From:	Sarah Peters
To:	FS-FPR_NPCLW
Cc:	Alison Flint
Subject:	Nez Perce-Clearwater Forest Plan comments
Date:	Thursday, November 13, 2014 3:35:20 PM
Attachments:	NP-C_WG_TWS_scoping.pdf Appendix I_TWS roads lit review w attachments.pdf Appendix II-forest plan direction.pdf Appendix III_ICL Report_In Need of Protection.pdf

Please find attached comments on behalf of WildEarth Guardians and The Wilderness Society addressing concerns with transportation and recreation management on the Nez Perce-Clearwater National Forests.

Thank you,

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WildEarth Guardians
A Force for Nature
25 Years

November 14, 2014

Forest Plan Revision
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To the Forest Plan Interdisciplinary Team:

This letter comments on the Nez Perce-Clearwater National Forests Proposed Action for Forest Plan Revision (PA) on behalf of WildEarth Guardians and The Wilderness Society.

I. Sustainable, Minimum Road System

A. Background

1. The Best Available Science Shows that Roads Cause Significant Adverse Impacts to National Forest Resources.

National Forests provide a range of significant environmental and societal benefits.[1] For example, they provide clean air and water, habitat for myriad wildlife species, and outdoor recreation opportunities for millions of visitors and local residents each year. According to the assessment completed to inform the forest planning process, approximately 480,000 people visited the forests in 2010 (Forest Planning Assessment for Forest-based Recreation, 2014).

The Forest Service's extensive and decaying road system, however, poses a principle threat to the future ability of the National Forests to provide critical environmental, ecosystem, and recreation services. Collectively, the National Forests contain an astounding 375,000 miles of system roads (excluding tens of thousands of additional miles of unclassified, non-system, temporary, and user-created roads). That is nearly eight times the length of the entire U.S. Interstate Highway System. This road system is primarily a byproduct of the era of big timber; as such, it often is convoluted, unmanageable, and ineffective at

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[1] *See generally* 36 C.F.R. § 219.1(c) ("range of social, economic, and ecological benefits [of National Forests] . . . include clean air and water; habitat for fish, wildlife, and plant communities; and opportunities for recreational spiritual, educational, and cultural benefits"); 66 Fed. Reg. 3244, 3245-47 (Jan. 12, 2001) (Preamble to Roadless Area Conservation Rule describing key ecosystem and other services of roadless National Forest lands).

meeting 21st- century transportation needs. Much of the system is also in a state of serious disrepair: as of 2013, the National Forest road system had a 3.2 billion dollar maintenance backlog.[2]

The 2003 Clearwater National Forest Roads Analysis Process Report (RAP) states that only 22% of the system was maintained to standard. Similarly, according to the 2006 RAP for the Nez Perce National Forest, Congressionally appropriated road maintenance funding was approximately 9% of needed revenue for the classified road system. The assessment to inform this forest planning process stated the following re: the state of funding for the road system:

> An annual need of approximately $6,100,000 was identified as being necessary to maintain Maintenance Level 3 through 5 roads along with major Maintenance Level 2 routes. Appropriated funding for road maintenance was approximately 20% or less at the time of this analysis. This level did not address maintenance needs for the remainder of the Maintenance Level 2 and Maintenance Level 1 roads. Appropriated road funds have since declined by 50% over the last 3 years, which will profoundly affect road access to National Forest System lands.

While well-sited and maintained roads undoubtedly provide important services to society, the adverse ecological and environmental impacts associated with the Forest Service's massive and deteriorating road system are well-documented. Those adverse impacts are long-term, occur at multiple scales, and often extend far beyond the actual "footprint" of the road. The literature review attached as Appendix I surveys the extensive and best-available scientific literature (including the Forest Service's 2000 General Technical Report synthesizing the scientific information on forest roads)[3] on a wide range of road-related impacts to ecosystem processes and integrity on National Forest lands.

For example, erosion, compaction, and other alterations in forest geomorphology and hydrology associated with roads seriously impair water quality and aquatic species viability. *See* Appx. I at 2-4. Roads disturb and fragment wildlife habitat, altering species distribution, interfering with critical life functions such as feeding, breeding, and nesting, and resulting in loss of biodiversity. *See id.* at 4-6. Roads also facilitate increased human intrusion into sensitive areas, resulting in poaching of rare plants and animals, human-ignited wildfires, introduction of exotic species, and damage to archaeological resources. *See id.* at 6, 9 & Att. 1.

Climate change intensifies the adverse impacts associated with roads. For example, as the warming climate alters species distribution and forces wildlife migration, landscape connectivity becomes even more critical to species survival and ecosystem resilience. *See id.* at 9-14.[4] Climate change is also

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[2] USDA, Forest Service, National Forest System Statistics FY 2013, *available at* http://www.fs.fed.us/publications/statistics/nfs-brochure-2013.pdf.

[3] Hermann Gucinski *et al.*, *Forest Roads: A Synthesis of Scientific Information*, Gen. Tech. Rep. PNW-GTR-509 (May 2001), *available at* http://www.fs.fed.us/pnw/pubs/gtr509.pdf.

[4] *See also* USDA, Forest Service, *National Roadmap for Responding to Climate Change*, at 26 (2011), *available at* http://www.fs.fed.us/climatechange/pdf/Roadmapfinal.pdf (recognizing importance of reducing fragmentation and increasing connectivity to facilitate climate change adaptation).

expected to lead to more extreme weather events, resulting in increased flood severity, more frequent landslides, altered hydrographs, and changes in erosion and sedimentation rates and delivery processes. *See* Appx. I at 9. Many National Forest roads, however, were not designed to any engineering standard, making them particularly vulnerable to these climate alterations. And even those designed for storms and water flows typical of past decades may fail under future weather scenarios, further exacerbating adverse ecological impacts, public safety concerns, and maintenance needs.[5]

2. Regulatory Framework

a. National Forest System Road Management

To address its unsustainable and deteriorating road system, the Forest Service promulgated the Roads Rule (referred to as "subpart A") in 2001. 66 Fed. Reg. 3206 (Jan. 12, 2001); 36 C.F.R. part 212, subpart A. The rule directs each National Forest to conduct "a science-based roads analysis," generally referred to as the "travel analysis process" or "TAP." 36 C.F.R. § 212.5(b)(1).[6] Based on that analysis, forests must first "identify the minimum road system needed for safe and efficient travel and for administration, utilization, and protection of National Forest System lands." 36 C.F.R. § 212.5(b)(1). The Rule further defines the minimum road system as:

> the road system determined to be needed [1] to meet resource and other management objectives adopted in the relevant land and resource management plan . . . , [2] to meet applicable statutory and regulatory requirements, [3] to reflect long-term funding expectations, [and 4] to ensure that the identified system minimizes adverse environmental impacts associated with road construction, reconstruction, decommissioning, and maintenance.

Id. Forests must then "identify the roads . . . that are no longer needed to meet forest resource management objectives and that, therefore, should be decommissioned or considered for other uses, such as for trails." *Id.* § 212.5(b)(2).[7]

While subpart A does not impose a timeline for agency compliance with these mandates, the Forest Service Washington Office, through a series of directive memoranda, has ordered forests to complete their TAPs by the end of fiscal year 2015, or lose maintenance funding for any road not analyzed.[8] The

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[5] *See* USDA, Forest Service, *Water, Climate Change, and Forests: Watershed Stewardship for a Changing Climate*, PNW-GTR-812, at 72 (June 2010), *available at* http://www.fs.fed.us/pnw/pubs/pnw_gtr812.pdf.

[6] Forest Service Manual 7712 and Forest Service Handbook 7709.55, Chapter 20 provide detailed guidance on conducting travel analysis.

[7] The requirements of subpart A are separate and distinct from those of the 2005 Travel Management Rule, codified at subpart B of 36 C.F.R. part 212, which address off-highway vehicle use and corresponding resource damage pursuant to Executive Orders 11,644, 37 Fed. Reg. 2877 (Feb. 9, 1972), and 11,989, 42 Fed. Reg. 26,959 (May 25, 1977).

[8] Memorandum from Joel Holtrop to Regional Foresters *et al.* re Travel Management, Implementation of 36 CFR, Part 212, Subpart A (Nov. 10, 2010); Memorandum from Leslie Weldon to Regional Foresters *et al.* re

memoranda articulate an expectation that forests, through the subpart A process, "maintain an appropriately sized and environmentally sustainable road system that is responsive to ecological, economic, and social concerns." They clarify that TAPs must address *all* system roads – not just the small percentage of roads maintained for passenger vehicles to which some forests had limited their previous Roads Analysis Process reports (RAPs) or TAPs. And they require that TAP reports include a list of roads likely not needed for future use.

b. National Forest System Land Management Planning

The 2012 National Forest System Land Management Planning Rule, 36 C.F.R. part 219, guides the development, amendment, and revision of forest plans, with an overarching goal of promoting the ecological integrity and ecological and fiscal sustainability of National Forest lands:

> Plans will guide management of [National Forest System] lands so that they are ecologically sustainable and contribute to social and economic sustainability; consist of ecosystems and watersheds with ecological integrity and diverse plant and animal communities; and have the capacity to provide people and communities with ecosystem services and multiple uses that provide a range of social, economic, and ecological benefits for the present and into the future.

36 C.F.R. § 219.1(c).

To accomplish these ecological integrity and sustainability goals, the rule imposes substantive mandates to establish plan components, including standards and guidelines, that maintain or restore healthy aquatic and terrestrial ecosystems, watersheds, and riparian areas, and air, water, and soil quality. *Id.* § 219.8(a)(1)-(3); *see also id.* § 219.9(a) (corresponding substantive requirement to establish plan components that maintain and restore the diversity of plant and animal communities and support the persistence of native species).[9] The components must be designed "to maintain or restore the structure, function, composition, and connectivity" of terrestrial, riparian, and aquatic ecosystems, *id.* § 219.8(a)(1) & (a)(3)(i); must take into account stressors including climate change, and the ability of ecosystems to adapt to change, *id.* § 219.8(a)(1)(iv); and must implement national best management practices for

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Travel Management, Implementation of 36 CFR, Part 212, Subpart A (Mar. 29, 2012); Memorandum from Leslie Weldon to Regional Foresters *et al.* re Travel Management Implementation (Dec. 17, 2013).

[9] The following types of plan components are required:

1) Desired Conditions describe "specific social, economic, and/or ecological characteristics . . . toward which management of the land and resources should be directed" and must be "specific enough to allow progress toward their achievement to be determined."
2) Objectives are "concise, measurable, and time-specific statement[s] of a desired rate of progress toward a desired condition or conditions . . . based on reasonably foreseeable budgets."
3) Standards are "mandatory constraint[s] on project and activity decisionmaking, established to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements."
4) Guidelines are "constraint[s] on project or activity decisionmaking that allows for departure from its terms, so long as the purpose of the guideline is met."

Id. § 219.7(e)(1).

water quality, *id.* § 219.8(a)(4).[10] In addition, plans must include plan components for "integrated resource management to provide for ecosystem services and multiple uses," taking into account "[a]ppropriate placement and sustainable management of infrastructure, such as recreational facilities and transportation and utility corridors." *Id.* § 219.10(a). Plan components also must ensure social and economic sustainability, including sustainable recreation and access. *Id.* § 219.8(b). The Forest Service must "use the best available scientific information" to comply with these substantive mandates. *Id.* § 219.3.

B. Existing Plan Direction is Inadequate to Comply with Regulatory Requirements.

Existing plan direction fails to meet the substantive requirements of subpart A or the 2012 Planning Rule, and is included in Appendix II for ease of reference.

Though the Nez Perce forest plan direction is an improvement over the Clearwater forest plan direction, both plans emphasize expansion of the road system and fail to offer direction on identifying or achieving a minimum road system, removing unneeded roads, or otherwise promoting sustainable transportation infrastructure that helps maintain and restore ecological integrity. Moreover, current plan direction does not address the effects of climate change, which likely will be dominant in road management decision-making over the life of the revised plan.

Accordingly, the Forest Service may not solely rely on or otherwise incorporate existing plan direction to satisfy its substantive duties under subpart A or the 2012 Planning Rule. As explained below, the revised plan and corresponding NEPA process are the appropriate places to comprehensively assess and provide management direction on the forest road system and to ensure timely compliance with subpart A.

C. The Forest Service Must Address the Road System in its Plan Revision.

1. The Substantive Requirements of the 2012 Planning Rule Require Meaningful Plan Direction on Roads.

The substantive requirements of the 2012 Planning Rule require the Forest Service to comprehensively address the road system in its plan revision. Given the significant aggregate impacts of that system on landscape connectivity, ecological integrity, water quality, species viability and diversity, and other forest resources and ecosystem services, the Forest Service cannot satisfy the rule's substantive requirements without providing management direction for transportation infrastructure. As described above, plans must provide standards and guidelines to maintain and restore ecological integrity, landscape connectivity, water quality, and species diversity. 36 C.F.R. § 219.8(a). Those requirements simply cannot be met absent integrated plan components directed at making the road system considerably more sustainable and resilient to climate change stressors. *See* Forest Service Handbook (FSH) 1909.12, ch. 20, § 23.22o (Feb. 14, 2013 draft) (plan should include "integrated desired conditions" for road system and ecological integrity).

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[10] The rule also requires the Forest Service to establish riparian management zones for which plan components "must ensure that no management practices causing detrimental changes in water temperature or chemical composition, blockages of water courses, or deposits of sediment that seriously and adversely affect water conditions or fish habitat shall be permitted." *Id.* § 219.8(a)(3)(ii)(B).

Plan components also must ensure fiscal sustainability. 36 C.F.R. § 219.8(b); *see also id.* § 219.1(g) (plan components generally must be "within . . . the fiscal capability of the unit"); FSH 1909.12, ch. 20, § 23.22o (plan objectives for road system must "recognize fiscal limitations and relative urgencies"). The forest road system, however, suffers from an extraordinary maintenance backlog of over 3 billion dollars, with inadequately maintained roads more likely to fail, causing corresponding damage to aquatic and other ecological systems and endangering public safety. As stated previously in these comments, the Clearwater only maintained 22% of the system to standard. The situation in the Nez Perce is even more stark, with the forest receiving approximately 9% of the budget needed to maintain the classified road system.

As with ecological integrity and sustainability, the Forest Service cannot satisfy its mandate to achieve fiscal sustainability absent plan components that remedy the unwieldy size and decaying nature of the road system. Recommended plan components to satisfy these substantive mandates and achieve a sustainable minimum road system are discussed below in section I(C)(4).

More generally, the revised plan is the logical and appropriate place to establish a framework for management of the forest road system. Plans "provide[] a framework for integrated resource management and for guiding project and activity decisionmaking." 36 C.F.R. § 219.2(b)(1); *see also id.* § 215(e) (site-specific implementation projects, including travel management plans, must be consistent with plan components). Plans allow the Forest Service to comprehensively evaluate the road system in the context of other aspects of forest management, such as restoration, protection and utilization, and fiscal realities, and to integrate management direction accordingly. Plans also provide and compile regulatory direction at a forest-specific level for compliance with the Clean Water Act, Clean Air Act, Endangered Species Act, and other federal environmental laws relevant to the road system and its environmental impacts. *See id.* § 219.1(f) ("Plans must comply with all applicable laws and regulations . . . ."). And plans allow forest managers and the public to clearly understand the management expectations around the road system and develop strategies accordingly. With frequent turnover in decision-making positions at the forest level, a plan-level management framework for the road system and transportation infrastructure is particularly critical. Moreover, with climate change anticipated to necessitate forest-wide upgrades and reconfigurations of transportation infrastructure, it is especially important that plans provide direction for identifying and achieving an environmentally and fiscally sustainable road system under future climate scenarios.

Lastly, the Forest Service does not have another planning vehicle to direct long-term and forest-wide management of the road system and to ensure compliance with current policy and regulatory direction. Travel Management Plans (TMPs) under subpart B of 36 C.F.R. part 212 are not a substitute for the integrated direction for transportation management that land management plans must provide. The main purpose of TMPs is to designate off-road vehicle use on the existing motorized road and trail system – not to identify a minimum road system pursuant to subpart A, achieve a sustainable transportation system, or otherwise meet the ecological restoration mandates of the 2012 Planning Rule.[11]

2. The Plan Revision Should Address Subpart A.

Complementing the substantive requirements of the 2012 Planning Rule, subpart A requires each National Forest to identify its minimum road system, as well as unneeded roads for decommissioning or conversion to other uses. 36 C.F.R. § 212.5(b)(1)-(2). As explained above, the minimum road system must, among other things, reflect long-term funding expectations. *Id.* § 212.5(b)(1). The Nez Perce-Clearwater NF has yet to comply with these mandates: it has not identified either its minimum road system or its unneeded roads for decommissioning. Moreover, with a significant road maintenance backlog, the existing road system is not reflective of long-term funding expectations and is not sustainable.

The plan revision is the appropriate place to ensure that these requirements will be met over the next 10 to 15 years, and to set standards and guidelines for achieving an environmentally and fiscally sustainable minimum road system through decommissioning or repurposing unneeded roads and upgrading the necessary portions of the system. Subpart A defines the minimum road system as that "needed for safe and efficient travel[;] for administration, utilization, and protection of [forest] lands[; and] to meet resource and other management objectives adopted in the relevant . . . plan." 36 C.F.R. § 212.5(b)(1). With forest plans determining the framework for integrated resource management, direction for identifying and achieving that minimum road system belongs in the forest plan.

Indeed, if the revised plan does not provide plan direction towards achieving a sustainable, minimum road system, it is unlikely that the Forest Service will satisfy the requirements of subpart A during the life of the plan (as evidenced by the lack of direction in the existing plan and the inability of forests to achieve environmentally and fiscally sustainable road systems to date). Forest managers and the public need forest-specific direction on how to achieve the desired minimum road system and ensure its sustainability in the face of climate change, all within realistic fiscal limitations of the unit. The purpose of a forest plan is to provide that direction, and it would be arbitrary for the Forest Service to fail to do so in its plan revision. At the very least, the revised plan must include standards and guidelines that direct compliance with subpart A within a reasonable timeframe following plan adoption.

Recommended plan components to satisfy the requirements of subpart A are discussed below in section I(C)(4).

