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Comments: Ms. Jeanne Higgins Forest Supervisor

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Re: Scoping Notice and Proposed Action: Stanislaus National Forest Over-Snow Vehicle Use Designation - June 2015

Jeanne Higgins:

In this letter we provide the Alternative developed by Snowlands Network and Winter Wildlands Alliance pursuant to the Settlement Agreement referenced in the Scoping Notice and Proposed Action. We request that this Alternative be analyzed as part of the Environmental Impact Statement for the designation of over-snow vehicle use on the Stanislaus National Forest ("STF"). Although this alternative is submitted by non-motorized advocacy groups, it is a compromise alternative that seeks a fair balance of motorized and non-motorized winter recreation opportunity, rather than a "non-motorized" alternative.

Stanislaus National Forest has published two winter recreation guides. The Ebbetts Pass Winter Recreation Guide, Calaveras Ranger District (2001) and A Guide to OSV Winter Recreation, Summit Ranger District (2003) that identify areas that are closed to motorized use in winter, both to protect non-motorized recreation opportunity and for other purposes. Our Alternative continues these closures. In addition, the 1991 Stanislaus National Forest Land and Resource Management Plan identifies management areas that are closed to winter motorized use. We oppose any opening up of these areas to OSV recreation. There are other areas on the STF that have been managed as non-motorized in winter, but have not been officially closed to OSV use. Our Alternative continues these closures too.

Winter travel planning must 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. Our Alternative is designed to minimize these impacts, especially to non-motorized recreation, while continuing to allow high quality OSV recreation on the STF. Additional restrictions may be appropriate and necessary to protect species, watersheds, riparian areas, and other ecosystems. We urge the Forest Service to carefully consider the comments submitted by The Wilderness Society and the Central Sierra Environmental

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Resource Center (CSERC) for more information on environmental issues at stake with winter travel management and suggestions on how to minimize or mitigate impacts to at-risk wildlife and the environment. We look forward to seeing a full analysis of OSV impacts on wildlife, the environment and other existing or proposed recreational uses in the Draft EIS.

Our Alternative allows snowmobile recreation to continue on designated routes as well as unrestricted cross-country snowmobile travel on a substantial portion of STF lands. It is a win-win for users and the local communities because it will better position the STF to accommodate growth in winter recreation demand as well as climate change trends that limit and concentrate over-snow recreation opportunity. Thus the STF will serve the

most users and bring the most winter tourism to local communities in a sustainable manner.

The Alternative that we propose meets the Purpose and Need set forth in the Stanislaus's Notice of Intent and is in compliance with Executive Order 11644, the Over-Snow Vehicle Rule, and the Settlement Agreement between the Forest Service and our organizations. However, we believe the Purpose and Need statement should specifically mention the need to preserve accessible opportunities for users to recreate on the national forest in winter free from the noise and other impacts of motorized recreation, rather than just ambiguously refer to "conflicts" between uses. Specifically, we propose that the Purpose and Need for this planning process be amended as follows (addition in *italics*):

Purpose and Need for Action

One purpose of this project is to effectively manage OSV use on the Stanislaus National Forest to provide access, ensure that OSV use occurs when there is adequate snow, promote the safety of all users, ensure non motorized recreation opportunities are preserved and enhanced, enhance public enjoyment, minimize impacts to natural and cultural resources, and minimize conflicts among the various uses.

Our Alternative designates 37% of the STF as necessary to be closed to winter motorized travel. These closure areas include Wilderness, existing non-motorized terrain, and additional terrain that should be closed to motorized use in order to provide a fair balance of non-motorized recreation opportunity. The remaining 63% of the STF could potentially be designated as open to OSV use but the designation of open lands should be triggered by need after consideration of all minimization criteria.

However, over-snow travel is only realistic in areas that are above 5,000 feet in elevation. Considering only these high elevation lands, our Alternative designates 51% of the STF as necessary to be closed to winter motorized travel. The remaining 49% of the STF high elevation lands could potentially be designated as open to OSV use but the designation of open lands should be triggered by need after consideration of all minimization criteria.

Our Alternative suggests what lands should be designated as open taking into account the areas that we believe must be closed (including Wilderness) and the application of other minimization criteria. The OSV use areas designated in our Alternative constitute approximately 13% of the STF (total) and 18% of the STF above 5,000 feet.

Our Alternative creates a fair balance of quality winter recreational opportunity on the STF taking into account the relative demand for motorized and non motorized recreation, the impacts of motorized recreation on non-motorized users and the environment, and the relative ability of the landscape to sustain growth in motorized use as compared to its ability to sustain growth in non-motorized use.

In many areas, the primary objective of the Forest Service and the primary needs of the public have shifted from resource extraction to recreation. Situated within a several-hour drive of dense centers of population, the STF exemplifies this trend. The demands of an increasing population require the STF to reevaluate how to serve the public in a responsible and sustainable manner.

As recently stated by the National Forest Foundation, "Backcountry skiing and snowboarding are some of the fastest growing sectors of the ski industry. Recent advances in snowmobile technology allow riders to get farther into the backcountry than ever before."¹ As recently confirmed by the Forest Service, "We can no longer manage as we have in the past."²

Our Alternative recognizes and deals with these facts and the twin facts that (i) there is substantially greater demand for non-motorized winter recreation on the STF than for motorized recreation, as established by Forest

Service monitoring data (NVUM)³ and direct observation, and (ii) on any single parcel, the STF can accommodate far more non-motorized users than motorized users.

One method for creating a fair balance of winter recreational opportunity that serves the greatest number of users and allows for the most growth in sustainable recreation is to restrict OSV travel to designated routes. Our alternative uses this method in the Osborne Hill area on Highway 4 and in the Herring Creek area on Highway 108.

Another method for creating a fair balance of winter recreational opportunity that serves the greatest number of users and allows for the most growth in sustainable recreation is to use temporal criteria for when OSV use is permitted in an area.

1 "Voices from the Forest," Your National Forests, the Magazine of the National Forest Foundation, Winter-Spring 2015.

2 "A Framework for Sustainable Recreation," USFS, USDA June 25, 2010.

3 According to the most recent National Visitor Use Monitoring data (2012), STF receives more than three times more cross-county skier visits (10,139) than snowmobiler visits (2,928).

Backcountry skiing is generally included in the cross-county skiing category for NVUM surveys.

This method is used effectively on the Carson Ranger District of the Humboldt-Toiyabe National Forest in the Alpine County Winter Recreation Project. In particular, when there is adequate snow on Blue Lakes Road for snowmobile recreation, then the nearby Forestdale Creek area is closed to OSV use. Early and late in the season the Forestdale Creek area is open to OSV use. Our alternative will use this technique on both the Highway 4 and Highway 108 corridors to minimize the conflict between motorized and non-motorized use and provide suitable opportunities for both user groups throughout the snow season.

Forest Service planning regulations recognize sustainable recreation as an important objective for the Forest Service.⁴ The need to close areas to OSV use and impose lesser restrictions in some areas such as a prohibition of cross-country travel, in order to protect non-motorized recreation opportunity is discussed in general in our position paper, "Analyzing OSV Impacts to Other Winter Recreation Users," included in our submission as Exhibit A ("Analyzing Impacts").

The OSV restrictions in our Alternative will also provide enhanced protection to wildlife, habitat, and water quality by increasing the acreage on the STF that is closed to cross-country OSV travel. We outline wildlife and environmental protections that should complement our proposed non-motorized recreation closures in our position paper, "Wildlife and Environmental Concerns - Over Snow-Vehicles in the Stanislaus National Forest" included in our submission as Exhibit B ("Wildlife Concerns"). We also support the comments submitted by The Wilderness Society and CSERC on fauna and flora.

General principles for effective management of OSVs and the need for such practices (both for preservation of recreational opportunity and for protection of plants, wildlife, and the environment) are discussed in the Winter Wildlands Alliance publication "Snowmobile Best Management Practices for Forest Service Travel Planning" included in our submission as Exhibit C ("BMP").

We have also included in our submission, via DVD, a file of important literature and science studies that document OSV impacts and the need for restrictions on OSV use. A list of these documents is included as "List of Additional Submitted Documents," attached as Exhibit D. These are basic to any analysis of OSV impacts. This file includes a recently published report by Winter Wildlands Alliance that shows the amount of lands open and closed to over-snow vehicles throughout the national forest system. This report demonstrates that Region 5 of the Forest Service has done relatively little to protect non-motorized recreation opportunity as compared to

other regions of the Forest Service.⁵

4 36 CFR 219.8(b)(2).

5 Please note that the numbers in this report related to the STF were obtained from the April 2010 Stanislaus Forest Plan Direction document, which was the best available data regarding acres open and closed to OSVs on the STF at the time the report was written.

We refer you to these documents for general support for each element of our Alternative and to ensure they are part of the legal record. As discussed throughout these documents, the restrictions outlined in our Alternative are necessary to manage OSVs in accordance with the minimization criteria set forth in Executive Order 11644 (Executive Order No. 11644, 37 Fed. Reg. 2877, Feb.

8, 1972, as amended by Executive Order No. 11989, 42 Fed. Reg. 26959, May 24, 1977) and in accordance with Forest Service principles of Sustainability, Multiple Use and Diversity of Plant and Animal Communities (Multiple-Use Sustained Yield Act of 1960).

We have included in our submission a map entitled "Winter Recreation Management on the Stanislaus National Forest", attached as Exhibit E. This map displays the specific areas that we have identified as of importance for non-motorized recreation and areas that would be closed to winter motorized due to other designations such as Wilderness, Near Natural, Semi-Primitive Non-Motorized or other in our Alternative.

Our map also identifies suggested boundaries of areas that should be designated as open to OSV's. In designating these areas we have recognized that low elevation areas on the STF are not suited to any over-snow recreation and have limited our proposed OSV open areas to those places that are above 5,000 feet in elevation.

STF's proposed designation of open areas must also take into account sensitive environmental areas, wildlife areas of critical habitat, areas of historical and tribal significance, and other appropriate considerations that we are able to only generally reference in our presentation.

Access to lands suitable for over-snow recreation is limited in many areas of the STF. Although access improvements may be outside the scope of this travel planning process, plowing additional parking areas, especially existing summer trailheads, for skiers and snowshoers to access non-motorized areas, would significantly improve quality winter recreation opportunities on the STF. We have suggested one location where improved access for non-motorized access is important.

We understand that the purpose and need of the proposed action is OSV-centric, but consideration of non-motorized trailheads is clearly part of the required scope. The designation of areas open to motorized traffic, if done with attention to motorized impacts on other forms of recreation, will de facto include a determination of areas where motorized travel should not be allowed. The establishment of suitable trailheads where users engaging in non-motorized recreation may avoid conflict with motorized impacts is clearly important to satisfaction of the minimization criteria.

Our Alternative emphasizes land use designations that are in keeping with historical use, maximizes lands for a given type of recreation where the access is the best for that type of recreation, and, although outside the scope of this planning process, suggests a location for improved access.

Federal law and regulations require the Forest Service to consider a full range of alternatives in its planning process. In winter travel management planning, the STF should include an alternative that places significant restrictions on motorized recreation. The Settlement Agreement did not state that our Alternative is to be considered as the "non-motorized emphasis" alternative. Although our alternative is submitted by non-motorized

advocacy groups, it is a compromise alternative that seeks a fair balance of motorized and non-motorized winter recreation opportunity.

To meet the requirement to consider a fair range of alternatives, the Forest Service must also consider an alternative that gives priority to non-motorized recreation and to environmental protection. This alternative would place greater restrictions on motorized activity, such as confining OSV recreation to designated routes, similar to current restrictions on wheeled vehicles, with very limited "open play" areas. Such an alternative merits serious consideration, not as our proposal, but as a true "environmental" alternative. A No Action alternative could go further still - designating no trails or areas as open to OSV use.

In the remainder of this letter, we will discuss (A) the 2015 Over-Snow Vehicle Rule, (B) OSV route grooming and trailhead plowing, (C) the need to mitigate impacts from OSV use, (D) changes to the Forest Plan, (E) important non-motorized winter recreation areas and other management areas, (F) suggested boundaries for designated OSV areas, and (G) general best management practices.

A. The 2015 Over-Snow Vehicle Rule

In January 2015 the Forest Service released a new Over-Snow Vehicle Rule providing a framework for winter travel planning efforts on all National Forest lands (80 Fed. Reg. 4500, Jan. 28, 2015, 36 C.F.R. part 212, subpart C). The OSV Rule requires that forests designate routes and areas where OSV use is allowed or allowed with restrictions, publish these designations on an OSV use map, and prohibit any OSV activity that is inconsistent with the published map. This travel planning is to occur under the directives that accompanied the 2005 Travel Management Rule. The Forest Service's National Office is planning to revise these directives in light of the new OSV Rule.

The OSV Rule requires national forests with adequate snowfall designate and display on an "over-snow vehicle use map" (OSVUM) specific areas and routes where OSV use is permitted based on resource protection needs and other recreational uses. The STF is the fourth national forest in Region 5 to start winter travel management planning under the new OSV rule. To comply with the rule

and get rule implementation off to a good start it is critical that the STF's OSV plan satisfies the Forest Service's substantive legal duty to locate areas and trails designated as open to OSV use in a manner that minimizes resource damage, wildlife disturbance and conflicts with other uses.

The STF is obligated to comply with the minimization criteria outlined in Executive Order No. 11644, 37 Fed. Reg. 2877 (Feb. 8, 1972), as amended by

Executive Order No. 11989, 42 Fed. Reg. 26959 (May 24, 1977). These criteria are as follows: 1) minimize damage to soil, watershed, vegetation, or other resources of the public lands; 2) minimize harassment of wildlife or significant disruption of wildlife habitats; and 3) minimize conflicts between off-road vehicle use and other existing or proposed recreational uses of the same or neighboring public lands. The executive orders require the Forest Service to minimize impacts

-not just identify or consider them -when designating areas or trails for OSV use, and to demonstrate in the administrative record how it did so. This duty was recently confirmed by the 9th Circuit Court in *WildEarth Guardians v. U.S. Forest Service* in which the Court ruled that the agency must "apply the minimization criteria to each area it designated for snowmobile use" and "provide a more granular minimization analysis to fulfill the objectives of Executive Order 11644, which the [Travel Management Rule] was designed to implement." More specifically, the Court ruled that "mere 'consideration' of the minimization criteria is not enough" and that "the Forest Service cannot rely upon a forest-wide reduction in the total area open to snowmobiles as a basis for demonstrating compliance with the minimization criteria." The Forest Service must show not

just that impacts have been studied, but specifically demonstrate how effective each of the Alternatives presented

in the DEIS is in minimizing impacts from OSVs. As one of the first forests to implement the new OSV rule, it is critical that the STF properly apply the minimization criteria.

To meet these minimization criteria the STF must follow the process for travel management planning as outlined in Chapter 10.3 of Forest Service Handbook

7709.55. This six-step process includes: "(1) compiling existing travel management direction; (2) assembling resource and social data; (3) using travel analysis to identify proposals for change; (4) conducting appropriate environmental analysis and decision-making; (5) identifying designated routes and areas on an MVUM [or OSVUM in this case]; and (6) implementing, monitoring, and revising." Step 3, travel analysis, is the critical point where broad-scale issues are identified and thus forms the basis for proposed actions related to travel planning. We believe that the STF should not have proposed travel management designations in its scoping notice without having completed this travel analysis. We ask that the STF comply with all 6 steps in the travel planning directives.

6 WildEarth Guardians v. U.S. Forest Service, ---F.3d---, No. 12-35434, 2015 U.S. App. LEXIS 10447 (9th Cir. June 22, 2015)

Under the OSV Rule, areas open for cross-country snowmobile travel must be smaller than a ranger district, and areas that are not specifically designated as open are closed to OSV use. The proposed action put forth by the STF does not abide by the letter or spirit of this rule. The proposed action fails to designate areas that are "discrete," "specifically delineated," and "smaller . . . than a ranger district." (definition of an "area" in 36 C.F.R. § 212.1). Rather than identify and delineate discrete open areas the scoping notice suggested that the STF proposes to designate as open everywhere that is not otherwise prohibited. From the scoping notice and proposed action, it appears that the STF is proposing to designate as open all areas that are above 5,000 feet and not otherwise closed through Land and Resource Management Plan designations. Proper application of the executive order "minimization criteria" almost certainly would not result in designation of all of these open areas given the significant adverse impacts of cross-country OSV travel to sensitive wildlife, non-motorized users, and other uses and resources. The STF must go one step further, and applying all the minimization criteria, identify discrete areas within this potentially suitable landscape to determine where cross-country OSV travel should actually be allowed.

The Proposed Action as described in the June 2015 scoping notice is essentially the status quo with two major areas and a number of smaller areas that were previously closed to OSV use designated open under the Action. This does not meet the minimization criteria.

To remedy the shortcomings of the Proposed Action, we hope that the Preferred Alternative identified in the draft Environmental Impact Statement draws heavily from our proposal.

B.OSV Route Grooming and Trailhead Plowing

As required under the Settlement Agreement, the STF is required to "identify snow trails for grooming" and analyze "a range of alternative actions that would result in varying levels of snowmobile use," taking into account the impact of activities "such as the plowing of related parking lots and trailheads". Amended Settlement Agreement, Snow/ands Network v. US. Forest Serv., 2012 WL 4755161 (2012) (No. 2:11-cv-002921).

