultation.* The agency official shall consult with the SHPO/THPO and other consulting parties, including Indian tribes and Native Hawaiian organizations, to develop and evaluate alternatives or modifications to the undertaking that could avoid, minimize or mitigate adverse effects on historic properties.

(1) *Notify the Council and determine Council participation.* The agency official shall notify the Council of the adverse effect finding by providing the documentation specified in § 800.11(e).

(i) The notice shall invite the Council to participate in the consultation when:

- (A) The agency official wants the Council to participate;
 - (B) The undertaking has an adverse effect upon a National Historic Landmark; or
 - (C) A programmatic agreement under § 800.14(b) will be prepared;
- (ii) The SHPO/THPO, an Indian tribe or Native Hawaiian organization, or any other consulting party may at any time independently request the Council to participate in the consultation.
- (iii) The Council shall advise the agency official and all consulting parties whether it will participate within 15 days of receipt of notice or other request. Prior to entering the process, the Council shall provide written notice to the agency official and the consulting parties that its decision to participate meets the criteria set forth in appendix A to this part. The Council shall also advise the head of the agency of its decision to enter the process. Consultation with Council participation is conducted in accordance with paragraph (b)(2) of this section.
- (iv) If the Council does not join the consultation, the agency official shall proceed with consultation in accordance with paragraph (b)(1) of this section.

(2) *Involve consulting parties.* In addition to the consulting parties identified under § 800.3(f), the agency official, the SHPO/THPO and the Council, if participating, may agree to invite other individuals or organizations to become consulting parties. The agency official shall invite any individual or organization that will assume a specific role or responsibility in a memorandum of agreement to participate as a consulting party.

(3) *Provide documentation.* The agency official shall provide to all consulting parties the documentation specified in § 800.11(e), subject to the confidentiality provisions of § 800.11(c), and such other documentation as may be developed during the consultation to resolve adverse effects.

(4) *Involve the public.* The agency official shall make information available to the public, including the documentation specified in § 800.11(e), subject to the confidentiality provisions of § 800.11(c). The agency official shall provide an opportunity for members of the public to express their views on resolving adverse effects of the undertaking. The agency official should use appropriate mechanisms, taking into account the magnitude of the undertaking and the nature of its effects upon historic properties, the likely effects on historic properties, and the relationship of the Federal involvement to the undertaking to ensure that the public's views are considered in the consultation. The agency official should also consider the extent of notice and information concerning historic preservation issues afforded the public at earlier steps in the section 106 process to determine the appropriate level of public involvement when resolving adverse effects so that the standards of § 800.2(d) are met.

(5) *Restrictions on disclosure of information.* Section 304 of the act and other authorities may limit the disclosure of information under paragraphs (a)(3) and (a)(4) of this section. If an Indian tribe or Native Hawaiian organization objects to the disclosure of information or if the agency official believes that there are other reasons to withhold information, the agency official shall comply with § 800.11(c) regarding the disclosure of such information.

(b) *Resolve adverse effects.*

(1) *Resolution without the Council.*

- (i) The agency official shall consult with the SHPO/THPO and other consulting parties to seek ways to avoid, minimize or mitigate the adverse effects.

(ii) The agency official may use standard treatments established by the Council under § 800.14(d) as a basis for a memorandum of agreement.

(iii) If the Council decides to join the consultation, the agency official shall follow paragraph (b)(2) of this section.

(iv) If the agency official and the SHPO/THPO agree on how the adverse effects will be resolved, they shall execute a memorandum of agreement. The agency official must submit a copy of the executed memorandum of agreement, along with the documentation specified in § 800.11(f), to the Council prior to approving the undertaking in order to meet the requirements of section 106 and this Subpart.

(v) If the agency official, and the SHPO/THPO fail to agree on the terms of a memorandum of agreement, the agency official shall request the Council to join the consultation and provide the Council with the documentation set forth in § 800.11(g). If the Council decides to join the consultation, the agency official shall proceed in accordance with paragraph (b)(2) of this section. If the Council decides not to join the consultation, the Council will notify the agency and proceed to comment in accordance with § 800.7(c).

(2) *Resolution with Council participation.* If the Council decides to participate in the consultation, the agency official shall consult with the SHPO/THPO, the Council, and other consulting parties, including Indian tribes and Native Hawaiian organizations under § 800.2(c)(3), to seek ways to avoid, minimize or mitigate the adverse effects. If the agency official, the SHPO/THPO, and the Council agree on how the adverse effects will be resolved, they shall execute a memorandum of agreement.