3. The Forest Service Must Analyze the Road System under the National Environmental Policy Act.

In addition to the requirements of the 2012 Planning Rule and subpart A, the National Environmental Policy Act (NEPA) requires the Forest Service to analyze its road system as part of the forest plan revision process. Because they constitute "major Federal actions significantly affecting the quality of the human

[11] *See, e.g.,* Nez Perce NF Designated Routes and Areas for Motor Vehicle Use Draft DEIS, p. 1. ("The purpose of this planning effort is to meet the intent of the Travel Management Rule (USDA-FS 2005), and determine which routes should be designated for motorized vehicle use by type of vehicle and season of use.").

environment," forest plan revisions require preparation of an environmental impact statement (EIS) under NEPA. 42 U.S.C. § 4332(2)(C); 36 C.F.R. § 219.5(a)(2)(i). The EIS must analyze in depth all "significant issues related to [the plan revision]." 40 C.F.R. § 1501.7; *see also id.* § 1502.1 (an EIS "shall provide full and fair discussion of significant environmental impacts" and "shall focus on significant environmental issues and alternatives"). Management of the forest road system and its significant environmental impacts on a range of forest resources undoubtedly qualifies as a significant issue that must be analyzed in the plan revision EIS.[12]

Importantly, adequate analysis of the forest road system cannot be provided in a piecemeal fashion under other, individual resource topics in the EIS. That approach would preclude comprehensive analysis of the significant impacts associated with the road system and could result in fragmented and conflicting management direction that fails to satisfy the substantive mandates of the 2012 Planning Rule and subpart A.

4. Recommended Plan Components for a Sustainable Road System

The plan components of the revised forest plan should integrate a variety of approaches to satisfy the substantive mandates of the 2012 Planning Rule and subpart A. The following recommendations are based on the best available science, which is summarized in Appendix I. Under the 2012 Planning Rule, the Forest Service is required to formulate plan components based on that science. 36 C.F.R. § 219.3.

Moving towards an environmentally and fiscally sustainable minimum road system requires removal of unneeded roads (both system and non-system) to reduce fragmentation and the long-term ecological and maintenance costs of the system. As discussed in Appendix I at pages 9 and 11, reconnecting islands of unroaded forest lands is one of the most effective actions land managers can take to enhance forests' ability to adapt to climate change. To that end, the revised plan should prioritize reclamation of unauthorized and unneeded roads in roadless areas (both Inventoried Roadless Areas under the 2001 Roadless Area Conservation Rule and newly inventoried areas pursuant to FSH 1909.12, Chapter 70), recommended wilderness areas, important watersheds, and other sensitive ecological and conservation areas.

A sustainable road system also requires maintenance and modification of needed roads and transportation infrastructure to make it more resilient to extreme weather events and other climate stressors. As discussed in Appendix I at pages 10-11, plan components should direct that needed roads be upgraded to standards able to withstand more severe storms and flooding by, for example, replacing under-sized culverts and installing additional outflow structures and drivable dips. Plan components should also prioritize decommissioning of roads that pose significant erosion hazards or are otherwise particularly vulnerable to climate change stressors, and should address barriers to fish passage.

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[12] NEPA analysis as part of a previous travel management planning process under subpart B does not satisfy the Forest Service's duty to comprehensively analyze the impacts of its road system in the EIS for the plan revision. As explained above, the purpose of the TMP is to designate existing roads and trails available for off-road vehicle use, not to identify and provide a framework for a sustainable road system.

In addition to reducing fragmentation and enhancing climate change adaptation, adoption of road density thresholds for important watersheds, migratory corridors and other critical wildlife habitat, and general forest matrix is one of the most effective strategies for achieving an ecologically sustainable road system. *See* Appx. I at 6-8 & Att. 2 (summarizing best available science on road density thresholds for fish and wildlife). Indeed, there is a direct correlation between road density and various markers for species abundance and viability. *See id.* at 7-8. Plan components should incorporate road density thresholds, based on the best available science, as a key tool in achieving a sustainable minimum road system that maintains and restores ecological integrity. In doing so, it is critical that the density thresholds apply to all motorized routes, including closed, non-system, and temporary roads, and motorized trails. *See id.* Att. 2 (describing proper methodology for using road density as a metric for ecological health).

A sustainable road system must also be sized and designed such that it can be adequately maintained under current fiscal limitations. Inadequate road maintenance leads to a host of environmental problems. *See id.* at 14-15. It also increases the fiscal burden of the entire system, since it is much more expensive to fix decayed roads than maintain intact ones, and it endangers and impedes access for forest visitors and users as landslides, potholes, washouts and other failures occur.

To integrate these approaches and satisfy the substantive mandates of the 2012 Planning Rule and subpart A, we recommend the following plan components and elements, which are supported by best available science, as the building blocks of a framework for sustainable management of forest roads and transportation infrastructure:

- *Clearly and comprehensively articulate all regulatory requirements applicable to transportation infrastructure.*

  This could be accomplished in a background section that explains the requirements of subpart A, related implementing memoranda, and other regulatory requirements related to roads management (*e.g.*, U.S. Fish & Wildlife Service critical habitat and other Endangered Species Act requirements; applicable best management practices; Roadless Area Conservation Rule requirements; etc.). The explanation of subpart A must make clear that the Forest Service is required to complete a science-based analysis to identify a minimum road system and unneeded roads for decommissioning or conversion to other uses, and to implement those findings through plan components and subsequent projects.

- *Desired Future Conditions include achievement and maintenance of an appropriately sized and environmentally and fiscally sustainable minimum road system.*

  Desired future conditions include a well-maintained system of needed roads that is fiscally and environmentally sustainable and provides for safe and consistent access for the utilization and protection of the forest. That forest road system is designed and maintained to withstand future storm events associated with climate change and to prioritize passenger vehicle access to major forest attractions. The road system reflects long-term funding expectations. Unneeded roads, including temporary and non-system roads, are reclaimed as soon as practicable to reduce environmental and fiscal costs, with reclamation efforts prioritized in inventoried roadless and other ecologically sensitive areas to enhance ecological integrity and facilitate climate change adaptation. The system meets density standards, based on the best available science, for all motorized routes in important watersheds and wildlife habitat, migratory corridors, and general forest matrix. Road construction, reconstruction, decommissioning, and maintenance activities are designed to minimize adverse environmental impacts.

- *Standards ensure that roads do not impair ecological integrity and otherwise satisfy the substantive requirements of the 2012 Planning Rule and subpart A.*

To ensure ecological integrity and species viability, the plan establishes density standards based on the best available science for all motorized routes in important watersheds, wildlife habitat, and migratory corridors, and for motorized routes in the remainder of the forest. The plan includes a standard that the forest will identify its minimum road system within 3 years of finalizing the plan. The plan includes standards addressing temporary roads: that the Forest Service will track all temporary roads and associated projects and make that information available to the public, and that all temporary roads will be closed and rehabilitated as soon as they are no longer needed for project purposes. The plan includes a standard that all roads, including temporary roads, will comply with applicable and identified Forest Service best management practices for water management. Finally, the plan includes a standard that all management practices and project-level decisions with road-related elements in riparian management zones may not cause detrimental changes in water quality or fish habitat.

- *Guidelines are designed to achieve desired condition:*

    1. Make annual progress toward achieving the minimum road system and motorized route density standards through maintenance, decommissioning, and reclamation.

    2. Within 2 years of identifying the minimum road system, create an implementation strategy for achieving the minimum road system.

    3. Within 3 years of identifying the minimum road system, update the road management objective for each system road and trail to reflect the minimum road system.

    4. Project-level decisions with road-related elements implement TAP recommendations and advance implementation of the minimum road system and motorized route density standards.

    5. Prioritize road decommissioning based on: effectiveness in reducing fragmentation and connecting unroaded areas and improving stream segments, with a focus on inventoried roadless areas, important watersheds, and other sensitive ecological and conservation areas; benefit to species and habitats; and enhancement of visitor experiences.

6. Routes identified as unneeded through the TAP or other processes will be closed, decommissioned, and reclaimed to a stable and more natural condition as soon as practicable.

7. Watershed restoration action plans identify and address road-related impacts to watershed health.

II. Recreation

A. Winter Motorized Recreation

1. Winter Motorized Designations Must Comply with Executive Orders Governing Off-Road Vehicles.

In response to the growing use of off-road vehicles and corresponding environmental damage, Presidents Nixon and Carter issued executive orders mandating that federal land management agencies only permit off-road vehicles, including snowmobiles, on the public lands if certain conditions were met. Exec. Order No. 11,646, 37 Fed. Reg. 2877 (Feb. 9, 1972), *as amended by* Exec. Order No. 11,989, 42 Fed. Reg. 26,959 (May 25, 1977). When designating areas and trails available to off-road vehicle use, agencies must: (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." *Id.* § 3(a).

To ensure compliance with this so-called "minimization criteria" for snowmobiles, the Forest Service's proposed Travel Management Rule for Over-Snow Vehicles (OSV rule) would amend 36 C.F.R. part 212, subpart C to require the designation of roads, trails, and areas where OSV use is allowed, restricted, or prohibited. Proposed Rule, 79 Fed. Reg. 34,678, 34,679 (June 18, 2014). Like summertime travel management planning under subpart B of the regulations, this OSV designation process is ostensibly outside the scope of the forest planning process. However, because the proposed OSV Rule permits the Forest Service to designate large open areas for OSV use, management areas designated under the forest plan revision could conceivably substitute for all or part of the OSV travel planning process contemplated by the proposed rule. To the extent the Forest Service does designate areas available to OSV use in the plan revision, and does not have a comprehensive OSV management plan already in place, it must comply with the minimization criteria in the Executive Orders. *See Wildlands CPR, Inc. v. U.S. Forest Serv.*, 872 F. Supp. 2d 1064, 1081-82 (D. Mont. 2012) (OSV designations in plan for Beaverhead-Deerlodge National Forest must comply with minimization criteria).

2. The Revised Forest Plan Should Adopt a Closed Unless Marked Open Policy.

The proposed OSV rule gives the Forest Service discretion to designate either a system of routes and areas where OSV use is prohibited unless allowed (*i.e.*, "closed unless marked open"), or a system where OSV use is allowed unless prohibited (*i.e.*, "open unless marked closed"). 79 Fed. Reg. at 34,680. To alleviate potential inconsistency between neighboring districts and confusion among the public, the Forest Service should adopt a closed unless marked open approach in its plan revision.

Unlike the alternate approach, a closed unless marked open approach is consistent with the intent of the Executive Orders, which require the Forest Service to demonstrate that impacts to resources have been minimized *before* permitting motorized use. Hence, the only tenable legal approach is to clearly establish that winter motorized travel is permitted only in those places where the Forest Service has verified that sensitive wildlife, such as wolverine, and other forest resources, such as water, air, and soundscapes, will not suffer.

We have learned from our experience with summertime motorized use that a closed unless marked open policy is also the only practical approach. For decades, summer motorized recreation was managed with an inconsistent, ad hoc approach that led to confusion and enforcement difficulties. The Forest Service was (and remains) unable to maintain signage indicating whether motorized access is permitted at all access points. These management difficulties were so significant that the Forest Service in 2005 adopted a nationwide policy that forest lands were closed unless marked open on a map. 36 C.F.R. part 212, subpart B. Absent a consistent approach like that required under subpart B, users simply cannot know whether an area is open unless marked closed or closed unless marked open.

Moreover, an open unless marked closed approach creates an incentive for irresponsible motorized users to remove closure and boundary signs. When the management scheme places the burden on the land manager to maintain signs and barriers that indicate where closure boundaries exist, enforcement necessarily fails and wildlife, natural resources, and other forest users suffer the consequences.

B. The Forest Plan Should Include Enforceable Recreation Opportunity Spectrum Designations

Recreation is the number one use – and number one income-generating use – of our national forests, with approximately 160 million recreation visits each year.[13] According to the assessment completed to inform the forest planning process, approximately 380,000 people visited the forests in 2011 (Forest Planning Assessment, 2014). 50% of those visitors traveled from within a 50-mile radius to access the Forests. The top ten reasons people recreate on the Forests are to gather forest products, relax, drive for pleasure, view natural features, hike, camp, hunt, snowmobile, cross-country ski, and fish (Forest Planning Assessment, 2014). All of these activities depend upon the presence and condition of the natural resources.

To proactively plan for and manage recreation opportunities, the forest plan revision should use the Recreation Opportunity Spectrum (ROS) to establish a system of enforceable recreation zones. ROS categories should not – as they have in the past – result by default based on existing or planned timber, grazing, and other extractive designations. Instead, the Forest Service must proactively prescribe ROS zones for both winter and summer in a way that creates a quality recreation system and experience for

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[13] *See* USDA, Forest Service, *National Visitor Use Monitoring Results, National Summary Report* (May 2013), *available at* http://www.fs.fed.us/recreation/programs/nvum/2012%20National_Summary_Report_061413.pdf.

visitors.[14] The plan revision should include a standard directing that ROS designations are enforceable and must guide future forest management and site-specific decision-making.

C. The Forest Plan Should Not Permit Mechanized Travel Off of Designated Routes.

Bicycle riding is a great way to visit and enjoy the National Forests. However, just like any recreational use, it is important to manage it sustainably. To that end, we recommend that the Forest Service require mountain bikes to stay on a designated system. For the same reasons it makes sense to disallow motorized vehicle use off a designated system – namely, that trails should not be created by users without the benefit of environmental and public review, and that off-trail riding can lead to the creation of unauthorized trails and resource damage – it makes sense to require mountain bikes to stay on a designated system of roads, trails, and open areas. The White River National Forest adopted this position in its recent travel management plan decision.[15]

D. The Forest Plan Should Not Permit Motorized or Mechanized Travel in Recommended Wilderness Areas.

With respect to areas recommended for wilderness designation, the Forest Service may not permit "any use or activity that may reduce the wilderness potential of the area." Forest Service Manual 1923.03. "Activities currently permitted may continue pending designation, if the activities do not compromise the wilderness values of the area." *Id.* Hence, while the Forest Service has discretion to allow motorized and mechanized use in recommended wilderness, it is our experience that allowing incompatible uses in those areas can lead to a reduction in the likelihood that the area will be designated, as the incompatible use becomes accepted and expected. In a recent report, the Idaho Conservation League examined the effects of allowing incompatible modes of access in recommended wilderness areas and concluded that allowing those uses in certain circumstances can lead to a diminishment in wilderness potential.[16] Accordingly, we recommend that the revised forest plan disallow mechanized and motorized uses in recommended wilderness areas.

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[14] The Forest Service has defined summertime ROS settings in a technical guide, but has not, as far as we know, defined wintertime ROS settings in any consistent way. It is important in this planning process to define an appropriate spectrum of winter recreation settings and to allocate them across the forest in a way that provides quality wintertime recreation.

[15] *See* White River National Forest, Travel Management Plan Record of Decision, at 16 (Mar. 2011), *available at* http://a123.g.akamai.net/7/123/11558/abc123/forestservic.download.akamai.com/11558/www/nepa/1118_FSPLT2_048796.pdf ("During the summer season all motorized and mechanized travel is restricted to routes designated for each particular use type – full-sized vehicles, all-terrain vehicles, motorcycles, mountain bikes, and all other mechanized vehicles used for human transport. Other designations include pack and saddle, and foot.").

[16] Idaho Conservation League, *In Need of Protection: How Off-Road Vehicles and Snowmobiles Are Threatening the Forest Service's Recommended Wilderness Areas* (2011) (Attachment III).

Thank you for your consideration of these comments, and we look forward to working with the forests as you move forward with this process. Please let us know if you have questions about any of the concerns that we have raised.

Sincerely,

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Transportation Infrastructure and Access on National Forests and Grasslands
A Literature Review
May 2014

Introduction

The Forest Service transportation system is very large with 374,883 miles (603,316 km) of system roads and 143,346 miles (230,693 km) of system trails. The system extends broadly across every national forest and grasslands and through a variety of habitats, ecosystems and terrains. An impressive body of scientific literature exists addressing the various effects of roads on the physical, biological and cultural environment – so much so, in the last few decades a new field of "road ecology" has emerged. In recent years, the scientific literature has expanded to address the effects of roads on climate change adaptation and conversely the effects of climate change on roads, as well as the effects of restoring lands occupied by roads on the physical, biological and cultural environments.

The following literature review summarizes the most recent thinking related to the environmental impacts of forest roads and motorized routes and ways to address them. The literature review is divided into three sections that address the environmental effects of transportation infrastructure on forests, climate change and infrastructure, and creating sustainable forest transportation systems.

I. Impacts of Transportation Infrastructure and Access to the Ecological Integrity of Terrestrial and Aquatic Ecosystems and Watersheds

It is well understood that transportation infrastructure and access management impact aquatic and terrestrial environments at multiple scales, and, in general, the more roads and motorized routes the greater the impact. In fact, in the past 20 years or so, scientists having realized the magnitude and breadth of ecological issues related to roads; entire books have been written on the topic, e.g., Forman et al. (2003), and a new scientific field called "road ecology" has emerged. Road ecology research centers have been created including the Western

Transportation Institute at Montana State University and the Road Ecology Center at the University of California - Davis.[1]

Below, we provide a summary of the current understanding on the impacts of roads and access allowed by road networks to terrestrial and aquatic ecosystems, drawing heavily on Gucinski et al. (2000). Other notable recent peer-reviewed literature reviews on roads include Trombulak and Frissell (2000), Switalski et al. (2004), Coffin (2007), Fahrig and Rytwinski (2009), and Robinson et al. (2010). Recent reviews on the impact of motorized recreation include Joslin and Youmans (1999), Gaines et al. (2003), Davenport and Switalski (2006), Ouren et al. (2007), and Switalski and Jones (2012). These peer-reviewed summaries provide additional information to help managers develop more sustainable transportation systems

Impact on geomorphology and hydrology

The construction or presence of forest roads can dramatically change the hydrology and geomorphology of a forest system leading to reductions in the quantity and quality of aquatic habitat. While there are several mechanisms that cause these impacts (Wemple et al. 2001 , Figure 1), most fundamentally, compacted roadbeds reduce rainfall infiltration, intercepting and concentrating water, and providing a ready source of sediment for transport (Wemple et al. 1996, Wemple et al. 2001). In fact, roads contribute more sediment to streams than any other land management activity (Gucinski et al. 2000). Surface erosion rates from roads are typically at least an order of magnitude greater than rates from harvested areas, and three orders of magnitude greater than erosion rates from undisturbed forest soils (Endicott 2008).

