Fallen Bear DN

Appendix A

Comments from 30-day Comment Period and Forest Service Response to Comments

C. L. "Butch" Otter
governor

Robert L. Meinen
director

Dean Sangrey, Administrator
operations division

David Ricks, Administrator
management services division
……

IDAHO PARK AND
RECREATION BOARD
……
Steve Klatt
region one

Randal F. Rice
region two

Ernest J. Lombard
region three

Latham Williams
region four

Jean S. McDevitt
region five

Douglas A. Hancey
region six
……
IDAHO DEPARTMENT OF
PARKS AND RECREATION
.....
p.o. box 83720
boise, idaho 83720-0065

(208) 334-4199

fax (208) 334-3741

tdd 1-800-377-3529

street address
5657 Warm Springs Avenue

www.parksandrecreation.idaho.gov

December 17, 2008

Charles A. Mark, District Ranger
St. Joe Ranger District
222 S 7th St. Suite 1
St. Maries, ID 83861

RE: Fallen Bear EA

Dear Mr. Mark:

The Idaho Department of Parks and Recreation (IDPR) staff reviewed the Fallen Bear Environmental Assessment (EA). The St. Joe Ranger District proposes to harvest trees and decommission roads in the Haggerty Creek, Shady Creek, Tumbledown Creek, Bruin Creek and Stevens Creek drainages.

The EA noted that up to three dispersed campsites would be affected by the timber harvest activities for a period up to eight years. The district could lessen these impacts by only harvesting a few units at a time. This method allows only one or two dispersed sites would be impacted at any one time. **1-1**

The action alternatives would decommission up to 35.5 miles of road. The project area is heavily roaded from past timber sale activities. Decommissioning these roads will help to decrease road densities in the drainages.

At the same time, road decommissioning can impact motorized recreation access, particularly ATV use. ATVs have few dedicated trail opportunities on the St. Joe Ranger District. ATV recreation use is mainly limited to old logging roads.

The St. Joe Ranger District should designate Road 1223 as an ATV route from the intersection of Road #3350. Designating this road as an ATV route rather than a barrier road would allow ATVs a trail opportunity outside of Conrad Campground. **1-2**

The EA mentioned that one trail would be affected by timber harvest. The Blackjack Trail #85 would have an additional road crossing. The district should require that both an entrance and an exit should be built across the roadbed. Too often, we have seen road crossing basically destroy trail opportunities by creating excavation and fill banks that are too steep to hike or ride. **1-3**

We reviewed the Fallen Bear Recreation report also. We concur with the specialist report. The report did a great job explaining the Recreation Opportunity Spectrum and analyzing how the alternatives would affect recreation opportunities.

Thank you for the opportunity to review this EA. If you have any questions about our comments, please let me know.

Sincerely,

Jeff Cook, Outdoor Recreation Analyst
Comprehensive Planning, Research, and Review

Charles A. Mark, District Ranger December 24, 2008
Fallen Bear EA
St. Joe Ranger District
222 S 7th Street, Suite 1
St. Maries, ID 83861

Dear Mr. Mark,

The following comments are being submitted in response to the Fallen Bear Environmental Assessment (EA). There are two Alternatives, B and C. Alternative B is the proposed action. Alternative B would log 483 acres, construct 2.8 miles of new road, and reconstruct 17.9 miles. The logging volume is approximately 8.2 MMBF. Logging would occur on 68 acres that meet Region One old growth criteria.

A. Economics:

The economics analysis on page 45 includes the following statement. "The estimated high bid for Alternatives B and C indicate that the project is feasible." On page 46 the discussion of PNV indicates that Alternative B is estimated to have a PNV of $578,608.00. On page 4 of the Economics project file, Table 1-1 lists the predicted high bid for Alternative B as ($/CCF) of $38.00. The estimated ecosystem costs are shown as $915,317.00, which would result in a deficit of $336,709.00.

It is unclear in the economics analysis in the EA where the additional $336,709.00 would come from in order to fully perform all required ecosystem projects. Are one or more deficit timber sales classified as being economically feasible? 2-1

Additional, the current market price of lumber is approximately $177.00 per 1000 bd ft. If the price of lumber remains below $250.00 per 1000 bd ft during calendar year 2009, and one or more sales are put up for bid in 2009, is it accurate to state in the EA the predicted high bid for Alternative B would be $578,608.00?
High quality information with expert agency comments are needed that would indicate whether both Alternatives B and C would be deficit timber sales if the price of lumber remains below $250.00 per 1000 bd feet in 2009 or 2010, NEPA at 40 CFR 1500.1(b). 2-2

If one or more timber sales are sold in 2009 and the sale(s) would be below costs, NEPA requires high quality information and expert agency comments indicating the specific sources of funds that would be used to pay for all required Fallen Bear ecosystem projects.

There is also the question that concerns the issue of no bids being submitted if one or more Fallen Bear timber sales were put up for bids in calendar year 2009. If no bids were submitted, and the timber sale contracts are rewritten in order to put up a revised timber sale in 2009 or 2010, NEPA requires expert agency comments indicating each ecosystem project that would be dropped due to lower expected timber sale receipts. 2-3

2-4 A revised EA should include high quality information regarding the likelihood that one or more timber sale would not be sold due to market conditions during calendar year 2009.

B.WATSED model issues:
The Water Resources Report, page four, includes the following statement regarding ECA. "The model is driven by local climatic conditions and it uses Equivalent Clearcut Area (ECA) notation to represent the apparent degree of landscape disturbance through time."

In contrast to this statement, the 2007 Bonners Ferry Ranger District Myrtle Creek ROD, Appendix A, page 24 contained the following statement. "ECA is a general subset of some of the original logic that WATSED eventually uses for estimating changes in runoff; but it does not use all the logic and **has not been calibrated, validated, or updated for the IPNF."** (Emphasis added)

Is the statement from the Myrtle Creek ROD Appendix A regarding ECA and the WATSED model incorrect?

High quality information is needed that will indicate whether the ECA component of WATSED was used to calculate the ECA of the project area and the cumulative effects analysis area.

2-5 High quality information is also needed that will indicate whether the process that was used to calculate ECA in the project area and cumulative effects analysis area in fact was the best available science.

2-6 The WATSED discussions Water Resources Report does not include data regarding the percent of canopy closure that would result for each unit if Alternative B or C were implemented. The revised EA needs to provide high quality information that will indicate whether the WATSED model was used to calculate Crown Removal and Canopy Closure for Alternatives B and C. If this data has been produced, it should be included in the project files.

2-7 There is an additional WATSED issue that concerns sediment issues. On page five of the Water Resources Report the following statement is made. "The WATSED sediment estimate is based on timber sale related activities occurring over two years (2010-2011)". There are at least four timber sales on the St. Joe District that have received contract extensions, they are; Turn N Burn, Quarling Eagles, Manhattan Creek, and Mossy Cliff. If Alternative B is implemented and one or more timber sales are sold in 2009, are the WATSED sediment estimates accurate if new road construction and reconstruction activities occur past the year 2011 due to contract extensions?

C. Monitoring:
2-8 The very brief Monitoring discussion on page 24 of the EA does not mention the 1987 IPNF Forest Plan monitoring and evaluation requirements. The Forest Plan discussions regarding monitoring and evaluation include page I-1 of the Introduction and pages IV-7

through IV-13. Are the monitoring programs described on page 24 in full compliance with the IPNF Forest Plan monitoring and evaluation requirements?
Also, if the Fallen Bear project is implemented and one or more timber sales are deficit sales, what are the specific assurances that all required Forest Plan monitoring would occur? 2-8 cont.
What are the specific assurances there is guaranteed funds to perform all aquatics monitoring to assure Idaho Water Quality Standards would be met during and after road construction, and after logging activities were completed? 2-9

D. Noxious Weeds:
The noxious weeds discussions of Alternatives B and C on pages 41, 42, and 43 state that there would be a static trend or a increase in weed numbers in the project area. The cumulative effects discussions for Alternatives B and C also indicate the logging and road construction being proposed "… would have a higher risk for noxious weeds spread and establishment than the existing condition,.."
The current noxious weeds condition in the project area does not appear to be in full compliance with Federal and State noxious weed laws. The noxious weeds analysis in the EA does not confirm that Alternative B or C would in fact be in full compliance with Federal and State noxious weed laws, P.L. 93-629 and Idaho Code 24 Chapter 22, respectively. 2-10

The discussions on pages 41, 42, and 43 also do not indicate whether either Action Alternative would be in full compliance with the IPNF Environmental Management Systems (EMS) process. The Northern Region EMS Briefing Document mentions FSM 1331. FSM 1331 indicates the Forest Service is to comply with legal requirements. The EMS Environmental Objectives regarding invasive weeds also require the reduction of invasive weed introduction or spread through improved and more effective control and management. 2-11

E. Large trees/carbon storage:
Each Alternative includes the logging of large diameter trees, in particular Alternative B that would log 68 acres of old growth. Alternative B would remove approximately 8.2 MMBF from 483 acres; this is an average of approximately 17,000 board feet per acre. The 17,000 board feet per acre includes a significant amount of large trees. The vegetation analysis in the EA does not include high quality information concerning the issue of carbon storage in the large trees that would be lost if either Action Alternative were implemented. The issue of carbon storage is a national issue that particularly affects National Forest System lands. A revised EA needs to include high quality information indicating the expected impacts to carbon storage in the project area if large trees were logged. 2-12

F. Fisheries:
On page 13 of the Fisheries Report it is indicated the general trend for streams in the middle part of the St. Joe Drainage "… is toward impaired in-stream habitat conditions. It is also indicated on page 13 the HUC that includes the project area is classified as being functioning at risk. Alternative B would log 483 acres in the project area. The fisheries

discussions of Alternative B on pages 36 and 37 of the EA state that there would be minimal logging in the Tumbledown Creek, Bruin Creek, and St. Joe River face drainages. It is also stated on page 37 regarding Stevens Creek there would be only 28 acres of commercial thin with Alternative B. It appears that 458 acres would be logged in drainages other than Steven Creeks.

2-13 Is it accurate to depict the logging in three drainages as being minimal if 458 acres where to be logged in the three drainages with significant canopy removal in each drainage? If the timber volume removed with Alternative B amounts to over 8 MMBF, how much volume would be removed from the three drainages where 458 acres would be logged?

2-14 The fisheries analysis in the EA does not mention fine or coarse bedload movement or streambed scour in the Creeks in the project area. Information in the management activities files indicates over 4,000 acres have been logged in the project area since the 1960s, including over 1,500 acres of clearcuts. Did the cumulative effects analysis examine the expected impacts to fisheries habitat due to bedload movement and streambed scour to the Creeks in the project area if Alternative B is implemented?

On pages 36, 37, and 38 of the EA it is stated the proposed logging with Alternative B "…. would have no effects on streams conditions …." and it is also stated there would be no adverse effects with Alternatives B and C. Do the statements of no effects and no adverse effects indicate no bedload movement and no streambed scour will occur and therefore bull trout and westslope cutthroat trout habitat would not be impacted with either Alternatives B or C?

2-15 A revised EA needs to indicate whether there is high quality data to support a finding the implementation of any proposed Action Alternative would not result in fine or coarse bedload movement, nor any streambed scour in the Creeks in the project area.

We wish to remain on the mailing list for this project. These comments are also being submitted on behalf of The Lands Council, Jeff Juel, 25 W Main Ave, Ste 222, Spokane, WA, 99201.

Sincerely,
/S/
Mike Mihelich
Forest Watch Coordinator 208-667-9093
Kootenai Environmental Alliance
PO Box 1598
Coeur d'Alene, ID 83816-1598

December 29, 2008

Charles Mark, District Ranger
St. Joe Ranger District
222 S. 7th Street, Suite 1,
St. Maries, ID 83861

Dear Mr. Mark:

These are comments on the Fallen Bear Environmental Assessment (EA), on behalf of The Lands Council, WildWest Institute, Kootenai Environmental Alliance, Alliance for the Wild Rockies, and Friends of the Clearwater.

The EA fails to provide adequate descriptions of existing conditions for most resources, rendering it inadequate for compliance with NEPA. Full disclosures of the environmental "baseline" conditions (i.e., prior to human-induced modifications) is a critical necessity for cumulative impacts analyses. Citing other reports without presenting their discussions of existing conditions is a violation of NEPA. 3-1

Basically the EA says the existing conditions are a result of all previous activities and natural disturbances. However, "It is what it is" is not a cumulative effects analysis. 3-2

We are glad that the District is proposing to reduce the impacts of the project area road network on the landscape. However there are lingering concerns that must be addressed. It is not clear in the EA—would all the road decommissioning be fully committed to—guaranteed—in adopting an action alternative? If road decommissioning is dependent upon uncertain funding, then the EA should disclose the likely scenarios and include them in cumulative effects discussions. Much of the concerns expressed in these comments are based upon the failure of genuine cumulative effects analyses along with our suspicion that the IPNF is not committed to actually finalizing the road decommissioning within the time frame of other project activity direct effects to forest composition, structure, and function. 3-3

In other words, the EA guarantees the project would decrease habitat conditions for wildlife that need seclusion from human activities such as logging and motorized travel, but fails to guarantee what the EA says is needed habitat improvement accomplished by road removal.