A major consequence of OSV route grooming and trailhead plowing is to increase the general level of OSV traffic and usage in the national forest. In its environmental analysis of the OSV grooming program, the State assumed that the program approximately triples snowmobile activity in the groomed areas. (DEIR

p 2-20) The manner in which such use affects and displaces non-motorized use and impacts wildlife is discussed in our position papers that are included with this comment letter (see "Analyzing Impacts," "Wildlife Concerns," "BMP Practices" and Exhibit D).

Our Alternative does not call for the cessation of grooming on any currently groomed OSV route or for the cessation of plowing of any OSV trailhead. Only five miles of ungroomed, marked trail riding would be lost if our Alternative is implemented in its entirety.⁷ There would still be 58 miles of groomed trails; the proposed 98 miles of ungroomed OSV routes would be reduced to 93 miles. The total reduction to the trail system would be 3.2 percent.

With restrictions on OSV use in other areas, there is adequate room on the STF to provide a fair balance of recreational opportunity without ending the grooming of OSV routes and plowing of OSV trailheads. The additional closures and restrictions we propose in our Alternative serve as mitigation of the consequences of grooming OSV routes and plowing OSV trailheads by establishing non-motorized areas where recreation users seeking clean and quiet areas can readily avoid the impact of the State's OSV grooming program.

Restrictions and other mitigation measures may be necessary beyond those provided by our suggested Alternative to protect species, watersheds, riparian areas, and other ecosystems. Appropriate mitigation measures for various impacts of OSVs on other forest uses, wildlife, and the environment should be spelled out in the Draft EIS. With the minimization criteria in mind, we expect that designated OSV use areas set forth in the Preferred Alternative will be smaller than the entirety of those lands that lie outside of our Important Non-motorized Recreation Areas. We have included on our map suggested boundaries for designation of OSV areas, subject to further review of sensitive environmental areas, wildlife areas, areas of historical and tribal significance, and other appropriate considerations that we are able to only generally reference in our presentation.

C. The Need to Mitigate Impacts from OSV Use

In proposing this Alternative, we assume that the Forest Service acknowledges the need for mitigation of OSV impacts due to the noise, emissions and other impacts of OSVs that are discussed in our submitted and referenced documents, as well as the stimulation of OSV use caused by the Forest Service's participation in the State of California's OSV trail grooming program. The STF should, to the extent practicable, rely on relevant past scientific studies of OSV impacts such as noise, pollution, and user experiences so that it does not duplicate efforts in this EIS. We believe these impacts have been well-established in prior government studies, including, for instance, in Yellowstone National Park, as well as the numerous scientific studies referenced in our submitted documents. Certain impacts -such as noise and the smell of toxic exhaust -are obvious from personal observation, and their impact on other users is subjective and well-established by user comments (see, for instance, the file of comments included in Exhibit D).

⁷ FS Road 4N12 (Hening Creek Road) from Highway 108 to its junction with 5N17 is closed to OSV use in our Alternative.

In order to manage OSVs in a manner that meets the minimization criteria, the Forest Service must collect reliable data on OSV impacts. Regardless of the alternative selected for the final plan, we suggest, among other analyses, that the Forest Service measure the ambient air pollution in recreation areas with heavy snowmobile traffic (both trailheads and routes), the distance snowmobile noise travels through popular recreation areas, and the relative capacity of powder covered slopes to serve motorized and non-motorized users (by measuring the relative number of users that can obtain their desired recreation experience on one slope [a] if it is open to

motorized travel and [b] if it is closed to motorized travel). This data can help determine the impact of motorized use on users desiring clean and quiet recreation, and uses established Forest Service indicators such as persons-at-one-time (PAOT) and recreation visitor days (RVD).

If STF does not undertake its own studies, then based on current science and knowledge, the STF must at least acknowledge (i) that snowmobile use displaces non-motorized use and adversely impacts the user experience sought by many non-motorized users, (ii) that such impact and displacement increases with the intensity of snowmobile use (especially when vehicles do not meet best available technology standards) and totally displaces non-motorized use where motorized use is heavy, (iii) the noise impacts of motorized use affect very large areas and are best contained by designating non-motorized areas that are protected from noise incursion due to topography or other features, and (iv) where use is heavy, such as at staging areas, OSV pollution results in confined concentrations of unhealthy air.

D.Changes to the Forest Plan

We strongly oppose allowing OSVs in any Near Natural Areas or other areas that the Forest Plan specifies should be closed to motorized use.

The STF's proposed amendment to the 1991 forest plan to permit OSV use in portions of the Eagle/Night and Pacific Valley Near Natural Areas is subject to the 2012 planning rule provisions at 36 C.F.R. part 219 and not the provisions of the 1982 planning rule under which the current forest plan was developed.⁸ If the Forest Service were to move forward with this proposal, the Agency must ensure that the amendment satisfies the substantive requirements of the 2012 planning rule. Those requirements include providing for ecological sustainability by "maintain[ing] or restor[ing]": (a) "the ecological integrity of terrestrial and aquatic ecosystems and watersheds," including "structure, function, composition, and connectivity;" (b) air and water quality, soils and soil productivity, and water resources; and (c) "the ecological integrity of riparian areas," including their "structure, function, composition, and connectivity."⁹ Plans also must provide for:

⁸ 36 C.F.R. § 219.17(b)(2) (following a 3-year transition period that expired May 9, 2015, "all plan amendments must be initiated, completed and approved under the requirements of this part").
⁹ 36 C.F.R. § 219.8(a).

(a) "the diversity of plant and animal communities;" (b) "the persistence of native species;" and (c) "the diversity of ecosystems and habitat types."¹⁰ And in providing for social and economic sustainability, plans must account for "[s]ustainable recreation; including recreation settings, opportunities, and access; and scenic character."¹¹ In satisfying these substantive requirements, the agency must "use the best available scientific information to inform the planning process."¹²

As the STF recognizes, the proposal to open portions of the Eagle/Night and Pacific Valley Near Natural Areas to OSV use will require an amendment to the 1991 forest plan, which prohibits motorized uses in those areas. These areas encompass key roadless and other conservation lands and resources, provide important habitat and corridors for sensitive wildlife species, and offer high quality opportunities for primitive, non-motorized recreation. The existing STF LRMP designates the Pacific Valley, Eagle, and Night roadless areas as areas to be managed with consideration for special attention for fish and wildlife. Accordingly, the areas serve important functions in maintaining the integrity and diversity of the forest's ecosystems and plant and animal communities and in providing for sustainable recreation. To preserve and protect these important functions, the Forest Service in its 1991 forest plan determined that the areas should be managed with an "[e]mphasis . . . on providing a natural appearing landscape in a non-motorized setting."¹³ The proposed forest plan amendment would severely erode those protections by permitting cross-country OSV use in

portions of those areas, with corresponding adverse impacts on the integrity and diversity of the forest's ecosystems and plant and animal communities and on the provision of sustainable, non-motorized forms of recreation. 14 Accordingly, the proposed amendment is unlikely to satisfy the substantive requirements of the 2012 planning rule.

In addition to its substantive provisions, the 2012 planning rule prescribes the process for a plan amendment:

"The process for amending a plan includes: Preliminary identification of the need to change the plan, development of a proposed amendment, consideration of the environmental effects of the proposal, providing an opportunity to comment on the proposed amendment, providing an opportunity to object before the proposal is approved, and, finally,

10 36 C.F.R. § 219.9.

11 36 C.F.R. § 219.8(b)(2).

12 36 C.F.R. § 219.3.

13 Stanislaus Forest Plan Direction, p. 119.

14 See generally Snowmobile Best Management Practices, pp. 5-14 (summarizing best available scientific information on the adverse impacts of OSV use on key elements of the integrity and diversity of ecosystems and plant and animal communities, including air, water, and soil quality, snowpack chemistry, vegetation, soundscape, and denning, foraging, and other sensitive wildlife habitat).

approval of the plan amendment. The appropriate NEPA documentation for an amendment may be an environmental impact statement, an environmental assessment, or a categorical exclusion, depending upon the scope and scale of the amendment and its likely effects."15

The rule also establishes requirements for public participation, directing the agency to reach out to stakeholders early and throughout the process using collaborative processes where appropriate and feasible.16

It is unclear, based on the proposed action and scoping notice, if and how the Forest Service intends to satisfy these procedural requirements. Presumably the forest intends to analyze the proposed amendment in the EIS for the proposal to designate roads, trails, and areas for OSV use and to identify trails for grooming. The current proposed action, however, fails to identify a preliminary need to change the current plan, as required by the rule, and instead simply proposes a plan amendment that would exempt portions of the Eagle/Night and Pacific Valley Neai-Natural Areas from management prescriptions designed to protect their natural character and other conservation values. To the extent the forest has identified a need to change those protections, it is to accommodate and perpetuate illegal "historic" OSV use in those areas. This is not a legitimate need to change the current plan. The Forest Service must provide a legitimate preliminary need to change prior to proceeding with the proposed amendment.

E. Important Non-Motorized Winter Recreation Areas and other Management Areas

The map submitted with our Alternative identifies the areas that are important for non-motorized recreation; some are designated non-motorized in the Proposed Action and some are not. Those that are not are described in detail as to their importance in this document and are deemed critical to the creation of a balance between motorized and non-motorized winter recreation opportunities.

In addition, the map also identifies those areas that the STF must manage as Wilderness, Recommended Wilderness, Semi-Primitive Non-motorized, Research Natural Areas, or for other reason non-motorized in winter under the current Land and Resource Management Plan. Many of these areas are also important for non

motorized winter recreation, and we fully support their management of these areas non-motorized year-round.

We understand that the STF's OSV Use Designation plan will designate areas for motorized use, rather than areas that are specifically managed for non-motorized use. However, our expertise and knowledge is of the areas on the STF that are

15 36 C.F.R. § 219.5(a)(2)(ii); see also id. § 219.13(b)(1) (explaining that "[t]he responsible official shall . . . [b]ase an amendment on a preliminary identification of the need to change the plan").

16 36 C.F.R. § 219.4(a)(1).

valuable for non-motorized recreation. Therefore, we have focused our efforts on identifying these areas. We are separately submitting a GIS shapefile of these areas in order to facilitate analysis of this Alternative during the EIS process.

The three different types of human-powered winter recreation discussed in our document "Analyzing Impacts" have different objectives and needs. Therefore, we have classified our proposed areas into three types. Although we believe these classifications could assist Region 5 in adopting a uniform and readily understandable system of winter travel management, our goal here is not to impose a classification scheme but to provide supporting information to better describe why these areas are important to human-powered winter recreationists. The three types are:

"Front-country non-motorized" areas 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 or reduce noise, toxic exhaust, disproportionate consumption of powder snow, trail mting, and other OSV impacts.

"Backcountry solitude" areas 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.

"Managed shared use" areas restrict OSV usage so that there can be meaningful shared use of easily-accessible and popular areas. Meaningful shared use is made possible by restricting OSVs to designated routes, establishing separate trailheads, restricting OSVs to cleaner and quieter machines, imposing temporal restrictions on OSV use, imposing speed limits on shared-use trails, and other management tools. Methods for managing shared use are explained and discussed in the documents "Analyzing Impacts" and "BMP Practices".

Winter recreation opportunities on Stanislaus National Forest are located along or accessed from the west on two highways that enter the forest: Highway 4 and Highway 108. Both are closed to through traffic in winter due to snow on the high passes they cross.

Highway 4

The winter recreation along Highway 4 extends west to east from approximately Black Springs to Lake Alpine with snowmobile recreation continuing east beyond Lake Alpine on Highway 4 to Ebbetts Pass and Highland Lakes on groomed snowmobile trails. From Black Springs to Lake Alpine, the highway runs along a giant ridge that is bordered by the Mokelumne River to the north and the Stanislaus River to the south.

Bear Valley is the main development along the upper portion of Highway 4. Adjacent to the village is the Bear Valley Nordic Center, and not far from the village is the Bear Valley Ski Resort. Both cater to their respective clientele.

Bear Valley has been touted as the "snowmobile capitol of California." This is due to the large number of snowmobiles used by property owners who reside at Bear Valley and the large number of snowmobilers that are attracted to the area due to the 32 miles of groomed snowmobile trails and Highway 4's proximity to large population areas.

The Highway 4 corridor can be divided into two geographical areas based on suitable terrain for winter recreation. West of Bear Valley the terrain near the highway is relatively mild; here there is terrain suitable to beginner through intermediate skiers and snowshoers. East of Bear Valley the terrain is considerably steeper and with few exceptions is suitable only to intermediate through advanced skiers and snowshoers. Both areas attract skiers and snowshoers as well as snowmobilers.

West of Bear Valley

On the north side of the highway and west of Bear Valley, between the highway and where the terrain drops abruptly into the Mokelumne River canyon, there are many snow-covered roads and mild ridges that attract skiers, snowshoers and snowmobilers. Due to the proximity of the residential and commercial development of Bear Valley, the snow route along the ridges west from Bear Valley to Flagpole Point are now almost the exclusive domain of motorized winter recreation. Homeowners in the developments at Skyhigh, Tamarack and Sherman Acres also have snowmobile access to this ridge. In summary, although there are no groomed or ungroomed snowmobile routes in this area per the December 1999 Ebbetts Pass Area Winter Recreation Guide, this area is a de facto high intensity use snowmobile area. Skiers who once used this area have abandoned it due to the conflict with motorized use.

There is a distinct need for a designated non-motorized winter recreation area west of Bear Valley in order to meet the demand for quiet and safe, quality non motorized backcountry winter recreation opportunities, especially for beginner and intermediate skiers who find the terrain east of Bear Valley too difficult to negotiate.

Our alternative includes two such areas: the Mattley Ridge area and the Cabbage Patch to Black Springs area.

Mattley Ridge area

Classification: Front-county non-motorized and managed shared use Size: 5,663 acres

Reference: Exhibit F, Mattley Ridge map

The Mattley Ridge area has historical significance for non-motorized users. Ski Tours in the Sierra Nevada 17 describes four tours in this area plus the route along ridges from Bear Valley Ski Resort to Flagpole Point and then to Cabbage Patch. The description of the tour along the ridges begins with: "If there is a classic tour in the Bear Valley area it is the ski along the high ridges." Today these ridges are inundated with OSV use, and non-motorized recreationists have been displaced by the heavy snowmobile use along the ridges.

The displacement of non-motorized visitors from the ridges in this area with superb vistas and terrain can be in part mitigated by designating the Mattley Ridge area as closed to OSV use and is part of our Alternative.

Five miles of ridge connect Bloods Point near Bear Valley to Flagpole Point. The Mattley Ridge closure will reduce the ridge open to snowmobile use to four miles. The final one mile to Flagpole Point will be within the non-motorized area.

The Mattley Ridge area is accessible from Cabbage Patch, which means that non motorized visitors will rarely see a snowmobile until they reach the east end of the non-motorized area. This is because there is no room for snowmobile staging at Cabbage Patch.

Descriptions in the guidebook give a glimpse of why the area makes an excellent non-motorized destination:

"... you will climb steeply from Mattley Road to the top of Mattley Ridge. The ridge is a good destination if you seek fine views and lots of downhill skiing on the return."

"... is an excellent choice for beginners who have mastered the basics."

"... offers spectacular views from the ridge tops and a variety of terrain including mild slopes, steady climbing, traversing ridges and a descent through trees."

The Mattley Ridge closure is designed to provide a non-motorized winter recreation area and at the same time minimize the impact to OSV recreation.

1. Maintaining the first 0.5 mile of road from Cabbage Patch open to snowmobiles will allow cabin owners in the St Michele Meadow area motorized access to their property.

17 Ski Tours in the Sierra Nevada, Marcus Libkind, Bittersweet Publishing Company, 1985.

2. The roads that border the area to the west, south, and east are not part of the closure. This allows motorized users access to and from Cabbage Patch as well as to other areas open to OSV use.

An annual problem for OSV recreation occurs each spring when plowing of Highway 4 ends access to Highway 4 east of the Lake Alpine Sno-Park. To compensate for this, our Alternative limits the Mattley Ridge area closure to periods when Highway 4 east of the Sno-Park is open to OSV use.

We urge the Forest Service to embrace a very forward-looking view of how both motorized and non-motorized winter recreation can be significantly improved along the Highway 4 corridor. We would support a staging area in the Cabbage Patch area that would provide both motorized and non-motorized winter recreation if the Mattley Ridge and Cabbage Patch to Black Springs closures (described below) were implemented.

A staging area at Cabbage Patch would improve access for both motorized and non-motorized recreationists and would create a new late season staging area for OSV use along the Highway 4 corridor.

However, such a staging area would increase conflict if the two non-motorized areas were not created; the improved access for OSVs would inundate areas that currently have low OSV use with new motorized use.

Cabbage Patch to Black Springs

Classification: Front-country non-motorized Size: 4,770 acres

Reference: Exhibit G, Cabbage Patch to Black Springs map

The December 1999 Ebbetts Pass Area Winter Recreation Guide shows 35 miles of ungroomed trails in the area north of Highway 4 stretching from Cabbage Patch to Black Springs. These trails are open to both motorized and non-motorized recreation. Currently the use is heavily skewed toward non-motorized use because there is no staging area for snowmobiles.

