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Roadless Area Conservation

National Forest System Lands in Idaho

PHYSICAL RESOURCES SPECIALISTS REPORT

SOIL, WATER AND AIR

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Abstract

This Physical Resources Specialist Report provides background and information analysis for the affected environment and environmental consequences of the alternatives analyzed in Chapter 3 of the Forest Service Draft Roadless Area Conservation - Environmental Impact Statement (FEIS) for Idaho, June 2007. The analysis focuses on five key measures to compare and contrast alternatives: (1) Risk to watersheds that have Higher potential for Soil Loss and Sedimentation (2) Risks to Source Areas for Surface Water Supplies, (3) Risks to Water Quality of 303, (d) listed waters, (4) Risks to Class I Air Quality Areas, and (5) Existing miles of road. The report uses these key measures as risk indicators of overall health of the soil, water, and air resources for the three management themes considered. These themes would all, to varying degrees, prohibit road construction and reconstruction, timber harvesting, mineral extraction, and geothermal energy development in inventoried roadless areas on National Forests in Idaho. The three management themes considered are:

2001 Rule - Areas designated in Idaho by the Forest Service Roadless Area Conservation Final EIS, November, 2000 refereed as the 2001 Roadless Rule (considered the no action alternative),

Existing Forest Plans - Areas Designated as Roadless in Forest Plans for Forests located in Idaho, and

Idaho Petition - Areas submitted in the Petition of Governor James E. Risch for Roadless Area Management in Idaho, October 5, 2006.

The Existing forest Plans and Idaho Petition place acreages in the "General Forest" land use classification that would allow the most road building and associated other uses. The 2001 Rule has no "General Forest" category. The existing Forest Plans would designate 1,262,400 acres to General Forest. The State Petition would designate approximately 609,500 acres to General Forest when compared to the 2001 Rule. All Alternatives considered would: (1) prohibit most road construction and reconstruction, (2) prohibit timber harvest designed exclusively for commodity production purposes, and (3) allow timber harvest for stewardship purposes. They all would also allow management practices that help minimize increases in large, severe wildfires that can damage water, soil, and air resources on both National Forests and adjacent or downstream lands. At present nine leases for geothermal development are pending and will be addressed. Because additional specific locations of future geothermal development are unknown, the analysis cannot thoroughly address this potential within the State. Projected new road development for all uses is minimal, and average of approximately 4 miles per year in the existing Forest Plans and 1 mile per year in the Idaho Petition and the majority of these new roads would be temporary.

Methodology

This analysis is done for all National Forests in the State of Idaho. None of the Alternatives authorize any specific ground-disturbing action, however, each of the three alternatives would result in varying levels of future road development and other land uses within certain constraints. Due to the broad state-wide scale and the absence of specific ground-disturbing action the comparison of alternatives is general rather than site-specific. The Idaho Petition divided Forests into four land classification themes: 1) Wild Land Recreation, 2) Primitive, 3) Backcountry Restoration, and 4) General Forest. There are also five designated Special Areas that will generally be managed under the Primitive theme. Existing landscape classifications in the Forest Plans were converted as accurately as possible into one of these categories for comparison. The 2001 Rule had no General Forest or Backcountry Restoration category. Of the categories, the General Forest classification would provide the most possibility of ground disturbing activities so is the focus of this analysis. Wild Land Recreation and primitive categories are generally consistent with the 2001 Rule. In some limited circumstances roads can be built in the backcountry restoration category.

A literature review on the effects of various land management activities on erosion and sedimentation, water quality, and air resources pertinent to Idaho's climate, landforms, and vegetation cover was conducted. A synthesis of the information used was completed to assist in understanding differences among the alternatives.

Several measures were selected that lent themselves to the general analysis needed and compared against the addition of lands in the Existing forest Plans and the Idaho Petition in each of the four land use themes. These measures include: 1) located in watersheds used for surface drinking water source, 2) located in watersheds with water bodies not meeting water quality standards identified on Idaho's 303(d) list of impaired waters, 3) the area of sensitive soils with high hillslope and/or landslide risks, 4) the proximity to Class I air quality areas, and 5) the number of existing and anticipate road miles. Differences among these parameters served as indicators of relative risk to the soil, water, and air resources for the various alternatives are presented.

Assumptions

Scale and Magnitude of Changes Among Alternatives - Differences in the amount of "general forest" among Alternatives are not great, 1,262,400 in the Forest Plans and 609,500 acres for all Forests in the Idaho Petition. These changes represent approximately 0.01 and 0.02% of Idaho's total land area respectively. About 75 percent of the changes made by the Idaho Petition are on the Caribou-Targhee National Forests. With the possible exception of the Caribou-Targhee National Forests, few of the differences in the indicators selected were expected to be significant at the watershed scale (40,000 to 250,000 acres). None of the changes are expected to be significant at the state wide scale for the risk factors used in this analysis. However, the differences may

be important at site specific locations. Site specific evaluations would be done during project planning to address specific issues and risks.

Budget Trends Anticipated – Budgets should remain flat in nominal terms but decline in real terms. This implies: 1) reducing the miles of roads being maintained by putting roads into self maintaining, long term storage, decommissioning, or obliterating them, 2) little new construction, and 3) lowering maintenance standards on roads remaining. These changes will occur at the very time when demands for motorized access are increasing due to rapid population growth and the fact that the post WW II baby boomers generation is now an aging population, many of whom may desire more vehicle access on higher standard roads.