3-4 Here's a gem from the Management Activity Report that justifies our suspicions: "Road 3698AUA was partially recontoured and was slated to be decommissioned or removed from the National Forest Road System." So the District committed to removing this road in the past, in order to protect some resource, and is now reneging on that commitment.

3-5 How many miles of existing roads in the watershed—which will not be upgraded by the action alternatives—were not designed with current BMPs or are not up to current BMP standards?

3-6 How is consistency of action alternatives with the 2005 Travel Management Rule demonstrated?

3-7 We do not support the construction of new roads to bring additional native forest land under timber management. The proposal begins to recognize the need to reduce road density so that chronic adverse impacts on water quality and aquatic habitat are reduced. But a program of decommissioning some roads while always newly constructing or "reconstructing" more roads will never achieve this much-needed restoration—especially since the IPNF is failing to set hard deadlines for the road decommissioning.

Furthermore we are concerned that the FS is merely using terms such as "long-term storage" and "decommissioning" to justify analyses that underestimate the impacts of these roads across time, all the while retaining easy options to use the roads again. This was seen in the Flathead National Forest this year, when "decommissioned" roads were later admitted to be not really fully ecologically functioning following decommissioning, and whose "decommissioned" status was quickly abandoned when more log extraction was targeted. From USDA Forest Service 2008a:

> Public Concern: What condition are the historical roads that will be rebuilt for this project currently in and what impacts will rebuilding them have to project area resources?
>
> ***Response:*** Essentially, the temporary roads on historic templates were system roads constructed to the best road construction standards of their day but later removed or decommissioned from the Forests transportation system for a variety of reasons. **The road template, drainage ditches, and ditch relief culverts are typically still in place. Stream crossing culverts may or may not have been removed.** Many of the roads have been naturally revegetated with grass, shrubs, and thick clumps of alder. Reconstruction of the roads would typically only require the replacement of stream culverts and possibly brush cutting. …Most of the impacts of historic road reconstruction are related to water quality, wildlife, and fisheries.
>
> Temporary roads built on historic templates would be returned to the condition or near the condition the road was in before they were reconstructed for use on this project.

3-8 (Emphasis added.) We are concerned that the terms "long term storage" and "decommission" are not clearly defined in the Fallen Bear EA.

3-9 Concerning the 17.9 miles of road reconstruction proposed, how many miles of those roads are now in an overgrown condition, essentially recovered from a water quality perspective? We are concerned because quite often road "reconstruction" ends up causing the same degree of impacts as new road reconstruction. In cases where old roads are essentially ecologically recovered, it

would be more accurate to place the miles of "reconstruction" into the "new construction" category—at least for purposes of environmental impacts analyses.

There are decisions you've apparently already made for road management. The FS did not bringing the public into the dialogue that leads to decisions about which roads ought to be kept on the landscape, and which permanently removed. This curtailed the range of actions considered in the EA and unnecessarily narrowed the range of activities that might actually make management more sustainable in a project area. And so the EA still considers the road density to be "high" under the alternative with the least road density (p. 27). 3-10

Please explain why roads not needed are to be placed in "storage" rather than removed from the inventory—what future specific management needs are linked to those specific road segments to be "placed in storage?" Also, please estimate the approximate time frame for such management actions. 3-11

Regarding its roads decisions, the District seems also to be avoiding the question of costs. There is apparently no consideration of the long-term financial commitments the District makes in its road management decisions. How can anyone tell if what is proposed is sustainable merely in a fiscal sense? Roads kept on the landscape, including the newly proposed roads, will require periodic and ongoing maintenance just to keep the ecological impacts minimized, but where and when will the Forest Service analyze and disclose such costs, since it's not in the EA? 3-12

New roads, regardless of their location on this landscape, cannot be constructed with no ecological impacts as the EA implies. Pulses of sediment and alteration of hydrological functioning is inevitable. 3-13

The Old Growth Report states:

> Eleven stands previously included in the allocation did not meet current minimum criteria as listed in removed (approximately 420 acres) from the old growth allocation (project file OG-5). The old growth classification of twenty-nine allocated old growth stands was changed, but the stands were retained in the allocation. Twenty-one stands changed from code 9 to code 11, and eight changed from code 11 to code 9. Twelve stands that previously had no old growth special use code assigned and now meet minimum criteria were added to the allocation (approximately 356 acres). Additionally, two stands identified as nonallocated other old growth are now allocated (approximately 51 acres). As a result of this validation process OGMU 27 had a **net decrease** in allocated old growth of approximately 13 acres (0.1%) (project file OG-5).
>
> …OGMU 27 has approximately 10,524 acres in National Forest System lands, with approximately 2,845 acres (27%) of those acres allocated to old growth management. All of these allocated old growth stands are located within the project area boundary, and all allocated old growth stands in OGMU 27 (Avery, 02) are located within the project area.

3-14 This Report continues the IPNF's confusing practice of conflating "allocated" old growth with **effective** old growth (the latter fully meeting old-growth criteria). The EA does not clearly disclose the total acres of old growth in the IPNF's forestwide inventory in this project area that was assumed to fully meet old-growth criteria **before this analysis**—and compare that figure to the total acres of old growth on the forestwide inventory in this project area that **is now assumed** to fully meet old-growth criteria.

3-15 Much of the justification for the silvicultural treatments proposed under the action alternatives is largely based upon what is claimed or assumed to be a shift in the project area vegetation composition away from "historic conditions," also know as "reference conditions" or the "range of natural variability" or other similar terms. The EA fails to provide adequate quantitative information that form the basis for such statements as "There is a need to accelerate or maintain the development of long-lived, early-seral, shade-intolerant species (western white pine and western larch)" (EA at 1) and "There is a need to reduce stand densities to enhance and encourage resilience to insects, disease, and other disturbances" (EA at 2). Frissell and Bayles, 1996 state:

> **The concept of range of natural variability … suffers from its failure to provide defensible criteria about which factors ranges should be measured.** Proponents of the concept assume that a finite set of variables can be used to define the range of ecosystem behaviors, when ecological science strongly indicates many diverse factors can control and limit biota and natural resource productivity, often in complex, interacting, surprising, and species-specific and time-variant ways. Any simple index for measuring the range of variation will likely exclude some physical and biotic dimensions important for the maintenance of ecological integrity and native species diversity. (Emphasis added.)

3-16 The EA's historic conditions discussions focus too much on trees and not enough on the other components of the ecosystem.

Noss (2001) addresses composition along with other basic components of the ecosystem:

> Ecosystems have three basic components: **composition, structure, and function**. Together, they define biodiversity and ecological integrity and provide the foundation on which standards for a sustainable human relationship with the earth might be crafted.

Noss goes on to define those basic components:

> **Composition** includes the kinds of species present in an ecosystem and their relative abundances, as well as the composition of plant associations, floras and faunas, and habitats at broader scales. We might describe the composition of a forest, from individual stands to watersheds and regions.
>
> **Structure** is the architecture of the forest, which includes the vertical layering and shape of vegetation and its horizontal patchiness at several scales, from within stands (e.g., treefall gaps) to landscape patterns at coarser scales. Structure also includes the presence and abundance of such distinct structural elements as snags (standing dead trees) and downed logs in various size and decay classes.

> **Function** refers to the ecological processes that characterize the ecosystem. These processes are both biotic and abiotic, and include decomposition, nutrient cycling, disturbance, succession, seed dispersal, herbivory, predation, parasitism, pollination, and many others. Evolutionary processes, including mutation, gene flow, and natural selection, are also in the functional category.

Key species, structures, and function that are excluded or inadequately analyzed in the EA include: amount of **interior** mature and old-growth forest, amount and size distribution of snags, amounts and distribution of coarse woody debris, soil conditions, populations of MIS and TES fish and wildlife species, and wildland fire. These factors happen to be associated with the 3-16
cumulative effects of past logging. Furthermore, these ecological factors will be tweaked even farther away from historic conditions by the proposed intensive industrial logging operations. Yet these are factors which the EA largely ignores in failing to satisfy requirements under the National Environmental Policy Act (NEPA) to **analyze and disclose cumulative effects.**

Cumulative impacts is defined by NEPA regulations at 40 CFR **§** 1508.7:

> …the impact on the environment which results from the incremental impact of the action **when added to other past, present, and reasonably foreseeable future actions** regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. (Emphasis added.)

The EA provides no comparison of a true "environmental baseline"—the reference conditions— 3-17
for so many ecological considerations.

Hayward, 1994 states:

> Despite increased interest in historical ecology, scientific understanding of the historic abundance and distribution of montane conifer forests in the western United States is not sufficient to indicate how current patterns compare to the past. In particular, knowledge of patterns in distribution and abundance of older age classes of these forests in not available. …Current efforts to put management impacts into a historic context seem to focus almost exclusively on what amounts to a snapshot of vegetation history—a documentation of forest conditions near the time when European settlers first began to impact forest structure. …The value of the historic information lies in the perspective it can provide on the potential variation… I do not believe that historical ecology, emphasizing static conditions in recent times, say 100 years ago, will provide the complete picture needed to place present conditions in a proper historic context. Conditions immediately prior to industrial development may have been extraordinary compared to the past 1,000 years or more. Using forest conditions in the 1800s as a baseline, then, could provide a false impression if the baseline is considered a goal to strove toward.

This calls into question the IPNF's entire mechanical manipulation/ prescribed burning regime, as represented by the Fallen Bear proposal. The project area and IPNF have been fundamentally 3-18

changed, so the agency must consider how much native forest it has fundamentally altered compared to historic conditions forestwide before pursuing "treatments" here. And that includes considering the effects of human-induced climate change and how forest management might exacerbate or mitigate such effects. Essentially, this means considering new scientific information on all relevant changes away from historic conditions— and in the forestwide context of Forest Plan Revision—not on a project-level basis prior to revision. 3-19

The EA discloses that large-scale logging has occurred in the area, but fails to disclose if the results of that logging—much of it very much like what is now being proposed—are consistent with the objectives of the similar logging proposed for the Fallen Bear timber sale. Such an analysis is of vital importance for the public's and decisionmaker's understanding of this proposal. 3-20

We believe that maintaining critical **ecological functioning** is overlooked in the EA's current and desired conditions. The prime example in the Northern Rockies and project area is the process of wildland fire. Continuing fire suppression actions will move conditions farther from historic conditions. The impacts of these "connected" fire suppression actions are not disclosed, as NEPA requires, at any programmatic or project scale. Although the IPNF is obviously assuming that it can successfully "improve" habitat forever via substituting logging for wildland fire, nowhere does any analysis disclose the amount of unintended consequences to overall **composition, structure, and function** of the ecosystem that will be continually realized with this highly experimental management regime. 3-21

McClelland (undated) states:

> The snags per acre approach is not a long-term answer because it concentrates on the **products** of ecosystem processes rather than the **processes** themselves. …The processes that produce suitable habitat must be retained or reinstated by managers…(fire, insects, disease, flooding, lightning, etc.). (Emphasis added.)

And Hutto, 1995 addresses the *processes* topic, talking about fire in that case:

> Fire is such an important creator of the ecological variety in Rocky Mountain landscapes that the conservation of biological diversity [required by NFMA] is likely to be accomplished only through the conservation of fire *as a process*…Efforts to meet legal mandates to maintain biodiversity should, therefore, be directed toward maintaining processes like fire, which create the variety of vegetative cover types upon which the great variety of wildlife species depend. (Emphasis added.)

And Riggers et al., 2001 emphasize, "the importance of wildfire, including large-scale, intense wildfire, in creating and maintaining stream systems and stream habitat."

Noss (2001) states, "If the thoughtfully identified critical components and **processes** of an ecosystem are sustained, there is a high probability that the ecosystem as a whole is sustained." (Emphasis added.) But in failing to adequately analyze key species, structures, and function the EA fails to reflect and impart to the public and decisionmakers true insight into and understanding of **ecology**.

Clearly underlying much of the EA's analysis is the belief that management can manipulate and natural processes to arrive at predicable outcomes. This notion ought to have been by now eliminated from public land managers' worldview simply because the failure of the old paradigm is quite evident from the lists of threatened and endangered species and damaged watersheds, the increased fire risk and out-of-whack ecosystems from fire suppression, the invasions of exotic species, and agency budgets strained to the breaking point trying to deal with the accrued damages caused by this "manipulate and control" paradigm.