The Cabbage Patch to Black Spring map shows the area and the ungroomed trails that are closed to OSV use in our Alternative. In terms of mileage, 11 miles or 31 percent of the total ungroomed trails in the area would be closed to OSV use.

Over the last five years, on-the-ground experience shows that the Cabbage Patch to Black Springs area receives almost no OSV use. Furthermore, the Cabbage Patch to Black Springs area has the necessary terrain, roads, and mild ridges to

support a major backcountry non-motorized trail system similar to that developed in the Foster Meadow area on Highway 88.¹⁸

Big Meadow Campground

Classification: Front-country non-motorized Size: 271 acres

On the south side of the Highway 4 and west of Bear Valley the lands are much less suitable for winter recreation because the terrain rapidly drops down into the Stanislaus River drainage and much of the area is covered with dense, small diameter trees.

OSV use is concentrated around the Spicer Sno-Park and the groomed Spicer Reservoir Road OSV route. The Sno-Park does not serve non-motorized winter recreationists well due to the lack of suitable terrain. In fact, it was created as a staging area for snowmobiles; 19 miles of groomed snowmobile trails lead from here to Spicer Reservoir, Summit Lake, Union Reservoir, and Utica Reservoir, and then an ungroomed snowmobile trail continues to Lake Alpine and the groomed snowmobile trail to Ebbetts Pass.

A small area at the Big Meadow Picnic and Campground area has been historically managed as non-motorized in winter. Much of the area is closed to motorized use because it lies within a Near Natural Area. Only 271 additional acres are closed under our Alternative. Approximately one half of our suggested closure is designated as closed in the Proposed Action. However, the Proposed Action does not adequately protect the non-motorized recreational values in this area without the small added closure. This area encompasses one mile of marked trail and approximately another mile of good terrain for beginner through beginner-intermediate skiers.

The need to continue this non-motorized designation was brought to the attention of the Forest Service at a pre-scoping meeting in Sonoma.

East of Bear Valley

The access to backcountry lands east of Bear Valley is dominated by Highway 4, which is a groomed snowmobile route. This area draws a large number of OSV recreationists; most arrive with their own machines, but some rent from a concessionaire adjacent to the Lake Alpine Sno-Park.

There are 17 miles of groomed OSV trails that lead to Ebbetts Pass, Pacific Valley, and Highland Lakes. In addition there is an ungroomed route through

18 See http://www.backcountryskitours.com/pages/tours_1000/1008_tour.htm.

Deer Creek that leads to Highway 88, and OSVs can continue over Ebbetts Pass to Centerville Flat, both of which are on the Humboldt-Toiyabe National Forest.

Highway 4 Corridor

Classification: Managed shared use Size: Unknown

The Highway 4 corridor is a shared use area; it is an access route to Wilderness lands that provide "backcountry solitude" for advanced non-motorized winter recreationists. To facilitate shared use, our Alternative requires the STF to ask users to respect a voluntary restriction of use to BAT-compliant OSVs and commit to review such restriction every five years to determine whether it should be made mandatory.

Pacific Valley

Classification: Backcountry solitude Size: 8,578 acres

Under Current OSV management, OSVs are only allowed in a narrow corridor along 8N12 and a short distance beyond in Pacific Valley. Under the Proposed Action, 8,578 acres of the Pacific Valley Near Natural Area will be designated open to OSVs. Our Alternative maintains all current Near Natural Areas non-motorized in winter including the Pacific Valley area.

The Pacific Valley area has long been recognized for outstanding non-motorized recreation opportunities. The Record of Decision for the STF LRMP, signed by Forest Supervisor Janet Wold, contains the following information for the Pacific Valley roadless area:

"Pacific Valley: Although this area is considered by many to be highly suitable for Wilderness designation, I am not recommending that it be designated. The Pacific Valley region presents a unique opportunity to provide an outstanding area for semi-primitive non-motorized (SPNM) recreation outside of the designated Wilderness system. It is perhaps the best opportunity for this type of recreation area in the Sierra Nevada." 19

Thus, the rationale provided for not designating this highly suitable area for Wilderness was that by managing it as non-motorized outside of Wilderness, it presented a unique opportunity as an outstanding area for non-motorized recreation outside of the designated system.

19 Stanislaus National Forest Land and Resource Management Plan Record of Decision. October 28, 1991. Page 28.

Osborne Hill and Lake Alpine Areas

Classification: Front-country non-motorized Size: 1,220 acres

The Proposed Action would eliminate the historical non-motorized areas in the Osborne Hill and Lake Alpine areas. Our Alternative continues the non-motorized designation of these areas as shown on the December 1999 Ebbetts Pass Area Winter Recreation Guide.

This non-motorized area provides non-motorized terrain in the Lake Alpine area and access to the Carson-Iceberg Wilderness.

An ungroomed OSV route, which connects the groomed Spicer routes to the Lake Alpine area has historically passed through the Osborne Hill area and under our Alternative it continues thus making this a shared use area.

Round Valley and Woodchuck Basin Near Natural Area

Classification: Front-country non-motorized Size: 3,435 acres

The main area east of Bear Valley accessible to backcountry non-motorized recreationists and off-limits to snowmobile travel is the Round Valley and Woodchuck Basin Near Natural Area.²⁰ This area offers outstanding terrain for intermediate and advanced skiers and snowshoers. The Round Valley Sno-Park provides access for non-motorized forest visitors to these areas and at the same time results in more room for snowmobile staging at the Lake Alpine Sno-Park.

OSV trespass into this area is common. Some is directly from the Lake Alpine Sno-Park, where all lands to the north are off-limits to OSV use, but no signage has been present for many years. Signs are also needed along the southern boundary of Bee Gulch and Woodchuck Basin. Here, too, snowmobile trespass is common.

The scoping notice states that:

"The proposed action includes the following design features ... The Forest Service has an obligation to monitor the effects of OSV use as required by 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 trails systems for evidence of OSV trespass

²⁰ The Round Valley and Woodchuck Basin Near Natural Area encompasses Poison Canyon, Round Valley, Bee Gulch and Woodchuck Basin.

into closed areas, OSV use near or damage of sensitive plant and wildlife sites, and low snow areas subject to erosion concerns."

History has shown that enforcement efforts have not been effective. Enforcement must be transparent and documented in a way that shows the public that it is being carried out in the most efficient way possible and that it is effective in meeting objectives. Timing is critical. Enforcement must focus on weekends and holidays, and must include FS personnel on snowmobiles monitoring the Highway 4 corridor. Furthermore, enforcement must include citations, not warnings. These parts of the enforcement plan must be part of the project decision.

Highway 108

Winter recreation is focused at three areas along the Highway 108 corridor: Dodge Ridge area, Highway 108 east of the winter closure point (1.4 miles west of Cascade Creek Campground), and the Henning Creek and Cow Creek area.

Dodge Ridge area

Classification: Front-country non-motorized Size: 9,771 acres

The snow-covered roads that circumscribe Dodge Ridge Ski Resort are part of the developed ski and snowshoe trail system. This system of trails was developed and is maintained by the Pinecrest Nordic Ski Patrol. Our Alternative includes the designation of these lands, as shown in the Proposed Action, non-motorized in winter.

Highway 108 east of winter closure point

Classification: Managed shared use Size: Unknown

The winter road closure point on Highway 108 is the main staging point for snowmobile recreation along the Highway 108 corridor. The groomed snowmobile trail system begins here and extends east to Kennedy Meadows Road, plus there is a groomed trail system from the highway into the headwaters of Niagai-a Creek. In addition there are marked but ungroomed trails up the Clai-k Fork Road to Sand Flat and from Kennedy Meadows Road to Sonora Pass. Our Alternative makes no change to this use.

Under current OSV management, OSVs are not allowed in the Eagle/Night Near Natural Area. Under the Proposed Action, 5,045 acres of this Near Natural Area will be designated as open to OSVs. Our Alternative maintains all current Near Natural Areas non-motorized in winter including the Eagle/Night Near Natural Area.

This Highway 108 corridor is a shared use area; it is an access route to Wilderness lands that provide "backcountry solitude" for advanced non-motorized winter recreationists. To facilitate shared use, our Alternative requires the STF to ask users to respect a voluntary restriction of use to BAT-compliant OSVs and commit to review such restriction every five years to determine whether it should be made mandatory.

Herring Creek and Cow Creek

Classification: Front-country non-motorized and managed shared use Size: 1,542 acres

The junction of Herring Creek Road and Highway 108, and the junction of Forest Road 5N40Y and Highway 108 at Cow Creek, are the only two other trailheads of value for winter recreation along Highway 108. The snow-covered roads that emanate from these trailheads crisscross the lands to the east of Highway 108, and it is possible to reach all points to the east from either trailhead. Twenty-five miles of roads in this area are designated as ungroomed motorized winter routes, while none are designated strictly for non-motorized use. The situation is made even worse because all but two miles are designated for ATV use. These vehicles melt the snow such that they are impassable by non-motorized winter recreationists and difficult for snowmobiles to traverse as well.

Our alternative designates five miles of Herring Creek Road (Forest Road 4N12) from Highway 108 to its intersection with Forest Road 5N17, and lands north and adjacent to the road, non-motorized in winter. This area provides a non-motorized loop for skiers and snowshoers.

Our Alternative reduces the mileage of designated ungroomed motorized routes from 25 miles to 20 miles, but maintains access for snowmobiles to Bull Run, the Punch Bowl, and the loop around Hammill Canyon.

If the Forest Service deems it important to OSV use, an OSV route along 4N53Y can be designated through the Herring Creek closure area.

An annual problem for OSV recreation occurs each spring when plowing of Highway 108 ends access to Highway 108 east of the Sno-Park. To compensate for this, our Alternative limits the Herring Creek closure to periods when Highway 108 east of the Sno-Park is open to OSV use.

F. Suggested Boundaries for Designated OSV Areas

We have included on our map suggested boundaries of the areas that the STF might designate as open to OSV use. Such boundaries encompass all currently groomed OSV routes and the vast majority of all ungroomed OSV routes.

G. General Best Management Practices

Non-motorized trailheads should be established and designated to enhance access to non-motorized areas.

BAT - Transition of users to cleaner and quieter OSVs should be encouraged throughout the STF. The STF should adopt policies that promote the use of cleaner and quieter snowmobiles. Our Alternative includes a voluntary BAT restriction in two areas in order to promote better opportunity for shared use and a Forest Service commitment to reconsider the imposition of mandatory Forest wide BAT standards every five years. Due to the scale of impact of just one dirty machine, as more users transition to cleaner and quieter machines there will be greater justification for imposing a mandatory requirement.

The BAT standards adopted by Yellowstone National Park after extensive debate and consideration are reasonable. These published standards should be the starting place for a BAT standard applicable on the STF. Modifications to the Yellowstone BAT standard as applied to the STF should be considered at the regional level of the Forest Service.

Monitoring adaptive management and enforcement should be established as recommended in our document "BMP Practices."

Minimum snow depths should be 12 inches for grooming roads and 18 inches for cross-country travel, or greater if deemed appropriate by the STF. We suggest that the STF determine a variety of set locations where snow depth is measured in order to determine when the minimum snow depth requirement is met. Once there is enough snow the Forest Service should post online and at trailheads and Forest Service offices that certain areas are open (or closed) for over-snow use.

Minimum snow depths can be enforced in a number of ways. We suggest that the STF follow the example of other National Forests with minimum snow depth requirements. On these forests official snow depth measurements are taken by USFS personnel until the snowpack is at sufficient depth. Measurements are available at District offices and it is the user's responsibility to check and see whether the snow is deep enough to allow OSV use. On forests where the snow pack varies throughout the winter season additional measurements occur as conditions warrant.²¹ We also suggest implementing seasonal "bookends" before and after which OSV activity is not allowed regardless of snow depth.

21 See for example, Tongass NF MVUMs: <http://www.fs.usda.gov/dctail/tongass/maps/pubs/cid=stelprdb5430063>. Emergency closures due to low snow conditions can be communicated via online media channels, as with this example from the Chugach NF: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5441982.pdf

Nordic trail grooming for skier use is encouraged in our Alternative through cooperative arrangements with third parties. Such grooming can be done with light equipment that can have impact similar to riding a trail with a single snowmobile. The facilitation of more Nordic trail grooming can significantly encourage Nordic tourism for the benefit of local communities, as well as serving local residents.

Homeowner access to cabins and lots by OSV use on designated routes shall be preserved in our Alternative, and our Alternative permits additional designated routes where necessary to provide such access.

Additional trail conflicts sometimes arise through shared use of trails by skiers, snowshoers, dogs or, more recently, "fat bikes." Many of these conflicts can be minimized through educating users on shared use principles: having snowshoers and fat bikes stay off ski tracks and ski trails, and having owners clean up after their dogs. These responsible practices should be highlighted in the STF's winter recreation guide. Trail restrictions or separations may be warranted in certain areas and should be addressed through further collaborative efforts involving local community groups.

Our Alternative creates a fair balance of recreational opportunity using restrictions tailored to particular situations. We ask that it be incorporated into the DEIS Preferred Alternative, as well as included as one of the range of alternatives pursuant to the Settlement Agreement.

Sincerely,

SNOWLANDS NETWORK

.....EW

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WINTER WILDLANDS ALLIANCE

Hilary Eisen

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Exhibits and other submissions

Exhibit A

Analyzing OSV Impacts to Other Winter Recreation Users

Exhibit B

Wildlife and Environmental Concerns - Over-Snow-Vehicles in the Stanislaus National Forest

Exhibit C

Snowmobile Best Management Practices for Forest Service Travel Planning

Exhibit D (submitted on DVD)

List of Additional Submitted Documents

Exhibit E (submitted on DVD)

Map titled Proposed Winter Recreation Management on the Stanislaus National Forest

GIS shapefile for map in Exhibit E (submitted on DVD) The shapefile is comprised of 6 sub-files

Exhibit F

Mattley Ridge map

Exhibit G

Cabbage Patch to Black Springs map

Exhibit D:

Exhibit D: List of Additional Submitted Documents

A.U.S. Environmental Protection Agency

1. United States Environmental Protection Agency, "Frequently Asked Questions: Environmental Impacts of Newly Regulated Nonroad Engines" Sept 2002 Document EPA420F-02-033
2. Frequently Asked Questions from Snowmobile Owners Sep 2002
3. Final Regulatory Support Document, Sep 2002
4. Emission Standards for New Nonroad Engines Sept 2002
5. EPA -Exhaust Emission Standards for 2012 and Later Model Year Snowmobiles
6. 2010 EPA Non-road emission estimates

B. National Park Service

1. National Park Service, Air Resources Division, "Air Quality Concerns Related to Snowmobile Usage in National Parks", Feb 2000
2. Modeling Sound due to Over-Snow Vehicles Oct 2006
3. Yellowstone and Grand Teton National Parks FEIS 2007
4. Scientific Assessment of Yellowstone National Park Winter Use Mar 2011
5. Report to Congress on Overflights Sep 1994 ch 3
6. Soundscape Management Policy 4.9, 2006
7. Barber, J.R., Fristrup, K.M. et al, Conserving the wild life therein-Protecting park fauna from anthropogenic noise, Park Science v26n3, Winter 2009-2010
8. Fristrup, Measuring and monitoring soundscapes in the national parks, Park Science v26n3, Winter 2009-2010
9. Newman, From landscapes to soundscapes, Park Science v26n3, Winter 2009-2010
10. Yellowstone National Park, 2004-05 Winter Use Plan, Air Quality Analysis of Snowmobile and Snowcoach Emissions, Air Resource Specialists, July 29, 2004
11. Congressional Research Service, Snowmobiles, Environmental Standards, and Access to National Parks, McCarthy, James E., Oct. 2, 2008
12. Burson, Shan, "Understanding Oversnow Vehicle Noise Impacts" (2008). U.S. National Park Service Publications and Papers. Paper 17
13. Fristrup, Yellowstone National Park, Modeling Noise from Snow Vehicles in Yellowstone National Park: Tools Utilized for the 2011 EIS and 2012 SEIS, Draft Technical Report, Aug 2012.