Fire Frequency – It is anticipated that the warmer conditions with earlier snow melt seen in Idaho over the last decade will continue and that the risk of fire and the expense of fire suppression will increase commensurate with the warming climate (Westerling et al. 2006). Continued efforts to reduce fuel hazards by thinning vegetative fuel cover, conducting controlled burns, and wider use of prescribed natural fire will be ongoing. Priority for fuels treatment and fire suppression will continue to be given to wildland urban interface areas and municipal watersheds (Mote et al. 2005).

Population – Idaho will continue to see rapid growth at the present or greater rates. Between July 1, 2004 and July 1, 2005 the population grew by 2.4% or 33,956 people, making it the third fastest growing state in the nation. The current population is approximately 1, 429,000 (Idaho Department of Commerce and Labor 2005).

Water Supply - Growing populations in urban and rural areas will increase demand for reliable quantities of high quality water for domestic and industrial purposes. Communities dependent on surface water supplies are most vulnerable to changes as a result of land management actions. At present 72 public water supplies currently use surface water within the State. Of these 409,150 acres are in inventoried roadless areas. The number of communities and the number of total users of water flowing from watersheds containing NFS lands are likely to increase as the populations grow.

Water Quality - State 305(b) reports are generally submitted to and approved by the Environmental Protection Agency every two years (though environmental complexity and disagreements over specific inferences may extend the process). These reports enumerate the number of water bodies not meeting their beneficial uses and state water quality standards. As total daily maximum load (TMDL) reports or watershed analyses are completed, restoration needs will be identified, prioritized, and corrective actions will be taken on National Forests in Idaho as funding becomes available.

Watershed Size - Land management activities can adversely affect water, soil, and air resources. The probability of measuring and detecting the effects of many activities on watershed resources, such as temperature or water yield changes, generally increases as the size of the watershed decreases. The effect of a specific activity may be undetectable within a larger watershed while that same activity may be detectable in a smaller watershed. This effect is mainly due to the percent of total treated area within a given

watershed, though other factors such as the reduced likelihood of high intensity rainfall or a deep snow pack covering an entire large watershed, and the added length of time it takes for water to reach the mouth of a larger watershed from where it has fallen are also factors (multiple authors as reported in Black, 1996 pg. 248).

Proximity to Water - The potential risk of activities affecting watershed resources generally increases with proximity to the water body itself. Roads or harvest units adjacent to or near water bodies generally have a higher likelihood of impacting the water than a similar activity further away from the water. One exception, the impacts from landslides or debris torrents may be evident miles down slope from the initiation point and the volume of debris carried may actually increase in a down-slope direction.

Proximity to Class I Air Quality Protection Areas - Class I Air Quality Protection Areas are geographic areas designated for the most stringent degree of protection from future air quality degradation. The Clean Air Act designates as mandatory Class I areas each National Park over 6,000 acres and each Wilderness or National Wildlife Refuge over 5,000 acres in existence as of August 7, 1977. The potential risk of an activity affecting Class I Air Quality Protection Areas generally increases with proximity to the area, all other factors remaining equal.

Timber Harvest Activities - Future timber harvest activities will be conducted primarily for fuels treatment. Annual harvest volume differences from the 2001 Rule are estimated to be about 16 million board feet in the existing Forest Plans and 4 million board feet in Idaho Petition.

Forest Road Density - Higher road densities (the number of linear miles per square mile) are assumed to increase risk of road related erosion and sedimentation.

Burned Area Emergency Response, Rehabilitation and Restoration - Following wildfires, emergency stabilization is conducted through the Burned Area Emergency Response (BAER) program. The program is designed to quickly identify and reduce post fire risks to life, property, and significant ecosystem values as a result of the fire. Wildfires often increase the risk of factors such as: damaging erosion, debris torrents, sedimentation, flooding, and infrastructure damage such as burned guard rails along a forest roads, and tree blow-down. All actions under BAER authority must be completed within one year of fire containment. Longer term rehabilitation and restoration needs such as reforestation and burned facility replacement are addressed through normal program funds (FSM 2523). These programs are anticipated to continue.

Best Management Practices (BMPs) and Contract Requirements - BMPs are defined in The State of Idaho Water Quality Standards and Wastewater Treatment Requirements (Idaho Administrative Procedures Act 16.01.2003,01) as "a practice or combination of practices determined by the Department [of Health and Welfare] to be the most effective and practicable means of preventing or reducing the amount of pollution generated by nonpoint sources". The Idaho Division of Environmental Quality is delegated authority to implement Section 208 of the Federal Clean Water Act to

evaluate whether the BMPs adequately protect beneficial uses. In 1980, the Idaho Water Quality Standards were amended to identify the Forest Practices Act rules and regulations as the silvicultural BMPs for Idaho (Idaho Department of Health and Welfare 1985, 1989 as reported in Seyedbagheri, 1996). BMPs represent the state of current knowledge on preventing or reducing pollution from non-point sources. Using cost effective, up-to-date BMPs for the design, operation, and maintenance of forest roads and timber harvest and other ground disturbing activities will prevent or mitigate most adverse impacts to watershed resources. It is assumed that each project will implement BMPs.

Monitoring and Adaptive Management - Projects are required to incorporate BMPs and monitor their implementation. In addition, formal reviews are conducted at the Forest or Regional levels as well as by the State of Idaho (2004 Idaho Interagency Forest Practices Water Quality Audit 2007) on a subset of timber harvest areas. Recently, Forests have been directed to develop and conduct Environmental Management System (EMS) audits. Information gathered at these various levels of review are used to adjust management as needed improvements are identified. This approach is anticipated to continue at the project, Forest, and Regional levels.

Modification of Management Prescriptions - Should future public interest be best served by altering the management prescriptions for a given areas, each Alternative would require different procedures and timeframes. All would require extensive public involvement and review.