The EA is full of statements that claim the various vegetation manipulations proposed will improve some aspect of the ecosystem, mostly overstated or exaggerated. But of course, at the sacrifice of something else. However, not accompanying all these hypothetical promises of 3-22 improvement are acknowledgments of the fact and degree of ecological unintended side effects that pose risk or present likely damage to some other composition, structure, or function of the ecosystem. Regarding this characteristic agency hubris, as typified by the Fallen Bear EA, Frissell and Bayles (1996) state:

> Most philosophies and approaches for ecosystem management put forward to date are limited (perhaps doomed) by a failure to acknowledge and rationally address the overriding problems of uncertainty and ignorance about the mechanisms by which complex ecosystems respond to human actions. They lack humility and historical perspective about science and about our past failures in management. They still implicitly subscribe to the scientifically discredited illusion that humans are fully in control of an ecosystemic machine and can foresee and manipulate all the possible consequences of particular actions while deliberately altering the ecosystem to produce only predictable, optimized and socially desirable outputs. Moreover, despite our well-demonstrated inability to prescribe and forge institutional arrangements capable of successfully implementing the principles and practice of integrated ecosystem management over a sustained time frame an at sufficiently large spatial scales, would-be ecosystem managers have neglected to acknowledge and critically analyze past institutional and policy failures. They say we need ecosystem management because public opinion has changed, neglecting the obvious point that public opinion has been shaped by the glowing promises of past managers and by their clear and spectacular failure to deliver on such promises.

In regards to all these promises of "improvement" of one aspect or another of the forest from the Fallen Bear proposal, the only one having scientific support is the road decommissioning to improve soil and watersheds. The rest are merely hypothetical and should be considered experimental at best. However if truly experimental, the Forest Service ought to be stating them as hypotheses, and committing verification of them.

The Restoration Principles created and adopted by the Montana Forest Restoration Committee[1] provide a contrast to the agency hubris. Principle #2 states, "Adaptive management is an approach to natural resource policy that embodies a simple imperative: actions are experiments; learn from them."

[1] http://www.montanarestoration.org/restoration/principles

Regarding the mismanagement of fire by the "manipulate and control" paradigm (this mismanagement being identified as a driver for this Proposed Action), Wuerthner (2006a) states:

> The industrial/anthropocentric perspective believes that humans can and must control processes such as fire. It also tends to believe that natural processes are mechanical and that they respond to human tinkering much like a machine. Ultimately, the industrial/anthropocentric perspective on wildfire negatively affects the health and well-being of the environment.

Wuerthner (2006a) identifies several reasons why management based upon a worldview—unfortunately still pervasive in the IPNF—is simply not sustainable.

Lacy, 2001 examines the importance of soils for ecosystem functioning and points out the failure
3-23 of most regulatory mechanisms to adequately address the soils issue. The problems Lacy identifies of regulatory mechanisms exists in Regional and Forest-level standards and other guidance applicable for the Fallen Bear project. In fact, the EA fails to adequately disclose the IPNF's chosen regulatory mechanisms for protecting soil productivity, and omits any discussion of the impacts of the proposed management actions on soil productivity. Kuennen et al. 2000 state, "An emerging soils issue is the cumulative effects of past logging on soil quality."

From the IPNF's 2008 Gold Crown project Soil Scientists Report[2]:

> Many indirect effects are possible if soils are detrimentally-disturbed… . Such indirect effects could include: Compaction can indirectly lead to decreased water infiltration rates, leading to increased overland flow and associated erosion and sediment delivery to stream. Increased overland flow also increases intensity of spring flooding, degrading stream morphological integrity and low summer flows.

3-24 Yet the EA's modeling and methodology fail to take into account the indirect effects of soil compaction on increased overland flow and therefore water yield increases.

The Bonners Ferry Ranger District's Myrtle Creek HFRA FEIS acknowledges that such cumulative soil conditions affect the overall hydrology of a watershed:

> Alteration of soil physical properties can result in loss of soil capacity to sustain native plant communities and reductions in **storage and transmission of soil moisture that may affect water yield and stream sediment regimes.** (P. 4-76, emphasis added.)

The EA presumes that areas of soil disturbance less than 15% areal extent in an "activity area"
can be completely ignored in discussions about cumulative soil damage and accountings of
3-25 management-induced reductions in soil productivity. This problem arises from the failures of the SQS. The EA discloses nothing in terms of the **reduction in soil productivity** caused by all such soil disturbance. Implementation of the project would also mean creating additional detrimental soil disturbance on many other previously logged areas, with likewise unquantified losses in soil productivity.

---

[2] http://www.fs.fed.us/ipnf/eco/manage/nepa/sptnepa/gold_crown/Gold%20Crown%20Soils_Final%204_18_08.pdf

The Region 1 Soil Quality Standards (SQS) were developed internally by the agency, without the use of any public process such as Forest Planning, NEPA, or independent scientific peer review. It may be the case that the Forest Service chose 15% as it's upper limit on soil damage within a unit merely because they believe that modern clearcutting methods can avoid compacting more that 15% of a unit in while removing all the merchantable trees and burning the slash. In response to The Lands Council's comments on the Kootenai NF's Young Dodge Draft EIS, the FS replied: 3-26

> The 15% change in aerial extent realizes that timber harvest and other uses of the land result in some impacts and impairment that are unavoidable. This limit is based largely on what is physically possible, while achieving other resource management objectives.

So the FS admits that the limit is based on the fact that it is not feasible to do much less damage than 15% of an activity area while carrying out industrial logging. **We note that the limit has nothing to do with the science of maintaining soil productivity.**

In response to Draft EIS comments on the IPNF's Myrtle Creek HFRA project—comments that criticized the arbitrary nature of the SQS's use of 15% detrimental disturbance as somehow allowable—the Myrtle Creek HFRA FEIS cites one of the Forest Service's own experts on soil processes, Dr. Bob Powers of the Pacific Southwest Research Station:

> The Regional Soil Quality Standards (R-1 Supplement 2500-99-1) were revised in November 1999 (DEIS, A-11 (FEIS Chapter 3). Manual direction recommends maintaining 85% of an activity area's soils at an acceptable productivity potential with respect to detrimental impacts - including the effects of compaction, displacement, rutting, severe burning, surface erosion, loss of surface organic matter, and soil mass movement. This recommendation is based on research indicating that a decline in productivity would have to be at least 15% to be detectable (Powers, 1990). (Myrtle Creek HFRA FEIS at F-24.)

It is important to note that Dr. Powers was referring to separate and distinct thresholds when he talks about 15% **increases in bulk density**, which is a threshold of when soil compaction is considered to be detectable, and 15% **areal limit for detrimental disturbance**, which is the SQS upper limit on detrimental disturbance (including compaction from temporary roads and heavy equipment, erosion resulting from increased runoff, puddling, displacement from skid trails, rutting, severe burning, etc.). With that caveat, what Dr. Powers had to say in relation to the SQS is quite revealing as quoted in Nesser, 2002:

> [T]he 15% standard for increases in bulk density originated as the point at which we could reliably measure significant changes, considering natural variability in bulk density… [A]pplying the **15% areal limit** for detrimental damage is not correct... [T]hat was never the intent of the 15% limit… and **NFMA does not say that we can create up to 15% detrimental conditions**, it says basically that we cannot create significant or permanent impairment, period... (emphasis added)

Nesser was, until recently, the Soil Scientist at Region 1. In order to comply with NEPA, an EIS or EA must disclose scientific controversy of important resource concern. The FS has never

3-26 publicly disclosed the internal controversy the agency fully recognizes surrounding its own use of SQS standards for compliance with NFMA, in violation of NEPA.

In response to TLC's concern that the 15% areal extent limit had been confused by the Forest Service with the 15% increase in bulk density from soil compaction, the Kootenai NF's 2008 Young Dodge Final EIS stated:

> Powers (1990) cites that the rationale bulk density is largely based on collective judgment. The FS estimates that a true productivity decline would need to be as great as 15% to detect change using current monitoring methods. Thus the soil-quality standards are set to detect a decline in potential productivity of at least 15%. This does not mean that the FS tolerates productivity declines of up to 15%, **but merely that it recognizes problems with detection limits.** Also, a 15% increase in bulk density may not be detrimental to productivity; site and soil productivity depends on the soil and ecosystem in which it is found.

(Emphasis added.) So we have the SQS's 15% areal extent limit being based on mere feasibility rather than concerns over soil productivity, and additionally we have the 15% bulk density increase limit based upon the limitations of detection by FS bulk density measuring methods—not concerns over soil productivity!

This situation points out the lack of currently existing reasonable regulatory mechanisms for protecting soil productivity on the IPNF and Northern Region, as our citing of Lacy, 2001 pointed out above.

The Soil Scientists Report prepared for the IPNF's 2008 Gold Crown HFRA project EA points out the ecological importance of the fungal process in the soil that creates brown cubical rot from large logs of some species of conifer trees:

> (Brown cubical rot) is the result of numerous endemic, wood-infecting fungi, many of which are stem and heartwood diseases of native conifers.
>
> Residue left after advanced brown-rot decay is a brown, crumbly mass composed largely of lignin. In healthy forest ecosystems, especially coniferous forests, the upper-most soil horizon contains a significant portion of brown-rotted wood residues. The sponge-like properties of advanced brown-rotted wood act as a moisture and nutrient sink. Because of the high lignin concentrations, and low carbohydrate rates, it persists in the forest for a long time (Blanchette 1995).
>
> The lignin product of brown rot is tremendously important in the forests of the West. Since brown rot typically affects only heart wood, it is important that large trees are allowed to die and decompose naturally in the woods. For example, a larch 36 inches in diameter may possess 24 inches of heart wood. This in turn decomposes to a 16-inch zone of brown cubical residue, often referred to as soil wood. Early logging techniques that bulldozed forest debris into piles and then burned the organics significantly reduced the occurrence of soil wood in our forests. Soil wood possesses one key characteristic that makes it important: the ability to hold water. This high water-holding capacity provides:

- Plant-available water, especially during the driest months;
- Excellent underground habitat for all types of soil biological activity;
- Appropriate conditions that cause a hub of mycorrhizae fungi activity.

When a site loses woody soil components, the replacement process may take from 100 to 300 years (Harvey *et al.* 1981).

To ensure sustained forest use and protect ecosystem integrity, it is imperative that land managers understand two concepts in regard to the fungal resource. First, the role of fungi is essential for the continuance of many ecosystem processes. Second, with proper awareness and skill, forest managers can greatly influence fungal processes and potential benefits.
Wood decay fungi in the coniferous forest ecosystem have three major roles:

- breaking down plant residues and recycling carbon to the soil or the atmosphere;
- releasing mineral nutrients from plant residues and making the nutrients available to living organisms, and;
- producing the physical character of the soil matrix.

The outcomes of these processes promote soil water infiltration rates, soil water-holding capacity, cation exchange capacity, nutrient availability, nitrogen fixing activity, and habitat for mycorrhizae associations, to name a few.

The EA fails to account for the ecological damage that logging has caused due to the inattention to retaining adequate amounts of large woody debris in past timber removal operations. 3-27

Whereas the agency acknowledges that watersheds that have high levels of existing soil damage could indicate a potential for hydrologic and silviculture concerns (USDA Forest Service 2005b, p. 3.5-11, 12), nothing in the EA's watershed analysis section specifically addresses the hydrological implications of existing soil conditions nor the proposed project-induced soil impacts. 3-28

In response to comments on the Kootenai NF's Brush Creek Environmental Assessment, the FS stated:

> Forest ("land") productivity is "the summation of productivities of the individual landscape elements (stands) that comprise the forest and is the integration of soil productivity, species composition and stocking, and stand history (Grgal 2000)". If soil productivity is adversely affected due to compaction, then this will have an impact on the overall productivity of the forest. Forest productivity is difficult to measure, so oftentimes, soil quality is used to estimate the potential productivity (Little et al., unknown year).

The reductions of future timber yield due to cumulative ecological damage in the project area and forestwide is not quantified in the EA nor in any IPNF programmatic analysis. Further compromising soil productivity of the IPNF is the failure to adequately address the spread of noxious weeds, which have the potential effect of reducing site productivity by replacing natural 3-29

3-30 vegetation and competing with same for soil nutrients, moisture, etc. The EA does not adequately analyze or disclose the noxious weed implications for soil or other aspects of biological diversity.

3-31 "There would be no compaction or displacement beyond the currently existing levels." (EA at 58.) The EA fails to tell the public just what the "currently existing levels" of detrimental disturbance is, and where it's located. Why is restoration of management-induced soil damage not a consideration for any aspect of this project?

3-32 The EA fails to explain how more detrimental disturbance will still be within standards.

3-33 "Activity units that have had little prior disturbance show a greater incremental increase in potential detrimental disturbance than those units that contain a network of already existing skid trails. Proposed skyline units that were previously yarded with the same logging system have little to no additional impacts because existing corridors are **generally** reused." (EA at 59, emphasis added.) The EA fails to state how effective the reliance on old skid trails is, to comply with standards.

3-34 "Harvesting the tree bole (and bark) would remove about ±43 percent of the tree's potassium (Garrison-Johnston and others 2004) which may cause indirect effects to vegetation as nutrient sources are removed from site." This implies that some unspecified loss of potassium would cause long-term impacts on soil productivity. The EA does not provide a scientific basis for allowing the potassium losses that would occur.