C. Forest Service

1. Deschutes National Forest 2009 Winter Recreation Sustainability Analysis
2. Chugach National Forest 2007 FEIS Kenai Winter Access
3. USDA, National Best Management Practices for Water Quality Management on National Forest System Lands, FS-990a, April 2012

D. Other Federal Agencies

1. United States General Accounting Office, Report to Congressional Requesters, September 2000, "Federal Lands: Agencies Need to Assess the Impact of Personal Watercraft and Snowmobile Use"

E.General Impacts to Environment

- 1.Musselman, Robert C. and Korfmacher, John L., "Air Quality at a Snowmobile Staging Area, and snow chemistry on and off trail in a Rocky Mountain subalpine forest, Snowy Range, Wyoming , Environ Monit Assess (2007) 133:321-334
- 2.Effects of Snowmobile Use on Snowpack Chemistry, G. P. Ingersoll, 1999
- 3.Effects of Snowmobile Emissions on the Chemistry of Snowmelt Runoff, J. L. Arnold and T. M. Koe!, 2006
- 4.Deleted
- 5.The Impact of Snowmobiles on the Bridger-Teton National Forest, F. G. McCarthy, Dec 2008
- 6.Lela and White, Laboratory testing of Snowmobile Emissions, July 2002
- 7.Deleted
- 8.Deleted
- 9.Outdoor Recreation in Vermont, Wilderness Society, Jun 2009
- 10.Over Snow Vehicle Program DEIS, California Department of Parks and Recreation, Oct 2010 11.
- Snowmobiling in the Adirondack Park, E. Baker and E. Bithmann, Apr 2005
- 12.Winter Recreation on National Forest Lands, Winter Wildlands Alliance, June 2015
- 13.Radle, Autumn Lyn, "The Effect of Noise on Wildlife:A Literature Review" http://uwf.edu/proscenia.net/library/articles/radle_effect_noise_wildlife.pdf
- 14.Adams, John C., and McCool, Stephen F., Finite Recreation Opportunities: The Forest Service, the Bureau of Land Management, and Off-Road Vehicle Management, Natural Resource Journal, Vol. 49, Winter 2009
- 15.Ferrell, Ga il, Winter Recreation Management of Western United States Public Lands: Ethics, Evolution, and Choices, May 2013 dissertation submitted to the University of Nevada, Reno.

F.Impacts to Aquatic Resources

- 1.J . Ruzyski and J. Lutch, "Impacts of Two-Stroke Engines on Aquatic Resources" 1999 [available at <http://beringiasouth.org/impacts-of-two-stroke-engines-on-aquatic-resources>]
- 2.E. Gage and D.J. Cooper, "Winter Recreation Impacts to Wetlands: A Technical Review", Mar 2009 (Submitted to Arapaho-Roosevelt National Forests)
3. McDaniel, Mark, Semivolatile Organic Compounds in Snowmobile Emissions and in the Snowpack and Surface Water in Blackwood Canyon, Lake Tahoe, CA, May 2013 dissertation submitted to the University of Nevada, Reno

G.Economic Contribution of Human-Powered Sports

- 1.Economic Analysis of Winter Use Regulations in the Greater Yellowstone Area, RTI International Sep 2007
2. Expanded Social Economic Analysis, TMAP DEIS, Gallatin National Forest, Jun 2005

H.Sport Participation Data

- 1.Outdoor Recreation Participation Report 2011, Outdoor Foundation
- 2.2012 Participation Report, Physical Activity Counsel
- 3.SIA Snowsports Participation Study 2011, Snowsports Industries Association
- 4.SIA Sneak Peek, Snowsports Industries Association 2010

I.Impacts to Human Health

- 1.The Effect of Vehicular Emissions on Human Health,R. E. Rossman,Yale-New Haven Teachers Institute Aug 2009

J.Impacts to other Winter Recreation Users

- 1.Letter from Winter Wildlands Alliance to U.S. Dep't of Agric. and U.S. Forest Serv.,Petition to Amend the 2005 Travel Management Rule By Removingthe Over-Snow Vehicle Exemption and Remediying the Discretionary Management of Over-Snow Vehicles on National Forest System Lands, Appendix D (Aug. 27, 2010)
- 2.Laitos, Recreation Wars 2004

Exhibit A

Exhibit A

Analyzing Snowmobile Impacts to Other Winter Recreation Users in the Sierra Nevada and Southern Cascades

Analyzing Snowmobile Impacts to Other Winter Recreation Users in the Sierra Nevada and Southern Cascades

December 2014

Snowmobiles and other OSVs substantially impact the recreation experience of non-motorized users. These impacts are discussed below. Not discussed in these comments, but also important, are OSV impacts on wildlife, regional air quality, water quality, climate change, and ecosystems. Also important but not discussed in these comments, is creating more trailheads where nonmotorized users can access existing nonmotorized terrain and ensuring continued access to public lands.

OSV impacts on other recreational users include noise, toxic exhaust, consumption of powder snow and rutting of trails and routes. Because nonmotorized users wish to avoid such impacts, nonmotorized 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. By analyzing and understanding each of the impacts, the Forest Service can enhance opportunities for nonmotorized winter recreation while maintaining a fair balance of motorized recreation opportunity ...thereby augmenting the winter tourism dollars brought into local communities.

Two general factors cause the impact of motorized recreation on nonmotorized users to be substantially greater in winter than in summer. First, in summer, nonmotorized users desiring to escape the noise and emissions of vehicles can readily access many large areas of federally-designated Wilderness. In contrast, many roads and trailheads that access Wilderness are inaccessible in winter. Second, wheeled motor vehicle use is generally restricted to designated routes and trails, while OSVs are generally allowed to travel cross-country and into all areas where one might otherwise seek to distance oneself from motorized impacts.

Below, we first discuss the three most significant impacts. Then, we discuss a framework for analyzing motorized and nonmotorized activity that will facilitate a better understanding of impacts and needs and how to manage

winter travel so as to maximize recreation opportunity. lastly, we discuss two particular areas in which current Forest Service management has failed the backcountry nonmotorized user.

1.Impacts

NoiseFor many non motorized users, the ability to enjoy natural soundscapes is a highly important aspect of their recreation experience. For some, the appreciation of natural soundscapes is at

least as important as the appreciation of visual landscapes. Although many motorized users also enjoy natural soundscapes, OSV use itself is incompatible with such experience. Indeed, some motorized users seem to be completely unconcerned about their noise impacts on other users.

The intrusion of snowmobile noise is significant and unique. Snowmobiles are extremely loud and on a still winter day (when most users like to recreate), such noise can travel across open landscape (where most use occurs) ten or more miles, completely filling mountain valleys. (By comparison, most automobile noise travels a fraction of such distance.) On most of the accessible national forest lands that are snow-covered, there are natural soundscapes in winter, but for the noise of snowmobiles.

Noise is one of the principal reasons that heavy snowmobile activity can completely displace skiers and snowshoers from an area.

Quantification of snowmobile noise levels - as has been done by the National Park Service in Yellowstone -can help analyze and manage noise impacts, but we believe that the primary impact of noise is qualitative. It is the interruption of the natural soundscape, rather than the magnitude of the noise, that creates the disturbance. The fact that the noise is present, rather than just its intensity, is a problem to some users.

Just as sound bounces off ridgelines and noise can fill a valley, ridgelines can confine snowmobile noise, protecting natural soundscapes on the other side. Deep forest also can significantly buffer snowmobile noise. In some areas, such as within sight of highways with significant truck traffic, natural soundscapes are elusive in any event. Each of these factors should be looked at and taken into account in the winter travel management process.

Snowmobiles employing "best available technology" (BAT) emit substantially lower levels of noise, and thus the imposition of BAT restrictions can facilitate shared joint use in some areas.

Emissions and Ambient AirSnowmobiles are the most polluting recreational vehicle in common use. Snowmobile emissions contain heavy concentrations of toxic compounds, including carbon monoxide. Studies in Yellowstone National Park found snowmobile emissions can cause unhealthy levels of ambient air pollution in congested areas.

Even small amounts of carbon monoxide substantially adversely impact other users. Levels of air pollution that might be acceptable in urban environments, or at snowmobile competitions, are not appropriate for trails in which users seek fresh air. Snowmobile emissions are another reason nonmotorized users can be completely displaced from areas with heavy snowmobile activity.

Some OSV organizations use misleading comparisons to confuse this issue. Comparing OSV emissions to other vehicle emissions is difficult because the EPA regulates OSV emissions based on vehicle power rather than miles travelled.¹ (Thus, theoretically, a single OSV with unlimited power is legally able to produce unlimited emissions.) Studies conducted by Yellowstone National Park in 2004² found that

older-technology 2-stroke snowmobiles, travelling at 15-20 mph produce, per mile, 221 grams of carbon

1 EPA emissions standards effective 2012 allow new snowmobiles to produce 200 grams of carbon monoxide per kilowatt hour and 75 grams of hydrocarbons per kilowatt hour. EPA, Emissions Standards for New Nonroad Engines, EPA420-F-02-037, September 2002.

2 Yellowstone National Park, 2004-05 Winter Use Plan, Air Quality Analysis of Snowmobile and Snowcoach Emissions, accessible at the above website.

monoxide, 180 grams of hydrocarbons and 4 grams of PM -2.5. In comparison, cars employing 2002 year automobile technology emit 14.2 grams of carbon monoxide per mile and 1.2 grams of voe (comparable to hydrocarbons)'. Snowmobiles are very dirty vehicles; breathing their exhaust is unhealthy.

In the travel management process, the Forest Service should measure ambient air impacts from snowmobiles at heavily used trailheads and trails. The Forest Service also should consider the feasibility of creating separate trailheads for motorized and nonmotorized users.

BAT-compliant OSVs emit substantially lower levels of toxic emissions and thus the imposition of BAT restrictions can facilitate shared joint use in some areas.

Tracking of the Landscape and Consumption of Powder Snow Snowmobiles track up the landscape at a rate twenty or more times faster than skiers, snowboarders or snowshoers. Many skiers complain about the severe rutting that snowmobiles can impart, especially when descending or turning at speed. With increased demand for backcountry alpine skiing and snowboarding, powder snow has become a precious resource that merits Forest Service management.

As is apparent at any ski resort on "powder days", the experience of descending steep slopes blanketed with smooth powder is highly sought by many skiers and snowboarders. In the backcountry, the experience of skiing or riding powder snow often is the primary reward for the strenuous effort of climbing up without a chairlift. Accessible backcountry powder snow on steeper slopes is a limited resource, and a significant impact of OSVs is their disproportionate consumption of this resource. Due to its power, size and speed, one snowmobile can in a matter of hours completely consume (shred, in colloquial terms) all the powder snow on a slope that could otherwise provide recreational opportunity for twenty or more skiers and snowboarders. Acknowledging and addressing this disparate impact is critical to managing the forest lands in a sustainable manner for the future.

In the Sierra Nevada and southern Cascades, demand for nonmotorized winter backcountry recreation well exceeds demand for motorized backcountry recreation. This is reflected in many studies, including NVUM 4 surveys.

2.A Framework for Effective Management

In analyzing and addressing OSV impacts, it is helpful to distinguish between three types of activity. These same three types of activity are engaged in by both nonmotorized and motorized users. Indeed, one should not lose sight of the fact that both OSV riders and skiers/snowboarders/snowshoers share many of the same interests. For convenience, in the remainder of this discussion references to "skiers" are intended to include snowboarders and, in many cases, snowshoers as well.

In both skiing and snowmobiling, there is a Trail Touring activity, there is a Backcountry Exploring

activity, and there is an Alpine Adventure activity. There is also a distinct group of users who use OSVs

3Federal Highway Administration, Transportation Air Quality Facts and Figures January 2006, accessible at https://www.fhwa.dot.gov/environment/air_quality/publications/fact_book/page1_5.cfm

4 The Forest Service National Visitor Use Monitoring program tracks visitation and use levels in each national forest on a five year rotating schedule.

demographics, e.g. the demand for each type of activity, and issues of sustainability. It is fact that far more skiers and snowshoers than snowmobiles can be accommodated on one slope. In areas of high demand, the public as a whole is better served by restricting types of use so as to allow the greatest number of individuals to enjoy their sport. Such management will have obvious benefits to communities dependent on a tourist economy. There are limited areas in the Sierra and the southern Cascades where user demand, easy accessibility and natural terrain features warrant this restrictive management, but in those areas the Forest Service needs to recognize that the importance of maximizing recreation opportunity for the greatest number of users.

3. Two Shortcomings in Past Forest Service Management

The ROS System Forest Service land management has relied on a system of mapping recreational opportunity called the Recreation Opportunity System. Through this system, current land conditions are mapped so as to understand what areas have a high degree of developed presence and what areas are primitive without development. Thus, the ROS system maps what areas can be managed to provide users a primitive, backcountry experience. This mapping system has considered lands in summer, where access is far easier than winter. Thus, the ROS system has not reflected winter conditions. Areas that are crisscrossed by roads in summer may be relatively inaccessible in winter and thus in winter present a very primitive environment. Some of these lands should be protected for primitive backcountry experiences in winter, because the lands that provide a primitive backcountry experience in summer are largely inaccessible.

Whereas the ROS system has succeeded in preserving opportunities for primitive recreation in summer, it has had the opposite effect in winter. Rather than protecting areas where a primitive experience can be obtained in winter, the ROS system has resulted in mapping these areas as developed or semi developed and thus opened the door for widespread OSV recreation. This has become a self-fulfilling mapping effort that has failed the nonmotorized winter user. This shortcoming needs to be acknowledged and addressed in the winter travel management process. The Forest Service should acknowledge that some lands mapped as developed or semi-developed under the ROS system are highly-suitable for primitive backcountry recreation in winter but for the presence of OSVs, and should manage some of these lands for that purpose.

Unplowed Forest Roads and Impact of the State OSV Grooming Program In large part due to the availability of funds under the State of California's OSV grooming program, many (if not most) of the accessible and scenic unplowed forest roads in California, that are closed to wheeled vehicles in winter, have become dominated by OSV recreation. This has largely displaced skiers and snowshoers from these areas and created an imbalance in recreation opportunity.

The OSV community often claims that skiers and snowshoers like to recreate on their groomed trails. Though there are some skiers and snowshoers who do like to do this, the more important fact is that skiers and

snowshoers like to recreate on the unplowed roads. Regardless of whether these roads are groomed, they provide some of the best alternatives for skiers and snowshoers desiring long distance touring on well-marked routes (in our activity analysis above, either a trail touring or backcountry exploring activity, depending on one's primary focus.) They are wide, easy to follow, with consistent and moderate gradients. They are often very scenic. And, due to the State's OSV program, they are heavily used by snowmobiles. In many cases, where snowmobile use is heavy, skiers have been largely displaced

from such roads. In other areas, growth of ski tourism has been discouraged because of the OSV presence. This is not a fair balance, and it is not economically-sound policy for gateway communities.

This imbalance may be illustrated at the Gold Lakes trailhead in Plumas National Forest. Here a separate ski trail is provided for skiers and snowshoers who do not want to breathe snowmobile exhaust or compete with snowmobile traffic and want to try and distance themselves a bit from snowmobile noise. The ski trail is in the forested valley bottom below the road, while the road travels up the ridge with scenic vistas. The road is wide and open with even snowfall accumulation. The ski trail is in heavy forest where there are no views and uneven snow accumulation that creates constant bumps and bottoms. It is beyond dispute that the recreational experience provided by the ski trail is far inferior - not even comparable - to the recreation experience that otherwise would be available on the unplowed road, regardless of whether or not it is groomed. Perhaps this situation is justifiable at this one trailhead, but it is not justifiable for this situation to exist across the Sierra Nevada and southern Cascades. In the winter travel management process, more of the unplowed scenic forest roads that are closed to wheeled vehicle traffic should be protected for non motorized use, even if this results in a discontinuance of grooming on such roads.

Where OSV use is infrequent, shared use can be fostered by designation of trailheads and trails as limited to BAT-compliant OSVs. It needs to be emphasized that such restriction is not intended to give skiers grooming paid for with funds earmarked for snowmobile grooming. The restriction is warranted because it protects a fair balance of recreational opportunity on some of the best routes for touring, regardless of whether the routes are groomed. The OSV community may choose to discontinue grooming in areas with such restriction if it so desires.

Snowlands urges the Forest Service in California to set aside more areas specifically designated for nonmotorized winter use. We seek a fair balance of motorized and nonmotorized winter recreation opportunity, taking into account all relevant factors, including levels of user demand, user trends, relative impacts, and economic benefit to local communities.

Exhibit B

Exhibit B

Wildlife and Environmental Concerns

Wildlife and Environmental Concerns: Over-Snow-Vehicles in the Stanislaus National Forest

These comments provide additional support and details for our Alternative relating to our concerns with snowmobile impacts on wildlife and the environment. In addition, please refer to the included "Best Management Practices" (BMPs) for more detail on management practices that will help to limit these impacts and additional background supporting our recommendations.

In general, our Alternative addresses impacts to the environment and wildlife through the BMPs and through the closure of areas to OSVs, restrictions of OSVs to designated routes and by placing Best Available Technology

(BAT) restrictions on OSVs for some shared-use areas. The creation of large closure and restricted areas partly addresses wildlife concerns. Restrictions set forth in the BMPs also address concerns with regard to wildlife and the environment. Additional restrictions may need to be imposed in specific areas in response to species monitoring.

The Stanislaus National Forest Plan already prohibits OSVs in some areas, such as Recommended Wilderness, Near Natural Areas, Research Natural Areas, and some Special Interest Areas to protect habitat or outstanding natural values. We support continuing and enforcing these closures. We also support the Stanislaus's proposal to prohibit OSVs in all Special Interest Areas, Experimental Forests, developed areas, and in areas below 5,000 feet. We strongly oppose the Forest's proposal to allow OSVs within the Pacific Valley and portions of the Eagle/Night Near Natural Areas. Opening these areas to OSVs contradicts the stated management goals set forth for Near Natural Areas in the Forest Plan and jeopardizes future conservation efforts for Wilderness-quality lands within these areas. We hope that the Stanislaus will use the Winter Travel Plan as an opportunity to enforce, not weaken, the Forest Plan.