General Background Information Used:

- Forest Service Roadless Area Conservation Final Environmental Impact Statement, Nov., 2000
- The Petition of Governor James E. Risch for Roadless Area Management in Idaho, Oct. 5, 2006
- Federal Register, January 12, 2001, Part VI, Department of Agriculture Forest Service 36 CFR Part 294, Special Areas; Roadless Area Conservation; Final Rule
- Idaho National Forest Land Management Plans
- Interior Columbia Basin Ecosystem Management Project web site spatial data <http://www.icbemp.gov/>
- NRCS (STATSGO) Soils Map for Idaho
- Forest Service Roadless Area Conservation Final Environmental Impact Statement Physical Resources Specialist Report, November 2000 by Russell LaFayette
- Mapped location of existing and reasonably foreseeable road locations for the areas displayed in the Idaho Petition that were not present in either the 2001 Roadless Rule or the Forest Plans
- Mapped 303(d) stream reaches and lakes as identified by Idaho DEQ
- Mapped Surface Public Waters Supply Watersheds, Idaho DEQ

- Mapped 6th Code HUCs Watersheds (watersheds between 10,000 and 40,000 acres in size)
- Idaho Forest Information Displayed on Forest web sites
- Numerous peer reviewed papers or other sources as cited

Affected Environment

Geography and Population - With 80 recognized mountain ranges, Idaho is home to some of the most spectacular scenery and most rugged landscapes in the United States. Idaho is the 14th largest state covering 83,574 square miles (53,487,360 acres) in size. Largely because of the rugged topography found on Idaho's National Forest, the State has more area designated "Roadless Area" in all three alternatives being assessed than any other state except Alaska the nations largest state.

Sixty-four percent of the landbase in Idaho is publicly owned. The largest percentage (38%) of the landbase in Idaho occurs on National Forest System lands. There are 20,402,524 acres of National Forest System lands in Idaho. All ten National Forests in Idaho have Inventoried Roadless Areas. Forty-six percent or 9,303,629 acres of the National Forest System lands in Idaho are classified as Inventoried Roadless Areas (IRA).

The 2001 Rule identified a total of 9,303,634 acres be placed in Roadless designation. The existing Forest Plans would subtract 1,262,400 acres from the 2001 Rule and place them in "General Forest". The State Petition would subtract approximately 609,500 acres from the 2001 Rule Roadless designation and place them in General Forest.

Approximately 75% of the 530,000 acres of requested changes from the 2001 Rule proposed within the Idaho Petition occur on the Caribou National Forest in Southeastern Idaho on lands that are primarily used for livestock grazing or that may have increased phosphate mining activities in the future. There are nearly 13,400 acres of known deposits under lease that could be developed and approximately 9,100 acres of known phosphate leasing areas in the 2001 Rule are covered by existing Federal Phosphate Leases, of which approximately 2,000 acres have already been mined. Recent concerns over selenium concentrations as a result of this mining have emerged.

Hillslope and Stream System Adjustment - Erosion and deposition of eroded material is a natural process. Erosion rates are not uniform; lithology, geologic structure, tectonic uplift, climate (includes large magnitude episodic precipitation events, droughts, gradual or rapid climate change...) can all alter erosion rates. Human actions can further affect changes in erosion and deposition rates (Bull pg. 4-31, 1991). Removal of vegetation or road construction may in combination with ongoing natural processes accelerate erosion and set up a number of related geomorphic responses on hillslopes. A recent study in western Montana illustrates that fire and related floods can play an important role influencing the processes of erosion and stream system adjustment (Parrett et al. 2001). Periods of erosion followed by relative periods of

stability can be expected as a result of geo-climatic-anthropomorphic complexity. These complex hillslope possesses directly affect channel response and adjustment.

ANTHROPOMORPHIC FACTORS AFFECTING HILLSLOPE AND STREAM SYSTEMS –

Water Yield and Flooding – Small watershed studies in the Rocky Mountains indicate that a 15% or greater harvest can increase measurable annual water yield (Stednick, 1996). The small Horse Creek watersheds (54 to 213 acres) on the Nez Perce National Forest yielded from 15 to 36 percent more instantaneous flow than before road construction and clear cut timber harvest removed from 20.9 to 32.6 percent of the watershed timber (King, 1989). Though possible, under foreseeable management scenarios, it is unlikely that any HUC 6th Code (10,000 to 40,000 acres) would be harvested at levels approaching 15% in any of the Alternatives within a 25 to 30 year tree/vegetation recovery period. Therefore, neither flooding nor total water yield is anticipated at the 6th Code watershed scale as a result of any of the Alternatives. However, large scale wildfires may reduce tree cover by more than 15% at the 6th Code HUC scale. In this case increased risk flooding would be anticipated (Parrett, et al. 2004).

Other Ground Disturbing Activities – These include activities such as: mining, geothermal development, and livestock grazing. Keeping soil in place by preventing erosion by water or wind is paramount to maintaining healthy watersheds and Class I air quality areas. Preserving ground cover is generally the most effective means of preventing accelerated erosion. Alternatives with fewer ground-disturbing activities are generally preferable for water, soil, and air resources. Non-renewable mineral resources will become increasingly valuable as world sources are depleted and populations continue to grow. Extraction of mineral resources using current Best Management Practices can be accomplished with acceptable impacts to water quality (Best management practices for mining in Idaho. 1992). Many legacy mine sites within NFS boundaries have been identified for treatment as funding becomes available. Selenium has become an issue associated with phosphate mines (VanKirk and Hill, 2006). Idaho has high potential for geothermal energy development. As non-renewable sources of energy are depleted and become more expensive, this resource will become increasingly valuable. Utilization of geothermal resources would require development of appropriate BMPs to ensure protection of water quality. New road access, pipelines, power lines, wells, and other structures would be required. However, the overall environmental tradeoffs could likely be heavily weighted in favor of the ability to produce atmospheric, emission free power. No increases in livestock grazing or decreases in protective range management practices are anticipated.