3-35 The EA also fails to disclose how much long-term soil productivity loss due to potassium depletion occurred in the project area from past management activities.

3-36 "When existing and proposed system roads are incorporated, cumulative soil impacts would affect no more than 20% of the activity areas, therefore meeting forest plan standards." (P. 61.) The IPNF has never explained **which** segments of **which** roads it uses to calculate the total detrimental disturbance "When existing and proposed system roads are incorporated." This goes for log landings also.

3-37 The EA does not disclose in any detail whatsoever the population levels and distribution of Management Indicator Species (MIS) and Threatened, Endangered, and Sensitive (TES) species. Obviously, we are greatly concerned that, with so much of the project area and IPNF being altered via logging, burning, and road construction, how have such populations responded?

3-38 The EA also does not disclose the results of any site-specific surveys of those areas altered by logging in the past, comparing present vs. historic conditions of key ecological factors (vegetative composition and structure) that are important components of MIS and TES wildlife habitat. These include the amount and distribution of mature and old-growth forests, the amount of **interior** mature and old-growth forest, the amount and size distribution of snags, and the amounts and distribution of down logs.

Although one necessary purpose of an EA is to provide cumulative effects analyses for the various resource topics, the EA's cumulative effects analyses are deeply flawed. The major flaw is the failure to adequately disclose the additional impacts of the proposed logging, burning, and other development activities together with the impacts of previous logging, road building, livestock grazing, and other development actions. The flaws of the cumulative effects analyses leave the public unable to see a clear picture of how past and continued manipulations and human enforced changes continue to blend—more realistically continue conflict with—the natural processes that created the natural landscape in the Fallen Bear project area. 3-39

So the questions a cumulative effects analysis for wildlife species must answer are: How much habitat in the project area have all projects modified, adding together past, foreseeable future, and Fallen Bear project impacts? And: How do the remaining, habitat conditions compare to the habitat needs for well-distributed, viable populations of wildlife in the Fallen Bear project area and in the IPNF? The EA's cumulative effects analyses for wildlife evade these simple questions of such vital importance. As written, the EA does not support the proposal to deplete more wildlife habitat. 3-40

The Ninth Circuit Court of Appeals ruled that the IPNF "must both describe the quantity and quality of habitat that is necessary to sustain the viability of the species in question and explain its methodology for measuring this habitat." (*Lands Council v. McNair*). Here, the EA fails to describe the quantity and quality of habitat necessary to sustain the viability of the species in question and it does not "explain its methodology for measuring this habitat." The EA simply fails to describe the amount and quality of habitat needed to maintain viable populations of species. 3-41

The Forest Plan at II-5 defines habitat for viable populations as "greater than 40 percent of maximum potential." The EA fails to define "maximum potential" for any specific TES or MIS wildlife species expected to occupy the project area, making it impossible to determine viability. The IPNF seems to be using its forestwide old-growth inventory as proxy for viability, but the EA still fails to define "maximum potential" for forestwide old-growth. In the IPNF's Northern Prairie EA, the IPNF discloses a maximum potential in the IPNF's North Zone ("Historically, an estimated **15-35%** of all Idaho Panhandle North Zone forests were composed of old growth…" (p. 17, emphasis added). The St. Joe Ranger District is not in the North Zone, but the historic range would likely be similar to the North Zone. Since the EA failed to disclose the historic range of this important habitat quantity for St. Joe Ranger District, if one were to take that as the best estimate of old growth on the Forest, then "40% of maximum potential" of that range's maximum (35%) would be 14%, which would be, by the Forest Plan's own definition of habitat for viable populations, the minimum amount of old growth needed to insure viability on the Forest. We note that neither of the IPNF's old growth estimates—neither FIA nor otherwise, is even as much as 12% forestwide. 3-42 3-43

Sources cited in the EA and the project area reports it cites, as well as specialists on the Fallen Bear ID Team, are not from the independent research arm of the agency. A scientist from the agency's research arm, Ruggiero, 2007 states:

> Independence and objectivity are key ingredients of scientific credibility, especially in research organizations that are part of a natural resource management

> agency like the Forest Service. Credibility, in turn, is essential to the utility of scientific information in socio-political processes.

Ruggiero goes on to make the same distinction we do above, pointing out that the Forest Service's scientific research arm **is distinct** from its management arm:

> The Forest Service is comprised of three major branches: the National Forest System (managers and policy makers for National Forests and National Grasslands), Research and Development (scientists chartered to address issues in natural resource management for numerous information users, including the public), and State and Private Forestry (responsible for providing assistance to private and state landowners). This article is directed toward the first two branches.
>
> The relationship between the National Forest System and the Forest Service Research and Development (Research) branches is somewhat hampered by confusion over the respective roles of scientists (researchers) and managers (policy makers and those that implement management policy). For example, some managers believe that scientists can enhance a given policy position or management action by advocating for it. This neglects the importance of scientific credibility and the difference between advocating for one's research versus advocating for or against a given policy. Similarly, some scientists believe the best way to increase funding for research is to support management policies or actions. But, as a very astute forest supervisor once told me, "Everyone has a hired gun…they are not credible…and we need you guys [Forest Service Research] to be credible." It is naïve to believe that direct involvement in the establishment or evaluation of management policy doesn't damage scientific credibility in the long run. Neglecting this fact may put one on the short-term path to increased relevance and greater funding opportunities, but at the cost of long-term credibility.

Ruggiero (2007) goes on to point out that:

> The Forest Service Manual (FSM), which provides direction on how to implement statutes and related regulations, states in the section on Research Policies: "To achieve its Research and Development (R&D) program objectives, the Forest Service shall ... maintain the R&D function as a **separate entity** … with clear accountability through a system that **maintains scientific freedom…**" (emphasis added). This means that both Congress and the authors of these FSM directives recognized the importance of keeping research independent. This also signifies congressional intent to protect a key element of scientific credibility.
>
> …This separation also serves to keep conducting science separate from formulating policy and the political ramifications of that process. The wisdom here is that science cannot be credible if it is politicized. Science should not be influenced by managers, and scientists should not establish policy. This logic keeps scientific research "independent" while ensuring that policy makers are free to consider factors other than scientific understandings. Thus, science simply informs decision making by land managers. As the new forest planning regulations clearly state, those responsible for land management decisions must consider the

> best available science and document how this science was applied (Federal Register 70(3), January 5, 2005; Section 219.11(4); p. 1059).

Many agency experts such as Samson and those on the Fallen Bear ID Team **are** influenced by managers, and their inherent political positions. That is the clear converse of Ruggiero's article.

In sum, agency expert opinion provided in this EA is not the same as "the best scientific information" available, although the opinion may be based—however loosely or closely—upon the best science. Agency specialists have an acute responsibility to thoroughly investigate the latest and best available science that pertains to their field of expertise, so as to best inform decisionmaking. We maintain (and the courts have agreed) that this evaluation of scientific information must include that science specifically referred to in comments by the public (such as this letter) or other agencies, as pertaining to the project at hand. 3-44

Sullivan et al., 2006 discuss the concept of "best available science" and their research paper is incorporated within these comments. From their paper:

> Often, scientific and political communities differ in their definition of best available science and opposing factions misrepresent the concept to support particular ideological positions. Ideally, each policy decision would include all the relevant facts and all parties would be fully aware of the consequences of a decision. But economic, social, and scientific limitations often force decisions to be based on limited scientific information, leaving policymaking open to uncertainty.
>
> The American Fisheries Society and the Estuarine Research Federation established this committee to consider what determines the best available science and how it might be used to formulate natural resource policies and shape management actions. The report examines how scientists and nonscientists perceive science, what factors affect the quality and use of science, and how changing technology influences the availability of science. Because the issues surrounding the definition of best available science surface when managers and policymakers interpret and use science, this report also will consider the interface between science and policy and explore what scientists, policymakers, and managers should consider when implementing science through decision making.
>
> As part of their implicit contract with society, environmental scientists are obliged to communicate their knowledge widely to facilitate informed decision making (Lubchenco 1998). For nonscientists to use that knowledge effectively and fairly, they must also understand the multifaceted scientific process that produces it.
>
> A common misconception of nonscientists is that science can provide objective answers to the thorny question, "How *should* we manage this ecosystem or resource?" Such questions can be answered only by reconciling the socially constructed values and expectations of the stakeholders at the policymaking table. Scientists may, of course, participate in goal setting, but they should neither be expected nor claim to be completely objective under those circumstances. In contrast, science can inform society about the consequences of its management

goals and actions, which may lead to revised goals and actions, but goal setting itself is outside the realm of science.

Science is a dynamic process that adapts to the evolving philosophies of its practitioners and to the shifting demands of the society it serves. Unfortunately, these dynamics are often controversial for both the scientific community and the public. To see how such controversies affect science, note that over the last decade nonscientists have exerted increasing influence on how science is conducted and how it is applied to environmental policy. Many observers find this trend alarming, as evidenced by several expositions titled "science under siege" (e.g., Wilkinson 1998; Trachtman and Perrucci 2000).

Also controversial are recent legislative efforts to define best science, to mandate that certain kinds of data be given greater weight by decision makers, or to establish by law the qualifications for those who would conduct peer review (Bolten 2004). This in itself is contrary to the quest for the best available science because legislators—usually nonscientists—are seeking to dictate which type of science is best and then casting it as law, ignoring the fact that the best available science will continually evolve.

To achieve high-quality science, scientists conduct their studies using what is known as the scientific process, which typically includes the following elements:

- A clear statement of objectives;
- A conceptual model, which is a framework for characterizing systems, stating assumptions, making predictions, and testing hypotheses;
- A good experimental design and a standardized method for collecting data;
- Statistical rigor and sound logic for analysis and interpretation;
- Clear documentation of methods, results, and conclusions; and
- Peer review.

Peer review.—A basic precept of science is that it must be verifiable, and this is what separates science from other methods of understanding and interpreting nature. The most direct method of verification is to redo the study or experiment and get the same results and interpretations, thus validating the findings. Direct verification is not always possible for nonexperimental studies and is often quite expensive and time-consuming. Instead, scientists review the study as a community to assess its validity. This latter approach is the process of peer review, and it is necessary for evaluating and endorsing the products of science. **The rigor of the peer review is one way to assess the degree to which a scientific study is adequate for informing management decisions.** The use of peer review in applied sciences such as fisheries, natural resource, and environmental science has proven to be problematic because there are two components to consider, the science and the policy based on it.

Peer review has a different meaning to scientists than it does to the public. To

scientists, peer review is a formal process conducted by active, knowledgeable experts in the general field of the study of interest. The peer review covers (1) the validity of the methods used, (2) whether the methods and study design adequately address the objectives, (3) whether the results that are reported are adequate for interpretation, (4) whether the results support the conclusions, and (5) whether the findings represent a significant advance in scientific knowledge. Typically, several knowledgeable scientists conduct the review independently and anonymously.

While the scientific community is primarily interested in the validity of the research, the public and policymakers are is more interested in the impact of science on societal decisions. Thus the basis for judging science differs, as does the meaning of valid evidence (Clark and Majone 1985). The policy implications of science are judged not only on the basis of its quality but also regarding how it influences the public. Science, as well as discussions of "best" science, become controversial to nonscientists only when it has the potential to change societal policy. In any peer review process, the selection of reviewers helps set the tone for the critique.

In a scientific peer review, reviewers are selected because they are thought to be fair, unbiased, and knowledgeable, and anonymity is preserved to encourage frankness. For public reviews, reviewers are often selected because they can articulate opposing points of view, and reviewers' identities and credentials are revealed, helping to inform the debate. Such differences in style and substance are often misunderstood and unappreciated by both scientists and nonscientists. The U.S. Office of Management and Budget, which advises the president, recently proposed standards for conducting peer reviews of regulatory science. These standards are opposed by many scientists because they contradict conventional peer review in several important aspects, particularly by (1) disclosing the identities of the reviewers, (2) encouraging public—that is, nonscientist—participation, and (3) modifying conflict-of-interest criteria (Bolten 2004; Kennedy 2004). Recognition that scientific review and public debate inform different aspects of policymaking is important, but it is also important to recognize that one cannot replace the other.

Scientific information and information related to science conventionally has been available in four basic forms, all of which are useful in policy development and management. The first is the peer-reviewed literature, which formally presents the findings of scientific research after an extensive, independent review by other experts in the field. The second is the gray literature, which does not typically receive an independent peer review but which may be reviewed in-house, that is, within the author's own institution. The third is the opinion of individuals who are considered experts in the field. Typically no review is implied, although the experts' reputations may attest to the quality of their statements. Finally, there is anecdotal evidence, such as public testimony, which generally must stand on its own. Each form typically reflects different scientific content and exhibits different degrees of review, timeliness, and availability (See Table 2).