[1] See http://www.westerntransportationinstitute.org/research/roadecology and http://roadecology.ucdavis.edu/

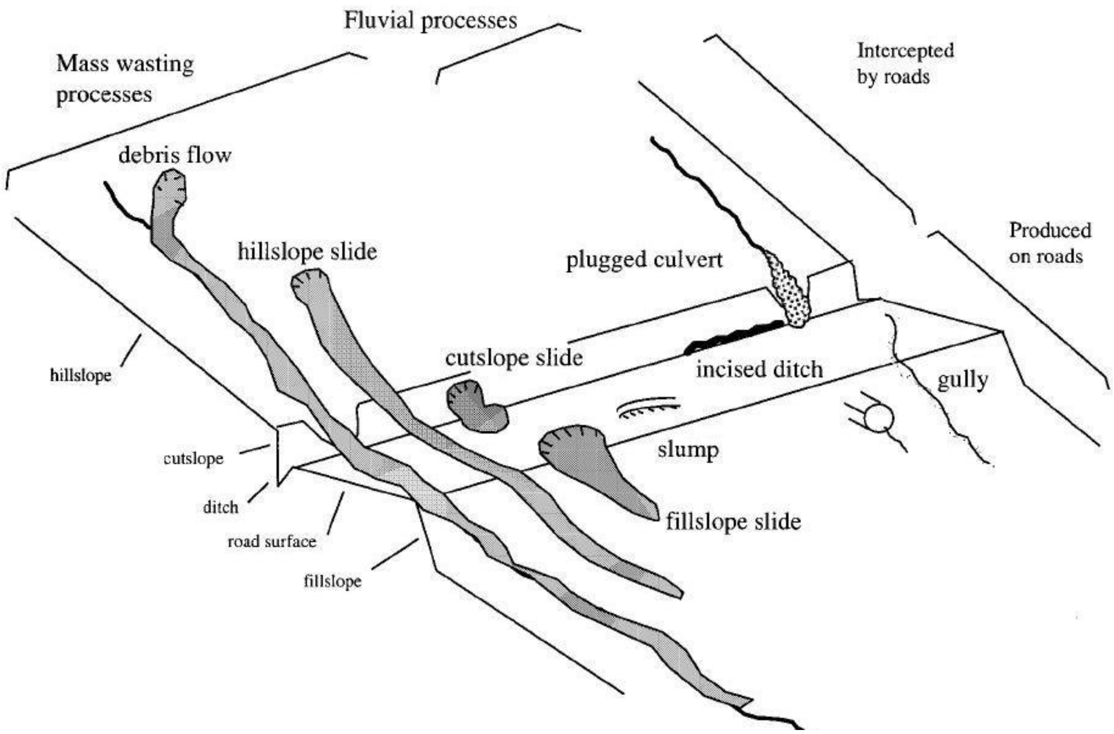

Figure 1: Typology of erosional and depositional features produced by mass-wasting and fluvial processes associate with forest roads (reprinted from Wemple et al. 2001)

Erosion of sediment from roads occurs both chronically and catastrophically. Every time it rains, sediment from the road surface and from cut- and fill-slopes is picked up by rainwater that flows into and on roads (fluvial erosion). The sediment that is entrained in surface flows are often concentrated into road ditches and culverts and directed into streams. The degree of fluvial erosion varies by geology and geography, and increases with increased motorized use (Robichaud et al. 2010). Closed roads produce less sediment, and Foltz et al. (2009) found a significant increase in erosion when closed roads were opened and driven upon.

Roads also precipitate catastrophic failures of road beds and fills (mass wasting) during large storm events leading to massive slugs of sediment moving into waterways (Endicott 2008; Gucinski et al. 2000). This typically occurs when culverts are undersized and cannot handle the volume of water, or they simply become plugged with debris. The saturated roadbed can fail entirely and result in a landslide, or the blocked stream crossing can erode the entire fill down to the original stream channel.

The erosion of road- and trail-related sediment and its subsequent movement into stream systems affects the geomorphology of the drainage system in a number of ways. The magnitude of their effects varies by climate, geology, road age, construction / maintenance practices and storm history. It directly alters channel morphology by embedding larger gravels as well as filling pools. It can also have the opposite effect of increasing peak discharges and scouring channels, which can lead to disconnection of the channel and floodplain, and lowered base flows (Furniss et al. 1991; Joslin and Youmans 1999). The width/depth ratio of the stream changes which then can trigger changes in water temperature, sinuosity and other geomorphic factors important for aquatic species survival (Joslin and Youmans 1999; Trombulak and Frissell 2000).

Roads also can modify flowpaths in the larger drainage network. Roads intercept subsurface flow as well as concentrate surface flow, which results in new flowpaths that otherwise would not exist, and the extension of the drainage network into previously unchannelized portions of the hillslope (Gucinski et al. 2000; Joslin and Youmans 1999). Severe aggradation of sediment at stream structures or confluences can force streams to actually go subsurface or make them too shallow for fish passage (Endicott 2008; Furniss et al. 1991).

Impacts on aquatic habitat and fish

Roads can have dramatic and lasting impacts on fish and aquatic habitat. Increased sedimentation in stream beds has been linked to decreased fry emergence, decreased juvenile densities, loss of winter carrying capacity, and increased predation of fishes, and reductions in macro-invertebrate populations that are a food source to many fish species (Rhodes et al. 1994, Joslin and Youmans 1999, Gucinski et al. 2000, Endicott 2008). On a landscape scale, these effects can add up to: changes in the frequency, timing and magnitude of disturbance to aquatic habitat and changes to aquatic habitat structures (e.g., pools, riffles, spawning gravels and in-channel debris), and conditions (food sources, refugi, and water temperature) (Gucinski et al. 2000).

Roads can also act as barriers to migration (Gucinski et al. 2000). Where roads cross streams, road engineers usually place culverts or bridges. Culverts in particular can and often interfere with sediment transport and channel processes such that the road/stream crossing becomes a barrier for fish and aquatic species movement up and down stream. For instance, a culvert may scour on the downstream side of the crossing, actually forming a waterfall up which fish cannot move. Undersized culverts and bridges can infringe upon the channel or floodplain and trap sediment causing the stream to become too shallow and/or warm such that fish will not migrate past the structure. This is problematic for many aquatic species but especially for anadromous species that must migrate upstream to spawn. Well-known native aquatic species affected by roads include salmon such as coho (*Oncorhynchus kisutch*), chinook (*O. tshawytscha*), and chum (*O. keta*); steelhead (*O. mykiss*); and a variety of trout species including bull trout (*Salvelinus confluentus*) and cutthroat trout (*O. clarki*), as well as other native fishes and amphibians (Endicott 2008).

Impacts on terrestrial habitat and wildlife

Roads and trails impact wildlife through a number of mechanisms including: direct mortality (poaching, hunting/trapping) changes in movement and habitat use patterns (disturbance/avoidance), as well as indirect impacts including alteration of the adjacent habitat and interference with predatory/prey relationships (Wisdom et al. 2000, Trombulak and Frissell 2000). Some of these impacts result from the road itself, and some result from the uses on and around the roads (access). Ultimately, roads have been found to reduce the abundance and distribution of several forest species (Fayrig and Ritwinski 2009, Benítez-López et al. 2010).

Table 1: Road- and recreation trail-associated factors for wide-ranging carnivores (Reprinted from Gaines et al. (2003)[2]

[2] For a list of citations see Gaines et al. (2003)

Focal species	Road-associated factors	Motorized trail-associated factors	Nonmotorized trail-associated factors
Grizzly bear	Poaching Collisions Negative human interactions Displacement or avoidance	Poaching Negative human interactions Displacement or avoidance	Poaching Negative human interactions Displacement or avoidance
Lynx	Down log reduction Trapping Collisions Disturbance at a specific site	Disturbance at a specific site Trapping	Disturbance at a specific site
Gray wolf	Trapping Poaching Collisions Negative human interactions Disturbance at a specific site Displacement or avoidance	Trapping Disturbance at a specific site	Trapping Disturbance at a specific site
Wolverine	Down log reduction Trapping Disturbance at a specific site Collisions	Trapping Disturbance at a specific site	Trapping Disturbance at a specific site

Direct mortality and disturbance from road and trail use impacts many different types of species. For example, wide-ranging carnivores can be significantly impacted by a number of factors including trapping, poaching, collisions, negative human interactions, disturbance and displacement (Gaines et al. 2003, Table 1). Hunted game species such as elk (*Cervus canadensis*), become more vulnerable from access allowed by roads and motorized trails resulting in a reduction in effective habitat among other impacts (Rowland et al. 2005, Switalski and Jones 2012). Slow-moving migratory animals such as amphibians, and reptiles who use roads to regulate temperature are also vulnerable (Gucinski et al. 2000, Brehme et al. 2013).

Habitat alteration is a significant consequence of roads as well. At the landscape scale, roads fragment habitat blocks into smaller patches that may not be able to support successfully interior forest species. Smaller habitat patches also results in diminished genetic variability, increased inbreeding, and at times local extinctions (Gucinski et al. 2000; Trombulak and Frissell 2000). Roads also change the composition and structure of ecosystems along buffer zones, called edge-affected zones. The width of edge-affected zones varies by what metric is being discussed; however, researchers have documented road-avoidance zones a kilometer or more away from a road (Table 2). In heavily roaded landscapes, edge-affected acres can be a significant fraction of total acres. For example, in a landscape area where the road density is 3 mi/mi^2 (not an uncommon road density in national forests) and where the edge-affected zone is estimated to be 500 ft from the center of the road to each side, the edge-affected zone is 56% of the total acreage.

Table 2: A summary of some documented road-avoidance zones for various species (adapted from Robinson et al. 2010).

Species	Avoidance zone m (ft)	Type of disturbance	Reference
Snakes	650 (2133)	Forestry roads	Bowles (1997)
Salamander	35 (115)	Narrow forestry road, light traffic	Semlitsch (2003)
Woodland birds	150 (492)	Unpaved roads	Ortega and Capen (2002)
Spotted owl	400 (1312)	Forestry roads, light traffic	Wasser et al. (1997)
Marten	<100 (<328)	Any forest opening	Hargis et al. (1999)
Elk	500–1000 (1640-3281)	Logging roads, light traffic	Edge and Marcum (1985)
	100–300 (328-984)	Mountain roads depending on traffic volume	Rost and Bailey (1979)
Grizzly bear	3000 (9840)	Fall	Mattson et al. (1996)
	500 (1640)	Spring and summer	
	883 (2897)	Heavily traveled trail	Kasworm and Manley (1990)
	274 (899)	Lightly traveled trail	
	1122 (3681)	Open road	Kasworm and Manley (1990)
	665 (2182)	Closed road	
Black bear	274 (899)	Spring, unpaved roads	Kasworm and Manley (1990)
	914 (2999)	Fall, unpaved roads	

Roads and trails also affect ecosystems and habitats because they are also a major vector of non-native plant and animal species. This can have significant ecological and economic impacts when the invading species are aggressive and can overwhelm or significantly alter native species and systems. In addition, roads can increase harassment, poaching and collisions with vehicles, all of which lead to stress or mortality (Wisdom et al. 2000).

Recent reviews have synthesized the impacts of roads on animal abundance and distribution. Fahrig and Rytwinski (2009) did a complete review of the empirical literature on effects of roads and traffic on animal abundance and distribution looking at 79 studies that addressed 131 species and 30 species groups. They found that the number of documented negative effects of roads on animal abundance outnumbered the number of positive effects by a factor of 5. Amphibians, reptiles, most birds tended to show negative effects. Small mammals generally showed either positive effects or no effect, mid-sized mammals showed either negative effects or no effect, and large mammals showed predominantly negative effects. Benítez-López et al. (2010) conducted a meta-analysis on the effects of roads and infrastructure proximity on mammal and bird populations. They found a significant pattern of avoidance and a reduction in bird and mammal populations in the vicinity of infrastructure.

Road density[3] thresholds for fish and wildlife

[3] We intend the term "road density" to refer to the density all roads within national forests, including system roads, closed roads, non-system roads administered by other jurisdictions (private, county, state), temporary roads and motorized trails. Please see Attachment 2 for the relevant existing scientific information supporting this approach.

It is well documented that beyond specific road density thresholds, certain species will be negatively affected, and some will be extirpated. Most studies that look into the relationship between road density and wildlife focus on the impacts to large endangered carnivores or hunted game species, although high road densities certainly affect other species – for instance, reptiles and amphibians. Gray wolves (*Canis lupus*) in the Great Lakes region and elk in Montana and Idaho have undergone the most long-term and in depth analysis. Forman and Hersperger (1996) found that in order to maintain a naturally functioning landscape with sustained populations of large mammals, road density must be below 0.6 km/km^2 (1.0 mi/mi^2). Several studies have since substantiated their claim (Robinson et al. 2010, Table 3).

A number of studies at broad scales have also shown that higher road densities generally lead to greater impacts to aquatic habitats and fish density (Table 3). Carnefix and Frissell (2009) provide a concise review of studies that correlate cold water fish abundance and road density, and from the cited evidence concluded that "1) no truly "safe" threshold road density exists, but rather negative impacts begin to accrue and be expressed with incursion of the very first road segment; and 2) highly significant impacts (e.g., threat of extirpation of sensitive species) are already apparent at road densities on the order of 0.6 km/km^2 (1.0 mi/mi^2) or less" (p. 1).

Table 3: A summary of some road-density thresholds and correlations for terrestrial and aquatic species and ecosystems (reprinted from Robinson et al. 2010).

Species (Location)	Road density (mean, guideline, threshold, correlation)	Reference
Wolf (Minnesota)	0.36 km/km2 (mean road density in primary range); 0.54 km/km^2 (mean road density in peripheral range)	Mech et al. (1988)
Wolf	>0.6 km/km^2 (absent at this density)	Jalkotzy et al. (1997)
Wolf (Northern Great Lakes region)	>0.45 km/km^2 (few packs exist above this threshold); >1.0 km/km^2 (no pack exist above this threshold)	Mladenoff et al. (1995)
Wolf (Wisconsin)	0.63 km/km^2 (increasing due to greater human tolerance	Wydeven et al. (2001)
Wolf, mountain lion (Minnesota, Wisconsin, Michigan)	0.6 km/km^2 (apparent threshold value for a naturally functioning landscape containing sustained populations)	Thiel (1985); van Dyke et al. (1986); Jensen et al. (1986); Mech et al. (1988); Mech (1989)
Elk (Idaho)	1.9 km/km^2 (density standard for habitat effectiveness)	Woodley 2000 cited in Beazley et al. 2004
Elk (Northern US)	1.24 km/km^2 (habitat effectiveness decline by at least 50%)	Lyon (1983)
Elk, bear, wolverine, lynx, and others	0.63 km/km^2 (reduced habitat security and increased mortality)	Wisdom et al. (2000)
Moose (Ontario)	0.2-0.4 km/km2 (threshold for pronounced response)	Beyer et al. (2013)
Grizzly bear (Montana)	>0.6 km/km^2	Mace et al. (1996); Mattson et al. (1996)
Black bear (North Carolina)	>1.25 km/km^2 (open roads); >0.5 km/km2 (logging roads); (interference with use of habitat)	Brody and Pelton (1989)
Black bear	0.25 km/km^2 (road density should not exceed)	Jalkotzy et al. (1997)
Bobcat (Wisconsin)	1.5 km/km^2 (density of all road types in home range)	Jalkotzy et al. (1997)

Large mammals	>0.6 km/km^2 (apparent threshold value for a naturally functioning landscape containing sustained popula-tions)	Forman and Hersperger (1996)
Bull trout (Montana)	Inverse relationship of population and road density	Rieman et al. (1997); Baxter et al. (1999)
Fish populations (Medicine Bow National Forest)	(1) Positive correlation of numbers of culverts and stream crossings and amount of fine sediment in stream channels (2) Negative correlation of fish density and numbers of culverts	Eaglin and Hubert (1993) cited in Gucinski et al. (2001)
Macroinvertebrates	Species richness negatively correlated with an index of road density	McGurk and Fong (1995)
Non-anadromous salmonids (Upper Columbia River basin)	(1) Negative correlation likelihood of spawning and rearing and road density (2) Negative correlation of fish density and road density	Lee et al. (1997)

Where both stream and road densities are high, the incidence of connections between roads and streams can also be expected to be high, resulting in more common and pronounced effects of roads on streams (Gucinski et al. 2000). For example, a study on the Medicine Bow National Forest (WY) found as the number of culverts and stream crossings increased, so did the amount of sediment in stream channels (Eaglin and Hubert 1993). They also found a negative correlation with fish density and the number of culverts. Invertebrate communities can also be impacted. McGurk and Fong (1995) report a negative correlation between an index of road density with macroinvertebrate diversity.

The U.S. Fish and Wildlife Service's Final Rule listing bull trout as threatened (USDI Fish and Wildlife Service 1999) addressed road density, stating:

> "… assessment of the interior Columbia Basin ecosystem revealed that increasing road densities were associated with declines in four non-anadromous salmonid species (bull trout, Yellowstone cutthroat trout, westslope cutthroat trout, and redband trout) within the Columbia River Basin, likely through a variety of factors associated with roads (Quigley & Arbelbide 1997). Bull trout were less likely to use highly roaded basins for spawning and rearing, and if present, were likely to be at lower population levels (Quigley and Arbelbide 1997). Quigley et al. (1996) demonstrated that when average road densities were between 0.4 to 1.1 km/km^2 (0.7 and 1.7 mi/mi^2) on USFS lands, the proportion of subwatersheds supporting "strong" populations of key salmonids dropped substantially. Higher road densities were associated with further declines" (USDI Fish and Wildlife Service 1999, p. 58922).

Anderson et al. (2012) also showed that watershed conditions tend to be best in areas protected from road construction and development. Using the US Forest Service's Watershed Condition Framework assessment data, they showed that National Forest lands that are protected under the Wilderness Act, which provides the strongest safeguards, tend to have the healthiest watersheds. Watersheds in Inventoried Roadless Areas – which are protected from road building and logging by the Roadless Area Conservation Rule – tend to be less healthy than watersheds in designated Wilderness, but they are considerably healthier than watersheds in the managed landscape.

Impacts on other resources
Roads and motorized trails also play a role in affecting wildfire occurrence. Research shows that human-ignited wildfires, which account for more than 90% of fires on national lands, is almost five times more likely in areas with roads (USDA Forest Service 1996a; USDA Forest Service 1998). Furthermore, Baxter (2002) found that off-road vehicles (ORVs) can be a significant source of fire ignitions on forestlands. Roads can affect where and how forests burn and, by extension, the vegetative condition of the forest. See Attachment 1 for more information documenting the relationship between roads and wildfire occurrence.

Finally, access allowed by roads and trails can increase of ORV and motorized use in remote areas threatening archaeological and historic sites. Increased visitation has resulted in intentional and unintentional damage to many cultural sites (USDI Bureau of Land Management 2000, Schiffman 2005).