Timber Harvest Activities – Future timber harvest will be conducted primarily for fuels treatment. The harvest unit includes two general types of activities that may affect water, soil, and air resources: (1) the cutting and skidding or other transport of the trees within the logging unit, and (2) post logging residue fuels treatment. In 1974 the State of Idaho established a comprehensive Forest Practices Act (Idaho Code 38-13). The

purpose is to encourage timber harvest and related activities that maintain or enhance trees, soil, air, water, wildlife and aquatic habitat. Best Management Practices have been promulgated as Rules Pertaining to the Idaho Forest Practices Act (IDAPA 20.02.1). Since their adoption BMPs have been an effective tool for helping forest managers minimize impacts from forest practices (State of Idaho. 2000. Forest Practices Cumulative Watershed Effects. Idaho Department of Lands, Idaho forest Practices Act). In addition, Forest Service Contract Provisions specifically regulate how logs are moved from where the tree was felled within the harvest unit to landings where they can be loaded on trucks have improved over time. Jammer logging with its high road densities is no longer practiced on National Forest lands. Traditional skid trails may still be used, but today they are required to be carefully located to minimize the density needed and are only used under specified soil moisture conditions. Other practices used include logging over frozen ground and snow, more frequent use of felling/bunching equipment, and use of forwarders to reduce the number of equipment passes over soil surfaces. Skyline and/or helicopter yarding is now standard on steep terrain. These practices are designed to reduce physical ground disturbance. Fuels treatments can vary by site and may include: hand or machine piling and burning, broadcast burning, whole tree yarding and either selling the slash as a product or burning large piles at the landing. Of these, machine piling and burning is of most concern as it must be carefully conducted to minimize impacts such as bare soil, soil compaction (with reduced infiltration rates, greater surface runoff, and loss of productivity), and associated potential surface erosion (2400-6 and 2400-6T Standard and Special Contract Provisions, R1/4 Soil and Water Conservation Practices).

Stewardship Treatments - All Alternatives allow timber harvest for stewardship reasons. Stewardship projects enable managers to implement actions to treat insect and disease outbreaks and reduce the risk of large, damaging wildfire and associated smoke, and other watershed restoration needs identified.

Roads - A detailed report presenting a synthesis of scientific information related to forest roads can be seen in USDA Forest Service Gcinski et al., 2000.

Roads and Timber Harvest Effect on Runoff Timing - Timing of water runoff (how quickly a watershed generates runoff and the time it takes for that water to travel downstream) can change as roads and related drainage structures intercept, collect, and divert water. This accelerates water delivery to the stream, by intercepting, concentrating, and diverting runoff resulting in more water becoming storm runoff, which increases the potential for runoff peaks to occur earlier, be of greater magnitude, and recede more quickly than in unroaded watersheds (Wemple et al., USDA Forest Service 2000h). In addition, timber harvest can reduce the percentage of precipitation that otherwise would be intercepted and evaporated before hitting the soil or water that would have been used by trees is available for runoff. The USDA publication, "Forest Service Roads: A Synthesis of Scientific Information," (USDA Forest Service 2000h) summarizes most of the effects of roads and timber harvests on hydrologic regimes.

Roads and Timber Harvest Effect on Flooding – Large magnitude flood events are generally the result of extended periods of precipitation and/or rapid snow melt runoff that exceeds the capacity of the soil to hold additional water (Lull and Reinhart, 1972; Swanston, 1991). Though land use practices may reduce soil water holding ability, flooding can occur regardless of the land use practices. The increased risk of flood flows from small research watersheds following logging has been documented. The ability to detect relative effects of timber harvesting and roads on flooding decreases as watershed size increases. The extra flow generated in smaller watersheds becomes less evident as it joins flows from other watersheds and continues downstream (Thomas and Megahan 1998; Ziemer 1998). Additional water from smaller units enters the main stream at different times. This action desynchronizes the flows, moderating net flow increases. In addition, the larger the watershed the less likely it is to receive heavy rainfall or deep snow packs across the entire watershed.

Roads and Timber Harvest Effect on Water Yield - Timber harvests can cause an increase in total annual water yield. Changes in total annual water yield would most likely be detected where there is abundant moisture to begin with, and where the soil has less ability to absorb additional water (Harr 1983; Kattelmann et al., 1983; Ziemer, 1987). Changes in total annual water yield are generally less detectable in the drier areas where additional water is quickly used by the remaining plants or is lost through evaporation (Schmidt and Solomon 1983 as reported in USDA Forest Service-Lafayette, 2000). The time it takes for water-yield to return to pre-harvest levels is proportional to how quickly the site re-vegetates. Re-growth of vegetation in humid areas is rapid and flows generally return to normal levels 6 to 10 years after harvest. Slower growth in drier regions may require longer timeframes to recover. (Stone and others 1979 as reported in USDA Forest Service-Lafayette, 2000).