Peer-reviewed literature.—The most readily available and reliable sources of information are scientific journals, monographs, and books. This type of information is considered the most reliable mainly because it has undergone peer review. It is widely available because it is generally published in a standard format, is held by many libraries, is often accessible through the Internet, and is catalogued by a variety of abstracting services. Peer-reviewed literature is often not as timely as other information sources because time is needed to do a proper review.

Gray literature.—Gray literature, such as some agency or academic technical reports, is also available, but until recently has not been widely accessible. This literature commonly contains reports of survey, experimental or long-term historical data along with changes in protocols, meta-data, and the progress and findings of standard monitoring procedures. Gray literature may be reviewed internally, such as by other agency scientists, but it typically does not contain significantly new findings that would require review by a broader or more independent audience. Like the peer-reviewed literature, gray literature is increasingly accessible through rapidly evolving electronic forums.

Expert opinion.—The third source of scientific information is professional experts such as university and government scientists. Expert opinion can be highly reliable, especially when it is based on the experience of multiple experts who collectively function as peer reviewers of a sort. Furthermore, it may be the only form of scientific knowledge available for some crucial policy issues. Questions such as “Is this stock overfished?,” “Is this species imperiled?,” and “Is this water body impaired?” often require substantial amounts of expert opinion to answer them. In fact, judgments about the recovery of imperiled species are based largely on expert opinion (Schemske et al. 1994).

Anecdotal evidence.—A final source of information that should be acknowledged is anecdotal evidence. Webster’s dictionary defines an anecdote as a short narrative of an interesting, amusing, or biographical incident; basically, it is a short story about a personal experience. In fisheries and environmental science, anecdotal evidence often becomes available through public comments at regulatory meetings, through newspaper or popular journal coverage, or through letters sent to government representatives or the media. It may reflect traditional ecological knowledge, that is, knowledge that is not generally available to the public but passed on from one generation to the next within various fishing and environmental communities. Scientific communities often put much less credence in this type of information because it is difficult to access, verify, and review. This is so even when anecdotal evidence is generated by the scientific community itself. The public can be offended when their input is dismissed as “anecdotal,” but the process of science would be impeded if this type of information were dealt with inappropriately. One reason for reconsidering the role of anecdotal evidence in informing science is that today it is easier to document, look for patterns in, and follow up on less-structured forms of information than it was in the past. This is an area that will require greater examination. As discussed in the section on the democratization of science (below),

anecdotal evidence may often be relevant at the science–policy interface.

Politicization of Science
Many nonscientists and scientists believe that science is being increasingly politicized. Articles in newspapers (e.g., Broad and Glanz 2003) and professional newsletters document frequent instances in which the process and products of science are interfered with for political or ideological reasons. In these cases, the soundness of science, as judged by those interfering, turns on the extent to which the evidence supports a particular policy stance or goal. What was previously an objective scientific debate then becomes centered on values in a public forum. Some environmental sociologists refer to such a debate as a "tournament of values" (Hull and Robertson 2000). Politicization is especially problematic for scientists supervised by administrators who may not feel the need to follow the same rules of scientific rigor and transparency that are required of their scientists. While public debate about science-informed issues is important, for we must identify values of concern and risks associated with alternative management actions, political intervention itself can be a major barrier to the sound practice and application of science.

Scientists committed to the sustainable management of ecosystems are developing new strategies to buffer science from political interference, while keeping open the possibility for a democratic debate. These strategies fall into four main categories:
1. Invoke independent review. The emphasis here is on *independent*, which means that reviewers have little personal stake in the policy outcomes and cannot be intimidated or persuaded by stakeholders. Key strengths of independent review include
a. minimizing the influence of special interest groups;
b. separating scientific and nonscientific issues;
c. incorporating all relevant information; and
d. articulating all relevant assumptions, risks, and alternatives (Meffe et al. 1998).
2. Develop standard procedures and criteria. The procedures and criteria for guiding management actions should be developed *before* stakeholders are embroiled in controversy. Decision rules should be laid out before the data are even considered. A critical and difficult step is to articulate the uncertainties related to various costs and benefits of potential management actions (Mangel et al. 1996; Shelden et al. 2001).
3. Revise the bureaucratic structure. Science functions best when the responsibility for it resides in an institution that is politically independent of the policymakers it informs (Hutchings et al. 1997; Wagner 2001). Furthermore, fragmented information and authority enhance the probability of poor policy decisions mediated by political influence (Yaffee 1997). Science-based management is facilitated by viewing resources in a landscape or ecosystem context, which requires scientists to communicate across disciplines (Baron et al. 2002). Thus, bureaucracies that broadly integrate information, while linking management actions with science but keeping the scientific and policymaking functions separate, should produce sound, useful science.

> 4. Promote scientific literacy. A society that understands how science works is more likely to value science as an aid in decision making than is a scientifically illiterate society. Scientific literacy enhances citizens' ability to participate effectively in the decision making of modern society and helps them distinguish science from pseudoscience (Maienschein 1998). Scientific literacy means not only being familiar with various facts and technologies but also expecting legitimate disagreement among scientists and being able to think critically to reach an informed opinion on public issues. A more scientifically literate society would probably be less tolerant of political interference with science. Much can be learned from how science and policy have historically interacted to gain insights on how best to link environmental science with policy now (Gunderson et al. 1995). Certainly both scientists and policymakers must act adaptively and learn from the changing science–policy interface.

Sensitive species are defined by the Forest Service as those "for which population viability is a concern as evidenced by significant current or predicted downward trends in population numbers or density, or habitat capability that would reduce a species' existing distribution." The rationale used by the Forest Service in downlisting the northern goshawk from its status on the IPNF Sensitive species list was provided by a non-peer reviewed source, which is perhaps why it contained no genuine viability analysis or discussion of population trends for the IPNF or Region.

3-45 Please disclose numerical values or estimates/ranges for the "minimum number of reproductive individuals…to insure that viable populations will be maintained"[3] for all MIS and TES species found on the IPNF, and the scientific basis utilized for each wildlife species.

3-46 Since the criteria for qualifying stands as "designated old growth" do not include dead standing and down trees and logs, and since the 1998 Forest Plan Monitoring and Evaluation Report admits that the databases your wildlife models rely upon do not have reliable data for dead standing and down trees and logs (along with canopy closure), what basis exists for the EA's assumptions that these important habitat structures are present in adequate amounts for old-growth associated TES and Management Indicator species?

Regarding the models the analyses for wildlife utilize, we assume that the TSMRS database is the habitat basis for the numbers input into the model. Please disclose what portions, or data columns, are used for each MIS and TES species to determine "capable" and "suitable" habitat.

3-47 Regarding an IPNF Sensitive species, the black-backed woodpecker, the Region 1 black-backed woodpecker assessment (Hillis et al., 2002) notes that the black-backed woodpecker depends upon the very forest that the premises of this project abhor:

> Black-backed woodpeckers occupy forested habitats that contain high densities of recently dead or dying trees that have been colonized by bark beetles and

[3] The quotes are from the NFMA regulations at 36 CFR § 219.19 upon which the IPNF Forest Plan is based: "In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area."

> woodborer beetles (Buprestidae, Cerambycidae, and Scolytidae). These beetles and their larvae are most abundant within burned forests. In unburned forests, bark beetle and woodborer infested trees are found primarily in areas that have undergone natural disturbances, such as wind-throw, and within structurally diverse old-growth forests. (Internal citations omitted.)
>
> …Black-backed woodpeckers also occur in unburned landscapes Bull et al.1986, Goggans et al.1987, Bate 1995, Hoffman 1997, Weinhagen 1998, Steeger and Dulisse in press, Taylor unpublished data). Taylor's observations of black-backed woodpeckers in unburned forests in northern Idaho suggest that they may occur at substantially lower densities in unburned forests, but no rigorous comparisons between black-backed woodpecker densities in burned and unburned forests have been done. Hutto (1995) hypothesized that black-backed woodpeckers reproduce at *source* reproductive levels in burns, but may drop to *sink* reproductive levels in the intervening periods between large burns.

Forest Service biologist Cherry (1997) states:

> The black-backed woodpecker appears to fill a niche that describes everything that foresters and fire fighters have attempted to eradicate. For about the last 50 years, disease and fire have been considered enemies of the 'healthy' forest and have been combated relatively successfully. We have recently (within the last 0 to 15 years) realized that disease and fire have their place on the landscape, but the landscape is badly out of balance with the fire suppression and insect and disease reduction activities (i.e. salvage logging) of the last 50 years. Therefore, the black-backed woodpecker is likely not to be abundant as it once was, and continued fire suppression and insect eradication is likely to cause further decline.

Given this "eradication" of habitat by actions such as the Fallen Bear proposal, the EA's failure to adequately analyze this cumulative effect shows the agency is not learning its lessons. 3-48

Hutto, 1995 states: "Fires are clearly beneficial to numerous bird species, *and are apparently necessary for some*." (p. 1052, emphasis added.) Hutto, 1995 whose study keyed on forests burned in the supposedly disastrous 1988 season, noted:

> Contrary to what one might expect to find immediately after a major disturbance event, I detected a large number of species in forests that had undergone stand-replacement fires. Huff et al. (1985) also noted that the density and diversity of bird species in one- to two-year-old burned forests in the Olympic Mountains, Washington, *were as great as adjacent old-growth forests*…
>
> …Several bird species seem to be relatively *restricted* in distribution to early post-fire conditions… I believe it would be difficult to find a forest-bird species more restricted to a single vegetation cover type in the northern Rockies than the Black-backed Woodpecker is to early [first 6 years] post-fire conditions. (Emphasis added).

Regarding the "U.S. Forest Service Region One Black-Backed woodpecker Assessment" (Hillis et al., 2002) we point out the following salient points:

> "The relatively minor decline in existing habitat compared to the mean HRV for the entire 1940 to 2000 time period… simplistically interpreted, might suggest that black-backed woodpeckers are at no risk." **"That conclusion is likely grossly understated…"** (p. 13. emphasis added).
>
> "Burned habitats lost to timber salvage have not been considered… (Ibid.)
>
> *Managers should recognize the need for decadence in unburned forests.* For black-backed woodpeckers, this is especially important in trees that are otherwise healthy, dying, or recently dead." (Ibid. p. 15.)

We now refer to the very first management recommendation at the end of Hillis et al., (2002):

> Considering both the departure from historically available habitat and the increased interval between large fires, **these findings suggest the black-backed woodpecker may be at substantial risk in USFS Region One**. This conclusion suggests that *Region One policy-makers should recognize the need for retaining moderate and high severity fires on substantial acreages at normal intervals when land use and fire suppression decisions are made.* (Italicized in orig., p. 14.)

Dolan (1998a,b) states in regards to impacts on the black-backed woodpecker due to fire suppression and post-fire logging states:

> It seems that we have a huge cumulative effects problem here, and that each salvage sale removes habitat that is already very limited. We are having trouble avoiding a "trend to federal listing" call for the BBWO in salvaging burns, unless comparable acres of fire-killed dead are being created through prescribed burns.

The comments by other biologists attached to Dolan (1998a,b) reveal that the FS has yet to design a consistent, workable, scientifically defensible strategy to ensure viable populations of the black-backed woodpeckers. Fire suppression, insect and disease suppression, and "salvage" logging policies of the FS are the biggest threat to black-backed woodpecker population viability on the Forest, unfortunately in failing to create a conservation strategy the cumulative impacts of the IPNF's ongoing fire suppression policy will remain unexamined.

3-49 The FS has yet to design a consistent, workable, scientifically defensible strategy to ensure
3-50 viable populations of the black-backed woodpeckers. The cumulative impacts of the IPNF's ongoing fire suppression policy are also not adequately considered.

There is considerable scientific controversy over the adequacy of the IPNF's snag standards and guidelines. Such methodology has not been subject to independent scientific peer review and validation from post-implementation monitoring. The preference for large diameter of nesting trees for the pileated woodpecker is not considered in retention standards. McClelland and McClelland (1999) found such results in their study in northwest Montana, with the average nest tree being 73 cm. (almost 29") dbh. Effectively, the IPNF provides inadequate commitment to leaving specific numbers and sizes of largest trees favored by this MIS. The analysis assumes that following the Northern Region Snag Protocol would meet Forest Plan requirements,

however the latter uses population potential capacity that the Protocol does not. How does the IPNF reconcile this discrepancy? 3-51

B.R. McClelland has extensively studied the pileated woodpecker habitat needs. To quote a March 12, 1985 letter from B.R. McClelland to Flathead NF Supervisor Edgar B. Brannon:

> Co-workers and I now have a record of more than 90 active pileated woodpecker nests and roosts, …the mean dbh of these trees is 30 inches… A few nests are in trees 20 inches or even smaller, but the minimum cannot be considered suitable in the long-term. Our only 2 samples of pileateds nesting in trees <20 inches dbh ended in nest failure… At the current time there are many 20 inch or smaller larch, yet few pileateds selected them. Pileateds select old/old growth because old/old growth provides habitat with a higher probability of successful nesting and long term survival. They are "programmed" to make that choice after centuries of evolving with old growth.