We recommend closing all crucial winter range, fawning habitat, and sensitive species nesting or breeding habitat that occurs above 5,000 feet in order to protect wildlife and other sensitive natural resources. The Stanislaus's Forest Plan Direction (April 2010) states that deer winter concentration areas and winter range areas may be closed to motor vehicles from November 15 - April 15 and states that motor vehicles may be restricted in a 100 acre buffer around marten den sites or 700 acre buffer around fisher den sites. The travel plan is an opportunity to solidify these protections by prohibiting OSVs in these areas. Likewise, OSVs should be prohibited in important avian areas during limited operating periods.

Wildlife Concerns

Over Snow Vehicles can cause mortality, habitat loss, and harassment of wildlife (Boyle and Samson 1985, Oliff et al. 1999). While most animals are well adapted to survival in winter conditions, the season creates added stress to wildlife due to harsher climate and limited foraging opportunities (Reinhart 1999). Deep snow can increase the metabolic cost of winter movements in ungulates up to five times normal levels (Parker et al. 1984) at a time when they are particularly stressed by forage scarcity and high metabolic demands. Disturbance and stress to wildlife from snowmobile activities during this highly vulnerable time is dire. Studies of

observable wildlife responses to snowmobiles have documented elevated heart rates, elevated glucocorticoid stress levels, increased flight distance, habitat fragmentation as well as community and population disturbance (Baker, E. and Bithmann 2005).

In addition to the direct physiological stress of snowmobiles, evidence suggests that popular winter trails can fragment habitat and wildlife populations. Winter trails through surrounding wilderness areas or other core areas create more "edge effect" (the negative influence of the periphery of a habitat on the interior conditions of a habitat) and thereby marginalize the vitality of some species (Baker and Bithmann 2005).

In many instances, snowmobiles induce animal flight, causing increased energy expenditures. In Yellowstone National Park, where snowmobile-wildlife interactions have been most extensively studied, evasive maneuvers in response to snowmobiles have been documented in a number of species. These maneuvers result in increased energy expenditures for the affected wildlife. For example, Aune (1981) reported flight distances of 33.8 meters for elk and 28.6 meters for mule deer in response to snowmobiles in Yellowstone. The energy cost estimates calculated for these impacts were 4.9 to 36.0 kcal in elk and 2.0 to 14.7 kcal in mule deer per disturbance (Parker et al., 1984). These energy expenditures are roughly equivalent to the necessary additional consumption of 4.3 - 31.7 grams of dry forage matter by elk and 1.8 - 12.9 grams by mule deer each time a disturbance occurs. Severinghaus and Tullar (1978) theorize that for white-tailed deer, during a 20-week winter with snowmobile harassment each weekend, "food enough for 40 days of normal living would be wasted just escaping from snowmobiles."

Sierra Nevada Red Fox

The Sierra Nevada red fox (SNRF) is listed as a Management Indicator Species on the Stanislaus NF. This extremely rare forest carnivore is classified as a Threatened Species in California and a Region 5 Sensitive Species. The species is found at or around 6,500 feet in elevation and prefers areas with forest cover (Pennington et al. 2010). They avoid open areas and dense forests. Recent sightings have been concentrated in high elevation areas near Lassen Peak and Sonora Pass but the extent of their current distribution is unknown (Perrine et al. 2010). Most recently, an individual was caught on camera in Yosemite National Park, the first proven detection in almost a century (Chappell 2015). While very little is known about this species, the travel planning process presents an opportunity to minimize impacts from winter recreation on Sierra Nevada red fox. Our most pressing concern with SNRF in regards to OSV use is in how OSVs may tip the competitive balance between coyotes and SNRF. Snow compacted by OSVs can become travel corridors that facilitate coyote incursion into red fox habitat. There are several studies in other areas that show coyotes heavily utilize snowmobile tracks (Koehler and Aubry 1994, Buskirk et al. 2000, Bunnell, et al., 2006), allowing them to move into areas that are normally the domain of species better adapted to deep snows, such as lynx. Although it is likely that red foxes also exploit snowmobile tracks opportunistically, we are concerned that snowmobiles tip the competitive equation more in favor of coyotes. Coyotes and foxes utilize the same food resources and coyotes are known to prey on fox as well. Without snowmobiles packing down

trails, the lighter red foxes may have just enough of an edge to coexist with the otherwise dominant competitor in lean winter times.

Given that the Stanislaus NF is one of very few places in the world where SNRF are known to exist, any analysis accompanying this travel plan should include an examination of how OSV trail and area designations will minimize impacts to SNRF populations. We suggest that the Stanislaus NF implement trail closures or re-route trails that may facilitate coyote movement into suitable Sierra Nevada red fox habitat.

California Wolverine

While wolverines are extremely rare in California, evidence of the presence of at least one animal on the Tahoe NF indicates connectivity between the western Rocky Mountains and the Sierra Nevada (Morriarty et al. 2009), and the California Wolverine is a Region 5 Sensitive Species. Although it is likely that there is currently only one wolverine in California, the possibility remains that more could follow. Given the possibility of wolverines in this landscape, and the long-term impact of any travel plan, it is important to consider how OSVs may impact this species. There is scientific uncertainty about the exact effects of snowmobiles on wolverines. However, compelling anecdotal evidence suggests snowmobile use displaces wolverines and may reduce reproductive success, especially when it occurs within potential wolverine denning habitat. Wolverine parturition primarily occurs mid-winter during the month of February (WCS, 2007). Six of the seven natal dens located in the Greater Yellowstone Ecosystem by the Wildlife Conservation Society (2007) were in areas without motorized use, i.e., designated wilderness, areas inaccessible by vehicle, or National Park. Other wolverine biologists have suggested refuge from all human activity is important for wolverine reproduction (Banci, 1994; Magoun and Copeland, 1996). Female wolverines appear to be quite sensitive to human disturbance in the vicinity of natal and maternal dens, and may abandon dens and move their kits a considerable distance if they detect human presence in the area (Copeland 1996, Magoun and Copeland 1998). Although the lone detected wolverine in California is a male, not a reproductive female, in general it appears that wolverines are sensitive to human disturbance and are less likely to occur in areas with anthropogenic activity (Fisher et al. 2013). By increasing the number of acres on the Stanislaus NF that are non-motorized in winter, especially in large blocks of high-elevation terrain, the Forest may increase wolverine habitat security. Given the historic use of the high elevation crest zone area by wolverine, any land management planning action

such as the current Over-Snow Vehicle Use Designation plan must consider long-term implications for enhancing or diminishing the potential for recovering a sustainable, healthy population of native species -including the wolverine.

American Marten

American marten is listed as a Management Indicator Species on the Stanislaus NF and a Species of Special Concern in the state of California but marten occupancy is on the decline (Moriarty 2011). Although recreational activities are not the primary threat to martens, increased human activity can increase stress to individuals and habitat with limited human use is important for marten survival. As martens are active throughout the winter and thus often present in areas

where snowmobiling occurs, it is important for the Forest Service to take steps to mitigate OSV

impacts on this species. Martens travel on top of the snow but also utilize the subnivean zone, especially during very cold weather. Limiting the size of play areas, or restricting OSVs to designated routes, are two tools that can be used to protect subnivean habitat. We also recommend following the lead of other National Forests, such as the Plumas, and implementing trail closures or re-routing portions of trails within 1/2 mile of marten den sites. In addition, we recommend restricting OSV activity within suitable marten habitat, especially in areas where the Forest has evidence of marten detections from baited photo-detection cameras or track plates.

The Pacific Valley near natural area and the Eagle/Night roadless area both have proven detections documented by Forest biologists and by CSERC doing cooperative surveys in partnership with the Forest. Those areas should remain non-motorized in order to avoid disturbance and stress for martens.

Pacific Fisher

The Pacific fisher is a candidate for listing under the Endangered Species Act and is listed as a Region 5 Sensitive Species. It is also a Management Indicator Species on the Stanislaus NF although the animal is not currently proven to still be present within the Stanislaus NF. Human activity directly threatens fishers through poaching and trapping and indirectly by causing behavioral or habitat use modifications (Naney et al. 2012). Therefore it would be important to assess the impacts of, and possibly curtail, potentially disturbing motorized recreational activities within areas where fisher habitat is formally designated for special consideration by the current existing Stanislaus Forest Land and Resource Management Plan. Absent documented evidence that the fisher is no longer present within the Forest, the agency should assume residual pockets of remaining animals and should manage suitable habitat to support the recovery of the population.

Birds

Many threatened or sensitive bird species, such as the bald eagle and northern goshawk great gray owl, California Spotted owl, peregrine falcon, and golden eagle, occupy areas that also provide high-quality recreation opportunities. We will delve into noise impacts from OSVs later in these comments, but would like to stress here that it is important to consider how excessive noise related to motorized recreation may impact breeding birds. Many birds rely on auditory communication which can be disrupted by anthropogenic sources of noise. We recommend locating snowmobile staging areas and groomed trails away from known sensitive species nesting areas or winter roosting areas. Existing monitoring and closure actions to protect activity centers and winter roosting areas should be continued.

Subnivean Mammals

Compacted snow fundamentally alters habitat quality in the subnivean zone (Keddy et al. 1979, Sanecki et al. 2006). Small mammals, including marten and Sierra Nevada snowshoe hare, which remain active during the winter depend on the insulated space between the snowpack and ground for winter survival.

Winter temperatures, even with snow cover, are stressful to small mammals (Schwartz et. al., 1964, Fuller 1969, Fuller et al. 1969, Brown 1970) and many small mammal species depend on the insulated space between the

frozen ground and the snow for survival. When snow compaction from snowmobiles occurs, the subnivean (below snow) space temperatures decrease, which can lead to increased metabolic rates in these small mammal species. If the subnivean air space is cooled by as little as 3 degrees Celsius, the metabolic demands of small mammals living in the space would increase by about 25 calories per hour (Neumann and Merriam, 1972).

Jarvinen and Schmid (1971) determined through controlled experiments that compaction due to snowmobile use reduced rodent and shrew use of subnivean habitats to near zero, and attributed this decline to direct mortality, not outmigration. In a study in Minnesota, Rongstad (1980) found that intensive snowmobiling on an old field eliminated the small mammal population in the layer between the ground and snow. Likewise, Sanecki et al. (2006) documented a decline in small mammals following destruction of the subnivean zone following snowmobile activity.

Population declines of small mammals undoubtedly impacts the species that prey upon them, creating ecosystem level disturbance. Sierra Nevada red fox and American marten almost certainly prey upon subnivean mammals and thus are impacted by any changes to these small mammal populations. We suggest limiting the size of OSV play areas in order to protect subnivean habitat and the species that depend (directly or indirectly) upon it.

Amphibians

Several amphibian species are federally listed as endangered (Sierra Nevada yellow-legged frog) or threatened (Yosemite toad, California red-legged frog) and the Stanislaus NF must avoid negatively impacting these species when designating routes and areas that are open to winter motorized use. Although direct mortality to fish and amphibians from OSVs is unlikely, the indirect effects of OSV exhaust and associated pollutants pose a concern. Pollutants from snowmobile emissions are deposited upon and accumulate within the snowpack throughout the winter (Ingersoll, 1998). During spring snowmelt these accumulated pollutants are released, causing elevated acidity levels in surrounding waterways and resulting in higher death rates for aquatic insects and amphibians (Charette et. al., 1990). Researchers have found that 80 percent of acid concentrates are released in the first 20 percent of snowmelt, and that this acid pulse is a major cause of death for aquatic insects and amphibians (Hagen and Langeland, 1973). This

acid pulse may also reduce the acid neutralizing capacity of aquatic systems, particularly those found at high elevations which typically are less capable of neutralizing acid deposition. The impact of the spring release of pollutants may have far-reaching consequences for surrounding watersheds. Acidity fluctuations can disable a watershed's ability to regulate its own pH level, which could trigger system-wide problems and result in a long-term alteration of an entire ecosystem (Shaver et. al., 1998).

The pollution pulse and its subsequent effect on aquatic systems is of particular concern for sensitive aquatic species. These species are sensitive to pollutants that have been trapped in the

snowpack and melt into surface water. In addition, frogs that emerge in the spring and travel over ice and snow may be directly threatened by OSVs.

The "pre Proposed Action" released this spring included a proposal to end the snowmobile season on April 14 for several areas on the Stanislaus NF. This closure date would ensure that snowmobiles would not directly impact sensitive amphibian habitat and would avoid or limit any direct interactions between these species and snowmobiles. We believe the snowmobile season should end, Forest-wide, on April 14 to protect wildlife habitat, limit damage to vegetation and soils, and reduce the chances that OSVs will travel across insufficient snowpack.

Stanislaus Meadow is one of the few places in the entire Stanislaus National Forest where Sierra Nevada yellow-legged frogs are proven to breed. This unique, and rare, habitat area must be protected to the highest extent

possible in order to best protect this vanishing species.

Snowmobiles should not be allowed in Stanislaus Meadow simply relying upon a deeper snow depth to somehow ensure protection for the SNYLF. In particular, the Forest Service is fully aware that expectations that snowmobile riders will self-restrict riding to only areas with the required snow depth is an expectation that will not be realistic for some riders. Accordingly, eliminating any legal snowmobile use in Stanislaus Meadow and surrounding areas is essential for protection of the species.

Pollution concerns Impacts to air quality

Two-stroke engines, which represent the vast majority of OSV use on NFS land, are particularly dirty and polluting machines. A two-stroke snowmobile can emit as many hydrocarbons and nitrogen oxides as 100 cars and create up to 1,000 times more carbon monoxide (EPA, 2002).

Since that study was performed, cars have become substantially cleaner but most snowmobiles continue to use older technology. In addition snowmobiles, emit significant amounts of carbon dioxide (USDI 2000), which is classified as an air pollutant under section 302(g) of the Clean Air Act and is well-documented to contribute to climate change.

Two-stroke engines emit many carcinogens and pose a danger to human health (Eriksson et al. 2003, Reimann et al. 2009). Two-stroke engines emit dangerous levels of airborne toxins including nitrogen oxides, carbon monoxide, ozone, aldehydes, butadiene, benzenes, and extremely persistent polycyclic aromatic hydrocarbons (PAH). Several of these compounds are listed as "known" or "probable" human carcinogens by the EPA. Benzene, for instance, is a "known" human carcinogen, and several aldehydes including butadiene are classified as "probable human carcinogens." All are believed to cause deleterious health effects in humans and animals well short of fatal doses (EPA 1993). Carbon monoxide -even at levels meeting OSHA standards -is particularly harmful to humans engaging in active sports (such as skiing) because it interferes with the ability of human blood to transport oxygen. Winter recreationists are especially at risk because the concentration of these emissions increases with elevation and cold (Janssen and Schettler, 2003). Yellowstone National Park conducted many studies examining how, and at what levels, OSVs impact human health. Studies in the park have shown that park personnel were exposed to dangerously high levels of pollutants when 2-stroke

machines were allowed in the park. By requiring 4-stroke machines that utilize Best Available Technology this exposure has been dramatically reduced (Spear and Stephenson, 2005).

In a study on the Medicine-Bow National Forest Musselman and Korfinacher (2007) documented a decline in air quality with increased snowmobile activity. They measured higher ambient concentrations of CO₂, NO_x, NO, and NO₂ at a snowmobile staging site and found significantly higher concentrations of these air pollutants on days with significantly more snowmobile activity. The researchers concluded that snowmobile exhaust was degrading air quality.

Due to concerns with air pollution, particularly at OSV staging areas or where OSV use is concentrated, we recommend separating motorized and non-motorized winter recreationists to the extent possible. Separate parking areas for motorized and non-motorized users will help skiers and snowshoers limit their exposure to snowmobile exhaust. Separating parking areas will also help to relieve congestion as snowmobile trailers take up considerably more space than passenger cars and trucks, often leaving little or no room for non-motorized users to park at trailheads. Designating trails for non-motorized use gives skiers and snowshoers the option to avoid snowmobile exhaust and other issues that cause conflict between non-motorized and motorized winter trail users. In addition, the forest is required to protect the Class I airsheds within the designated Wilderness on the forest.

The creation of closed areas in our Alternative addresses the desire of nonmotorized recreationists to breathe clean air and to protect Class I airsheds in and near the forest.

Water quality impacts

Earlier in these comments we discussed concerns about snowpack pollution in regards to amphibians. Here we would like to emphasize our overall concerns with water quality.

Not only do snowmobiles increase air pollution -quite significantly in areas where many machines are concentrated -this pollution settles into the snowpack and affects snow chemistry. Musselman and Kormacher (2007) found that many changes to snow chemistry on snowmobile trails when compared to untracked powder. These changes included elevated numbers of cations and some anions and a significant drop in pH. Other studies have shown that snowpack concentrations of ammonium and sulfate positively correlate with snowmobile activity (Ingersoll 1998). Concentrations of toluene and xylene in the snow are also positively correlated with snowmobile traffic (Ingersoll 1998). Likewise, snowpack concentrations of benzene are higher in areas with heavy snowmobile use (Ingersoll 1998). When the snow melts, these pollutants, which are stored in the snowpack throughout the winter, are released in a concentrated pulse and can seep into groundwater or enter surface water.