Temperature – Road construction and reconstruction and timber harvest may cause water temperature to change where groundwater is intercepted and brought to the surface, where the stream channel shape becomes wider or shallower due to road related sedimentation, or where loss of tree cover in riparian areas reduces shading (Hornbeck and Leak 1992). Temperatures may rise sharply in exposed areas and some of those elevated temperatures may then return to normal levels as water re-enters shaded areas downstream or receives cool inflow from other streams or groundwater (Pierce and others 1992 as reported in USDA Forest Service-Lafayette, 2000). Smaller or shallower streams are generally more susceptible to temperature fluctuations than larger or deeper streams (Chamberlin and others 1991 as reported in USDA Forest Service-Lafayette, 2000).

Open Roads – The potential impact of roads on erosion and sedimentation often exceed all other activities combined in forests managed for timber (Satterlund and Adams, pg. 325, 1992). Where system roads remain open the risk of erosion and sedimentation generally decreases over time following construction (Dryness, 1965, MacDonald and Coe, 2005) although roads may be a continual source of chronic erosion and sedimentation. Road surfaces are compacted and have low infiltration capacities; this

means that precipitation will become surface runoff that can concentrate and be discharged in areas where concentrated flow was not present before the road was constructed. Drainage patterns and roads are both networks, but they generally run perpendicular to each other; i.e. roads usually cut across slopes while streams flow down slopes. Common effects of roads on watersheds can occur where roads intersect drainages. Increases in the percent of fine sediment measured below road stream intersections have been measured in granitic soils in Colorado (Schnackenberg and MacDonald, 1998). Designing road stream intersections to accommodate disturbances (large floods, debris flows etc.) is important to reduce road failures (Furniss and others 1997 as reported in USDA Forest Service Gcinski et al., 2000). A dense road network interacting with a dense stream network will have a higher likelihood of effects than a limited road network overlaying a sparse drainage pattern. Roads that parallel drainages in close proximity to streams are at particular risk of adversely impacting stream systems. Forest roads located adjacent to water bodies are often a direct source of sediments, other pollutants, and increased flow volume. In steep landslide prone terrain the risk of mass movement (landslide and debris torrents) can be greatly increased by roads (USDA Forest Service-Geinski et. al. 2000).

Temporary Roads – To address long term road caused erosion and sedimentation and to reduce road maintenance costs a large percentage of new roads used for timber harvest whether temporary or designed system roads will be closed following construction. Both categories will have increased risks of erosion and sedimentation during the construction phase and for the first few years after construction. Temporary roads built with fewer design specifications may present a higher short term risk than designed roads with detailed construction specifications. In addition, these low standard roads in some cases may not be closed as quickly as anticipated. Research in Idaho has shown that appropriate stabilization techniques can greatly reduce road related erosion (Burroughs and King, 1989). Roads closed and left in a self maintain, long term storage condition, or decommissioned should eventually recover to near background levels of erosion and sedimentation risk as vegetation reestablishes effective ground cover increases. The length of time needed for recovery would vary according to factors such as treatments used when road was closed, climate, soil type, and terrain.

Water Quality Impairment – Roads, timber harvest, mining, energy development and other land disturbing activities may indirectly affect water quality by baring soil surfaces to erosion or increasing the release of certain nutrients from the decomposition of timber harvest byproducts (leaves, branches, and other organic matter). Nutrients, such as nitrogen, phosphorous, potassium, and calcium, may increase in stream water following timber management activities (Hornbeck and Leak 1991). Elevated nutrient levels in streamflow usually return to normal in 1 to 4 years (Chamberlin and others 1991 as reported in USDA Forest Service-Lafayette, 2000).

The U.S. Environmental Protection Agency (EPA) has delegated the primary responsibility to implement actions that comply with the Clean Water Act to the State

and Tribes. The Forest Service works closely with States and Tribes to assure Agency management practices comply with their requirements. Section 303(d) of the Clean Water Act requires States to evaluate water quality in light of State water-quality standards, report those stream segments that are impaired, and requires development of total maximum daily load (TMDL) assessments. Idaho has completed TMDL analysis for many of the 303(d) listed watersheds. The Forest Service has been an active cooperator in this effort and this cooperation will continue into the future.

Surface Water Used for Public Water Supply – Surface water used for domestic supplies were selected as a risk factor in this analysis as ground disturbing activities could directly affect their suitability for use in a public water supply. Idaho DEQ data bases were used to determine the location of watersheds that provide surface water as a public supply.

Air Quality – Congress established a national goal to prevent visibility impairment and improve visibility in all Class I areas. Class I air quality areas are National Forest System Wilderness areas, national parks, or national wildlife refuges greater than 5,000 acres in size, designated prior to the establishment of the Clean Air Act Amendments of 1977. Class I areas can also include lands designated by tribes or States. These areas serve as benchmarks for monitoring changes in air quality over adjacent lands. There are 12 Class I areas within 50 miles of any point in Idaho. The goal is to reduce regional haze that now affects Class I areas to near natural background levels. Atmospheric emissions from road construction, unsurfaced or gravel road dust, volatile organic compounds from gasoline or soot from diesel engines, open pit mining operations, and smoke from fire use fires, slash treatment, or wildfires all may contribute to haze levels. Idaho DEQ is consulted and authorizes management authorized burning to reduce adverse effects by choosing timeframes that will allow for maximum dispersion of smoke (Letter from Dudley and Weldon, 5, 2007 with attachments).