II. Climate Change and Transportation Infrastructure including the value of roadless areas for climate change adaptation

As climate change impacts grow more profound, forest managers must consider the impacts on the transportation system as well as from the transportation system. In terms of the former, changes in precipitation and hydrologic patterns will strain infrastructure at times to the breaking point resulting in damage to streams, fish habitat, and water quality as well as threats to public safety. In terms of the latter, the fragmenting effect of roads on habitat will impede the movement of species which is a fundamental element of adaptation. Through planning, forest managers can proactively address threats to infrastructure, and can actually enhance forest resilience by removing unneeded roads to create larger patches of connected habitat.

Impact of climate change and roads on transportation infrastructure
It is expected that climate change will be responsible for more extreme weather events, leading to increasing flood severity, more frequent landslides, changing hydrographs (peak, annual mean flows, etc.), and changes in erosion and sedimentation rates and delivery processes. Roads and trails in national forests, if designed by an engineering standard at all, were designed for storms and water flows typical of past decades, and hence may not be designed for the storms in future decades. Hence, climate driven changes may cause transportation infrastructure to malfunction or fail (ASHTO 2012, USDA Forest Service 2010). The likelihood is higher for facilities in high-risk settings—such as rain-on-snow zones, coastal areas, and landscapes with unstable geology (USDA Forest Service 2010).

Forests fragmented by roads will likely demonstrate less resistance and resilience to stressors, like those associated with climate change (Noss 2001). First, the more a forest is fragmented (and therefore the higher the edge/interior ratio), the more the forest loses its inertia characteristic, and becoming less resilient and resistant to climate change. Second, the more a forest is fragmented characterized by isolated patches, the more likely the fragmentation will interfere with the ability of species to track shifting climatic conditions over time and space. Noss (2001) predicts that weedy species with effective dispersal mechanisms might benefit from fragmentation at the expense of native species.

Modifying infrastructure to increase resilience

To prevent or reduce road failures, culvert blow-outs, and other associated hazards, forest managers will need to take a series of actions. These include replacing undersized culverts with larger ones, prioritizing maintenance and upgrades (e.g., installing drivable dips and more outflow structures), and obliterating roads that are no longer needed and pose erosion hazards (USDA Forest Service 2010, USDA Forest Service 2012a, USDA Forest Service 2011, Table 4).

Olympic National Forest has developed a number of documents oriented at oriented at protecting watershed health and species in the face of climate change, including a 2003 travel management strategy and a report entitled Adapting to Climate Change in Olympic National Park and National Forest. In the travel management strategy, Olympic National Forest recommended that 1/3rd of its road system be decommissioned and obliterated (USDA Forest Service 2011a). In addition, the plan called for addressing fish migration barriers in a prioritized and strategic way – most of these are associated with roads. The report calls for road decommissioning, relocation of roads away from streams, enlarging culverts as well as replacing culverts with fish-friendly crossings (USDA Forest Service 2011a, Table 4).

Table 4: Current and expected sensitivities of fish to climate change on the Olympic Peninsula, associated adaptation strategies and action for fisheries and fish habitat management and relevant to transportation management at Olympic National Forest and Olympic National Park (excerpt reprinted from USDA Forest Service 2011a).

Current and expected sensitivites	**Adaptation strategies and actions**
Changes in habitat quantity and quality	• Implement habitat restoration projects that focus on re-creating watershed processes and functions and that create diverse, resilient habitat.
Increase in culvert failures, fill-slope failures, stream adjacent road failures, and encroachment from stream-adjacent road segments	• Decommission unneeded roads. • Remove sidecast, improve drainage, and increase culvert sizing on remaining roads. • Relocate stream-adjacent roads.
Greater difficulty disconnecting roads from stream channels	• Design more resilient stream crossing structures.
Major changes in quantity and timing of streamflow in transitional watersheds	• Make road and culvert designs more conservative in transitional watersheds to accommodate expected changes.
Decrease in area of headwater streams	• Continue to correct culvert fish passage barriers. • Consider re-prioritizing culvert fish barrier correction projects.
Decrease in habitat quantity and connectivity for species that use headwater streams	• Restore habitat in degraded headwater streams that are expected to retain adequate summer streamflow (ONF).

In December 2012, the USDA Forest Service published a report entitled “Assessing the Vulnerability of Watersheds to Climate Change.” This document reinforces the concept expressed by Olympic National Forest that forest managers need to be proactive in reducing erosion potential from roads:

> "Road improvements were identified as a key action to improve condition and resilience of watersheds on all the pilot Forests. In addition to treatments that reduce erosion, road improvements can reduce the delivery of runoff from road segments to channels, prevent diversion of flow during large events, and restore aquatic habitat connectivity by providing for passage of aquatic organisms. As stated previously, watershed sensitivity is determined by both inherent and management-related factors. Managers have no control over the inherent factors, so to improve resilience, efforts must be directed at anthropogenic influences such as instream flows, roads, rangeland, and vegetation management….
>
> [Watershed Vulnerability Analysis] results can also help guide implementation of travel management planning by informing priority setting for decommissioning roads and road reconstruction/maintenance. As with the Ouachita NF example, disconnecting roads from the stream network is a key objective of such work. Similarly, WVA analysis could also help prioritize aquatic organism passage projects at road-stream crossings to allow migration by aquatic residents to suitable habitat as streamflow and temperatures change" (USDA Forest Service 2012a, p. 22-23).

Reducing fragmentation to enhance aquatic and terrestrial species adaptation
Decommissioning and upgrading roads and thus reducing the amount of fine sediment deposited on salmonid nests can increase the likelihood of egg survival and spawning success (McCaffery et al. 2007). In addition, this would reconnect stream channels and remove barriers such as culverts. Decommissioning roads in riparian areas may provide further benefits to salmon and other aquatic organisms by permitting reestablishment of streamside vegetation, which provides shade and maintains a cooler, more moderated microclimate over the stream (Battin et al. 2007).

One of the most well documented impacts of climate change on wildlife is a shift in the ranges of species (Parmesan 2006). As animals migrate, landscape connectivity will be increasingly important (Holman et al. 2005). Decommissioning roads in key wildlife corridors will improve connectivity and be an important mitigation measure to increase resiliency of wildlife to climate change. For wildlife, road decommissioning can reduce the many stressors associated with roads. Road decommissioning restores habitat by providing security and food such as grasses and fruiting shrubs for wildlife (Switalski and Nelson 2011).

Forests fragmented by roads and motorized trail networks will likely demonstrate less resistance and resilience to stressors, such as weeds. As a forest is fragmented and there is more edge habitat, Noss (2001) predicts that weedy species with effective dispersal mechanisms will increasingly benefit at the expense of native species. However, decommissioned roads when seeded with native species can reduce the spread of invasive species (Grant et al. 2011), and help restore fragmented forestlands. Off-road vehicles with large knobby tires and large undercarriages are also a key vector for weed spread (e.g., Rooney 2006). Strategically closing and decommissioning motorized routes, especially in roadless areas, will reduce the spread of weeds on forestlands (Gelbard and Harrison 2003).

Transportation infrastructure and carbon sequestration
The topic of the relationship of road restoration and carbon has only recently been explored. There is the potential for large amounts of carbon (C) to be sequestered by reclaiming roads. When roads are decompacted during reclamation, vegetation and soils can develop more

rapidly and sequester large amounts of carbon. A recent study estimated total soil C storage increased 6 fold to 6.5 x 107g C/km (to 25 cm depth) in the northwestern US compared to untreated abandoned roads (Lloyd et al. 2013). Another recent study concluded that reclaiming 425 km of logging roads over the last 30 years in Redwood National Park in Northern California resulted in net carbon savings of 49,000 Mg carbon to date (Madej et al. 2013, Table 5).

Kerekvliet et al. (2008) published a Wilderness Society briefing memo on the impact to carbon sequestration from road decommissioning. Using Forest Service estimates of the fraction of road miles that are unneeded, the authors calculated that restoring 126,000 miles of roads to a natural state would be equivalent to revegetating an area larger than Rhode Island. In addition, they calculate that the net economic benefit of road treatments are always positive and range from US$0.925-1.444 billion.

Table 5. Carbon budget implications in road decommissioning projects (reprinted from Madej et al. 2013).

Road Decommissioning Activities and Processes	Carbon Cost	Carbon Savings
Transportation of staff to restoration sites (fuel emissions)	X	
Use of heavy equipment in excavations (fuel emissions)	X	
Cutting trees along road alignment during hillslope recontouring	X	
Excavation of road fill from stream crossings		X
Removal of road fill from unstable locations		X
Reduces risk of mass movement		X
Post-restoration channel erosion at excavation sites	X	
Natural revegetation following road decompaction		X
Replanting trees		X
Soil development following decompaction		X

Benefits of roadless areas and roadless area networks to climate change adaptation
Undeveloped natural lands provide numerous ecological benefits. They contribute to biodiversity, enhance ecosystem representation, and facilitate connectivity (Loucks et al. 2003; Crist and Wilmer 2002, Wilcove 1990, The Wilderness Society 2004, Strittholt and Dellasala 2001, DeVelice and Martin 2001), and provide high quality or undisturbed water, soil and air (Anderson et al. 2012, Dellasalla et al. 2011). They also can serve as ecological baselines to help us better understand our impacts to other landscapes, and contribute to landscape resilience to climate change.

Forest Service roadless lands, in particular, are heralded for the conservation values they provide. These are described at length in the preamble of the Roadless Area Conservation Rule (RACR)[4] as well as in the Final Environmental Impact Statement (FEIS) for the RACR[5], and

[4] Federal Register .Vol. 66, No. 9. January 12, 2001. Pages 3245-3247.

include: high quality or undisturbed soil, water, and air; sources of public drinking water; diversity of plant and animal communities; habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land; primitive, semi-primitive non- motorized, and semi-primitive motorized classes of dispersed recreation; reference landscapes; natural appearing landscapes with high scenic quality; traditional cultural properties and sacred sites; and other locally identified unique characteristics (e.g., include uncommon geological formations, unique wetland complexes, exceptional hunting and fishing opportunities).

The Forest Service, National Park Service, and US Fish and Wildlife Service recognize that protecting and connecting roadless or lightly roaded areas is an important action agencies can take to enhance climate change adaptation. For example, the Forest Service National Roadmap for Responding to Climate Change (USDA Forest Service 2011b) establishes that increasing connectivity and reducing fragmentation are short and long term actions the Forest Service should take to facilitate adaptation to climate change.[6] The National Park Service also identifies connectivity as a key factor for climate change adaptation along with establishing "blocks of natural landscape large enough to be resilient to large-scale disturbances and long-term changes" and other factors. The agency states that: "The success of adaptation strategies will be enhanced by taking a broad approach that identifies connections and barriers across the landscape. Networks of protected areas within a larger mixed landscape can provide the highest level of resilience to climate change."[7] Similarly, the National Fish, Wildlife and Plants Climate Adaptation Partnership's Adaptation Strategy (2012) calls for creating an ecologically-connected network of conservation areas.[8]

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[5] Final Environmental Impact Statement, Vol. 1, 3–3 to 3–7

[6] Forest Service, 2011. *National Roadmap for Responding to Climate Change*. US Department of Agriculture. FS-957b. Page 26.

[7] National Park Service. *Climate Change Response Program Brief.* http://www.nature.nps.gov/climatechange/adaptationplanning.cfm. Also see: National Park Service, 2010. *Climate Change Response Strategy*. http://www.nature.nps.gov/climatechange/docs/NPS_CCRS.pdf. Objective 6.3 is to "Collaborate to develop cross-jurisdictional conservation plans to protect and restore connectivity and other landscape-scale components of resilience."

[8] See http://www.wildlifeadaptationstrategy.gov/pdf/NFWPCAS-Chapter-3.pdf. Pages 55- 59. The first goal and related strategies are:

> Goal 1: Conserve habitat to support healthy fish, wildlife, and plant populations and ecosystem functions in a changing climate.
>
>> Strategy 1.1: identify areas for an ecologically-connected network of terrestrial, freshwater, coastal, and marine conservation areas that are likely to be resilient to climate change and to support a broad range of fish, wildlife, and plants under changed conditions.
>>
>> Strategy 1.2: Secure appropriate conservation status on areas identified in Strategy 1.1 to complete an ecologically-connected network of public and private conservation areas that will be resilient to climate change and support a broad range of species under changed conditions.
>>
>> Strategy 1.4: Conserve, restore, and as appropriate and practicable, establish new ecological connections among conservation areas to facilitate fish, wildlife, and plant migration, range shifts, and other transitions caused by climate change.

Crist and Wilmer (2002) looked at the ecological value of roadless lands in the Northern Rockies and found that protection of national forest roadless areas, when added to existing federal conservation lands in the study area, would 1) increase the representation of virtually all land cover types on conservation lands at both the regional and ecosystem scales, some by more than 100%; 2) help protect rare, species-rich, and often-declining vegetation communities; and 3) connect conservation units to create bigger and more cohesive habitat "patches."

Roadless lands also are responsible for higher quality water and watersheds. Anderson et al. (2012) assessed the relationship of watershed condition and land management status and found a strong spatial association between watershed health and protective designations. Dellasalla et al. (2011) found that undeveloped and roadless watersheds are important for supplying downstream users with high-quality drinking water, and developing these watersheds comes at significant costs associated with declining water quality and availability. The authors recommend a light-touch ecological footprint to sustain the many values that derive from roadless areas including healthy watersheds.

III. Sustainable Transportation Management in National Forests as Part of Ecological Restoration

At 375,000 miles strong, the Forest Service road system is one of the largest in the world – it is eight times the size of the National Highway System. It is also indisputably unsustainable – that is, roads are not designed, located, or maintained according to best management practices, and environmental impacts are not minimized. It is largely recognized that forest roads, especially unpaved ones, are a primary source of sediment pollution to surface waters (Endicott 2008, Gucinski et al. 2000), and that the system has about 1/3rd more miles than it needs (USDA Forest Service 2001). In addition, the majority of the roads were constructed decades ago when road design and management techniques did not meet current standards (Gucinski et al. 2000, Endicott 2008), making them more vulnerable to erosion and decay than if they had been designed today. Road densities in national forests often exceed accepted thresholds for wildlife.

Only a small portion of the road system is regularly used. All but 18% of the road system is inaccessible to passenger vehicles. Fifty-five percent of the roads are accessible only by high clearance vehicles and 27% are closed. The 18% that is accessible to cars is used for about 80% of the trips made within National Forests.[9] Most of the road maintenance funding is directed to the passenger car roads, while the remaining roads suffer from neglect. As a result, the Forest Service currently has a $3.7 billion road maintenance backlog that grows every year. In other words, only about 1/5th of the roads in the national forest system are used most of the time, and the fraction that is used often is the best designed and maintained because they are higher level access roads. The remaining roads sit generally unneeded and under-maintained – arguably a growing ecological and fiscal liability.

Current Forest Service management direction is to identify and implement a sustainable transportation system.[10] The challenge for forest managers is figuring out what is a sustainable road system and how to achieve it – a challenge that is exacerbated by climate change. It is

[9] USDA Forest Service. Road Management Website Q&As. Available online at http://www.fs.fed.us/eng/road_mgt/qanda.shtml.

[10] See Forest Service directive memo dated March 29, 2012 entitled "Travel Management, Implementation of 36 CFR, Part 202, Subpart A (36 CFR 212.5(b))"

reasonable to define a sustainable transportation system as one where all the routes are constructed, located, and maintained with best management practices, and social and environmental impacts are minimized. This, of course, is easier said than done, since the reality is that even the best roads and trail networks can be problematic simply because they exist and usher in land uses that without the access would not occur (Trombulak and Frissell 2000, Carnefix and Frissell 2009, USDA Forest Service 1996b), and when they are not maintained to the designed level they result in environmental problems (Endicott 2008; Gucinski et al. 2000). Moreover, what was sustainable may no longer be sustainable under climate change since roads designed to meet older climate criteria may no longer hold up under new climate scenarios (USDA Forest Service 2010, USDA Forest Service 2011b, USDA Forest Service 2012a, AASHTO 2012).

Forest Service efforts to move toward a more sustainable transportation system
The Forest Service has made efforts to make its transportation system more sustainable, but still has considerable work to do. In 2001, the Forest Service tried to address the issue by promulgating the Roads Rule[11] with the purpose of working toward a sustainable road system (USDA 2001). The Rule directed every national forest to identify a minimum necessary road system and identify unneeded roads for decommissioning. To do this, the Forest Service developed the Roads Analysis Process (RAP), and published Gucinski et al. (2000) to provide the scientific foundation to complement the RAP. In describing the RAP, Gucinski et al. (2000) writes:

> "Roads Analysis is intended to be an integrated, ecological, social, and economic approach to transportation planning. It uses a multiscale approach to ensure that the identified issues are examined in context. Roads Analysis is to be based on science. Analysts are expected to locate, correctly interpret, and use relevant existing scientific literature in the analysis, disclose any assumptions made during the analysis, and reveal the limitations of the information on which the analysis is based. The analysis methods and the report are to be subjected to critical technical review" (p. 10).

Most national forests have completed RAPs, although most only looked at passenger vehicle roads which account for less than 20% of the system's miles. The Forest Service Washington Office in 2010 directed that forests complete a Travel Analysis Process (TAP) by the end of fiscal year 2015, which must address all roads and create a map and list of roads identifying which are likely needed and which are not. Completed TAPs will provide a blueprint for future road decommissioning and management, they will not constitute compliance with the Roads Rule, which clearly requires the identification of the minimum roads system and roads for decommissioning. Almost all forests have yet to comply with subpart A.

The Forest Service in 2005 then tried to address the off-road portion of this issue by promulgating subpart B of the Travel Managemenr Rule,[12] with the purpose of curbing the most serious impacts associated with off-road vehicle use. Without a doubt, securing summer-time travel management plans was an important step to curbing the worst damage. However, much work remains to be done to approach sustainability, especially since many national forests used the travel management planning process to simply freeze the footprint of motorized routes, and did not try to re-design the system to make it more ecologically or socially sustainable. Adams

[11] 36 CFR 215 subpart A
[12] 36 CFR 212 subpart B

and McCool (2009) considered this question of how to achieve sustainable motorized recreation and concluded that:

> As the agencies move to revise [off-road vehicle] allocations, they need to clearly define how they intend to locate routes so as to minimize impacts to natural resources and other recreationists in accordance with Executive Order 11644....[13]
>
> …As they proceed with designation, the FS and BLM need to acknowledge that current allocations are the product of agency failure to act, not design. Ideally, ORV routes would be allocated as if the map were currently empty of ORV routes. Reliance on the current baseline will encourage inefficient allocations that likely disproportionately impact natural resources and non-motorized recreationists. While acknowledging existing use, the agencies need to do their best to imagine the best possible arrangement of ORV routes, rather than simply tinkering around the edges of the current allocations.[14]

The Forest Service only now is contemplating addressing the winter portion of the issue, forced by a lawsuit challenging the Forest Service's inadequate management of snowmobiles. The agency is expected to issue a third rule in the fall of 2014 that will trigger winter travel management planning.