Many forests restrict or prohibit snowmobile activity within municipal watersheds, and we recommend that this forest consider taking similar steps. For instance, recreational snowmobiling is not allowed within the municipal watersheds for the cities of Bend, OR or Salt Lake City, UT. Likewise, snowmobile traffic should be directed away from surface water. Just as "leave no trace" guidelines and Forest Service regulations help safeguard water quality by prohibiting camping within 300 feet of lakes and 150 feet of rivers and streams, snowmobile

trails should be located away from surface water. The BMP document that we have developed recommends locating snowmobile trails at least 300 feet away from lakes and 150 feet away from rivers and streams and prohibiting cross-country travel over frozen lakes

In addition to concerns with exhaust deposition onto the snowpack, we would also like to highlight an often overlooked water quality issue related to OSVs. Both early and late in the season snowmobiles often travel over bare ground or areas with little snow to access trails and play areas, leading to the same erosion and soil compaction issues that are commonly associated with wheeled motor vehicles. Adequate snowpack can help prevent these issues. There should be at least 12 inches of snow before allowing snowmobile trails to be groomed. Off-trail use should not be allowed until there is at least 18 inches of snow on the ground.

Noise Pollution

Silence is a valuable and fragile resource that can easily be shattered by snowmobiles (Vitters0 et al. 2004). Natural soundscapes are intrinsic elements of the environment and are necessary for natural ecological functioning (Burson, 2008). Noise from snowmobiles severely affects the winter soundscape and impacts both wildlife and other visitors. A noise study from Yellowstone National Park involving four-stroke machines, which are much quieter than two-stroke snowmobiles, found that under a "best case scenario" (upwind, no temperature inversion, soft snow) snowmobiles were audible at distances of up to a half mile (NPCA, 2000). When there was a temperature inversion or firm snow, or for those downwind of a snowmobile, the machines could be heard more than two miles away (NPCA, 2000) and even four-stroke snowmobiles can be audible from as many as 8 miles away (Burson, 2008).

Indirectly, the noise generated by OSVs can adversely impact animals impairing feeding, breeding, courting, social behaviors, territory establishment and maintenance, increasing stress, and/or by making animals or their young more susceptible to predation (Luckenbach 1975, Wilshire et. al., 1977, Bury 1980).

Many people visit the forest in the winter with the expectation that they will experience silence or natural soundscapes, and it is important that this opportunity be afforded to those who cannot travel deep into the Wilderness. In order ensure that there are places on the landscape where both people and wildlife can escape

the sound of snowmobiles it is important for the Forest Service to consider how sound travels when designating motorized and non-motorized areas.

Many of the terrain features that lend themselves to natural boundaries, such as ridgelines and rivers, can also help to buffer noise. By using these types of terrain features to demarcate motorized and non-motorized areas the Forest Service will be able to better enforce travel regulations and non-motorized areas will be quieter.

In defining the boundaries of the closure areas included in our Alternative, we have considered noise impacts. It is important that areas be protected where users can be assured of experiencing natural soundscapes.

Soil and Vegetation Damage

Pollution from OSV exhaust contains a number of elements that can damage vegetation. While the amount of pollutants emitted by two-stroke engines are greater than those emitted by four stroke engines, the elements in the emissions, except for the unburned fuel emitted by two-stroke engines, are similar and include: 1) carbon dioxide which may act as a fertilizer and cause changes in plant species composition (Bazzaz & Garbutt 1988); 2) sulfur dioxide which is taken up by vegetation and can cause changes in photosynthesis (Iqbal 1988); 3) oxides of nitrogen which may be harmful to vegetation or may act as a fertilizer, causing changes in plant species composition (Falkengren-Grerup 1986); 4) organic gases such as ethylene, to which plants may be extremely sensitive (Gunderson and Taylor 1988); and 5) heavy metals which may cause phytotoxic damage. OSVs can cause significant damage to land cover indirectly through snow compaction. Impacts on soil and vegetation include retarded growth, erosion, and physical damage (Baker and Bithmann, 2005). These impacts are exacerbated on steep slopes (Stangl, 1999) or in areas with inadequate snow cover (Stangl, 1999; Baker and Bithmann, 2005). This erosion can lead to increased soil runoff resulting in sedimentation and turbidity in the immediate area and throughout the watershed (Stangl, 1999). Rongstad (1980) reported delayed flowering in some plants in spring, lower soil bacteria, and elimination of some plants due to snow compaction.

Snow compaction from snowmobiles can lower soil temperatures and reduce the survival of plants and soil microbes (Wanek, 1973). A natural, un-compacted snowpack greater than 45 cm deep will prevent frost from penetrating the soil (Baker and Bithmann, 2005). However, the thermal conductivity of snow, when compacted by snowmobiles, is greatly increased, resulting in both greater temperature fluctuations and overall lower soil temperatures (Baker, and Bithmann, 2005). This in turn inhibits soil bacteria that play a critical role in the plant food cycle (Stangl, 1999).

Vegetation in riparian areas is highly susceptible to damage from snowmobiles (Stangl, 1999). In their study of snowmobile impacts on old field and marsh vegetation in Nova Scotia, Canada, Keddy et.al. (1979) concluded that compaction may affect the soil surface microstructure, early spring germination and growth, seed dispersal from capsules still attached to dead stalks, and may modify seed predation patterns by subnivean rodents.

Abrasion and breakage of seedlings, shrubs, and other exposed vegetation frequently result from snowmobile travel across a landscape (Stangl, 1999). Although these impacts may not be environmentally significant when they occur in robust forest environments, they can be very significant when they occur in sensitive forest habitat, such as high mountain slopes or meadows. A recent study on the Gallatin National Forest (MT) found 366 acres of trees damaged by snowmobiles on timber sale units - slowing forest regeneration (WWA 2009).

One way to limit damage to vegetation and soils is to ensure that there is sufficient snow cover before allowing OSV use in an area. Our BMPs recommend a minimum snow depth of 18

inches before allowing cross-country travel and 12 inches before allowing grooming. We also recommend setting a specific snowmobile season (December 1 -April 14), with these dates serving as "bookends" before and after which OSV use is not allowed at all. This helps to ensure OSVs are not traveling through areas where

snow has melted or not yet accumulated.

Sensitive Plant Species

The Forest Service is required to maintain plant diversity and ecosystem integrity and included in this charge is the identification of rare and sensitive plants. A conservation plan for sensitive species in areas where dispersed winter recreation takes place outside of ski resorts typically does not exist for sensitive species. Such plans would support plant viability and protection of wildlife where needed. Winter travel planning is an opportunity to establish conservation plans for sensitive plants (and animals) that live in snow areas. We request that the Stanislaus NF create winter conservation plans for sensitive species as part of over-snow vehicle management planning.

There are a number of sensitive plant species on the Stanislaus NF. While many of these species are dormant during the snow season, others are vulnerable to impacts from OSVs if proper restrictions are not in place. Of particular concern is whitebark pine. Whitebark pine are slow growing conifers that are found in high elevation mountain environments -often the same areas that are desirable for cross-country OSV travel. Because trees are not covered by snow like many other plants are in the winter they are vulnerable to mechanical damage. OSVs run into mature trees, snapping branches and damaging trunks and over smaller trees that are partially buried in the snow. Under the best of circumstances this damage merely slows growth but can also lead to tree mortality.

The Forest Service should only permit snowmobile use when there is sufficient snowpack to protect soils and vegetation. As we have stated previously in these comments, and in our BMPs, there should be at least 12 inches of snow before allowing snowmobile trails to be groomed.

Off-trail use should not be allowed until there is at least 18 inches of snow on the ground. These standards will help to protect soils, vegetation, and water quality.

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Exhibit C

Snowmobile Best Management Practices for Forest Service Travel Planning
A Comprehensive Literature Review and Recommendations for Management
December 2014

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Introduction

Winter backcountry recreation is a popular and steadily growing activity on Forest Service lands. Undeveloped skiing (including backcountry skiing, cross country skiing, and snowshoeing) is projected to be one of the five fastest growing activities on Forest Service lands in the next 50 years (Figure 1). In one scenario, The number of participants in undeveloped skiing is predicted to double - reaching 16 million participants by 2060 (Cordell 2012). Motorized snow activities are forecasted to grow as well, albeit at a slower rate. Overall, more

than 20 million people participate in some form of backcountry winter recreation on National Forest lands each year (Cordell 2012).

Snowmobilers and skiers often seek out the same winter backcountry setting and look for similar experiences such as solitude, fun, and the enjoyment of the natural beauty of the mountains. But as motorized and non-motorized winter recreation grows on Forest Service lands, so does the potential for conflicts between the two user groups and impacts on natural resources. In terms of recreation opportunity, snowmobile use adversely impacts the recreation experience sought by many nonmotorized users, while the reverse is rarely true. Motorized recreation will displace nonmotorized users where use is heavy. This has occurred numerous places. Where displacement does not occur because of the high level of demand for a particular area or a lower density of snowmobile use, conflicts among users still arise, and can be substantial.

Additionally, advancements in technology and changes in use patterns among both user groups have increased the need for proactive management. While in the early years, snowmobiles were relatively slow and were limited to groomed trails, today's snowmobiles can go off-trail and up very steep slopes. "High marking" steep alpine bowls is now a popular riding technique, and modified motorcycles with a tread and ski allow riders to negotiate even heavily wooded areas. Backcountry skiers and snowboarders have also seen their sport evolve through technological changes in gear - making it easier for skiers and snowshoers to climb and descend mountains in the heart of the winter, and accelerating the trend of increased user participation and demand.

These advancements and changes in use patterns have led to increased use conflict and impacts to natural resources. Snowmobiles can create a number of impacts to wildlife which can result in fitness costs, fragmentation, and potential population declines (Gaines et al. 2003). Water quality, vegetation, and soils can also be greatly affected - especially in more sensitive alpine environments. Hundreds of research papers and monitoring reports have quantified these impacts and have been summarized in a number of recent literature reviews (e.g., Stokowski and Lapointe 2000, Gaines et al. 2003, Baker and Bithmann 2005, Davenport and Switalski 2006, Ouren et al. 2007, USDI NPS 2011, WWA 2014).

(Figure 1: percent growth in projected number of participants in undeveloped skiing and motorized snowsports on forest service lands in three model scenarios, 2008-2060 (adapted from Cordell 2012).)

Snowmobile management

In recent years, the Forest Service has identified "unmanaged recreation" as one of the four threats to the health of National Forests (Bosworth 2003). On most forests, snowmobile recreation opportunities were never formally planned, but resulted from a default policy of allowing motorized use - including in many places where snowmobiling could not actually occur because of limitations in technology - in the absence of a specific reason to close or restrict it. As a result, more than 70 percent or 81 million acres in the western snowbelt forests are open to potential snowmobile use (Rivers and Menlove 2006, Figure 2). While skiers (including cross country, backcountry, and snowshoers) outnumber snowmobiles on National Forest System Lands (USDA FS 2014a), significantly more acreage and trail miles are available for winter motorized recreation than are designated for non-motorized recreation (Rivers and Menlove 2006, Figure 2). Of the thirty percent or 35 million acres closed to snowmobiles two-thirds are in Wilderness areas where all motorized use is legally prohibited, but where human-powered winter recreation opportunities are often difficult or impossible to access. Furthermore, many of the existing trailheads are weighted towards snowmobile recreation. The legacy of this unplanned "allocation" is widespread 'open' allocations for winter motorized use that is often not based on historical use patterns or any specific rationale, and displacement of non-motorized users has occurred as snowmobiles, aided by technology, expand their reach (e.g., Stokowski and Lapointe 2000, Manning and Valliere 2001, Adams and McCool 2010). Revisiting the disparity of this allocation is critical to addressing recreational use conflict (Adams and McCool 2010).

(Figure 2: Acres open and closed to snowmobiles on national forests in the western snowbelt region (reprinted from Rivers and Menlove 2006))

Main Authorities governing the management of snowmobiles in the national forest system

In the early 1970s, management of snowmobiles and other motorized uses on public lands was inconsistent. However, after a series of ecological research findings and an increasing need for conflict management, President Nixon signed Executive Order 11644 on February 8, 1972. This order charged federal land managers with developing and issuing regulations to manage off-road vehicles, including snowmobiles, specifically to minimize damage to natural resources and minimize conflicts between motorized and non-motorized communities. The Executive Order continues to be the legal authority guiding off-road vehicle designations on public lands.

Executive Order 11644:

Section 3. Zones of use. (a) each respective agency head shall develop and issue regulations and administrative instructions, within six months of the date of this order, 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, and areas in which the use of off-road vehicles may not be permitted, and set a date by which such designation of all public lands shall be completed. Those regulations shall direct that the designation of such areas and trails will be based upon the protection of the resources of the public lands, promotion of the safety of all users of those lands, and minimization of conflicts among the various uses of those lands. The regulations shall further require that the designation of such areas and trails shall be in accordance with the following-

(1) Areas and trails shall be located to minimize damage to soil, watershed, vegetation, or other resources of the public lands.

(2) Areas and trails shall be located to minimize harassment of wildlife or significant disruption of wildlife habitats.

(3) Areas and trails shall be located to minimize conflicts between off-road vehicle use and other existing or proposed recreational uses of the same or neighboring public lands, and to ensure the compatibility of such uses with existing conditions in populated areas, taking into account noise and other factors.

(4) Areas and trails shall not be located in officially designated wilderness Areas or primitive Areas. Areas and trails shall be located in areas of the national park system, natural Areas, or national wildlife refuges and game ranges only if the respective agency head determines that off-road vehicle use in such locations will not adversely affect their natural, aesthetic, or scenic values.

In 1977, President Carter signed Executive Order 11989, which amended and strengthened EO 11644 by giving federal public land managers the authority to close a motorized route or area if it "will cause or is causing considerable adverse effects" to natural resources:

Executive Order 11989:

Section 9. Special protection of the public Lands.

(a) notwithstanding the provisions of section 3 of this order, the respective agency head shall, whenever he determines that the use of off-road vehicles will cause or is causing considerable adverse effects on the soil, vegetation, wildlife, wildlife habitat or cultural or historic resources of particular areas or trails of the public lands, immediately close such areas or trails to the type of off-road vehicle causing such effects, until such time as he determines that such adverse effects have been eliminated and that measures have been implemented to prevent future recurrence.

(b) each respective agency head is authorized to adopt the policy that portions of the public lands within his

jurisdiction shall be closed to use by off-road vehicles except those areas or trails which are suitable and specifically designated as open to such use pursuant to section 3 of this order.

Travel Management Rule (TMR)

Over the last few decades, impacts from unmanaged off-road vehicle use and the growth of non-motorized backcountry recreation on national forest system lands has led to a renewed effort to comply with the executive order direction. In 2005, the forest service promulgated the travel management rule (tmr) to govern the management of the summer and winter off-road vehicle systems. 2 subpart b of the tmr requires the forest service to have a designated summertime off-road vehicle system, while subpart C allowed but did not require forests to designate a winter time off-road vehicle system.

In 2013, a federal court found that subpart C failed to comply with the direction in the executive order to designate a system of trails and areas that minimize impacts to natural resources and conflicts. In response, the forest service issued a draft amendment to the tmr in 2014 to require the designation of roads, trails, and areas where over-snow vehicle (osv) use is allowed, restricted, or prohibited. A final winter travel rule is expected during late 2014 or early 2015. In the coming years, forests that receive enough snow to support winter recreation will be required to have a system of designated routes and areas for winter motorized use, providing opportunity for public involvement as they do so. This document is designed specifically to aid in the process of OSV route and area designation, management and monitoring on forest service lands.

BEST MANAGEMENT PRACTICES (BMPs)

FOR LAND MANAGERS MINIMIZING IMPACTS FROM SNOWMOBILES

Best management practices provide science-based criteria and standards that land managers follow in making and implementing decisions that affect natural resources and human uses. BMPS are usually developed for a particular land use (e.g., road building and maintenance) and are based on the best available science, legal obligations and pragmatic experience (Switalski and Jones 2012).

While some BMPs currently exist for snowmobiles, they are presented in a piecemeal, resource-specific fashion, or only provide guidelines for trail building and maintenance. For example, the Forest Service has created BMPs for protecting water quality on their lands and gives some guidance on how to minimize impacts related to snowmobile route planning (USDA FS 2012). The Forest Service - as well as other land management agencies - also has guidance to pursue environmental collaboration and conflict resolution in addressing land management challenges generally (OMB CEQ 2012). The practice of collaboration and conflict resolution has been an increasing trend in recent years, and for environmental collaboration to be successful, several key aspects have been identified, including: balanced stakeholder representation, clear goals and objectives, information exchange, and shared decision-making (Schuett et al. 2001). As the Forest Service begins travel planning, it will be essential to have a comprehensive framework to help managers implement their mandate to minimize social and environmental impacts in designating winter motorized routes and areas.

In this document, we lay out the best available science for the impacts of snowmobiles on recreation use conflict and natural resources including water quality, soils, vegetation, and wildlife. Building off of the literature and existing recommendations from researchers and managers, we present a framework for minimization of snowmobile impacts. These Best Management Practices provide guidelines to help Forest Service managers designate appropriate routes and areas, and close inappropriate routes and areas. Additionally, they provide guidance on managing snowmobile use to be consistent with the Executive Orders minimization criteria and the Forest Service Travel Management Rule.