Alternative Comparison

2001 ROADLESS RULE

This alternative applies the strategy introduced by the 2001 Roadless Rule, the purpose of which was to ensure that inventoried roadless areas sustained their values for the current and future generations. Under the 2001 Roadless Rule, particular conditions applied with respect to permissibility of selected management activities within inventoried roadless areas (IRAs) (See Chapter 2 of DEIS for detailed description of this alternative):

- Road construction and reconstruction – prohibited except as provided in 7 exceptions that revolve around public health and safety (e.g., catastrophic events, CERCLA, etc.) prevention of irreparable resource damage, and existing rights or jurisdictions.
- Timber cutting – limited to four exceptions: for the purposes of conservation of TES species and ecosystem maintenance and restoration, where incidental to other

activities that are not prohibited (including personal and administrative uses), and where roadless characteristics already have been compromised due to roads or timber harvest.

- Discretionary mining – minerals exploration and exploitation not directly prohibited, but the construction or reconstruction of roads associated with leases issued after January 12, 2001 was prohibited except where associated with reserved or outstanding rights, provided for by statute or treaty. Exploration or development of leasable minerals using existing roads or not requiring use of roads could still occur.

Under this alternative, construction of 0.8 mile of permanent road and 0.2 mile of temporary road per year is projected to take place (Table 1), all of which would be related to non-timber cutting activities such as access to rights-of-way, leaseable minerals, and recreation (total = 5 miles of road from 2007-2011). This alternative presents the least risk to soil, water, and air resources.

EXISTING LAND AND RESOURCE MANAGEMENT PLANS

Approximately 83% of the 9.3 million acres of inventoried roadless areas are included in land-management plan prescriptions that would allow road construction, road reconstruction, and timber harvest. This alternative has approximately 1.26 million acres designated as general forest. Projected road construction and reconstruction in IRAs under this alternative is 12 miles per year. This estimate includes both permanent and temporary roads for timber cutting and non-timber related activities. The projected timber harvest offer of 14 MMBF is estimated to occur annually on 2,800 acres.

Management of leasable mineral resources in IRAs would be guided by each forest's land and resource management plan. The existing Caribou Forest Plan does not preclude mining of approximately 13,400 acres of existing Federal unleased phosphate deposits. In the long-term it is reasonable to assume that most of the 13,400 KPLA acres within IRAs that contain mineral reserves would eventually be mined. Roads, pits, and other surface mining facilities would be constructed for this purpose. Additional deposits would likely also be found within these areas.

Due to the potential acres available for ground disturbing activities, this alternative represents the most risk to soil, water and air resources. In general, Forests have been moving more roadless areas into management prescriptions that conserve roadless characteristics. Five of the National Forests in Idaho have revised their plans since 1999, the remaining five Forest Plans are older. The newer plans generally place more value on providing for roadless characteristics. The Existing Land and Resource Management Plans Alternative would have the greatest risk potential for soil, water, and air resources associated with roads, timber cutting, discretionary mining, and other activities.

STATE'S PETITION

The State's Petition Alternative proposes 5 themes for the Idaho IRAs. Each theme contains different land management restrictions:

- Wild Land Recreation
- Primitive
- Backcountry/Restoration
- General, Rangeland, and Grassland (General Forest)
- Special Areas of Historic or Tribal Significance (Special Areas)

Projected road construction and reconstruction in IRAs under this alternative is 4 miles per year. This estimate includes both permanent and temporary roads for timber cutting and non-timber related activities. The projected timber harvest offer of 4 MMBF is estimated to occur annually on 800 acres.

Of the 5 state Petition themes, the Wild Land Recreation, Primitive and Special Areas of Historic and Tribal Significance (SAHTS) themes are the most restrictive because they only allow road construction, road reconstruction or timber cutting only under limited situations (see the State Petition). Discretionary mineral activities are also limited under these themes. Under this alternative, the Forest Service would not authorize road construction/reconstruction or surface occupancy for new mineral leases in IRAs managed under these three themes. However, the Forest Service could allow exceptions to the surface occupancy prohibition for geothermal resources under the primitive theme. The Special Areas theme acres are to be managed under the primitive theme guidelines, except that the allowance for surface occupancy for geothermal would be precluded. Because of the prohibitions on ground disturbing activities within the Wild Land Recreation, Primitive and Special Areas themes, these themes should provide little risk to the soil, water and air resources.

The Backcountry/Restoration theme allows some road construction, road reconstruction, and timber cutting. The allowances include all the permissions in the 2001 Roadless Rule with the addition of allowing activities necessary to perform expedited hazardous fuel treatment in Backcountry/Restoration areas at significant risk of wildfire or insect/disease epidemics. Most new roads will be temporary, unless the responsible official determines that a permanent road meets the road exceptions and it will not substantially alter any of the roadless characteristics.

The Backcountry/Restoration theme under this alternative allows both surface occupancy and road construction/reconstruction for phosphate resources within known phosphate lease areas and geothermal resources.

QUANTATIVE METHODOLOGY USED TO ACCESS RELATIVE RISK

To further distinguish the relative differences between the three alternatives, the existing Forest Plans and the Idaho Petition were compared to the 2001 Rule with regard to the following for factors:

- The number of surface drinking water source area watersheds.
- The miles of streams and rivers not meeting water quality standards (listed on Idaho's 303(d) list of impaired waters)
- The number of acres identified as having: unstable soils, lack of vegetation cover, and known impacts where there is a likelihood of hillslope erosion and/or landslides exist.
- The proximity to Class I air quality areas.
- Road miles, to indicate the relative risks of road associated erosion and sedimentation.

Due to the broad state-wide scale and the absence of specific ground-disturbing action the comparison of alternatives is general rather than site-specific. The Idaho Petition divided Forests into four land classification themes: 1) Wild Land Recreation, 2) Primitive, 3) Backcountry Restoration, and 4) General Forest. There are also five designated Special Areas that will generally be managed under the Primitive theme. Existing landscape classifications in the Forest Plans were converted as accurately as possible into one of these categories for comparison. The 2001 Rule had no General Forest or Backcountry Restoration category. Of the categories, the General Forest classification would provide the most possibility of ground disturbing activities so is the focus of this analysis. Wild Land Recreation and primitive categories are generally consistent with the 2001 Rule. In some limited circumstances roads can be built in the backcountry restoration category.