Strategies for identifying a minimum road system and prioritizing restoration

Transportation Management plays an integral role in the restoration of Forestlands. Reclaiming and obliterating roads is key to developing a sustainable transportation system. Numerous authors have suggested removing roads 1) to restore water quality and aquatic habitats Gucinski et al. 2000), and 2) to improve habitat security and restore terrestrial habitat (e.g., USDI USFWS 1993, Hebblewhite et al. 2009).

Creating a minimum road system through road removal will increase connectivity and decrease fragmentation across the entire forest system. However, at a landscape scale, certain roads and road segments pose greater risks to terrestrial and aquatic integrity than others. Hence, restoration strategies must focus on identifying and removing/mitigating the higher risk roads. Additionally, areas with the highest ecological values, such as being adjacent to a roadless area, may also be prioritized for restoration efforts. Several methods have been developed to help prioritize road reclamation efforts including GIS-based tools and best management practices (BMPs). It is our hope that even with limited resources, restoration efforts can be prioritized and a more sustainable transportation system created.

GIS-based tools

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[13] Recent court decisions have made it clear that the minimization requirements in the Executive Orders are not discretionary and that the Executive Orders are enforceable. See

- *Idaho Conservation League v. Guzman ,* 766 F. Supp. 2d 1056 (D. Idaho 2011) (Salmon-Challis National Forest TMP) .
- *The Wilderness Society v. U.S. Forest Service*, CV 08-363 (D. Idaho 2012) (Sawtooth-Minidoka district National Forest TMP).
- *Central Sierra Environmental Resource Center v. US Forest Service*, CV 10-2172 (E.D. CA 2012) (Stanislaus National Forest TMP).

[14] Page 105.

Girvetz and Shilling (2003) developed a novel and inexpensive way to analyze environmental impacts from road systems using the Ecosystem Management Decision Support program (EMDS). EMDS was originally developed by the United States Forest Service, as a GIS-based decision support tool to conduct ecological analysis and planning (Reynolds 1999). Working in conjunction with Tahoe National Forest managers, Girvetz and Shilling (2003) used spatial data on a number of aquatic and terrestrial variables and modeled the impact of the forest's road network. The network analysis showed that out of 8233 km of road analyzed, only 3483 km (42%) was needed to ensure current and future access to key points. They found that the modified network had improved patch characteristics, such as significantly fewer "cherry stem" roads intruding into patches, and larger roadlessness.

Shilling et al. (2012) later developed a recreational route optimization model using a similar methodology and with the goal of identifying a sustainable motorized transportation system for the Tahoe National Forest (Figure 2). Again using a variety of environmental factors, the model identified routes with high recreational benefits, lower conflict, lower maintenance and management requirements, and lower potential for environmental impact operating under the presumption that such routes would be more sustainable and preferable in the long term. The authors combined the impact and benefit analyses into a recreation system analysis "that was effectively a cost-benefit accounting, consistent with requirements of both the federal Travel Management Rule (TMR) and the National Environmental Policy Act" (p. 392**).**

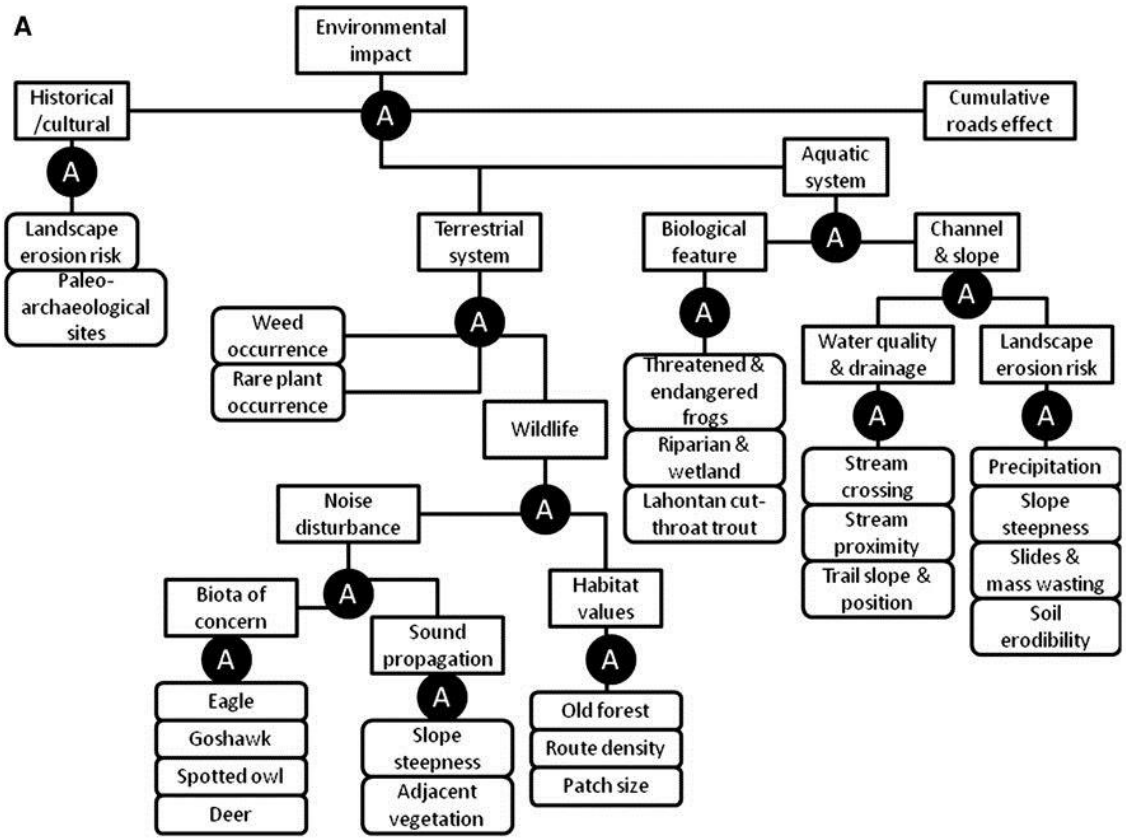

Figure 2: A knowledge base of contributions of various environmental conditions to the concept ‘‘environmental impact’’ [of motorized trails]. Rectangles indicate concepts, circles indicate Boolean logic operators, and rounded rectangles indicate sources of environmental data. (Reprinted from Shilling et al. 2012)

The Wilderness Society in 2012 also developed a GIS decision support tool called “RoadRight” that identifies high risk road segments to a variety of forest resources including water, wildlife, and roadlessness (The Wilderness Society 2012, The Wilderness Society 2013). The GIS system is designed to provide information that will help forest planners identify and minimize road related environmental risks. See the summary of and user guide for RoadRight that provides more information including where to access the open source software.[15]

[15] The Wilderness Society, 2012. Rightsizing the National Forest Road System: A Decision Support Tool. Available at http://www.landscapecollaborative.org/download/attachments/12747016/Road+decommissioning+model+-overview+2012-02-29.pdf?version=1&modificationDate=1331595972330.

The Wilderness Society, 2013.
RoadRight: A Spatial Decision Support System to Prioritize Decommissioning and Repairing Roads in

Best management practices (BMPs)

BMPs have also been developed to help create more sustainable transportation systems and identify restoration opportunities. BMPs provide science-based criteria and standards that land managers follow in making and implementing decisions about human uses and projects that affect natural resources. Several states have developed BMPs for road construction, maintenance and decommissioning practices (e.g., Logan 2001, Merrill and Cassaday 2003, USDA Forest Service 2012b).

Recently, BMPs have been developed for addressing motorized recreation. Switalski and Jones (2012) published, "*Off-Road Vehicle Best Management Practices for Forestlands: A Review of Scientific Literature and Guidance for Managers*." This document reviews the current literature on the environmental and social impacts of off-road vehicles (ORVs), and establishes a set of Best Management Practices (BMPs) for the planning and management of ORV routes on forestlands. The BMPs were designed to be used by land managers on all forestlands, and is consistent with current forest management policy and regulations. They give guidance to transportation planners on where how to place ORV routes in areas where they will reduce use conflicts and cause as little harm to the environment as possible. These BMPs also help guide managers on how to best remove and restore routes that are redundant or where there is an unacceptable environmental or social cost.

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Attachments

Attachment 1: Wildfire and Roads Fact Sheet

Attachment 2: Using Road Density as a Metric for Ecological Health in National Forests: What Roads and Routes should be Included? Summary of Scientific Information

Roads and Fire: A Proven Relationship

Photo: Lou Anegli Digital

Roaded Forests Are at a Greater Risk of Experiencing Wildfires than Unroaded Forests

- A wildland fire ignition is almost twice as likely to occur in a roaded area than in a roadless area. (USDA 2000, Table 3-18)
- The location of large wildfires is often correlated with proximity to busy roads. (Sierra Nevada Ecosystem Project, 1996)
- High road density increases the probability of fire occurrence due to human-caused ignitions. (Hann, W.J., et al. 1997)
- Unroaded areas have lower potential for high-intensity fires than roaded areas because they are less prone to human-caused ignitions. (DellaSala, et al. 1995)
- The median size of large fires on national forests is greater outside of roadless areas. (USDA 2000, Table 3-22)
- A positive correlation exists between lightning fire frequency and road density due to increased availability of flammable fine fuels near roads. (Arienti, M. Cecilia, et al. 2009)
- Human caused wildfires are strongly associated with access to natural landscapes, with the proximity to urban areas and roads being the most important factor (Romero-Calcerrada, et al. 2008)

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Human Activity and Wildfire

- Sparks from cars, off-road vehicles, and neglected campfires caused nearly 50,000 wildfire ignitions in 2000. (USDA 2000, Fuel Management and Fire Suppression Specialist Report, Table 4.)
- More than 90% of fires on national lands are caused by humans (USDA 1996 and 1998)
- Human-ignited wildfire is almost 5 times more likely to occur in a roaded area than in a roadless area (USDA 2000, Table 3-19).

There are 375,000 miles of roads in our national forests.

Photo: USDA Forest Service, Coconino National Forest

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Attachment 2: Using Road Density as a Metric for Ecological Health in National Forests: What Roads and Routes should be Included?

Summary of Scientific Information

Last Updated, November 22, 2012

I. Density analysis should include closed roads, non-system roads administered by other jurisdictions (private, county, state), temporary roads and motorized trails.

Typically, the Forest Service has calculated road density by looking only at open system road density. From an ecological standpoint, this approach may be flawed since it leaves out of the density calculations a significant percent of the total motorized routes on the landscape. For instance, the motorized route system in the entire National Forest System measures well over 549,000 miles.[1] By our calculation, a density analysis limited to open system roads would consider less than 260,000 miles of road, which accounts for less than half of the entire motorized transportation system estimated to exist on our national forests.[2] These additional roads and motorized trails impact fish, wildlife, and water quality, just as open system roads do. In this section, we provide justification for why a road density analysis used for the purposes of assessing ecological health and the effects of proposed alternatives in a planning document should include closed system roads, non-system roads administered by other jurisdictions, temporary roads, and motorized trails.

Impacts of closed roads

It is crucial to distinguish the density of roads physically present on the landscape, whether closed to vehicle use or not, from "open-road density" (Pacific Rivers Council, 2010). An open-road density of 1.5 mi/mi^2 has been established as a standard in some national forests as protective of some terrestrial wildlife species. However, many areas with an open road density of 1.5 mi/mi^2 have a much higher inventoried or extant hydrologically effective road density, which may be several-fold as high with significant aquatic impacts. This higher density occurs because many road "closures" block vehicle access, but do nothing to mitigate the hydrologic alterations that the road causes. The problem is

[1] The National Forest System has about 372,000 miles of system roads. The forest service also has an estimated 47,000 miles of motorized trails. As of 1998, there were approximately 130,000 miles of non-system roads in our forests. Non-system roads include public roads such as state, county, and local jurisdiction and private roads. (USFS, 1998) The Forest Service does not track temporary roads but is reasonable to assume that there are likely several thousand miles located on National Forest System lands.

[2] About 30% of system roads, or 116,108 miles, are in Maintenance Level 1 status, meaning they are closed to all motorized use. (372,000 miles of NFS roads - 116,108 miles of ML 1 roads = 255,892). This number is likely conservative given that thousands of more miles of system roads are closed to public motorized use but categorized in other Maintenance Levels.

further compounded in many places by the existence of "ghost" roads that are not captured in agency inventories, but that are nevertheless physically present and causing hydrologic alteration (Pacific Watershed Associates, 2005).

Closing a road to public motorized use can mitigate the impacts on water, wildlife, and soils only if proper closure and storage technique is followed. Flow diversions, sediment runoff, and illegal incursions will continue unabated if necessary measures are not taken. The Forest Service's National Best Management Practices for non-point source pollution recommends the following management techniques for minimizing the aquatic impacts from closed system roads: eliminate flow diversion onto the road surface, reshape the channel and streambanks at the crossing-site to pass expected flows without scouring or ponding, maintain continuation of channel dimensions and longitudinal profile through the crossing site, and remove culverts, fill material, and other structures that present a risk of failure or diversion. Despite good intentions, it is unlikely given our current fiscal situation and past history that the Forest Service is able to apply best management practices to all stored roads,[3] and that these roads continue to have impacts. This reality argues for assuming that roads closed to the public continue to have some level of impact on water quality, and therefore, should be included in road density calculations.

As noted above, many species benefit when roads are closed to public use. However, the fact remains that closed system roads are often breached resulting in impacts to wildlife. Research shows that a significant portion of off-road vehicle (ORV) users violates rules even when they know what they are (Lewis, M.S., and R. Paige, 2006; Frueh, LM, 2001; Fischer, A.L., et. al, 2002; USFWS, 2007.). For instance, the Rio Grande National Forest's Roads Analysis Report notes that a common travel management violation occurs when people drive around road closures on Level 1 roads (USDA Forest Service, 1994). Similarly, in a recent legal decision from the Utah District Court , *Sierra Club v. USFS*, Case No. 1:09-cv-131 CW (D. Utah March 7, 2012), the court found that, as part of analyzing alternatives in a proposed travel management plan, the Forest Service failed to take a hard look at the impact of continued illegal use. In part, the court based its decision on the Forest Service's acknowledgement that illegal motorized use is a significant problem and that the mere presence of roads is likely to result in illegal use.

In addition to the disturbance to wildlife from ORVs, incursions and the accompanying human access can also result in illegal hunting and trapping of animals. The Tongass National Forest refers to this in its EIS to amend the Land and Resources Management Plan. Specifically, the Forest Service notes in the EIS that Alexander Archipelego wolf mortality due to legal and illegal hunting and trapping is related not only to roads open to motorized access, but to all roads, and that *total road densities* of 0.7-1.0 mi/mi^2 or less may be necessary (USDA Forest Service, 2008).

As described below, a number of scientific studies have found that ORV use on roads and trails can have serious impacts on water, soil and wildlife resources. It should be expected that ORV use will continue to

[3] The Forest Service generally reports that it can maintain 20-30% of its open road system to standard.

some degree to occur illegally on closed routes and that this use will affect forest resources. Given this, roads closed to the general public should be considered in the density analysis.

Impacts of non-system roads administered by other jurisdictions (private, county, state)

As of 1998, there were approximately 130,000 miles of non-system roads in national forests (USDA Forest Service, 1998). These roads contribute to the environmental impacts of the transportation system on forest resources, just as forest system roads do. Because the purpose of a road density analysis is to measure the impacts of roads at a landscape level, the Forest Service should include all roads, including non-system, when measuring impacts on water and wildlife. An all-inclusive analysis will provide a more accurate representation of the environmental impacts of the road network within the analysis area.

Impacts of temporary roads

Temporary roads are not considered system roads. Most often they are constructed in conjunction with timber sales. Temporary roads have the same types environmental impacts as system roads, although at times the impacts can be worse if the road persists on the landscape because they are not built to last.

It is important to note that although they are termed temporary roads, their impacts are not temporary. According to Forest Service Manual (FSM) 7703.1, the agency is required to "Reestablish vegetative cover on any unnecessary roadway or area disturbed by road construction on National Forest System lands within 10 years after the termination of the activity that required its use and construction." Regardless of the FSM 10-year rule, temporary roads can remain for much longer. For example, timber sales typically last 3-5 years or more. If a temporary road is built in the first year of a six year timber sale, its intended use does not end until the sale is complete. The timber contract often requires the purchaser to close and obliterate the road a few years after the Forest Service completes revegetation work. The temporary road, therefore, could remain open 8-9 years before the ten year clock starts ticking per the FSM. Therefore, temporary roads can legally remain on the ground for up to 20 years or more, yet they are constructed with less environmental safeguards than modern system roads.

Impacts of motorized trails

Scientific research and agency publications generally do not decipher between the impacts from motorized trails and roads, often collapsing the assessment of impacts from unmanaged ORV use with those of the designated system of roads and trails. The following section summarizes potential impacts resulting from roads and motorized trails and the ORV use that occurs on them.

Aquatic Resources
While driving on roads has long been identified as a major contributor to stream sedimentation (for review, see Gucinski, 2001), recent studies have identified ORV routes as a significant cause of stream sedimentation as well (Sack and da Luz, 2004; Chin et al.; 2004, Ayala et al.; 2005, Welsh et al;. 2006). It has been demonstrated that sediment loss increases with increased ORV traffic (Foltz, 2006). A study by

Sack and da Luz (2004) found that ORV use resulted in a loss of more than 200 pounds of soil off of every 100 feet of trail each year. Another study (Welsh et al., 2006) found that ORV trails produced five times more sediment than unpaved roads. Chin et al. (2004) found that watersheds with ORV use as opposed to those without exhibited higher percentages of channel sands and fines, lower depths, and lower volume – all characteristics of degraded stream habitat.

Soil Resources [4]

Ouren, et al. (2007), in an extensive literature review, suggests ORV use causes soil compaction and accelerated erosion rates, and may cause compaction with very few passes. Weighing several hundred pounds, ORVs can compress and compact soil (Nakata et al., 1976; Snyder et al., 1976; Vollmer et al., 1976; Wilshire and Nakata, 1976), reducing its ability to absorb and retain water (Dregne, 1983), and decreasing soil fertility by harming the microscopic organisms that would otherwise break down the soil and produce nutrients important for plant growth (Wilshire et al., 1977). An increase in compaction decreases soil permeability, resulting in increased flow of water across the ground and reduced absorption of water into the soil. This increase in surface flow concentrates water and increases erosion of soils (Wilshire, 1980; Webb, 1983; Misak et al., 2002).