McClelland (1977), states:

> (The Pileated Woodpecker) is the most sensitive hole nester since it requires old growth larch, ponderosa pine, or black cottonwood for successful nesting. The Pileated can be considered as key to the welfare of most hole-nesting species. If suitable habitat for its perpetuation is provided, most other hole-nesting species will be accommodated.
>
> Pileated Woodpeckers use nest trees with the largest dbh: mean 32.5 inches;
>
> Pileated Woodpeckers use the tallest nest trees: mean 94.6 feet;
>
> The nest tree search image of the Pileated Woodpecker is a western larch, ponderosa pine, or black cottonwood snag with a broken top (status 2), greater than 24 inches dbh, taller than 60 feet (usually much taller), with bark missing on at least the upper half of the snag, heartwood substantially affected by Fomes laracis or Fomes pini decay, and within an old-growth stand with a basal area of at least 100 sq feet/acre, composed of large dbh classes.
>
> A cluster analysis based on a nine-dimensional ordination of nest tree traits and habitat traits revealed close association between Yellow-bellied Sapsuckers, Mountain Chickadees, and Red-breasted Nuthatches. These three species plus the Pileated Woodpecker and Hairy Woodpecker are relatively grouped by coincident occurrence in old growth. Tree Swallows, Black-capped Chickadees, and Common Flickers are separated from the above five species by their preference for more open areas and their frequent use of small dbh nest trees.
>
> (Most) species found optimum nesting habitat in stands with a major component of old growth, particularly larch. Mean basal area for pileated woodpecker nest sites was 150 square feet per acre. (McClelland. B.R. and others, 1979)

> Many large snags are being cut for firewood. Forest managers should limit firewood cutting to snags less than 15 inches in d.b.h. and discourage use of larch, ponderosa pine, and black cottonwood. Closure of logging roads may be necessary to save high-value snags. Logging slash can be made available for wood gatherers.

3-52 The EA fails to recognize that Forest Plan Old-Growth Standard 10(f) is based upon the habitat needs of the IPNF MIS pileated woodpecker. The EA does not consider the viability implications of current block sizes of effective old growth. Nor is there forestwide information available on block sizes and their spatial arrangement, to determine the effectiveness of old-growth habitat distribution.

3-53 The EA fails to adequately estimate the amount of snags that would be cut down for safety reasons during logging operations (due to OSHA regulations). And the use of temporary roads and skid trails is a routine procedure in timber sales. When snags are standing in the way of a convenient location for either a temporary road or skid trail (especially skyline), most assuredly the snags will be cut down.

3-54 The EA does not adequately consider cumulative effects on upland habitat for boreal toads. This does not make sense, since such small populations that are likely to persist are especially susceptible to fragmentation and extirpation due to isolation of smaller populations.

3-55 Since field reviews are necessary for accuracy of OG inventories, the failure provide information on the accuracy of the IPNF's <u>forestwide</u> inventory leaves compliance with the 10% Forest Plan standard very much in doubt, which is where it has been since before the Douglas-fir Beetle project in the late 1990s. There is no justification for the EA's assumption that old-growth habitat is in enough supply so that logging 68 acres would be okay.

3-56 Since the IPNF does not recognize the importance of canopy layers, snags, defective trees, and large down logs in terms of objective old-growth criteria, the proposed activities approved for areas that would otherwise develop into old growth are problematic. The amount of those structures within old growth (Green et al., 1992) would be substantially reduced with the planned activities.

Then there is doubt as to the adequacy of the 10% old-growth Standard itself. Lesica (1996) stated that the Northern Region of the FS's general goal of maintaining 10% of forests as old growth may extirpate some species. This is based on his estimate that 20-50% of low and many mid-elevation forests were in old growth condition prior to European settlement. The adjacent Kootenai National Forest has done an analysis (Gautreaux, 1999) that shows 10% to be, quite realistically, not within the historical range.

3-57 What is the historic range of old-growth habitat in the IPNF? The scientific basis for the IPNF's position, namely that maintaining 10% old-growth on the Forest is plenty to maintain population viability of all species needing old-growth habitat, has never been established. The FS does not cite adequate scientific basis—it is merely an arbitrary figure.

Since there is no scientific basis for assuming that 10% old growth is enough for species viability, the proof would be in the monitoring. And nothing else shows the FS has completed or is committed to the monitoring that would insure old-growth species' viability.

Open roads fragment old growth, resulting in firewood cutting that destroys snag habitat and reduces recruitment of down woody debris in old growth. The IPNF does not disclose the significance of the effects on OG wildlife species' populations of habitat degradation of old growth because of firewood cutting and illegal poaching of trees due to unrestricted access. The IPNF did not present an analysis of the impacts of open roads through old growth in the affected OGMU. 3-58

The IPNF's recent Twomile EA (Coeur d'Alene River Ranger District) states:

> There have been changes over the last 100 years in the size and distribution of patches across the landscape. The mean patch size has decreased since the early 1900's in the Coeur d'Alene Basin and patches have become more linear, with accompanying increases in edge and decreases in core/interior habitats (Geographic Assessment, p. 42; PF Doc. VEG-R10). (P. 3-9.)

The EA does not provide a comparison between the natural historic range and current conditions regarding patch size, edge effect, and interior forest of old growth in the OGMU. Old growth may not be truly "effective" with these edge effects, yet the EA fails to consider this in its overall "effective" old growth inventory. 3-59

The fact that large trees are important Townsend's big-eared bat habitat is not considered. 3-60

The IPNF FIA analysis does not assure that habitat quality regarding block size and spatial distribution of old growth is sufficient for maintaining viable populations of wildlife in the IPNF. Nor is it disclosed in the EA if the criteria for old growth identification during the FIA inventory is consistent with the Green et al., 1992 criteria to be meaningful for wildlife habitat analyses. 3-61

The IPNF cites absolutely no data collected in the analysis area or interpretation of data done with adequate scientific veracity to show that there is genuinely a problem with forest composition or tree density that has been caused by fire suppression. 3-62

The FS has still not sufficiently dealt with the issue of fragmentation, road effects, and past logging on old-growth species' habitat, as discussed above. The EA fails to disclose the degree to which edge effects on old growth species' habitat exist, and how much total edge effect would be increased, by the alternatives. Cumulative effects on old-growth habitat and on old-growth associated species include increased fragmentation, reduced older forest patch sizes, increased high-contrast edge, reduced availability of interior habitat, and decreased forested connectivity. These effects would reduce the ability to provide for the habitat needs of old-growth associated species for decades to come following implementation of the timber sale and other activities in the cumulative effects analysis area. 3-63

3-64 The EA's connectivity analysis lacks adequate context. It is separate from the species habitat discussions where it would be meaningful, and even though it is a topic relevant to habitat spatial considerations, not even a single map is provided.

3-65 The EA does not disclose how or if "leave tree retention would …be adjusted within the travel corridor to meet canopy cover needs." (EA at 64 and 65.)

3-66 The cumulative effects of management actions—past ongoing, and foreseeable—on lands of all ownership is glossed over for most if not all resource discussions. The listing and discussions about past and ongoing activities in the EA is far too cursory to provide a real analysis and understanding cumulative effects. We believe that in order to properly assess cumulative effects, the FS must not only quantify the acres and point to locations of past and ongoing actions, but
3-67 also state the goals of the projects and if those goals were met, indicate if any assumptions underlying those projects' "purpose and need" statements were correct, and disclose significant monitoring information related to potentially similar impacts from the project proposal.

3-68 The EA does not present a plan for achieving full support of designated beneficial uses in the affected watersheds.

3-69 The EA does not recognize that water temperature in streams is partially a function of the intactness of the tree canopy through which water flows above and below ground. The EA does not analyze the temperature increases likely due to the proposed logging and burning activities.

How frequent are the peak flows specifically resulting from 'rain-on-snow' events or
3-70 other stochastic events"—the events that WATSED does not model? Please estimate the difference in frequency of such peak flows that are potentially damaging, comparing natural vs. management induced conditions in the watersheds.

3-71 The EA does not adequately disclose current conditions of the project-affected streams. Streambank and streambed stability are very much affected by peak flow events, the latter being artificially elevated by roads and logged openings.

Forest Service hydrologist Johnson (1995) states, "For the roads we no longer actively use, our dwindling road maintenance budget will make it difficult to maintain the culvert crossings. When these fail during storm and runoff events, tremendous amounts of sediment can be
3-72 delivered directly to the channel and from there down to lower streams with significant beneficial uses such as sensitive fish habitat." The EA fails to disclose the significance of such foreseeable lack of maintenance <u>in this project area</u>, and the direct, indirect and cumulative effects poorly maintained roads have on water quality.

The EA fails to include an alternative that removes or fixes all the roads having design flaws, are
3-73 otherwise contributing to soil and watershed problems contributing to watersheds' status as impaired, or are not needed for foreseeable management activities. Does the EA specifically analyze the effects of all **existing roads** that are located on landtypes of moderate or high mass failure potential?

Have the project area landtypes been field verified concerning their mass failure potential(s)? 3-74

In its failure to disclose existing conditions, the EA lacks adequate basis for statements such as "Modeling shows reduction in risks of erosion and sedimentation" and "Major streams in the project area are functioning for the existing water and sediment yield and are believed to be in adjustment." (p. 31.) 3-75

"The small predicted increase in water yield is not outside the range of natural variability" (p. 31). The EA does not disclose what the "range of natural variability" is. 3-76

Likewise, "The short-term increase in sediment is not substantial…" (Id.) The EA fails to quantify sediment increases, so such statements are meaningless. And "The temporary sediment increase is not expected to be appreciable or measurable in project area streams" is a phony statement since the FS has never measured sediment increases in the project area anyway. 3-77

The EA fails to disclose the significance of the following cumulative effects: "Migration barriers on Highway 50 would remain." (p. 35.) 3-78

The EA did not consider an alternative that gets the streams in the project area to meet Riparian Management Objectives (RMOs). The public needs to know how much it will cost to manage these watersheds up to acceptable conditions. 3-79

It is reasonably foreseeable that a wildfire will affect the project area, the only question is when. The Western Montana Level I Bull Trout Team (Riggers et al., 2001) state:

> (T)he real risk to fisheries is not the direct effects of fire itself, but rather the existing condition of our watersheds, fish communities, and stream networks, and the impacts we impart as a result of fighting fires. …If we are sincere about wanting to reduce risks to fisheries associated with future fires, we ought to be removing barriers, reducing road densities, reducing exotic fish populations, and re-assessing how we fight fires. At the same time, we should recognize the vital role that fires play in stream systems, and attempt to get to a point where we can let fire play a more natural role in these ecosystems.

The biologists emphasize: "in most cases, proposed projects that involve large-scale thinning, construction of large fuel breaks, or salvage logging as tools to reduce fuel loading with the intent of reducing negative effects to watersheds and the aquatic system are largely unsubstantiated." The biologists point out that logging, thinning and fire suppression can have harmful effects on watersheds (Id.). The EA does not propose a plan that will result in minimized risk to water quality following foreseeable and inevitable wildfire—a plan that proactively deals with road and other erosion sources so that the short-term loss of vegetation and increase in runoff won't result in unnecessary degrading of water quality and fish habitat. 3-80

Fine sediment in spawning gravels is a major limiting factor to fry survival in many of the drainages on the IPNF. Spawning success is an extremely important factor in maintaining the viability of fish populations. In eliminating the Forest Plan the Fry Emergence standard, the

IPNF has inadequate regulatory mechanisms to deal with the habitat quality needed to maintain viable populations.

Isaacson, 2001 states: "During the Forest planning period …the IPNF Plan committed to the
3-81 maintenance of at least 80% of emergence even if technologies change." The amendment to the Forest Plan that eliminated this standard did not consider existing watershed degradation.

The Forest Plan Appendix JJ requires validation monitoring. "Intergravel fines modeling–Compare stream intergravel fines with predicted values." FP Appendix JJ at page 4. Isaacson, 2001 states: "The intergravel fines monitoring is a necessary component in determining the fry emergence success."

The EA does not demonstrate conformance with the Forest Plan Fry Emergence Standard; fails
3-82 to adequately consider the Project's relationship to rain on snow; does not conform to IPNF Forest Plan monitoring standards; and does not adequately disclose the cumulative effects of all activities within the Project area.

The assumption that the BMPs and/or project design features will adequately mitigate sediment
3-83 increases has not been proven in any landscape in the Northern Rockies. There is scientific evidence to expect otherwise. The EA fails to cite the scientific research or even its own monitoring to adequately base its assumptions and effect analyses regarding BMPs and other proposed mitigation measures.

Another major problem with the models is that they fail to take into account the extreme peak flow increases due to the network of roads in the project area. Johnson (1995) states, "Impacts from roads basically fall into three areas: introduced sediment into streams; snowmelt re-direction and concentration; and surface flow production."