Several measures were selected that lent themselves to the general analysis needed and compared against the addition of lands in the Existing forest Plans and the Idaho Petition in each of the four land use themes. These measures include: 1) located in watersheds used for surface drinking water source, 2) located in watersheds with water bodies not meeting water quality standards identified on Idaho's 303(d) list of impaired waters, 3) the area of sensitive soils with high hillslope and/or landslide risks, 4) the proximity to Class I air quality areas, and 5) the number of existing and anticipate road miles. Differences among these parameters served as indicators of relative risk to the soil, water, and air resources for the various alternatives are presented. Table 1 below displays the relative differences among the land classification themes for the risk factors selected.

Table 1. Risk Factor Summary Table – Physical Resources Risk Factor Comparison

	Acres of Watersheds with Surface Drinking Water	Total Miles of 303(d) Listed Stream	Number of Acres having high sensitivity soils	Number of Acres within 50 miles of a Class I Air Quality Protection Area	Road Miles by Alternative and Land Use Theme ¹
2001 Rule					
Total 2001 Rule (managed similarly to Wildland Recreation and Primitive Themes)	409,080	445	3,094,200	5,542,800	1,938
Existing Forest Plans					
Wildland Recreation	26,845	15	221,900	832,400	32
Primitive	165,006	62	817,200	1,712,300	227
Backcountry Restoration	151,575	159	1,503,400	2,370,600	796
General Forest	61,449	84	440,300	395,200	724
Forest Plan Special Area	4,205	125	111,400	232,300	32
Total Forest Plans	409,080	445	3,094,200	5,542,800	1,811
<i>%Change Backcountry Restoration + General Forest from 2001 Rule</i>	52%	55%	63%	50%	84%
<i>% Change General Forest from 2001 Rule</i>	15%	28%	14%	7%	40%
Idaho Petition					
Wildland Recreation	29,468	29	270,200	879,600	34
Primitive	119,907	47	610,800	1,406,300	168
SAHTS	5	4	24,100	46,500	16
Backcountry Restoration	230,867	210	1,842,500	2,871,100	1,293
General Forest	24,628	30	235,200	107,000	300
Forest Plan Special Area	4,205	125	111,400	232,300	0
Total Idaho Petition	409,080	445	3,094,200	5,542,800	1,811
<i>%Change Backcountry Restoration + General Forest from 2001 Rule</i>	62%	63%	67%	54%	88%
<i>% Change General Forest from 2001 Rule</i>	6%	8%	8%	2%	18%

¹ This data represents "ALL ROADS" on National Forest including system and non-system roads based on the roads data from the 12/2006 FOIA Request. It represents the best effort to sift out "Existing" roads. The non-system roads include but are not limited to "jammer roads and user created routes" and other roads that had no designation for "SYSTEM". Not all datasets were equal and as much data that was available was used to create the dataset used for this analysis.

CONCLUSIONS:

These themes would all, to varying degrees, prohibit road construction and reconstruction, timber harvesting, mineral extraction, and geothermal energy development in inventoried roadless areas on National Forests in Idaho. The management themes would all (1) prohibit most road construction and reconstruction, (2) prohibit timber harvest designed exclusively for commodity production purposes, and (3) allow timber harvest for stewardship purposes. Of the land use themes only Backcountry Restoration and General Forest differ in practical terms from the 2001 Rule. Backcountry Restoration would allow temporary roads and logging of dead or dying trees or for fuels treatment and General Forest would permit logging for stewardship purposes and mining.

The generalized risk calculations were made to disclose the changes among the five risk factors and the existing Forest Plans and the Idaho Petition. The General Forest and Backcountry Restoration themes would allow the most potential uses. No change would occur due to management in either of these categories until specific projects are proposed and implemented in the future.

Table 2 illustrates that when the Backcountry Restoration and General Forest themes are combined the Idaho Petition would increase the potential changes in the risk factors selected. However, when General Forest theme which will allow the widest array of activities is compared alone the existing Forest Plan theme would increase the potential change in the risk factors selected. The existing Forest Plans would designate 1,262,400 acres to General Forest. The State Petition would designate approximately 609,500 acres to General Forest when compared to the 2001 Rule. It would allow additional road access primarily to rangelands and areas with potential phosphate mining primarily on the Caribou-Targhee National Forest (about 75 percent of the acres changed from the 2001 Rule).

The amount of mining and energy development as a result of the Forest Plans or the Idaho Petition is not known. It is reasonable to anticipate that at least some expansion of these activities will occur as economic conditions increase the value of minerals and energy production. Each would have the potential to cause adverse effects. To address these risks, it is reasonable to assume that individual projects on National Forests would address potential effects and mitigation needs in a public planning process.

A warming climate change and continued increased fire activity may expose larger areas to severe wildfires than was experienced within the 20th Century. Class I Air Quality Protection Areas will likely receive longer periods of denser smoke. Post fire recovery of ecosystems may take longer and project planning teams may find landscapes more sensitive to man's perturbations than in the past. Disturbances on hill slopes may take longer to grow protective vegetative cover and as a result alluvial stream and river channels may receive greater volumes of sediment for longer periods

of time. Future Forest Service interdisciplinary assessment teams will need to recognize increased sensitivity of the general environment when recommending ground disturbing activities. Activities that reduce the risk and size of severe wildfire will likely receive more emphasis as warming occurs.