(c) *Memorandum of agreement.* A memorandum of agreement executed and implemented pursuant to this section evidences the agency official's compliance with section 106 and this part and shall govern the undertaking and all of its parts. The agency official shall ensure that the undertaking is carried out in accordance with the memorandum of agreement.

(1) *Signatories.* The signatories have sole authority to execute, amend or terminate the agreement in accordance with this Subpart.

(i) The agency official and the SHPO/THPO are the signatories to a memorandum of agreement executed pursuant to paragraph (b)(1) of this section.

(ii) The agency official, the SHPO/THPO, and the Council are the signatories to a memorandum of agreement executed pursuant to paragraph (b)(2) of this section.

(iii) The agency official and the Council are signatories to a memorandum of agreement executed pursuant to § 800.7(a)(2).

§ 800.7 Failure to resolve adverse effects.

(a) *Termination of consultation.*

After consulting to resolve adverse effects pursuant to § 800.6(b)(2), the agency official, the SHPO/THPO, or the Council may determine that further consultation will not be productive and terminate consultation. Any party that terminates consultation shall notify the other consulting parties and provide them the reasons for terminating in writing.

(1) If the agency official terminates consultation, the head of the agency or an Assistant Secretary or other officer with major department-wide or agency - wide responsibilities shall request that the Council comment pursuant to paragraph (c) of this section and shall notify all consulting parties of the request.

(2) If the SHPO terminates consultation, the agency official and the Council may execute a memorandum of agreement without the SHPO's involvement.

(3) If a THPO terminates consultation regarding an undertaking occurring on or affecting historic properties on its tribal lands, the Council shall comment pursuant to paragraph (c) of this section.

(4) If the Council terminates consultation, the Council shall notify the agency official, the agency's Federal preservation officer and all consulting parties of the termination and comment under paragraph (c) of this section. The Council may consult with the agency's Federal preservation officer prior to terminating consultation to seek to resolve issues concerning the undertaking and its effects on historic properties.

(b) Comments without termination.

The Council may determine that it is appropriate to provide additional advisory comments upon an undertaking for which a memorandum of agreement will be executed. The Council shall provide them to the agency official when it executes the memorandum of agreement.

(c) Comments by the Council.

(1) *Preparation.* The Council shall provide an opportunity for the agency official, all consulting parties, and the public to provide their views within the time frame for developing its comments. Upon request of the Council, the agency official shall provide additional existing information concerning the undertaking and assist the Council in arranging an onsite inspection and an opportunity for public participation.

(2) *Timing.* The Council shall transmit its comments within 45 days of receipt of a request under paragraph (a)(1) or (a)(3) of this section or § 800.8(c)(3), or termination by the Council under § 800.6(b)(1)(v) or paragraph (a)(4) of this section, unless otherwise agreed to by the agency official.

(3) *Transmittal.* The Council shall provide its comments to the head of the agency requesting comment with copies to the agency official, the agency's Federal preservation officer, all consulting parties, and others as appropriate.

(4) *Response to Council comment.* The head of the agency shall take into account the Council's comments in reaching a final decision on the undertaking. Section 110(l) of the act directs that the head of the agency shall document this decision and may not delegate his or her responsibilities pursuant to section 106. Documenting the agency head's decision shall include:

- (i) Preparing a summary of the decision that contains the rationale for the decision and evidence of consideration of the Council's comments and providing it to the Council prior to approval of the undertaking;
- (ii) Providing a copy of the summary to all consulting parties; and
- (iii) Notifying the public and making the record available for public inspection

Cumulative Effects for Cultural Resources

Plowing of roads and trailheads that access OSV areas is a reasonably foreseeable action that could affect 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 could break or crush artifacts, change artifact provenance, and mix and disperse 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 would occur in this project area that could 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 the Lassen National Forest, the vast majority of projects use standard mitigations, which would 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, puts greater significance on the cultural resources on Lassen National Forest. The cultural resources on NFS 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 would be 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 difference in designated area indirect effects.

When Avoidance Is Not Possible.

If procedures described above cannot be implemented to protect heritage resources, the Forest Service would immediately consult with the SHPO to ascertain the expected severity of damage. If the SHPO and Forest Service 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 Service would proceed with the activity using all appropriate protection measures.

Unanticipated Discoveries

There is always the possibility that surface and sub-surface cultural resources could be located during project operations. Should any additional 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 would 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 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, alternatives 1, 2, 3, and 5 have no adverse effect to historic properties under the NHPA, and have no direct, indirect effects, or cumulative effects under the NEPA. Alternative 4 has an adverse effect to historic properties under the NHPA.