Erosion of soil is accelerated in ORV-use areas directly by the vehicles, and indirectly by increased runoff of precipitation and the creation of conditions favorable to wind erosion (Wilshire, 1980). Knobby and cup-shaped protrusions from ORV tires that aid the vehicles in traversing steep slopes are responsible for major direct erosional losses of soil. As the tire protrusions dig into the soil, forces far exceeding the strength of the soil are exerted to allow the vehicles to climb slopes. The result is that the soil and small plants are thrown downslope in a “rooster tail” behind the vehicle. This is known as mechanical erosion, which on steep slopes (about 15° or more) with soft soils may erode as much as 40 tons/mi (Wilshire, 1992). The rates of erosion measured on ORV trails on moderate slopes exceed natural rates by factors of 10 to 20 (Iverson et al., 1981; Hinckley et al., 1983), whereas use on steep slopes has commonly removed the entire soil mantle exposing bedrock. Measured erosional losses in high use ORV areas range from 1.4-242 lbs/ft^2 (Wilshire et al., 1978) and 102-614 lbs/ft^2 (Webb et al., 1978). A more recent study by Sack and da Luz (2003) found that ORV use resulted in a loss of more than 200 lbs of soil off of every 100 feet of trail each year.

Furthermore, the destruction of cryptobiotic soils by ORVs can reduce nitrogen fixation by cyanobacteria, and set the nitrogen economy of nitrogen-limited arid ecosystems back decades. Even small reductions in crust can lead to diminished productivity and health of the associated plant community, with cascading effects on plant consumers (Davidson et al., 1996). In general, the deleterious effects of ORV use on cryptobiotic crusts is not easily repaired or regenerated. The recovery time for the lichen component of crusts has been estimated at about 45 years (Belnap, 1993). After this time the crusts may appear to have regenerated to the untrained eye. However, careful observation will reveal that the 45 year-old crusts will not have recovered their moss component, which will take an additional 200 years to fully come back (Belnap and Gillette, 1997).

[4] For a full review see Switalski, T. A. and A. Jones (2012).

Wildlife Resources[5]

Studies have shown a variety of possible wildlife disturbance vectors from ORVs. While these impacts are difficult to measure, repeated harassment of wildlife can result in increased energy expenditure and reduced reproduction. Noise and disturbance from ORVs can result in a range of impacts including increased stress (Nash et al., 1970; Millspaugh et al., 2001), loss of hearing (Brattstrom and Bondello, 1979), altered movement patterns (e.g., Wisdom et al. 2004; Preisler et al. 2006), avoidance of high-use areas or routes (Janis and Clark 2002; Wisdom 2007), and disrupted nesting activities (e.g., Strauss 1990).

Wisdom et al. (2004) found that elk moved when ORVs passed within 2,000 yards but tolerated hikers within 500 ft. Wisdom (2007) reported preliminary results suggesting that ORVs are causing a shift in the spatial distribution of elk that could increase energy expenditures and decrease foraging opportunities for the herd. Elk have been found to readily avoid and be displaced from roaded areas (Irwin and Peek, 1979; Hershey and Leege, 1982; Millspaugh, 1995). Additional concomitant effects can occur, such as major declines in survival of elk calves due to repeated displacement of elk during the calving season (Phillips, 1998). Alternatively, closing or decommissioning roads has been found to decrease elk disturbance (Millspaugh et al., 2000; Rowland et al., 2005).

Disruption of breeding and nesting birds is particularly well-documented. Several species are sensitive to human disturbance with the potential disruption of courtship activities, over-exposure of eggs or young birds to weather, and premature fledging of juveniles (Hamann et al., 1999). Repeated disturbance can eventually lead to nest abandonment. These short-term disturbances can lead to long-term bird community changes (Anderson et al., 1990). However when road densities decrease, there is an observable benefit. For example, on the Loa Ranger District of the Fishlake National Forest in southern Utah, successful goshawk nests occur in areas where the localized road density is at or below 2-3 mi/mi^2 (USDA, 2005).

Examples of Forest Service planning documents that use total motorized route density or a variant

Below, we offer examples of where total motorized route density or a variant has been used by the Forest Service in planning documents.

- The Mt. Taylor RD of the Cibola NF analyzed open and closed system roads and motorized trails together in a single motorized *route* density analysis. Cibola NF: Mt. Taylor RD Environmental Assessment for Travel Management Planning, Ch.3, p 55. http://prdp2fs.ess.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5282504.pdf.

- The Grizzly Bear Record of Decision (ROD) for the Forest Plan Amendments for Motorized Access

[5] For a full review see:Switalski, T. A. and A. Jones (2012).

Management within the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones (Kootenai, Lolo, and Idaho Panhandle National Forests) assigned route densities for the designated recovery zones. One of the three densities was for Total Motorized Route Density (TMRD) which includes open roads, restricted roads, roads not meeting all reclaimed criteria, and open motorized trails. The agency's decision to use TMRD was based on the Endangered Species Act's requirement to use best available science, and monitoring showed that both open and closed roads and motorized trails were impacting grizzly. Grizzly Bear Plan Amendment ROD. Online at cache.ecosystem-management.org/48536_FSPLT1_009720.pdf.

- The Chequamegon-Nicolet National Forest set forest-wide goals in its forest plan for both open road density and total road density to improve water quality and wildlife habitat.

> *I decided to continue reducing the amount of total roads and the amount of open road to resolve conflict with quieter forms of recreation, impacts on streams, and effects on some wildlife species.* ROD, p 13.

Chequamegon-Nicolet National Forest Land and Resource Management Plan Record of Decision. Online at http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5117609.pdf.

- The Tongass National Forest's EIS to amend the forest plan notes that Alexander Archipelago wolf mortality due to legal and illegal hunting and trapping is related not only to roads open to motorized access, but to all roads, and that *total road densities* of 0.7-1.0 mi/mi^2 or less may be necessary.

> *Another concern in some areas is the potentially unsustainable level of hunting and trapping of wolves, when both legal and illegal harvest is considered. The 1997 Forest Plan EIS acknowledged that open road access contributes to excessive mortality by facilitating access for hunters and trappers. Landscapes with open-road densities of 0.7 to 1.0 mile of road per square mile were identified as places where human-induced mortality may pose risks to wolf conservation. The amended Forest Plan requires participation in cooperative interagency monitoring and analysis to identify areas where wolf mortality is excessive, determine whether the mortality is unsustainable, and identify the probable causes of the excessive mortality.*
>
> *More recent information indicates that wolf mortality is related not only to roads open to motorized access, but to all roads, because hunters and trappers use all roads to access wolf habitat, by vehicle or on foot. Consequently, this decision amends the pertinent standard and guideline contained in Alternative 6 as displayed in the Final EIS in areas where road access and associated human caused mortality has been determined to be the significant contributing factor to unsustainable wolf mortality. The standard and guideline has been modified to ensure that a range of options to reduce mortality risk will be considered in these areas, and to specify that total road densities of 0.7 to 1.0 mile per square mile or less may be necessary.* ROD, p 24.

Tongass National Forest Amendment to the Land and Resource Management Plan Record of Decision and Final EIS. January 2008. http://tongass-fpadjust.net/Documents/Record_of_Decision.pdf

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Appendix II – Forest Plan Direction

Clearwater National Forest Land Resource Management Plan (1987)

Goals

Locate, design, and manage forest roads to meet resource objectives and public concerns, and to provide optimal soil and watershed protection.

Objectives

a. Incorporate transportation planning into all project and area analysis to determine road construction/reconstruction needs, appropriate road standards, and mitigation measures needed to minimize adverse effects.

b. Review existing system and nonsystem roads as part of transportation planning to determine road management needs, such as closures, maintenance and obliteration

c. Implement a road management program that is responsive to resource protection needs, water quality goals, and public concerns. Miles of road left open to public use will be that amount necessary to meet public needs and resource management objectives.

d. Review and approve road maintenance operations and road upgrading proposed by the public road agencies having jurisdiction over the Forest Highways on National Forest lands.

ROD

To meet forest plan goals for timber harvest, the ROD estimated 69 new miles of road construction each year during the planning period.

Nez Perce National Forest Land Resource Management Plan (1987)

Goal

Provide a stable and cost-efficient transportation system through construction, reconstruction, maintenance, or transportation system management.

Standard

1. Develop an "Area Transportation Analysis" prior to entering drainages with land-disturbing activities.

2. Analyze the economics of proposed access developments using proven tools, and incorporate them into the project design.

3. Evaluate all facilities using the Access Management Analysis Worksheet to determine use restrictions and access needs. This worksheet will be an integral part of the Decision Document.

4. An Access Management Plan will be implemented to monitor and evaluate the effects of access on

forest resources and the ability of the transportation system to accomplish the designed use. As measuring or monitoring tools, Forest access management will use two indices to monitor change over time. These indices will allow us to compare between points in time, between areas, and between alternate access management schemes or proposals.

…

5. Maintain access facilities to the level commensurate with use, user type, user safety, and facility resource protection.

6. Plan, design, and manage all access to meet land and resource management objectives, meet the State Water Quality Standards, and meet Best Management Practices (BMPs).

7. Plan to implement post-project activities, including access prescriptions, within two field seasons of the last planned land-disturbing activity. Minimize the total time that roads will be open for construction and timber harvest activities.

8. Minimize impacts from construction in identified key riparian and wildlife areas. Develop rehabilitation plans for existing access facilities that are producing significant impacts on riparian dependent resources.

9. Design all proposed road systems to mitigate at least 60 percent of the sediment predicted. Utilize proven mitigation procedures in the design and construction of roads to meet up to 90 percent of the sediment predicted, where needed to meet resource management objectives.

In Need of Protection

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How Off-Road Vehicles and Snowmobiles Are Threatening the Forest Service's Recommended Wilderness Areas

February 2011

In Need of Protection:

How Off-Road Vehicles and Snowmobiles Are Threatening the Forest Service's Recommended Wilderness Areas

Table of Contents

Executive Summary

Former Chief of the Forest Service, Dale Bosworth called "unmanaged recreation," including use of off-road vehicles and snowmobiles, one of the "top four threats" to our national forests. Motorized recreation is also the top threat to the Forest Service's recommended additions to the National Wilderness Preservation System. Increases in the volume of use, size of vehicles and advances in off-road vehicle and snowmobile technology are degrading the wilderness character of many Forest Service recommended wilderness areas.

The national forests in Idaho provide a unique opportunity to compare and contrast different management approaches to off-road vehicle and snowmobile use in Forest Service recommended wilderness areas. The national forests in the state are split between the Northern and Intermountain Regions of the agency. These regions manage the areas and uses differently.

Due to the degradation of wilderness character that has occurred as a result of motorized recreation, national forests in the Northern Region are prohibiting the use of motorized vehicles in recommended wilderness areas through travel management and land and resource management planning. Conversely, the national forests of the Intermountain Region continue to follow a loose national policy that permits existing uses of recommended wilderness areas to continue. Unfortunately, the national policy is leading to ecological damage, user conflicts, decreased opportunities for solitude and degradation of other wilderness values. Therefore, the Forest Service is not living up to its responsibility to ensure that the unique wilderness characteristics of these areas are maintained.

The time has come for a national policy that protects the unique character of the Forest Service's recommended additions to the National Wilderness Preservation System. The same uses of designated wilderness areas that are prohibited by the Wilderness Act should be banned from recommended wilderness areas. Such a policy is a commonsense means of protecting the wilderness character of Forest Service recommended wilderness areas until Congress considers statutory wilderness designation. At a minimum, a national policy for recommended wilderness areas should require the following:

- Adoption of a desired conditions statement in land and resource management plans that RWAs should be managed to reflect the definition of wilderness found in the Wilderness Act of 1964.
- Adoption of standards in land and resource management plans that require each national forest to prohibit uses of RWAs that are inconsistent with uses allowed per the Wilderness Act of 1964.
- Phase-out incompatible uses through land and resource management planning or travel management planning.
- Approval by the Chief of the Forest Service of any exceptions to this policy.

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Introduction

In 1964 Congress passed the Wilderness Act "[i]n order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States." The Act established the National Wilderness Preservation System (NWPS), including 16 "instant" wilderness areas. Additions to the NWPS are made by subsequent acts of Congress.

Section 3(b) of the Wilderness Act also set up a process whereby the Forest Service must make recommendations to Congress for additions to the NWPS. The Forest Service responded in the 1970s with the Roadless Area Review and Evaluation (RARE). However, litigation tied up RARE twice, so the agency elected to determine the wilderness suitability of individual roadless areas at the national forest level through the forest planning process.

Many national forests reviewed each roadless area for wilderness suitability and provided recommendations for additions to the NWPS in the first generation of forest plans. Subsequently, the Congressional delegations of all but two states with national forest system lands—Idaho and Montana—considered those recommendations and passed statewide wilderness bills in Congress. Idaho and Montana both attempted to produce and pass similar statewide legislation but fell short.

Since that time, both states have worked to resolve the wilderness debate through place-based legislation. The Selway-Bitterroot, Sawtooth, Hells Canyon, Gospel Hump and Frank Church – River of No Return Wilderness Areas were all designated by separate acts of Congress. The last are to be designated in Idaho was the Frank Church – River of No Return Wilderness in 1980.

With over 9 million acres of inventoried roadless areas in Idaho, many areas remain suitable for wilderness designation. Every forest plan in Idaho except the Nez Perce National Forest includes official Forest Service recommendations for additions to the NWPS (Table 1 and Figure 1).

Until Congress takes the opportunity to consider these recommendations, the Forest Service is obligated to protect the wilderness suitability of these areas. The Forest Service Manual states:

> Any inventoried roadless area recommended for wilderness or designated wilderness study is not available for any use or activity that may reduce the wilderness potential of the area. Activities currently permitted may continue pending designation, if the activities do not compromise the wilderness values of the area.[1]

Unfortunately some national forests have failed to curb the increasing use of off-road vehicles and snowmobiles in recommended wilderness areas (RWAs), which has resulted in the degradation of wilderness character and potential. Operating motorized vehicles, as a general rule, is a use that would be prohibited if an area were designated as wilderness. Therefore, permitting these uses to continue is, by definition, inconsistent with wilderness character. The use of larger off-road vehicles and snowmobiles, as well as technological advances, has decreased the naturalness of many RWAs, opportunities for primitive and unconfined types of recreation, and ecological, geological, or other features of scientific, educational, scenic, or historical value.[2] Specific examples are outlined in this report.

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[1] FSM 1923.03

[2] See Section 2(c) of the Wilderness Act of 1964 for a definition of Wilderness.

Idaho provides a unique opportunity to compare the management of RWAs between two different regions of the Forest Service. The national forests in North Idaho are part of the Northern Region of the Forest Service, and those in South Idaho are part of the Intermountain Region. The former is phasing out off-road vehicle and snowmobile use in the RWAs because trends in use, size and vehicle technology are decreasing the wilderness potential of areas where motorized vehicles have been permitted to continue. Perhaps the *Clearwater National Forest Travel Management Plan, Draft Environmental Impact Statement* articulates these impacts best:

> As motorized technology continues to be developed levels of access into remote, back-country locations will rise and with this increased use will come additional noise and disturbance which adversely affects attributes of wilderness character. These technology improvements allow motorcycles, bicycles and over-snow vehicles to increasingly overcome the expectations of the 1987 Forest Plan that assumed the difficult and rugged terrain would prove to be self-limiting to motorized access. Activities, including motorized/mechanized (bicycle) trail or road use, or motorized over-snow vehicle use, that may potentially lead to the decline of an areas ability to provide the level of wilderness character that was present when it was recommended in 1987 does not support the protection of wilderness character. Proposing motorized/mechanized (bicycle) activities as part of travel planning decisions in recommended wilderness areas will not result in best meeting the desired future condition in these areas.[3]

Meanwhile, national forests in the Intermountain Region continue to permit off-road vehicle and snowmobile use in every recommended wilderness area in the region. As this report demonstrates, there are real on-the-ground consequences of these two different approaches that can no longer be ignored. A consistent national policy is needed to protect the wilderness characteristics of these areas from the increasing size, technological capability and use of off-road vehicles and snowmobiles.

[3] *Clearwater National Forest Travel Management Plan, Draft Environmental Impact Statement*, page 3-83.

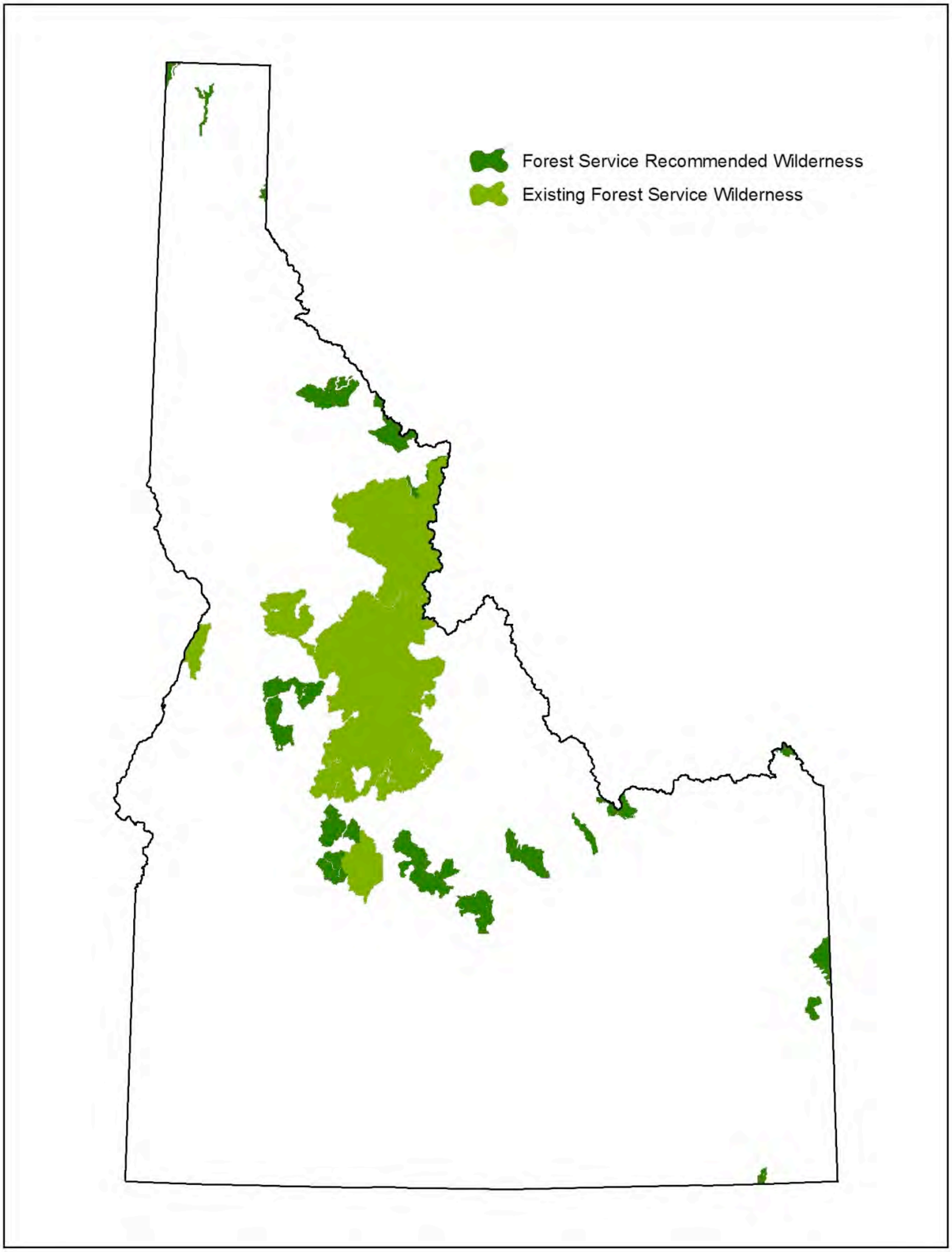

Figure 1. Forest Service recommended wilderness areas and designated Wilderness areas in Idaho.