In the Statewide context and projections for new road building (4 miles per year in the State Petition and 14 in the existing Forest Plans) indicate that none of the Alternatives would provide broad scale detrimental effects. Though even well designed and constructed roads will create some increased risk of erosion and sedimentation proper location and design and the use of best management practices during construction can minimize the risk. The risk incurred by building small numbers of mostly temporary roads will be minimal and their adverse affect would last only a few years for those roads that are properly placed into long term storage or obliterated following the management activity. Roads used to conduct fuels management treatment in priority areas to reduce the likelihood high intensity wildfire would provide for an activity that will reduce the risks to soil, water, and air resources. Watershed studies have indicated that water and sediment yield increases from fires varies significantly depending on fire intensity and severity. Low intensity-severity fires generally return to pre fire conditions within 3 years while high intensity-severity fires may take in excess of 15 years to recover (DeBano et al., 1999).

Water, soil, and air resources have measurable characteristics that operate within naturally variable ranges of values. Water yield, timing, and quality, soil erosion, air quality, and other characteristics can vary widely, even in undisturbed situations. Land management practices, such as road construction, and reconstruction, timber harvest, mining, prescribed burning, and other similar activities, can affect these values, and their variability. Although, BMPs do not completely eliminate unwanted impacts, they do provide practicable means of preventing or reducing the amount of pollution generated by nonpoint sources (Idaho DEQ, 2005, Seyedbagheri, 1996). Forest practices audit results in Idaho showed that 99.6 percent BMP implementation compliance rate (State of Idaho, 2004 Report).

Currently, all Forest Service permanent and temporary roads needed for timber sales are designed and constructed using water, soil, and air BMPs that meet or exceed those required by the State of Idaho. Road design and management criteria incorporate the latest knowledge and experience, resulting in fewer effects, such as surface erosion, landslides, sedimentation, and dust emissions, on water, soil, and air resources. Proper design and construction of new roads and maintenance of existing and new roads can limit but not eliminate these effects (USDA Forest Service 2000h). Budgets should remain flat in nominal terms but decline in real terms. This implies: 1) reducing the miles of roads being maintained by putting roads into self maintaining, long term storage, or decommissioning (obliterating) them, 2) little new construction, and 3) lowering maintenance standards on roads remaining. To cope with budget shortfalls, emphasis has been placed on placing existing roads in long term storage or obliterating

them altogether. It is highly likely that many more miles of road will be placed into storage or obliterated than will be built in any of the land management themes.

These themes would all, to varying degrees, prohibit road construction and reconstruction, timber harvesting, mineral extraction, and geothermal energy development in inventoried roadless areas on National Forests in Idaho. The management themes would all (1) prohibit most road construction and reconstruction, (2) prohibit timber harvest designed exclusively for commodity production purposes, and (3) allow timber harvest for stewardship purposes. All ground disturbing actions proposed in any of the themes would require National Environmental Policy Act (NEPA) assessment. The planning process used by the USDA Forest Service is transparent and public involvement is encouraged at every stage of alternative development and analysis to help insure that all potential issues and concerns are identified and addressed.

CUMULATIVE WATERSHED EFFECTS ALL LAND USE THEMES

Cumulative effects for soil, water and air resources are generally considered as incremental changes that alone are not overwhelming but when combined the impacts are judged to be detrimental or beneficial. Assessment of management caused cumulative effects must be done in the spatial and temporal context of naturally occurring events such as wildfire, drought, floods, earthquakes, and insect infestations which can all drastically alter physical conditions affecting soil, water, and air resources even without man induced perturbations. Since no specific actions are prescribed or authorized by any of the land management themes (alternatives) no assessment of cumulative effects was conducted beyond identification of the risk factors presented. It is likely that restricting road construction common to all the land use themes to a lesser or greater extent will reduce the risks of adversely affecting soil, water, and air resources either directly or cumulatively. Table 2 indicates that is also highly likely that many more miles of road will be placed into storage or obliterated than will be built in any of the land management themes and if so, cumulative effects will be positive.

Table 2. Road accomplishment summary – in miles

	FY06	FY05	FY04	FY03	FY02	FY01	FY00
Idaho Forests							
New construction	7	7	21	5	4	5	
Reconstruction ^a	41	26	58	44	57	39	
Decommissioning ^b	184	355	146	161	158	374	
Forest Service Total							
New construction	7	7	21	5	4	5	7
Reconstruction	41	26	58	44	57	39	41
Decommissioning	184	355	146	161	158	374	184

Reconstruction and construction miles accomplished are from capital improvement and maintenance appropriations, deferred maintenance funds, purchaser election inventory revisions, new construction and non-USDA Forest Service funds. Decommissioned miles are regardless of funding source

- Reconstruction of existing roads generally results in improved drainage structures and reduces risk to water quality.
- Decommissioned roads are left in a self maintaining condition, generally culverts are pulled and in some cases partial or total recontouring is conducted as needed to protect water quality.

The minimal amount of road construction anticipated in any of the management themes indicates that affects directly associated with road construction or ancillary effects will not be wide spread (See Table 3). Ancillary effects such as mining operations, geothermal development, or new off road vehicle use initiated following new road construction cannot be calculated at this time.

Table 3. Summary of Roads Timber Harvest by Management Theme within the Themes Only

Projections for Selected Management Activities	2001 Roadless Rule	Existing Forest Plans	Idaho State Roadless Petition
Road construction/ reconstruction – miles of road per year ¹	1	14	4
Timber Cutting – acres per year	100	2,800	800

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