MONITORING, ENFORCEMENT, AND FUNDING

Key to any management action is monitoring the success or failure of a project and adapting the management strategy to reach the project objectives. Accordingly, the BMPs presented here rely heavily on monitoring. Enforcement of management actions is also essential for the success of any management plan (Adams and

McCool 2010).

1winter Wild/andsalliance v. USFS, 2013 WL 1319598 (D.Idaho, March 29, 2013).

It is also essential that the Forest Service allocate adequate funding and resources to undertake travel planning efforts (Yankoviak 2005, Adams and McCool 2010). Education and outreach programs that reduce conflict between uses and to increase compliance have also been implemented (Lindberg et al. 2009, USDI NPS 2013); however there is limited data on the success of these programs and such efforts may need to be supplemented with monitoring and enforcement of existing regulations.

Yellowstone National Park has developed an extensive adaptive management program following the implementation of their winter use plan (USDI NPS 2013). They have identified key resources affected by motorized recreation, indicators for measuring their effects, and the most appropriate monitoring methods (Table 1). Using this framework they are able to revisit management decisions so learn if they are effectively mitigating use conflicts and environmental concerns in the Park.

(Table 1: Examples of adaptive management monitoring: affected resource, indicator, and monitoring method identification in Yellowstone National Park (reprinted from USDI NPS 2013))

CLIMATE CHANGE

Today's land managers have to plan in the context of a rapidly changing climate. This will include addressing rising temperatures, thinner snow packs, more intense storms, and more rain-on-snow events which can damage trail systems and add additional management challenges (IPCC 2013). A receding snowpack and earlier spring runoff will alter future winter backcountry recreation use patterns.

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 snowmobiles to travel on dry roadbeds or snow-free trails to access the receding snowline.

This direct contact with the ground can cause soil compaction, erosion, and water quality issues and lead to a whole new set of management concerns. In another example, grizzly bears may leave their dens earlier as climate changes making previous seasonal management decisions obsolete. The trails themselves will need increased maintenance such as grading and clearing obstacles during snow-free months, upgrading culverts, building larger bridges, and moving routes from areas prone to flooding or rapid melting. To preserve quality recreation opportunities and minimize natural resource damage, land managers should consider the impacts of a changing climate when developing management direction.

Winter recreational use conflict research

Introduction

As more people recreate in the backcountry, winter wildlands are becoming increasingly crowded and conflicts are on the rise. Backcountry skiers and other non-motorized users seek out solitude, quiet, and undisturbed natural areas. Desirable terrain, snow conditions and access are also key components of their recreational experience. Snowmobiles change the quality of this experience and create conflict with other winter recreationists (Adams and McCool 2012). Conflict among motorized and non-motorized use is typically "asymmetrical" where skiers experience conflict, while snowmobilers do not (Knopp and Tyger 1973, Jackson and Wong 1982, Gibbons and Ruddell 1995). Quiet non-motorized recreationists can have the quality of their experience dramatically altered by snowmobiles, while motorized users often don't even notice skiers using the same landscape.

In this section we present recent research on how snowmobile use and associated noise and fumes impact non-motorized use. Motorized use often creates a level of annoyance from non-motorized users that has been documented to lead to displacement (e.g., Stokowski and Lapointe 2000, Manning and Valliere 2001, Adams and

McCool 2010). However, a well-planned and enforced system of routes and areas as well as improved management tools and technologies can help reduce or eliminate conflict.

Soundscape

Protecting quiet soundscapes has become an increasingly important management issue in winter landscapes. Snowmobile noise is one of the biggest sources of use conflict, as an increasing number of winter recreationists seek out the peace and quiet found in the backcountry to escape the sounds of modern busy life (Abraham et al. 2010). Noise from motorized recreation is a particular problem in winter, when all use is restricted to a relatively small number of plowed trailheads and nonmotorized users cannot readily access Wilderness.

Natural soundscapes have been found to assist "in providing a deep connection to nature that is restorative and even spiritual for some visitors" (Freimund et al. 2009, pg. 4). When users have these expectations, the mechanical noise of snowmobiles can result in a substantial diminution in their recreation experience from the presence of snowmobile noise in otherwise quiet areas. This can negatively impact the experience of the recreationist, create conflict, and ultimately lead to displacement (Gibbons and Ruddell 1995, Manning and Valliere 2001, Vitterso et al. 2004, Adams and McCool 2010).

In "multiple-use" backcountry areas, snowmobile noise can be difficult to escape. While dependent on speed, type of machine, and direction of wind, snowmobile noise can travel up to 10 miles (Hastings et al. 2006, Burson 2008) - a distance farther than most non-motorized recreationists travel in a day. Additionally, considering that most forest roads are not plowed in the winter, the ability of skiers to avoid motorized noises is very restricted. Often trails and areas that are considered "frontcountry" and easily drivable in the summer are much more difficult to access in the winter. Accordingly, the user expectation in these areas is more aligned with a backcountry experience including a quiet soundscape. This disconnect between available recreation settings and desired user experience is something the Forest Service primarily addresses in planning through the Recreation Opportunity Spectrum (ROS). However, ROS is a classification tool that describes physical, social and managerial attributes - access, remoteness, size, user density, level of development - in summer, but not winter. Addressing these frontcountry multiple-use areas, which span a variety of ROS settings, is a particularly important source of conflict to address in travel planning.

Many people also travel in the winter backcountry to view wildlife. However, it has been well established that noise has a widespread and profound impact on wildlife (Barber et al. 2010, Farina 2014), which limits opportunities for watching and listening for birds and other wildlife. Most fundamentally, snowmobile noise creates a level of annoyance to many non-motorized users that either reduces the quality of their experience or can even cause displacement (e.g., Stokowski and Lapointe 2000, Manning and Valliere 2001, Adams and McCool 2010).

Airshed

Motorized and non-motorized winter backcountry recreationists are often confined to the same plowed parking areas to prepare for their trips. However in these "staging areas" snowmobile emissions can be concentrated and lead to an additional source of conflict and potential health concerns. While technological advances have produced cleaner four-stroke engines (and even zero emission electric snowmobile prototypes), the vast majority of snowmobiles still use highly polluting two-stroke engine technology. Lubricating oil is mixed with the fuel, and 20% to 30% of this mixture is emitted unburned into the air and snowpack (Kado et al. 2001). Also, the combustion process itself is relatively inefficient and results in high emissions of air pollutants (USDI NPS 2000). As a result, two-stroke snowmobiles emit very large amounts of smoke which includes carbon monoxide (CO), unburned hydrocarbons (HC) and other toxins (Zhou et al. 2010). Carbon monoxide is particularly harmful to the human body's ability to absorb oxygen (Janssen and Schettler 2003), and thus is particularly harmful to other users who wish to engage in aerobic exercise.

Concerns over human health related to snowmobile emissions have led to extensive recent research on

snowmobile pollution in Yellowstone National Park (e.g., USDI NPS 2000, Bishop et al. 2001, Kado et al. 2001, Janssen and Schettler 2003, Bishop et al. 2006, Bishop et al. 2009, Ray 2010, Zhou 2010), and conclusions from these studies have led to a ban of older technology 2-stroke engines from the Park (USDI NPS 2013). Emissions from snowmobiles emit many carcinogens and can pose dangers to human health (Eriksson et al. 2003, Riemann et al. 2009). Several "known" or "probable" carcinogens are emitted including nitrogen oxides, carbon monoxide, ozone, aldehydes, butadiene, benzenes, and polycyclic aromatic hydrocarbons (PAH). Particulate matter, also found in snowmobile smoke, is detrimental in fine and coarse forms as it accumulates in the respiratory system and can lead to decreased lung function, respiratory disease and even death (Janssen and Schettler 2003). While most of the acute toxic effects of snowmobiles are limited to staging areas and parking lots, the smoke and fumes from snowmobiles on trails can dramatically reduce the quality of the experiences of non-motorized users along the trail as well.

Viewshed and other impacts

In addition to the sounds and smells of snowmobiles, simply the presence of snowmobiles on the landscape can degrade the experience of many non-motorized users. In just a few hours, snowmobiles can access almost any basin in the west and disproportionately consume a limited resource, powder snow. Slopes displaying dozens of "high mark" tracks can take away the natural beauty of the landscape for some. The deep tracks of snowmobile can also create a hazard when skiing down a slope, or quickly "track out" a slope, rendering it un-skiable. Safety is also a concern as there is the possibility of collision with a snowmobile, or a risk of a snowmobile triggering an avalanche from above. Alternatively, a snowmobile can diminish the sense of risk or wildness because they effectively reduce the distance from safety (McCool and Adams 2012).

Winter recreational use conflict management

The most effective way to manage recreational use conflict is a well-planned and enforced system of routes and areas that separate motorized and non-motorized uses as much as possible (e.g., Andereck et al. 2001, Lindberg et al. 2009, Adams and McCool 2010, USDI NPS 2013). Simply reducing snowmobile noise and smells may not be sufficient to reduce conflict or deter displacement, although limiting snowmobile use to best available technology (BAT) machines, as has been done at Yellowstone National Park, can substantially reduce use conflict. Closing or separating the non-compatible uses is the most effective way to reduce conflict. For example, an analysis of conflict reduction strategies in Sweden found that closing access to snowmobiles - a change from seeing hearing, and smelling snowmobiles, led to significant skier welfare gains (Lindberg et al. 2009).

Another strategy employed by the Forest Service is to separate motorized and non-motorized temporally, thereby granting all users some opportunity for use while minimizing conflict. On the Chugach National Forest, for example, one section of the forest is closed to motorized use on alternating years (USDA FS 2007b). On the Humboldt-Toiyabe NF, a high-elevation trailhead is shared use until lower elevation access receives enough snow for OSV use at which point it becomes non-motorized (USDA FS 2007a). In more popular areas, shorter alternating closure periods, such as biweekly, may be more appropriate.

Mitigating snowmobile noise can help address use conflicts as well. Snowmobile noise can travel long distances in the winter, and noise models have been used to identify areas of recreational use conflict, and plan for management actions. For example, noise modeling has been used extensively in Yellowstone National Park to estimate the area affected by noise under a range of management alternatives (Hastings et al. 2006, Hastings et al. 2010, USDI NPS 2013, Figure 3).

(Figure 3: Example of noise simulation modeling used in Yellowstone National Park to identify where disturbance and conflict may be a management issue. Orange is the distance snowmobiles and snow coach noise travels beyond the groomed roads. Model inputs include temperature, relative humidity, snow cover, and natural ambient sound levels. The modeling also accounts for the acoustic effects of topography, vehicle speeds, and vehicle group size (USDI NPS 2013).)

Several studies have recommended replacing two-stroke engines with four-stroke engines to significantly reduce emissions and noise (e.g., Miers et al. 2000, Kado et al. 2001, Eriksson et al. 2003). Four-stroke engines are significantly less polluting (Zhou et al. 2010, Figure 4), and have improved fuel efficiency, as well as a reduction in visible exhaust plumes, odor, and noise (Bishop et al. 2006). A study of using best available technology (BAT) machines in Yellowstone has resulted in a 60% reduction in Carbon Monoxide (CO) and a 96% reduction in Hydrocarbon (HC) emissions (Bishop et al. 2006). However, if motorized use of a route or area has been identified as having an unacceptable impact on other user groups, that route or area should be closed (Lindberg et al. 2009, McCool and Adams 2010, and NYSDEC 2011).

Furthermore, in some forests non-motorized opportunities are limited, so creating non-motorized areas may be needed. For example, a snowmobile plan for Adirondack Park (NY) calls for closing routes if the "...opportunities for quiet, non-motorized use of trails are rare or nonexistent;" (NYSDEC 2011, p.244). Finally, in some areas - regardless of conflict, snowmobiling should not be allowed. For example, Adams and McCool (2010) argue that roadless areas should be protected from motorized use because "roadless areas are exceptional for their wild and quiet recreational opportunities, their habitat for threatened and endangered species, and other values. Their character and values derive from their lack of accessibility by motor vehicles" (p. 109).

(Figure 4: Average nonmethane hydrocarbons exhaust emission ratios relative to ethene (ppmv/ppmv) for two-stroke and four-stroke engines in 2002 (Reprinted with permission from (Zhou, Y., D. Shively, H. Mao, R.S. Russo, B. Pape, R.N. Mower, R. Talbot, and B.C. Sive. 2010. Air toxic emissions from snowmobiles in Yellowstone National Park. Environmental Science and Technology 44(1): 222-228. Copyright 2010 American Chemical Society))

Best management practices for winter recreational use conflicts

Designating motorized use

*When necessary elements for successful collaboration exist, establish a working group with motorized and non-motorized users, conservation interests, land managers, and other stakeholders to develop concepts for minimizing recreational conflict.

*Identify routes and areas where there is ongoing conflict among motorized and non-motorized winter recreational use using existing information, surveys, GIS modeling, and community outreach.

*Identify routes and areas of particularly high value or demand for motorized and non-motorized use.

*To the degree possible, allocate separate trails, trailheads, and areas.

*Ensure that non-motorized trails and areas are available:

○ close to plowed access points, groomed trails, and other access portals.

○ in contiguous non-motorized blocks.

○ in areas where there are few non-motorized opportunities. ○ in both frontcountry and backcountry settings.

○ in areas with scenic beauty.

○ in areas sheltered from noise emanating from motorized areas. ○ across a variety of Recreational Opportunity Spectrum (ROS) categories.

*Ensure that a fair balance of unplowed roads are set aside for nonmotorized use.

*Locate motorized routes and areas:

○ away from popular or historically used backcountry ski areas, or areas of growing use.

- O outside proposed Wilderness Areas, Wilderness Study Areas, and Research Natural Areas.
- O with easily enforceable boundaries using topographic or geographic features. (e.g., a ridge top or highway) - use boundary signage to provide additional clarity, or where unauthorized use is occurring.
- O where they do not bisect non-motorized areas.

*Consider temporal restrictions in areas of high-use or high-value to both motorized and non-motorized use. This includes both early/late season restrictions, as well as alternating access.

*Where necessary to designate a motorized route through a nonmotorized area, locate and manage such route (such as speed and idling limits) to minimize disturbance to the nonmotorized area.

*In areas of shared use consider requiring Best Available Technology (BAT) to reduce conflict and impacts between uses.

Minimizing impacts of motorized use

*Undertake proactive and systematic outreach programs in order to facilitate increased compliance of closures and reduce user conflicts.

*Provide free digital and paper maps that clearly show routes, areas, and watersheds open and closed to snowmobiles.

*Encourage or require the use of Best Available Technology (BAT) snowmobiles to reduce noise and local air quality impacts.

*Implement significant penalties and consequences for violating snowmobile regulations that will dissuade users from such violations.

*Monitor closed routes and areas to ensure that snowmobile intrusion is not occurring.

*Establish an adaptive management framework using monitoring to determine efficacy of current management.

*Revisit plan decisions as necessary to ensure use conflicts are being minimized and motorized impacts are below accepted thresholds. Close snowmobile routes and areas when motorized use is leading to trespass onto non-motorized trails or areas.

Wildlife research

Introduction

While many animals are well adapted for survival in the winter, deep snow and cold temperatures can limit foraging opportunities and increase metabolic demands. Snowmobiles can add to animals' vulnerability during this critical time by eliciting physiological responses such as increased heart rate and elevated stress level; eliciting behavioral responses including displacement and avoidance; facilitating sources of competition; and/or increasing hunting, trapping, and poaching mortality (for a review see Gaines et al. 2003, Figure 5, Table 2). These impacts can result in fitness costs, fragmented wildlife populations, and potential population declines (Gaines et al. 2003).

In this section, we focus on three species that warrant special attention because their populations are in decline or vulnerable, and they have state and/or federal legal protections: grizzly bears (*Ursus arctos*), wolverine (*Gulo gulo*), and lynx (*Lynx canadensis*). The strongest protection is afforded by the Endangered Species Act which prevents any "take" of a listed species. The term "take" includes any "means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (7 U.S.C. § 136, 16

U.S.C. § 1531 et seq.) As supported below, these three species are highly susceptible To snowmobile noise and disturbance and will need additional management actions to ensure winter recreation does not compromise their recovery. We also highlight research on the impact of snowmobiles on ungulates which are managed as game species and also need special management considerations.

(Figure 5. Interactions between the 29 focal wildlife species and snowmobile routes documented from a comprehensive literature review (reprinted from Gaines et al. 2003).)

(Table 2. Snowmobile route associated factors for wide-ranging carnivores and ungulate focal species (adapted from Gaines et al. 2003).)

Grizzly bear

Grizzly bears (*Ursus arctos*) are a Threatened Species under the U.S. Endangered Species Act and protected from harm across their range in the continental U.S. Their denning habitat often overlaps with winter recreation areas, and they are susceptible to disturbance - increasing energy expenditures and the potential of den abandonment (Linnell et al. 2000). Direct mortality is also possible if an avalanche is triggered on a slope where the bears are hibernating (Hilderbrand 2000).