Table 1. Forest Service recommended wilderness areas in Idaho by forest and region, including size and allowable off-road vehicle or snowmobile use within the area.[4]

Region	Forest	Area	Acres	Trails designated for off-road vehicle use (%)	Open yearlong or seasonally to snowmobiles (%)
Northern	Idaho Panhandle	Mallard-Larkins	78,500	0%	64%
		Salmo-Priest	17,600	0%	0%
		Scotchman Peaks	9,400	0%	100%
		Selkirk Crest	26,700	0%	10%
	Clearwater	Great Burn (Hoodoo)	113,000	1%, pending travel plan	0%, pending travel plan
		Mallard-Larkins	66,700	0%, pending travel plan	0%, pending travel plan
		Selway-Bitterroot Additions	18,500	0%	0%, pending travel plan
	Nez Perce	None	0	N/A	N/A
	Total		*330,400*		
Intermountain	Payette	Needles	91,900	30%	9%
		Secesh	115,400	37%	68%
	Boise	Hanson Lakes	13,600	0%	100%
		Needles	4,300	18%	100%
		Red Mountain	86,100	93%	100%
		Tenmile-Black Warrior	79,900	9%	100%
	Sawtooth	Boulder-White Clouds	184,400	30%	92%
		Hanson Lakes	18,500	39%	100%
		Pioneer Mountains	61,000	11%	80%
	Salmon-Challis	Borah Peak	119,000	41% of the routes are designated for motorized use[5]	0%
		Boulder-White Clouds	34,000	0%	0%
		Pioneer Mountains	48,000	10% of the routes are designated for motorized use[2]	0%
	Caribou-Targhee	Caribou City	29,201	0%	100%
		Diamond Peak	29,521	0%	79%
		Italian Peaks	49,406	72%	91%
		Lionhead	11,314	0%	100%
		Mt. Naomi	13,246	20%	100%
		Palisades	61,173	1%	94%
	Total		*1,049,614*		
Idaho Total			1,380,014		

[4] Figures for the acreage of each area were derived from the relevant forest management plans. Figures for motorized use were calculated with GIS software using spatial data provided by the Forest Service.
[5] The term "routes" is used because there are both roads (5.3 miles) and trails (7.2 miles) designated for motorized use in the Borah Peak RWA. There are 4.8 miles of designated roads in the Pioneer Mountains RWA.

Travel Management Planning

As described earlier, former Chief of the Forest Service, Dale Bosworth called "unmanaged recreation," including the use of off-road vehicles and snowmobiles, one of the top four threats to our national forests.[6] In 2005, the Forest Service promulgated the "Travel Management Rule" in response to the threat, prohibiting cross-country use of off-road vehicles. The rule also requires each national forest to designate specific roads, trails and areas for motor vehicle use.[7]

The travel management plans developed under these regulations must also be consistent with the land and resource management plans (LRMP) required by the National Forest Management Act (NFMA). Travel management decisions must reflect the desired conditions, goals, objectives, standards and management prescriptions contained in LRMPs, including those related to RWAs.

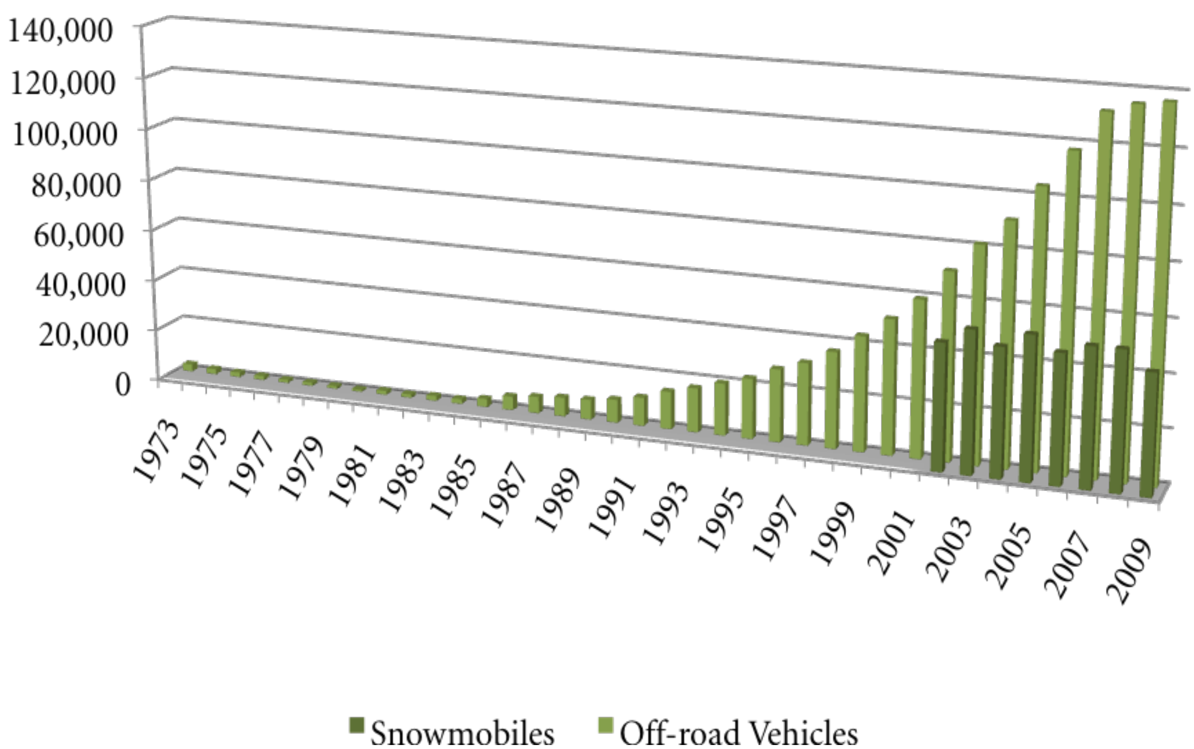

Figure 2. Registered off-road vehicles and snowmobiles in Idaho.[8]

Trends in off-road vehicle and snowmobile use in Idaho illustrate the magnitude of the threat that motorized recreation poses to our national forests and RWAs. The use of off-road vehicles has increased exponentially since the mid 1990s (Figure 2), due primarily to the rising popularity of all-terrain vehicles (ATVs).

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[6] http://www.fs.fed.us/projects/four-threats/
[7] 70 Fed. Reg. 68264-68291.
[8] http://parksandrecreation.idaho.gov/datacenter/recreation_statistics.aspx

There are also larger off-road vehicles and snowmobiles on the market today than in the past. The 1980 Honda ATC 185 three-wheeler included a 180 cc engine and was used as a farm implement.[9] By 1988 Honda was manufacturing a 4x4 ATV with a 282 cc engine, called the Four Trax 300.[10] The Four Trax 300 was intended for recreational use not for farming and ranching. As the off-road vehicles became larger, more powerful and popular for recreational use, the Forest Service was pressured to change regulations governing the use of these vehicles on Forest Service lands. In 1991, the Forest Service quietly did away with the "40-inch rule," which previously prohibited the use of any vehicle greater than 40 inches in width on Forest Service trails. Forty inches happened to be the width of most dirt-bike handle bars. Most present-day travel plans and motor vehicle use maps accommodate modern ATVs by designating trails less than 50 inches in width.

1976 Kawasaki Sno-Jet

Advances in vehicle technology and capability have also increased the threat. In particular, significant technological advances in snowmobile capability have occurred. For example, in 1973 Honda made a prototype snowmobile called the White Fox that had a 178 cc two-stroke engine and weighed 227 pounds.[11] The Sno-Jet made in 1976 weighed 355 pounds and was powered by a 338 cc engine.[12]

In the mid-1990s, the introduction of "powder sleds" vastly changed the pattern of snowmobile use. Advancements in technology led to greater power/weight ratios. For example, the 2011 Arctic Cat Z1 Turbo LXR has a 1,056 cc engine,[13] a displacement more than three times the 1976 Sno-Jet.

These trends have challenged the Forest Service's ability to protect the wilderness characteristics of RWAs. Trails and areas once considered physically inaccessible to off-road vehicles and snowmobiles because of technological limitations are now readily accessible to modern day machines.

The wilderness characteristics of many RWAs in Idaho have been degraded by the advances in technology and use of off-road vehicles and snowmobiles. The natural integrity of RWAs has declined where trail tread widths have been widened by the larger classes of off-road vehicles now available on the market. Naturalness has also declined because of physical resource damage, including erosion, siltation, loss of vegetation and spread of noxious weeds. Use of snowmobiles has also decreased the naturalness of RWAs where trail grooming and high-marking occurs.

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[9] http://www.atvriders.com/atvmodels/honda-history-1980-atc-185.html
[10] http://www.atvriders.com/atvmodels/honda-history-1988-fourtrax-300-atv.html
[11] See photo posted by the Snowmobile Canada website at http://www.snowmobile-canada.com/his3.htm
[12] http://www.snojet.com
[13] http://www.arcticcat.com/snow/Z1TURBOLXR.asp

Opportunities for solitude or primitive and unconfined recreation have declined where the use of off-road vehicles and snowmobiles has increased. Where terrain was previously considered to be a limiting factor for vehicular access, advances in vehicle technology have made access to previously inaccessible areas possible. The ability to use modern motorized vehicles in formerly inaccessible areas negates the need to use traditional, primitive and unconfined modes of travel to access remote areas in RWAs. Further, the noise from these machines transmits across the landscape and disrupts the natural acoustics thereby spoiling the solitude sought by many nonmotorized recreationists.

Last but not least, increased use of off-road vehicles and snowmobiles in RWAs has affected ecological, cultural and other values in RWAs. In some RWAs, wildlife are less secure where previously inaccessible areas provided undisturbed refugia or migration corridors for a host of wildlife species. Many of the habitats in RWAs are particularly important because of their rarity and sensitivity.

While degradation of wilderness character has occurred in many RWAs, it is not too late for the Forest Service to act and protect these unique places. Travel management and forest planning processes can restore wilderness character by limiting the uses of RWAs to those allowed by the Wilderness Act. However, a national policy is needed to provide consistency in management and implementation.

Northern Region

The Northern Region of the Forest Service includes three national forests in Idaho—the Idaho Panhandle, Clearwater, and Nez Perce National Forest. As the forests within the region revise their travel management plans and forest plans, uses of RWAs that are inconsistent with the Wilderness Act are being phased out to protect the unique character of these areas. This forward-thinking approach will ensure that, when Congress considers whether or not to designate these areas as wilderness, the Forest Service will have fulfilled its obligation to preserve the wilderness characteristics of these areas.

Idaho Panhandle National Forest

There are four RWAs on the Idaho Panhandle National Forests. The permissible uses of off-road vehicles and snowmobiles vary by area. The 1987 Forest Plan permitted off-road vehicle and snowmobile use in all four RWAs. However, various resource issues have led to off-road vehicle and snowmobile closures.

The Salmo-Priest, Selkirk Crest and Scotchman Peaks RWAs were closed to off-road vehicle use to protect listed grizzly bear populations. Similarly, all of the Salmo-Priest RWA and the majority of the Selkirk Crest RWA were closed to snowmobile use to protect the last population of endangered woodland caribou in the coterminous United States. Despite these closures, seasonal monitoring by the agency and conservation groups reveals that snowmobilers continue to violate closures for both areas.

Snowmobile use in the Selkirk Crest and Salmo-Priest RWAs negatively impacts endangered woodland caribou survival during the critical winter months. Photo by Jerry Pavia.

Designated snowmobile routes around the perimeter of the Selkirk Crest RWA facilitate illegal access into the caribou closure area and the RWA. Permitted snowmobile use within the "Trapper Burn" area between the Salmo-Priest RWA and the Selkirk Crest RWA has led to fragmentation of historic habitat in the Selkirk Crest RWA and habitat still used by caribou in the Salmo-Priest RWA. While snowmobile use is considered by the agency to be transitory in nature, wilderness characteristics are degraded on an ongoing basis by snowmobile use through increased noise, loss of opportunities for primitive and unconfined types of winter recreation, and impacts to ecological values including wildlife.

In 2006, the Forest Service nearly completed a revised forest plan for the Idaho Panhandle National Forest that would have prohibited off-road vehicles and snowmobiles in all four RWAs. However, nearly one-third of the Selkirk Crest RWA would have been dropped from the 1987 boundary to allow snowmobile use in the southern Selkirks. The Idaho Conservation League opposed this proposal because it would have sacrificed wilderness-quality landscapes in places like Fault Lake, Chimney Rock, Beehive Lakes, and Harrison Lake. These areas are also documented, historic caribou habitat. The revised plan was put on hold until recently because the Forest Service regulations used to draft the plan were enjoined in federal court. The plan revision is again underway using the 1982 planning regulations.

Snowmobiling is also permitted within the Scotchman Peaks RWA. However, actual snowmobile use is minimal. The 2006 revised plan would have slightly expanded the Scotchman Peaks RWA and prohibited both off-road vehicles and snowmobiles in the area. There is strong support in Bonner County for statutory wilderness designation of the Scotchman Peaks.

Snowmobile use at Kidd Lake in the Great Burn RWA is legal on the Clearwater National Forest, while just over the state line in Montana, it is illegal on the Lolo National Forest.

The last RWA on the Idaho Panhandle is the Mallard-Larkins, which straddles the shared boundary with the Clearwater National Forest. The St. Joe Ranger District recently completed a travel management plan that restricts the use of off-road vehicles in the Mallard-Larkins RWA to protect its wilderness character and opportunities for primitive and unconfined types of recreation commensurate with the Wilderness Act. The latest travel management plan for the St. Joe Ranger District does not prohibit snowmobile use in the area. However, the revised forest plan would have closed the area to snowmobiles. When the revised plan is completed, the prohibition of snowmobiles in the Mallard-Larkins RWA is expected to be carried forward.

Clearwater National Forest

There are three RWAs on the Clearwater National Forest identified by the 1987 Clearwater National Forest Plan. Off-road vehicles and snowmobiles are permitted in the Mallard-Larkins, Great Burn (Hoodoo) and proposed Selway-Bitterroot Wilderness additions. Conversely, the Forest Plan for the adjacent Lolo National Forest prohibits the use of snowmobiles and off-road vehicles within the portion of the Great Burn in Montana.

In 2007 the Clearwater National Forest began developing a new travel management plan for the forest. The draft plan released in 2009 proposed to prohibit the use of off-road vehicles and snowmobiles in all three RWAs with one exception—the existing ATV trail to Fish Lake (3 miles) in the Great Burn. The draft plan would close 38 miles of existing off-road vehicle trails within all three RWAs. Approximately 196,000 acres would be closed to snowmobiling. The preferred alternative would provide consistent management of the Great Burn and Mallard-Larkins RWAs across state and national forest boundaries. The Forest Service presented the following rationale in developing the preferred alternative:

The increase in vehicle capability, numbers, and local use, puts areas of recommended wilderness at far greater risk of degradation and loss of wilderness character than they were when the Forest

Plan was written. In addition, other areas recommended for wilderness have not received serious consideration for designation once motorized use has become established.

To date, the Clearwater National Forest Travel Management Plan, Draft Environmental Impact Statement is the best example of a plan that takes proactive steps to protect RWAs and their wilderness character. The plan correctly concludes that, due to the increasing size, capability and sheer numbers of off-road vehicles and snowmobiles, it is no longer possible for the agency to allow such uses in RWAs and protect their wilderness character at the same time.

Nez Perce National Forest

The 1987 Nez Perce National Forest Plan did not identify any RWAs on the forest. However, in 2006 the Clearwater and Nez Perce National Forests were in the midst of developing revised forest plans, which were not completed because of the injunction of the forest planning regulations in federal court. During the revision process, the Clearwater and Nez Perce National Forests reviewed every inventoried roadless area on the two forests for wilderness suitability. Each roadless area was given a "wilderness attributes rating" or WAR score. The East and West Meadow Creek Roadless Areas received WAR scores slightly higher and slightly lower, respectively, than the Great Burn RWA on the Clearwater National Forest.

The expansion of ATV use into the Meadow Creek Roadless Area has degraded water quality, fish habitat and tribal cultural resources.

For decades, the Idaho Conservation League has supported designating the Meadow Creek watershed as wilderness because of the area's intact fish and wildlife habitat, opportunities for primitive and unconfined modes of recreation, and its size (213,000 acres). During the planning process, the Idaho Conservation League worked to convince the Forest Service that Meadow Creek should be recommended to Congress for wilderness designation.

In 2007 the Nez Perce National Forest proceeded with a revision of the forest's travel management plan to comply with the 2005 travel management rule. Since Meadow Creek maintains high wilderness attribute ratings, the Idaho Conservation League and The Wilderness Society worked cooperatively to protect the Meadow Creek watershed from degradation by off-road vehicles.

A monitoring project conducted in 2008 uncovered severe off-road vehicle damage to sensitive meadows in the upper reach of Meadow Creek, clearly evidence of diminished naturalness and ecological value. In response, the Forest Service issued an emergency closure order to stop the damage and allow recovery of the meadows to begin. However, the emergency closure order will only remain in effect until the final travel management plan is completed.