Johnson (1995) discusses how "snowmelt re-direction and concentration and surface flow production" increase peak flow amounts <u>multiplicatively</u> by the presence of roads in a drainage.
3-84 The EA fails to acknowledge this limitation of the water models utilized for this analysis. Johnson (1995) also points out that the old road design used on many roads in the project area utilized ditches on the inside of the road which greatly increases drainage efficiency, causing peak flows to go far beyond any modeled predictions. So the very existence of the current road network is causing major water quality impacts.

The EA does not indicate the reliability of the models for quantitative analysis, meaning the models have not been validated for the use intended—demonstrating compliance with the Clean Water Act, the Forest Plan, and state regulations.

Some glaring omissions from EA discussions of reference conditions are the population levels
3-85 and distribution of TES fish species, the westslope cutthroat trout and bull trout. How have these populations fared, following construction of so many miles of roads in the affected watersheds, the hydrologically altered soil conditions, and reductions in canopy closure via logging and road
3-86 construction? The EA even lacks discussion of Forest Plan riparian management objectives.

The EA does not disclose the range of conditions that would be considered "reference conditions" for water yield and sediment. 3-87

The EA fails to disclose the ecological and economic cumulative impacts of its fire suppression management regime. The Forest Service has never complied with NEPA by analyzing and disclosing economic and ecological cumulative effects of the IPNF's fire suppression. Ingalsbee (2004) describes the direct, indirect, and cumulative environmental impacts of firefighting, and offers specific examples from the 2002 Biscuit Fire in southern Oregon. He notes direct effects from fireline construction, tree felling, chemical use, water use, and suppression firing operations along with indirect effects from off-highway vehicle use, and road reconstruction. Additionally, the entire premise of the Fallen Bear proposal—indeed most logging proposals put forth by Region 1 national forests—is that the ecological impacts of fire suppression have been drastic and unacceptable. Those effects must be addressed in a forestwide EIS such as Forest Plan revision, if project EISs and EAs such as Fallen Bear don't disclose them. 3-88

The economics section is far too brief to determine anything at all. It's all about timber salability. The EA fails to display **itemized** costs. There is no way to tell if there is anything missing, if present net value is adequately considered. 3-89

The EA states for the no-action alternative, "Continued fire suppression in this alternative would result in continued fuel accumulation and increased fire behavior characteristics, which would subsequently reduce the likelihood of keeping unwanted fires small." (p. 46.) The EA then proceeds to justify the proposed logging because it takes care of that "problem": "Timber harvest would promote conditions for safe and effective wildland fire management by maintaining fire suppression access through existing road maintenance and by altering fuels and fire behavior within harvested stands and." (P. 47.) But the EA fails to discuss the fire and fuel implications of the areas NOT treated by the action alternatives, and fails to place that "promote" statement in the context of how much is enough, and if the action alternatives are actually enough to accomplish anything significant at all. In this rather remote area in the St. Joe, why does the FS not consider a true "no-action" alternative that would embrace fire rather than continue to suppress it? 3-90

Furthermore, the EA fails to provide any **temporal** context to the fuel reduction benefits alleged for the action alternatives. 3-91

The trumped up "benefits" of logging slops over into the soils discussion. If "not implementing the proposed activities would further increase the risk of severe stand-replacing fires …that could increase the potential for locally severe fire effects on soils" then what about the areas not treated—isn't there some risk there that is worth mentioning? 3-92

Thank you for your attention to these concerns. It is our intention that you include in the record and review all of the literature we've cited herein. **Please contact the Jeff Juel if you have problems locating copies of any of them.** Also, please keep each of our groups on the list to receive further mailings on the proposal. 3-93

Sincerely,

/s/

Jeff Juel
The Lands Council
25 W. Main St., Ste. 222
Spokane, Washington 99201
509-838-4912

Michael Garrity
Alliance for the Wild Rockies
P.O. Box 505
Helena, Montana 59624
406-459-5936

Cameron Naficy
WildWest Institute
P.O. Box 7998
Missoula, Montana 59807
208-667-9093

Mike Mihelich
Kootenai Environmental Alliance
P.O. Box 1598
Coeur d'Alene, Idaho 83816-1598
208-667-9093

Gary Macfarlane
Friends of the Clearwater
PO Box 9241
Moscow, Idaho 83843
208-882-9755

Literature cited:

Cherry, M.B., 1997. The black-backed and three-toed woodpeckers: life history, habitat use, and monitoring plan. Unpublished report. On file with: Lewis & Clark National Forest, P.O. Box 869, Great Falls, Montana, 59403, 406-791-7700. 19 pp.

Dolan, P., 1998a, b. Email discussion with USFS Region One wildlife biologists regarding black-backed woodpecker and attached "Salvage of Burned Stands: Wildlife Considerations." On file at Lolo National Forest.

Frissell, C.A. and D. Bayles, 1996. Ecosystem Management and the Conservation of Aquatic Biodiversity and Ecological Integrity. Water Resources Bulletin, Vol. 32, No. 2, pp. 229-240. April, 1996

Gautreaux, 1999. Vegetation Response Unit Characterizations and Target Landscape Prescriptions, Kootenai National Forest, 1999. United States Department Of Agriculture Forest Service, Northern Region, Kootenai National Forest.

Green, P., J. Joy, D. Sirucek, W. Hann, A. Zack, and B. Naumann, 1992. Old-growth forest types of the northern region. Northern Region, R-1 SES 4/92. Missoula, MT.

Hayward, Gregory D., 1994. Information Needs: Great Gray Owls. Chapter 17 *In:* Hayward, Gregory D., and Jon Verner, 1994. Flammulated, Boreal, and Great Gray Owls in the United States: A Technical Conservation Assessment. USDA Forest Service General Technical Report RM-253.

Hillis, Mike; Amy Jacobs, and Vita Wright, 2002. Black-Backed Woodpecker Assessment. U.S. Forest Service Region One. http://www.fs.fed.us/r1/cohesive_strategy/integration/wildlife/R1_bbwo_assessment.htm

Hutto, R.L. 1995. The composition of bird communities following stand-replacement fires in northern Rocky Mountain (U.S.A.) conifer forests. Conservation Biology 9:1041-1058.

Ingalsbee, Timothy; 2004. Collateral Damage: The Environmental Effects of Firefighting. The 2002 Biscuit Fire Suppression Actions and Impacts. Western Fire Ecology Center and American Lands Alliance, May 2004. http://www.fire-ecology.org/research/biscuit_suppression.html

Isaacson, J. Allen, 2001. Declaration of J. Allen Isaacson, *The Lands Council, et al. v. Robert Vaught et al.* (CS-00-0185-EFS)

Johnson, Steve, 1995. Factors Supporting Road Removal and/or Obliteration, Memo from Kootenai Forest Hydrologist, February 6, 1995

Kuennen, Lou; Henry Shovic, Bill Basko, Ken McBride, Jerry Niehoff, and John Nesser, 2000. Soil Quality Monitoring: A Review of Methods and Trends in the Northern Region. May 2000.

Lacy, Peter M., 2001. Our Sedimentation Boxes Runneth Over: Public Lands Soil Law As The Missing Link In Holistic Natural Resource Protection. Environmental Law; 31 Envtl. L. 433 (2001).

Lesica, Peter, 1996. Using Fire History Models to Estimate Proportions of Old Growth Forest In Northwest Montana, USA. Biological Conservation 77, p. 33-39.

McClelland B. Riley, Sidney S. Frissell, William C. Fischer, and Curtis H. Halvorson, 1979. Habitat Management For Hole-Nesting Birds In Forests Of Western Larch And Douglas-fir. Journal of Forestry, August 1979 pp. 480-483

McClelland BR and McClelland PT. 1999. Pileated woodpecker nest and roost trees in Montana: links with old-growth and forest "health." Wildlife Society Bulletin 1999, 27(3): 846-857.

McClelland, B. Riley (undated). Influences of Harvesting and Residue Management on Cavity-Nesting Birds.

McClelland, B. Riley, 1977. Relationships Between Hole-Nesting Birds, Forest Snags, And Decay In Western Larch-Douglas-Fir Forests Of The Northern Rocky Mountains. Presented in partial fulfillment of the requirements for the degree of Doctor of Philosophy, University Of Montana, 1977.

Nesser, John A., 2002. Notes from the National Soil Program Managers meeting in Reno as related to soil quality issues. John A. Nesser, Regional Soil Scientist, USDA Forest Service, Northern Region. May 23, 2002.

Noss, Reed F. 2001. Biocentric Ecological Sustainability: A Citizen's Guide. Louisville, CO: Biodiversity Legal Foundation. 12pp.

Powers, R.F. 1990. Are we maintaining the productivity of forest lands? Establishing guidelines through a network of long-term studies. pp.70-81. *In*: Harvey, A.E and L.F. Neuenschwander (Eds.). Proceedings— Management Productivity of Western Montane Soils. Boise, Idaho, April 10-12. USDA Forest Service Intermountain Research Station and University of Idaho, Moscow, Idaho.

Riggers, Brian; Rob Brassfield; Jim Brammer; John Carlson; Jo Christensen; Steve Phillips; Len Walch; Kate Walker; 2001. Reducing Fire Risks to Save Fish – A Question of Identifying Risk. A Position Paper by the Western Montana Level I Bull Trout Team, 2001.

Ruggiero, Leonard F.; 2007. Scientific Independence: A Key to Credibility. From ECO-Report 2007: Bitterroot Ecosystem Management Research Project, Rocky Mountain Research Station, 800 E. Beckwith St., Missoula, MT 59801.

Sullivan, Patrick J.; James M. Acheson; Paul L. Angermeier; Tony Faast; Jean Flemma; Cynthia M. Jones; E. Eric Knudsen; Thomas J. Minello; David H. Secor; Robert Wunderlich; Brooke A. Zanetell; 2006. Defining and Implementing Best Available Science for Fisheries and Environmental Policy, and Management. American Fisheries Society, Bethesda, Maryland; Estuarine Research Federation, Port Republic, Maryland. September 2006

USDA Forest Service, 2005b. Middle East Fork Fuel Reduction Draft Environmental Impact Statement, Bitterroot National Forest.

USDA Forest Service, 2008a. Sheppard Creek Post-Fire Project Final Environmental Impact Statement, Tally Lake Ranger District, Flathead National Forest.

Wuerthner, George, 2006a. WORLD VIEW. Pp. xxiv-xxv in Wildfire: A Century of Failed Forest Policy, Edited by George Wuerthner. Published by the Foundation for Deep Ecology by arrangement with Island Press.

Chuck Mark, District Ranger
St. Joe Ranger District
222 South 7th Street. Suite 1
St. Maries, ID 83861

December 31, 2008

Idaho Conservation League scoping comments on Fallen Bear Project EA

Dear Chuck:

Thank you for allowing us to comment on the proposed Fallen Bear Project. For thirty-five years, the Idaho Conservation League has had a long history of involvement with roads, recreation, and watershed health. As Idaho's largest statewide conservation organization, we represent over 9,500 members from around the state -- many of whom have a deep personal interest in protecting water quality and wildlife from the harmful effects of logging and road construction in inappropriate areas.

We remain concerned with new road construction, and potential for logging of old growth. We are discouraged that you failed to fully evaluate an alternative based entirely off existing roads, one that applies less intensive prescriptions, and that applies more prescribed fire to the project area.

As you are well aware, the St. Joe River is one of the most valued fisheries in North Idaho. We appreciate the inclusion of road decommissioning as part of the action proposals that will minimize impacts to the river's tributaries and hope that you will develop additional projects to restore ecological function to some of the previously-impacted tributaries.

Please keep the Idaho Conservation League on the mailing list for this and other projects. We greatly appreciate the efforts on the part of the St. Joe Ranger District to listen to our concerns. Additional specific comments are included below.

Happy New Year!

/s/Jonathan Oppenheimer

Jonathan Oppenheimer
Senior Conservation Associate

Idaho Conservation League Comments on Fallen Bear Project EA

Reasonable Alternatives

As we pointed out in our scoping comments, we feel that an alternative that avoids any road construction should be considered. We are concerned that the project will build new roads. Developing a broad range of alternatives is important to effectively evaluate the viability of this
4-1 project in this critical area. The rationale for dismissing a "no new roads" alternative was based on the determination that "it would not be economically viable…with no new roads the timber volume would not cover the costs of road reconstruction to access the remaining units." This argument fails to recognize the tremendous costs associated with maintaining an unsustainable network of roads on the Idaho Panhandle National Forests and throughout the National Forest System.

According to roads analysis data, based on GIS information associated with the development of the Idaho Roadless Rule, the Idaho Panhandle National Forest (IPNF) has an inventory of 12,332.85 miles of road. The Forest Service has previously reported a backlog of over $10 billion to the road system in National Forests. In 2007, a Forest Service draft report entitled, "Rightsizing the Forest Service Road System" reported that roads open to passenger cars would have to drop 83% based on a most likely budget scenario (representing an annual 2% loss in purchasing power). The bottom line is that the existing network of forest roads is entirely unsustainable, the Forest Service has minimal capacity to manage and maintain existing road networks and to ensure that access can be preserved into the future, the Forest Service must
4-2 immediately reevaluate and recalibrate their entire road network and implement a plan to stabilize and create a workable system through a priority decommissioning program.