Grizzly bears typically den in relatively high elevation areas with more stable snow conditions and steep slopes (Linnell et al. 2000). In general they avoid roads (Mace et al. 1996), and will typically select den sites one to two kilometers from human activity (Linnell et al. 2000). However, snowmobiles can easily access these remote sites, posing the potential for disturbance. No systematic data set exists on how denning bears react to snowmobile disturbance, but a comprehensive review on the topic found that human disturbance within one kilometer of a den site has a significant risk of abandonment, especially early in the denning season (Linnell et al. 2000).

Grizzly bear management

Although grizzly bears can be susceptible to disturbance and the risk of den abandonment, careful management of winter recreation can help avoid this conflict. Linnell et al. (2000) recommended that "winter activities should be minimized in suitable or traditional denning areas; if winter activity is unavoidable, it should begin around the time bears naturally enter dens, so that they can choose to avoid disturbed areas; and winter activity should be confined to regular routes as much as possible" (Linnell et al. 2000, pgs. 409- 410). Podrutzney et al. (2000) modeled the overlap of potential grizzly bear denning habitat and potential snowmobile use areas on the Gallatin National Forest, MT. This model was used in Forest Service travel planning and allowed managers to plan snowmobile routes and areas to avoid conflict with grizzly bears.

Similar modeling efforts have been conducted in Alaska incorporating both motorized and non-motorized recreation with bear denning habitat (see Goldstein et al. 2010).

As a federally protected Threatened Species, the U.S. Fish and Wildlife Service considers snowmobile disturbance as a potential "take" thus requiring management actions. In a recent Biological Opinion for snowmobiling on the Flathead National Forest (MT), the U.S. Fish and Wildlife Service required the Forest to "quantify and monitor snowmobile use... and ensure adequate protection to known and discovered grizzly bear den sites and post-emergent females with cubs" (USDI FWS 2008, p. 57). In 2014, the Flathead National Forest closed the Skyland / Challenge snowmobile play area due to the emergence of a grizzly bear in the area.

Limiting open motorized route density is a key management action to increase grizzly bear habitat security. For example, USDA FS (2011) recommends limiting open motorized route density to less than 1 mile per square mile in much of the Cabinet-Yaak Recovery Area. State-level management plans also address management of snowmobiles in grizzly bear habitat. For example, The Montana Forested State Trust Lands Habitat Conservation Plan calls for minimizing road miles and restricting public access (including snowmobiles) on roads in important grizzly bear habitat areas and seasons (MT DNRC 2011).

Wolverine

Wolverine (*Gulo gulo*) are a rare, long-ranging carnivore that spends most of their lives in high elevation areas (Aubry et al. 2007). While they roam hundreds, sometimes thousands of miles seeking food and mates, in the heart of the winter females dig dens in the snowpack and give birth. Little has been known about this elusive carnivore until recently when it was petitioned for listing under the Endangered Species Act, resulting in a flurry of research studies. Wolverine are a Species of Special Concern in Montana, classified as a Sensitive Species by the Forest Service, and trapping has been banned across their range in the continental U.S.

In general, wolverine are sensitive to human disturbance. In studies in Canada, wolverine have been found to be much more common in protected areas than in multiple-use landscapes (Fisher et al. 2013, Whittington et al. 2014). Snowmobile use commonly overlaps with wolverine denning habitat, and their noise may cause female wolverines to abandon their denning sites, potentially reducing their reproductive success.

An ongoing five-year study is examining the impact of winter recreation on wolverine in multiple mountain ranges in Montana and Idaho (Heinemeyer and Squires 2013). Preliminary results suggest that in areas with winter backcountry use, denning female wolverine move more frequently, are moving at higher rates when in higher intensity recreation areas, and move more during the weekend when there is more use (Heinemeyer and Squires 2013). These impacts are creating a "significant additive energetic effects on wolverine during the critical winter and denning periods" (Heinemeyer and Squires 2013, p. 5).

While the majority of the study sites they have studied are snowmobile use areas, the ongoing study is adding more sites where non-motorized backcountry skiers recreate as well. However, researchers have already noted that limitations on the distance that skiers can travel often allows for core denning habitat to be available beyond the reach of backcountry skiers (Heinemeyer et al. 2014).

Wolverine management

Wolverine have very large home ranges and need large blocks of interconnected habitat. Key management schemes for protecting wolverine include limiting disturbance and retaining and restoring habitat connectivity. Managers can reduce the potential conflict with snowmobiles and wolverine by identifying areas of overlap and managing accordingly. For example, The Wilderness Society developed the spread-GIS model that can model snowmobile sound propagation overlap with wolverine denning habitat (Reed et al. 2009, Figure 6). Two other sound propagation models have also been used by Yellowstone National Park to model over-snow vehicle audibility including the Integrated Noise Model, and the Noise Simulation Model (USDI NPS 2013).

In the face of climate change, wolverines may lose much of their denning habitat as persistent snowfields disappear (Fisher et al. 2013), and connectivity among remaining habitat patches will become increasingly important (Schwartz et al. 2009). The 2014 Management Plan for the Conservation of Wolverines in Idaho calls for identifying wolverine linkage areas at local and regional scales and pro-actively conserving them (IDFG 2014).

(Figure 6: An example of using the spread model to identify the overlap of snowmobile noise emissions and wolverine habitat types (Reed et al. 2009).)

Canada Lynx

Canada lynx (*Lynx canadensis*) is a Threatened Species under the U.S. Endangered Species Act. They are adapted to deep snow conditions, allowing them to thrive in habitats where potential competitors and predators like coyotes (*Canis latrans*) cannot easily survive. However, compacted snow trails and play areas help facilitate coyote movement into Canada lynx habitat. While one study in Montana found limited use of snowmobile trails by coyotes (Kolbe et al. 2007), studies in Utah and Wyoming documented coyotes using compacted trails extensively resulting in potential competition and displacement of Canada lynx (Bunnell et al. 2006, Gese et al. 2013, Dowd et al. 2014). The differences in results are probably due to different regional snow characteristics,

predator communities, and snowmobile use (Bunnell et al. 2006). While both snowmobiles and skis create trails that coyotes could exploit, snowmobiles can travel an order of magnitude further in a day than non-motorized users.

Canada Lynx management

Both researchers and managers have recommended limiting snowmobile routes in lynx habitat. Following their research on coyotes use of snowmobile trails, Dowd et al. (2014) suggests "limiting the expanse of groomed trail system may minimize coyote encroachment into these deep snow environments" (p.39). The Canada Lynx Assessment and Conservation Strategy set planning standards on Forest Service lands that include, "on federal lands in lynx habitat, allow no net increase in groomed or designated over-the-snow routes and snowmobile play Areas by Lynx Analysis Unit... and map and monitor the location and intensity of snow compacting activities that coincide with lynx habitat, to facilitate future evaluation of effects on lynx as information becomes available" (USDA FS 2000, p.82).

Ungulates

Ungulates are hooved animals including deer (*Odocoileus* spp.), elk (*Cervus canadensis*), moose (*Alces alces*), mountain goat (*Oreamnos americanus*), and bighorn sheep (*Ovis canadensis*). All of these animals are highly prized game species. Bighorn sheep are classified as a Sensitive Species by the Forest Service, and two subspecies - Nelson's Peninsular and Sierra Nevada bighorn sheep - are listed as Endangered Species. It has been well established that undisturbed "winter range" is essential for ungulates survival (Canfield et al. 1999).

Studies have found that snowmobiles can exhibit both a physiological and behavioral response on a number of ungulate species (Gaines et al. 2003, Table 2). Recent studies in Yellowstone found elk had increased stress (Creel et al. 2002), and actively responded (Borkowski et al. 2006) when approached by snowmobiles. A recent study on moose in Scandinavia also found disturbance and displacement following snowmobile activity (Neumann et al. 2011). Bighorn sheep and mountain goats are particularly susceptible to the effects of disturbance because they are limited to relatively small areas of suitable habitat with very steep and rocky slopes (Canfield et al. 1999).

Ungulate management

Limiting disturbance on ungulates, especially in winter range, is a key management strategy. For example, Canfield et al. (1999) in their review of the impact of recreation on Rocky Mountain ungulates suggest keeping motorized routes and trails away from wintering areas, and to create established designated travel routes to make human use as predictable as possible. Further, Harris et al. (2014) recently reviewed the impacts of winter recreation on northern ungulates and highlighted the importance of limiting the duration and spatial footprint of disturbance.

Yellowstone National Park has implemented a number of policies to reduce disturbance from snowmobiles. Some of these practices include: limiting the number of snowmobiles, requiring best available technology, setting speed limits of 35mph, and establishing open and closure dates (USDI NPS 2013). This has also been coupled with monitoring and complementary research projects which can measure the effectiveness of the management plan. For example, Borkowski et al. (2006) stated that snowmobile regulations in Yellowstone including levels and travel routes "were effective at reducing disturbances to bison and elk below a level that would cause measurable fitness effects" (p.1).

Best management practices for wildlife

Designating motorized use

*Identify routes and areas where there is the potential for snowmobile disturbance of key wildlife including grizzly bear, wolverine, lynx, and ungulate winter range using survey data or GIS modeling. Survey information should be catalogued and regularly updated in a GIS database.

*Locate motorized routes and areas:

O where disturbance is unlikely to significantly affect viability or recovery of listed or petitioned threatened or endangered species:

*Limit snowmobile routes and areas in grizzly bear suitable denning habitat, wolverine denning habitat, and Canada lynx Critical Habitat.

*Reduce snowmobile route density to below 1 mile/mile² in occupied habitat.

O outside proposed Wilderness Areas, Wilderness Study Areas and Research Natural Areas.

O in discrete, specified areas bounded by natural features (topography and vegetative cover) to provide visual and acoustic barriers and to ensure that secure habitat is maintained for wildlife.

O outside critical ungulate wintering habitat.

*Set dates for snowmobile season opening and closure, and adjust based upon seasonal wildlife needs including:

O critical ungulate wintering habitat/winter concentration areas (e.g., December through March in Rockies).

O grizzly bear denning season (mid-November), and emergence time (mid-April).

*Limit or close routes and play areas with known bighorn sheep and mountain goat populations.

*Limit or close areas to off-road and oversnow vehicle use in areas where antler shed hunting is prevalent.

*Limit the number of routes and restrict off-trail use in key wildlife corridors.

*Maintain large un-fragmented, undisturbed, and connected blocks of forestland and alpine habitat where no snowmobile routes are designated.

Minimizing impacts of motorized use

*Implement outreach programs to raise public awareness of winter wildlife habitat, wildlife behavior, and ways to minimize user impacts.

*Encourage or require the use of Best Available Technology (BAT) where necessary to limit disturbance on sensitive species.

*Close snowmobile routes and areas if a grizzly bear emerges from their den in the area.

*Monitor closed and areas to ensure they are effectively mitigating impacts to wildlife, and not being used illegally.

Water quality, soils, and vegetation research

Introduction

Since the seminal research of Wallace Wanek and his colleagues in the 1970s, it has been well established that snowmobiles can negatively impact water quality, soils, and vegetation. However, while early researchers focused on localized impacts of snowmobiles on groomed trails, today's machines also travel off-trail and into many sensitive habitats such as alpine cirques, meadows, and wetlands. Water quality can also be affected when spring runoff releases pollutants stored in the snowpack. Furthermore, as snowmobiles become increasingly powerful, their increased torque and reach creates a potential for greater impact. For example, steep erosion-prone slopes are now commonly used for "high marking," increasing the risk of soil compaction and damage to slow-growing alpine vegetation.

Water quality

Protecting and enhancing water supply is a key mandate of the Forest Service, and a number of aquatic species and municipal watersheds depend on National Forests - especially in the West. For example, most National Forest acres west of the Cascade Mountains in Oregon and Washington are municipal watersheds (USDA FS 2000). During the winter, snowmobiles release toxins such as ammonium, nitrate, sulfate, benzene, and toluene which accumulate in the snowpack (Ingersol 1999), and increase acidity (Musselman and Kormacher 2007). In the spring runoff, accumulated pollutants are released as a pulse into the soil, groundwater, and surrounding waterbodies.

A recent study found snowmobiles are polluting a tributary of Lake Tahoe, CA. Examining 168 different semi-volatile organic compounds (SVOC), McDaniel (2013) found eight to 20 times greater loadings on snowmobile

trails than background levels. He further reported that highly toxic and persistent polycyclic aromatic hydrocarbons (pahs) had increased two to six times the background level in a nearby stream (McDaniel 2013). Impacts to water quality can be especially pronounced at trailheads and staging areas where snowmobiles congregate (USDA FS 2012).

Lakes can also be vulnerable because snow melts directly into the waterbody without any vegetative buffer, and there is a risk of snowmobiles falling through thin ice and spilling toxins directly into the water (USDA FS 2012).

Soils

Snowmobiles can directly impact soils in a number of ways including soil compaction, erosion, and contamination. When traveling in areas of low or no snow - such as wind-swept ridges, snow-free access points, or during periods of thin snowpack - snowmobiles can be particularly damaging.

They can also indirectly impact soils through snow compaction. Weighing several hundred pounds, snowmobiles easily compact the snow which can increase snowpack density, reduce soil temperatures, increase soil freezing, and result in a later melt-out (Gage and Cooper 2009). In areas of low or no snowpack, direct soil compaction can occur from snowmobiles leading to erosion (Gage and Cooper 2009). On steep slopes - especially south facing, or wind-swept slopes - vegetation and snow can be mechanically removed from snowmobile tracks resulting in exposed bare ground (Stagl 1999). Soil compaction impacts nearly all properties and functions of soil including increased bulk density and reduced pore space leading to reduced permeability of water and air (Batey 2009). This results in surface erosion especially on steep slopes (Batey 2009). Soil erosion when located near streams can also lead to localized stream sedimentation and increased turbidity. As climate change reduces the number of snow-free days, erosion from snowmobiles will be an increasing management concern.

Soils can also be contaminated when pollutants enter the soil from a melting snowpack. With inefficient engines, snowmobiles release much of their oil gas mixture into the snow unburned. Several pollutants have been recorded in the snowpack along snowmobile trails including ammonium, nitrate, sulfate, benzene, and toluene (Ingersol 1999). In the spring these pollutants are released into the soil creating local contamination and associated impacts.

Vegetation

Snowmobiles impact vegetation either through directly crushing and breaking vegetation, or through a number of indirect mechanisms. When traveling off-trail, snowmobiles often run over trees and shrubs causing damage or death - often with minimal snowmobile traffic. Although these impacts may not be environmentally significant when they occur in robust forest environments, they can be very significant when they occur in sensitive forest habitat, such as high mountain slopes or meadows.

A recent study on the Gallatin National Forest (MT) found 366 acres of trees damaged by snowmobiles on timber sale units - slowing forest regeneration (WWA 2009, Table 3). Trees such as white-bark pine (*Pinus albicaulis*), found only at high elevations and declining across its range, may be vulnerable to snowmobile damage. Trampling has also been found to result in a reduction in plant productivity, changes in the plant community, and a reduction in plant diversity (Stagl 1999).

As mentioned above, compaction of the snow reduces the insulating air spaces and conducts cold air to the ground (Gage and Cooper 2009).

These lower temperatures can reduce plant density and composition, reduce productivity and growth, delay seed germination and flowering, as well as affecting decomposition rates, hummus formation and microbial activity (Davenport and Switalski 2006). These impacts ultimately can change community structure and reduce the availability and duration of spring wildlife foods (Stagl 1999).

(Table 3: Summary of snowmobile damaged trees on the Gallatin National Forest (MT) reported during

regeneration transect surveys of previously logged timber stands (reprinted from WWA 2009).)

Water quality, soils, and vegetation management

The most common strategies for protecting water quality, soils, and vegetation from snowmobile impacts is to ensure that there is adequate snow cover and create a buffer around waterways. For example, the Forest Service has developed National Best Management Practices to protect water resources on Forest Service lands from snowmobile pollution (USDA FS 2012). This document recommends, "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; use and enforce closure orders to mitigate effects when adverse effects to soil, water quality, or riparian resources are occurring; use suitable measures to trap and treat pollutants from over-snow vehicle emissions in snowmelt runoff or locate the staging area at a sufficient distance from nearby waterbodies to provide adequate pollutant filtering" (USDA FS 2012, p. 96-97).

Water quality, soils, And vegetation management

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Individual forests have also recommended restricting snowmobile use to protect water quality. The Uinta-Wasatch- Cache National Forest (UT) does not allow recreational snowmobiling in Salt Lake City's municipal watershed (USDA FS 2003). The Inyo, Sequoia, and Sierra National Forests are proposing a minimum of 18" of snowpack before allowing snowmobiling in their revised Forest Plan to protect forest resources (USDA FS 2014b). Restricting snowmobile use in sensitive habitats such as riparian areas and wetlands can be helpful in mitigating these impacts as well.

Conclusion

The growing number of winter backcountry users has increased recreational use conflicts and negative impacts on natural resources. As the Forest Service begins formally addressing winter recreation and determining where motorized use is allowed, restricted, and prohibited, it is essential that managers have the best available science to guide their decisions. In this document we presented the best available science on the impacts of snowmobiles. Based upon this research and the recommendations of researchers and managers, and professional experience, we have developed a list of best management practices. If these BMPs are followed, they will help mitigate recreational use conflicts and minimize impacts to natural resources. Once a system of routes and special use areas are established, enforcement and monitoring will be critical to the success of any management plan.

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