Intermountain Region

The Intermountain Region of the Forest Service includes five national forests in Idaho—the Payette, Boise, Sawtooth, Salmon-Challis and Caribou-Targhee National Forests. The region follows a loose national policy concerning RWAs, that allows existing uses of RWAs to continue unless degradation of wilderness characteristics occurs.[14] All five national forests in the Intermountain Region allow off-road vehicle and snowmobile use in their RWAs. This policy is degrading the wilderness characteristics of many RWAs within the region, as described below.

Payette National Forest

Two RWAs identified in the 2003 Payette Forest Plan. Like almost all national forests in the Intermountain Region, some level of off-road vehicle and/or snowmobile use is permitted within the RWAs on the forest. Existing uses in the Secesh and Needles RWAs are permitted to continue unless they degrade wilderness character. Specifically, the "Southwest Idaho Ecogroup" forest plans for the Payette, Boise and Sawtooth National Forests provide that:[15]

> Mechanical transport in recommended wilderness areas where it currently exists may be allowed to continue unless: a) It degrades wilderness values,
> b) Resource damage occurs, or
> c) User conflicts result.

Motorcycle use on the Victor Creek Trail in the Secesh RWA is eroding trails.

In 2009 the Payette National Forest completed a travel management plan for off-road vehicle use. The travel management plan designated 61 miles (33%) of the 183 miles of trails in the Secesh and Needles RWAs as open to motorcycles, including the Victor Creek, Twentymile Creek, Secesh River, Buckhorn Creek and other trails. These motorized routes cut through the two RWAs from one side to the other, fragmenting wildlife habitat and nonmotorized zones in between the trail corridors. Consequently, opportunities for solitude in these RWAs have been diminished. Motorcycle use on popular trails like the Twentymile Creek Trail results in user conflicts where hikers and equestrians would otherwise find excellent opportunities for primitive and unconfined modes of recreation. Resource damage has also occurred due to motorized use on trails such as Victor Creek.

The Payette National Forest also recently completed a winter travel management plan. While the winter travel plan did not expand the physical acreage open to snowmobiles in the Secesh and Needles RWAs, more than two-thirds of the Secesh RWA remains open to snowmobile use. A smaller proportion of the Needles RWA is also open to snowmobiles. Places like Twentymile Creek, Duck Lake, and Buckhorn Summit have become increasingly popular with snowmobilers.

[14] See FSM 1923.03
[15] Payette Land and Resource Management Plan. 2003. Pages III-73 and III-74.

Advances in snowmobile technology and capability have led to snowmobile access in terrain that was formerly inaccessible. Snowmobiles high mark slopes and track up otherwise untouched snow deep in the backcountry, leaving their mark in an otherwise pristine landscape. Noise caused by snowmobiles can be heard far across the landscape and is disruptive to other users, diminishing naturalness, solitude, and opportunities for primitive and unconfined recreational experiences.

Boise National Forest

The Boise National Forest recently completed travel management plans on a district-by-district basis. The scope of the district travel plans was limited to the portions of each district where cross-country use of off-road vehicles had not been previously restricted. Since cross-country off-road vehicle use was already restricted in the RWAs on the forest, there were no changes made to existing route designations in RWAs.

This was an unfortunate omission by the Boise National Forest, which boasts more motorized trails (by percentage) than any other national forest in Idaho. With the proximity of this forest to the rapidly growing Treasure Valley, recreational uses of the Boise National Forest are closely following growth trends in the valley. On summer weekends, people from Boise, Nampa, Caldwell and other suburbs flock to the Boise National Forest to camp and partake in other recreational activities, including off-road vehicle use. The Red Mountain, Hanson Lakes and Tenmile-Black Warrior RWAs are all within a three-hour drive of nearly one-half million people.

ATV use on the Black Warrior Trail diverted the creek from its native stream channel in the Tenmile-Black Warrior RWA.

The Red Mountain RWA is particularly at risk, where more than 92% of the trail miles are open to motorcycle use. Opportunities for primitive and unconfined types of recreation are difficult to find without leaving the trail and venturing into terrain that would be difficult to access on foot. Recreational vehicle and off-road vehicle use is supported at Forest Service facilities on the perimeter of the Red Mountain RWA at Bull Trout Lake and Bear Valley where many Treasure Valley residents camp during summer weekends.

Although the Tenmile-Black Warrior RWA is perhaps a bit more difficult to access, off-road vehicle use also threatens the wilderness character of this RWA, which would make a logical addition to the Sawtooth Wilderness. The Blue Jay and Tenmile Ridge Trails on the edge of the RWA are increasingly popular with motorcycle enthusiasts, which has decreased opportunities for solitude, quiet, and primitive and unconfined types of recreation.

Resource damage has also occurred in the Tenmile-Black Warrior RWA, particularly in Black Warrior Creek where illegal ATV use caused significant resource damage that resulted in an emergency resource closure order. While Table 1 and Appendix A indicate that less than 9% of the trails in the Tenmile-Black Warrior RWA are open to off-road vehicles, the true figure remains uncertain. Many trails open to off-road vehicles follow the boundaries of the RWA and could be counted "in or out." Such trails are excluded from Table 1 and Appendix A.

In the Hanson Lakes RWA, significant resource damage has occurred on the Bench Creek and Swamp Creek Trails from illegal four-wheeler use. The increased trail tread width, erosion and siltation has reduced the naturalness and ecological integrity of the area. Motorized use has also decreased opportunities for solitude and primitive and unconfined types of recreation in the Hanson Lakes RWA due to intrusion by noise and dissruption of the primitive and remote characteristics of the RWA.

Snowmobile use is also an issue in all four RWAs on the Boise National Forest. Not a single acre of these four areas is closed to snowmobile use. It's not clear that a winter travel plan has ever been developed for the Boise National Forest despite the popularity with winter motorized and nonmotorized recreationists. The open nature of the timber stands and above-tree-line terrain in all four RWAs make for easy snowmobile access. Issues with wolverine denning habitat and mountain goats exist, but they have not been addressed through winter travel management planning.

Sawtooth National Forest

The Sawtooth National Forest is home to some of the most popular RWAs in Idaho. The Boulder-White Clouds RWA has a long and colorful history that includes the ascendency of Cecil Andrus in Idaho politics. Although the threat to this great area in the 1960s was a proposed open-pit mine, the modern threat is off-road vehicles. Existing off-road vehicle use is permitted to continue in the Boulder-White Clouds RWA under the Sawtooth Forest Plan. Nearly one-third of the trails in the Boulder-White Clouds RWA are open to motorcycles, and more than 90% of the RWA is open to snowmobiles. Resource damage has occurred on the Little Boulder Creek and Warm Spring Trails as a result of motorized use, lessening the natural character in these trail corridors. Motorcycles also regularly use nonmotorized trails in Upper Warm Springs, Castle Divide, Born Lakes and Garland Lakes. Motorized use has lessened opportunities for solitude and primitive and unconfined types of recreation since the area was first recommended for wilderness in 1972.

Motorcycle use is causing resource damage to the Little Boulder Creek Trail in the Boulder-White Clouds RWA.

There are no designated off-road trails in the portion of the Pioneer Mountains RWA managed by the Sawtooth National Forest. However, nearly 80% of the Pioneer Mountains RWA is open yearlong or seasonally to snowmobiles. Significant snowmobile recreation occurs in the Upper Little Wood drainage and is permitted seasonally in Hyndman Basin. While snowmobile use is considered by the agency to be transitory in nature, impacts to wolverine are likely resulting in this high mountain environment where this species has been confirmed. Advances in snowmobile technology have also facilitated access to formerly inaccessible terrain in the Pioneers. Consequently, opportunities for solitude and primitive and unconfined types of recreation have been diminished, including backcountry skiing and snowshoeing. Conflicts between snowmobilers and skiers and snowshoers have occurred. The Pioneers Mountains RWA is closed to snowmobiles on the Salmon-Challis National Forest side.

Nearly 40% of the trails in the portion of the Hanson Lakes RWA managed by the Sawtooth National Forest are designated for off-road vehicle use. Resource damage has been caused by off-road vehicle use on the Swamp Creek and Trap Creek Trails, including illegal four-wheeler use. Increases in trail tread width, erosion and siltation has occurred in both portions of the RWA managed by the Boise and Sawtooth National Forests. One-hundred percent (18,500 acres) of the portion of the Hanson Lakes RWA managed by the Sawtooth National Forest is open to snowmobile use.

In 2008 the Sawtooth National Forest completed a travel management plan that included only the portions of the forest open to cross-country use of off-roads at the time. Unfortunately, the scope of this plan did not include any of the three RWAs on the forest, despite increasing problems with resource damage, user conflicts, and illegal use of nonmotorized trails.

Salmon-Challis National Forest

Snowmobile use is prohibited in all three RWAs on the Salmon-Challis National Forest, including the Borah Peak, Boulder-White Clouds and Pioneer Mountains RWAs. The 1987 Forest Plan also prohibited off-road vehicle use in all three RWAs at the time. Unfortunately, the Forest Plan was amended in 1993 to allow nine different exceptions for off-road vehicle use on specific routes in all three RWAs. This amendment was followed by exponential growth in off-road vehicle use, putting the wilderness character of all three RWAs at risk.

Illegal ATV use is causing resource damage to the Swauger Lakes Trail in the Borah Peak RWA.

In 2009 the Salmon-Challis National Forest revised the forest-wide travel management plan, primarily to end cross-country off-road use on the forest. At the request of the Idaho Conservation League and The Wilderness Society, the Forest Service considered and analyzed an alternative that would have prohibited off-road vehicle use in all three RWAs to enhance and protect the wilderness characteristics of all three areas, reduce user conflicts, address resource impacts and increase opportunities for solitude and primitive and unconfined types of recreation consistent with the Wilderness Act.

The selected alternative closed the Herd Peak-Toolbox Trail to off-road vehicles in the portion of the Boulder-White Clouds RWA managed by the Salmon-Challis to address problems with cross-country off-road vehicle use and enforcement. Unfortunately, the existing designated routes in the Borah Peak and Pioneer Mountains RWAs were carried forward despite documented evidence shared with the Forest Service that resource impacts and degradation of wilderness character was occurring as a result of off-road vehicle use.

For example, motorized use of the Swauger Lakes Trail in the Borah Peak RWA has resulted in documented resource damage to the trail tread, sensitive meadows and wildlife habitat. The Idaho Conservation League and The Wilderness Society also documented illegal four-wheeler use along the entire length of the trail. Forest Service records that are part of the travel management plan revision also indicate that ATV users illegally graded portions of the trail with machinery to a wider tread width. All of these activities have lessened the natural character of the area and opportunities for primitive and unconfined types of recreation.

In the Pioneer Mountains RWA, an old mining road in Wildhorse Canyon is open to use by all vehicles. While the rough conditions of the road formerly limited use by motorized vehicles to some degree, the increasing use of four-wheelers has made motorized access easier in Wildhorse Canyon. Increased motorized access in Wildhorse Canyon has also increased dispersed camping and noise levels. Consequently, opportunities for solitude and primitive and unconfined types of recreation have declined.

The 2009 travel plan did not take into account increasing trends in the size, use and capabilities of off-road vehicles since the 1993 travel management plan was adopted. The 2009 plan did not analyze these trends in the context of the existing designated routes in all three RWAs and how those trends would affect the wilderness character of each area.

Caribou-Targhee National Forest

There are six RWAs on the Caribou-Targhee National Forest. Management of off-road vehicle and snowmobile use varies in each area. For Example, the 2003 Forest Plan for the Caribou National Forest identified two RWAs, including Mt. Naomi and Caribou City. The plan prohibits the use of off-road vehicles in both areas during the "snow-free" season but permits cross-country snowmobile use during the winter months. These travel management designations remained unchanged in the 2005 Caribou National Forest Travel Plan.

The 1997 Forest Plan for the Targhee National Forest identified four RWAs, including the Diamond Peak, Italian Peak, Lionhead and Palisades RWAs. Between 80 and 100% of each of these RWAs is open to snowmobile use (Table 1). Consequently, opportunities for solitude and primitive and unconfined types of recreation are limited, and impacts to wintering wildlife are on-going.

Snowmobiling in the Palisades RWA is degrading wilderness character, including ecological integrity and solitude. Photo by Thomas Turiano.

Off-road vehicle use also varies between each RWA. There are no designated off-road vehicle trails in the Diamond Peak or Lionhead RWAs. However, 72% (31 miles) of the trails in the Italian Peaks RWA are open to off-road vehicle use, offering few opportunities for primitive and unconfined types of recreation. The inconsistency in the management of each RWA has also led to public confusion about how the Forest Service regulates uses of RWAs. User conflicts also occur between backcountry skiers and snowmobilers.

Conclusions

As this report demonstrates, the Northern and Intermountain Regions of the Forest Service have sharply contrasting management approaches for recommended wilderness. Since 2003, the national forests of the Northern Region have been phasing out uses of RWAs that are impairing or have the potential to impair wilderness values as defined by the Wilderness Act of 1964. Draft plans on the Idaho Panhandle and Clearwater National Forests propose phase-outs of off-road vehicles and snowmobiles in RWAs.

In contrast, every national forest within the Intermountain Region allows some level of off-road vehicle and/or snowmobile use in one or more of their RWAs. For example, approximately 92% of the Boulder-White Clouds RWA managed by the Sawtooth National Forest is open to snowmobiles. Similarly, approximately 33% of the trails in the Secesh and Needles RWAs on the Payette National Forest are designated for off-road vehicle use.

These contrasting management strategies result in public confusion, inconsistent administration and user conflicts. As on-the-ground evidence indicates, allowing off-road vehicles has degraded wilderness character within the RWAs of the Intermountain Region. Deep ruts, stream bank erosion, impacts to wildlife habitats, illegal use of hiking trails by off-road vehicles, decreased opportunities for primitive and unconfined types of recreation, diminished solitude and user-conflicts are increasingly widespread throughout the RWAs in the Intermountain Region.

A national policy is needed for consistent management of Forest Service RWAs throughout the country. This policy should reflect the original intent of Congress in passing the Wilderness Act—to recommend additions to the National Wilderness Preservation System and to protect the wilderness character of such lands until Congress considers the agency's recommended additions to the NWPS. If the Forest Service finds particular lands suitable for wilderness designation, then the agency should support its own recommendations by allowing only the uses that are consistent with wilderness designation. At a minimum, a national policy that protects the wilderness character of RWAs should require the following:

- Adoption of a desired conditions statement in land and resource management plans that RWAs should be managed to reflect the definition of wilderness found in the Wilderness Act of 1964.
- Adoption of standards in land and resource management plans that require each national forest to prohibit uses of RWAs that are inconsistent with uses allowed per the Wilderness Act of 1964.
- Phase-out incompatible uses through land and resource management planning or travel management planning.
- Approval by the Chief of the Forest Service of any exceptions to this policy.

Appendix A Data regarding motorized recreation in each RWA

Area	Forest	Motorized Trails (mi)	Non-motorized Trails (mi)	% Motorized Trails	Acreage	Acres Open to Snowmobiles Yearlong	Acres Open to Snowmobiles Seasonally	% Open to Snowmobiles	Notes
Hanson Lakes	Boise	0	0	0.0%	13,600	13,600	0	100.0%	
Needles	Boise	0.9	4	18.4%	4,300	4,300	0	100.0%	
Red Mountain	Boise	47	3.8	92.5%	86,100	86,100	0	100.0%	
Tenmile - Black Warrior	Boise	3	31.7	8.6%	79,900	79,900	0	100.0%	
Caribou City	Caribou-Targhee	0	32	0.0%	29,201	29,201	0	100.0%	
Diamond Peak	Caribou-Targhee	0	14	0.0%	29,521	23,407	0	79.3%	Approximately 9,797 acres are also open to snowmobiles on designated routes only. These areas are not counted toward the total acres open to snowmobiles.
Italian Peak	Caribou-Targhee	31	11.8	72.4%	49,406	44,981	0	91.0%	Approximately 6,182 acres are also open to snowmobiles on designated routes only. These areas are not counted toward the total acres open to snowmobiles.
Lionhead	Caribou-Targhee	0	12.8	0.0%	11,314	11,314	0	100.0%	
Mt. Naomi	Caribou-Targhee	3.2	13	19.8%	13,246	13,246	0	100.0%	
Palisades	Caribou-Targhee	1.1	104.9	1.0%	61,173	57,660	0	94.3%	Approximately 7,836 acres are also open to snowmobiles on designated routes only. These areas are not counted toward the total acres open to snowmobiles.
Great Burn	Clearwater	1.2	117.7	1.0%	113,000	0	0	0.0%	
Mallard - Larkins	Clearwater	0	48.7	0.0%	66700	0	0	0.0%	

Area	Forest	Motorized Trails (mi)	Non-motorized Trails (mi)	% Motorized Trails	Acreage	Acres Open to Snowmobiles Yearlong	Acres Open to Snowmobiles Seasonally	% Open to Snowmobiles	Notes
Selway - Bitterroot Additions	Clearwater	0	23.1	0.0%	18,500	0	0	0.0%	
Mallard - Larkins	Idaho Panhandle	0	106.8	0.0%	78,500	49,963	0	63.6%	
Salmo - Priest	Idaho Panhandle	0	12.1	0.0%	17,600	0	0	0.0%	
Scotchman Peaks	Idaho Panhandle	0	8.4	0.0%	9,400	9,400	0	100.0%	
Selkirk Crest - Long Canyon	Idaho Panhandle	0	27.9	0.0%	26,700	2,666	0	10.0%	
Needles	Payette	25.1	60	29.5%	91,900	8,177	0	8.9%	
Secesh	Payette	36.2	62.1	36.8%	115,400	78,583	0	68.1%	
Borah Peak	Salmon-Challis	12.5	24.5	33.8%	119,000	0	0	0.0%	In addition to 7.2 miles of motorized trails in the Borah Peak RWA, there are also 5.3 miles of roads.
Pioneer Mountains	Salmon-Challis	4.8	42.5	10.1%	48,000	0	0	0.0%	While there are no motorized trails in the Pioneer Mountains RWA, there are 4.8 miles of designated roads.
Boulder-White Clouds	Salmon-Challis	0	12.8	0.0%	34,000	0	0	0.0%	
Hanson Lakes	Sawtooth	9.3	14.7	38.8%	18,500	18,500	0	100.0%	
Pioneer Mountains	Sawtooth	6.7	52.9	11.2%	61,000	44,780	3,945	79.9%	
Boulder-White Clouds	Sawtooth	50.7	115.9	30.4%	184,400	157,103	12,730	92.1%	