By continuing to add to the road network, the St. Joe District is failing to recognize these critical issues. Further, by dismissing an alternative that would avoid any new road construction based on economic arguments, the District is mislead the public and failing to recognize the reality that the Forest Service is unable to manage existing road systems and is falling deeper and deeper into an economic abyss.

While we appreciate that the project will decommission or "store" unneeded roads, we remain concerned with the proposal to build new ones.

4-3 We also suggested an alternative that would apply a variety of silvicultural prescriptions (i.e. free selection, thin from below, pruning, etc). It does not appear that this alternative was considered. Instead, based on our comments, the District only considered a "no new roads" alternative and summarily dismissed it on a faulty economic rationale. As a result, we recommend that you develop and consider additional alternatives (with appropriate public input) prior to making a final decision on this project.

Logging

4-4 On the 483 acres that is proposed for commercial logging, the treatments should include size class harvest restrictions so larger fire-resistant trees are retained.

We appreciate that small-diameter fuels may be used for local communities and suggest that you require the removal of this material for the "fuels to schools" program. Additional potential 4-5
commercial uses for small-diameter fuels could also be explored. One possibility would be to 4-6
stack non-commercial boles and branches at landings for use by commercial and private firewood cutters. By hauling logs to landings, you can reduce incursions by firewood cutters on undesignated and decommissioned roads. As much as possible with the removal of ladder fuels, 4-7
leave trees should represent a variety of age classes and species.

We are concerned with tractor skidding on approximately 91 acres. No tracked vehicles should be permitted to remove logs. Tracked vehicles destroy ground cover, expose mineral soil to 4-8
erosion, and compact soils for reduced absorption and increased runoff. All logs need to be removed by wheeled vehicles or cable systems that carry the entire tree without dragging it and disturbing the soils. Alternatively, you should consider limiting logging to winter months over snow and frozen ground. Winter logging can reduce the impacts to soils and should be 4-9
considered as a required implementation measure for this project.

We urge that the management action should be careful to remove only trees that are infected with 4-10
insects and/ or diseases at levels that are higher than the endemic levels. We remain unconvinced that larch mistletoe warrants aggressive treatment. Numerous studies have indicated that 4-11
mistletoe can actually benefit wildlife and that trees can live for decades even after infected with mistletoe. We also feel that predetermined numbers of dead and dying trees should be retained in 4-12
order to meet habitat requirements for wildlife.

Insect infestations and diseases are natural cycles that many species, such as woodpeckers and cavity nesters, take advantage of. In addition, insect-weakened trees that survive are important to retain disease-resistance genetics.

Old Growth

As disclosed in the EA, 68 acres of old growth logging is proposed. We urge you to drop this 4-13
portion of the proposal. Instead, the project decision should allocate these acres as designated Old Growth and add them to the official IPNF inventory. All recruitment or potential old growth stands should be retained with the project, including the 1.1 acres associated with new road construction. Based on issues related to insect, disease, climate change, fire and other external forces, the need to retain all existing and potential old growth should be a priority of the St. Joe District and the IPNF.

Roads

As was previously discussed, we appreciate the proposed road decommissioning, but are 4-14
concerned with the potential to build new roads for this project. The Forest Service should reconsider the proposal to build new roads.

Off Road Vehicle use

The devastating impacts of inappropriate Off Road Vehicles (ORVs) on forest ecosystems are well established. ORVs degrade water quality, spread noxious weeds, fragment wildlife habitat, disturb wildlife, and affect the enjoyment of non-motorized recreationists. The Idaho Panhandle National Forests needs to monitor and control the use of ORVs on forest service roads and 4-15
trails. The best way to control motorized use is simply to not build a road in the first place.

Noxious weeds

4-16 Vehicular traffic will serve as a vector for noxious weeds, an ecological problem of epidemic proportions. Where vehicle access is allowed, the tires and undercarriage must be hosed down with pressurized water to dislodge seeds. Funding needs to include surveys and treatment for noxious weeds before and after treatment.

Response to Comments
on the
Fallen Bear EA

Letter #1 – J. Cook; Idaho Department of Parks & Recreation; 12/17/08

1-1: Dispersed campsites identified in the Fallen Bear EA are within the road right of way or directly adjacent. Impacts from timber removal is not likely to impact these sites over all of the years of the timber sale contract.

1-2: The upcoming travel planning process for the St. Joe RD is addressing open and closed roads to ATVs. Public comments are being reviewed at this time, and we will include this comment for that process.

1-3: Please see page 23 of the EA; it includes Design Features that will provide protection for Blackjack Trail 86.

Letter #2 – M. Mihelich, Kootenai Environmental Alliance; J. Juel, The Lands Council; 12/24/08

2-1: The Fallen Bear EA assumes timber harvest would be completed as one timber sale in both alternatives (project file E-2). As shown in Table 1-1 of the Economics Report (p. 4), each of the timber sales are economically feasible with Alternative B's timber harvest PNV at $578,608 and Alternative C's timber harvest PNV at $394,736. The deficit of $336,709 is the difference between the Alternative B PNV of the timber sale and the PNV of the proposed ecosystem projects (project file E-2).

2-2: Project salability was based on a transaction evidence appraisal model described in the Economic Report (page 3). The predicted high bid is based on the transaction evidence appraisal model (project file E-8), which takes into account the market price of lumber. The market price of timber in the project area is estimated using the Western Wood Product Association (WWPA) index and the comparison of a geographically similar timber sale (project file E-10). Predicted high bid for the Fallen Bear EA was completed using the most current WWPA index at the time of analysis as documented in the project file E-8 and E-10. Changes in the market after completion of the analysis will affect the predicted high bid and change the present net value of all alternatives, but that cannot be determined at this time.

2-3: Implementation of the Fallen Bear EA would include timber harvest and other proposed ecosystem projects. The implementation of timber harvest through a timber sale would use the design features as described in the EA (p. 15). If no timber sale bids are received a rewritten timber sale would also include all relevant design features (EA p. 15). Proposed ecosystem projects, such as long –term storage and decommissioning of roads, pre-commercial thinning, and mistletoe treatment, would adhere to the design features for all proposed activities, as they apply to the activity being implemented (EA p. 15). Ecosystem projects may or may not be related to the proposed timber harvest.

2-4: Future market conditions are difficult to estimate. Currently, as of January 28, 2009, the Idaho Panhandle National forest has advertised and sold four timber sales in fiscal year 2009.

2-5: The Water Resources Report (p. 4) explains that the WATSED model was used to estimate water yield and sediment. Page 4 also explains that ECAs are utilized by the WATSED model and discusses the limitations of the model.

2-6: Project file document W-2 reports the WATSED erosion curves and W-3 reports the WATSED model output and summary. Crown removal is a required field in the WATSED model.

2-7: Page 3 of the EA states, "These dates are tentative based upon budgets, workforce, market conditions, and other considerations. Actual dates of implementation and accomplishment could vary". The Water Resource Report (p. 5) states that "The sediment estimate should be used to compare alternatives". These values are estimates: they are not exact numbers which would be affected by the date of activity. If the timber sales are delayed the effects of road construction would also be delayed.

2-8: The monitoring plan described on page 24 of the EA explains the proposed monitoring for the Fallen Bear Project. The Forest Plan on page I-1 and page IV-7-IV-13 describes monitoring for the Forest Plan. The monitoring of a site specific project can be included in the annual Forest Plan monitoring report but the monitoring that is described in Fallen Bear is not required for the Forest Plan. Forest Plan monitoring is not dependent on funding from timber sales.

2-9: The St. Joe Ranger District has provided water quality monitoring information for Forest Plan monitoring since 1988. Funds, therefore, have consistently been available to conduct some level of water quality monitoring. This monitoring can be used to fulfill both the Forest Plan monitoring requirements and monitoring of site-specific projects.

2-10: As stated in the Fallen Bear EA (pp. 13, 16) both Alternatives B and C "are expected to result in a static trend or in a slight increase in weed numbers within the area over time". The no action alternative also is expected to have a static or slight increase over time. Regardless of the actions occurring in the project area treatments for noxious weed control will be part of the St. Joe Ranger District's management. The federal and state noxious weed laws require managing and/or controlling invasive species. Control methods such as those set out in the design features found in the Fallen Bear EA and the continuing monitoring and treatment of previously know sites allow for compliance under federal and state laws.

While some actions in the alternatives, such as logging and road construction, will create new vectors for weeds, other actions such as road decommissioning and long-term storage reduce access and would decrease the amount of ground open for continuing disturbance thus reducing the available area for weed invasion (EA p. 16). Also these actions reduce the effectiveness of the area as a vector as vegetation returns and blocks the way of motorized and non-motorized vehicles, hikers, campers, and horses. While this reduction is slight it would over time, in conjunction with the design features, result in a static trend.

2-11: The IPNF EMS process does have the "Environmental Objective" to "make progress in improving the environment" by "reducing invasive weed introduction or spread" (EMS document 5/2008). The EMS also states that this is "not a short term project that will be completed on a specific date. It is an ONGOING PROCESS that formalizes the Forest Service's commitment to adaptive management". The Fallen Bear EA includes provisions for adaptive management through monitoring and future treatment of noxious weeds (EA pp. 15, 24). The EMS is not law, but rather an objective for a healthier environment and a commitment by the IPNF. The St. Joe Ranger District has on-going noxious weed treatment areas through out the district. New invaders are aggressively treated with biological, chemical, and/or mechanical methods.

2-12: Both Fallen Bear action alternatives would remove biomass as a result of timber harvest and prescribed burning including activity fuel treatments. This would reduce the amount of carbon stored in the treated stands. A portion of the carbon removed would remain stored for a period of time in wood products. In addition, the St. Joe Ranger District is committed to providing biomass to the St. Maries Fuels to Schools Project which would replace the use of fossil fuel carbon for heating the schools in the future.

Regeneration harvests such as shelterwood, seed tree, and clearcut with reserves, as proposed in both Fallen Bear action alternatives would substantially reduce existing carbon stocks. The harvest of live trees, combined with the likely increase in down, dead wood would temporarily convert stands from a carbon sink that removes more carbon from the atmosphere than it emits to a carbon source that emits more carbon through respiration than it absorbs. These stands would remain a source of carbon to the atmosphere until carbon uptake by new trees exceeds the emissions from decomposing dead organic material. The stands would likely remain a carbon source for several years, and perhaps for more than a decade, depending on the amount of dead biomass left on site, the length of time before new trees become reestablished, and their rate of growth once reestablished. As the stands continue to develop, the strength of the carbon sink would increase until peaking at an intermediate age and then gradually decline but remain positive. Similarly, once new trees are established, carbon stocks would accumulate rapidly for several decades. The rate of

accumulation would slow as the stands age. Carbon stocks would continue to accumulate, although at a declining rate, until impacted by future disturbances.

Recent scientific literature confirm these general patterns of forest carbon storage and release over the period of forest stand development and natural or induced disturbances. As overall context, our nation's forests have and continue to sequester vast amounts of carbon (nationally a net carbon sink, sequestering far more carbon then is released), equivalent to approximately 10% of annual carbon dioxide emissions from burning fossil fuels (Heath and Smith 2004; Birdsey and others 2006). Pregitzer and Euskirchen (2004) synthesized results from 120 separate studies of carbon pools and carbon fluxes for boreal, temperate, and tropical biomes. They found that in temperate forests net ecosystem productivity (NEP) is lowest (more towards source), and most variable, in young stands (0-30 years), highest (more towards carbon sink) in stands 31-70 years, and declines thereafter as stands age. Net ecosystem productivity, or NEP, is defined as gross primary productivity (GPP) minus ecosystem respiration (ER) (Chapin and others 2006). It reflects the balance between (1) absorbing CO_2 from the atmosphere through photosynthesis (GPP) and (2) the release of carbon into the atmosphere through respiration by live plants, decomposition of dead organic matter, and burning of biomass (ER). When NEP is positive, carbon accumulates in biomass. Ecosystems with a positive NEP are referred to as a carbon sink. When NEP is negative, ecosystems emit more carbon than they absorb. Ecosystem with a negative NEP are referred to as a carbon source. These studies also reveal a general pattern of total carbon stocks declining after disturbance and then increasing, rapidly during intermediate years and then at a declining rate, over time until another significant disturbance (timber harvest or tree mortality resulting from drought, fire, insects, disease or other causes) kills large numbers of trees and again converts the stands to a carbon source where carbon emissions from decay of dead biomass exceeds that amount of carbon removed from the atmosphere by photosynthesis within the stand. Over the long term (centuries) net carbon storage is often zero, if stands regenerate after disturbance, because re-growth of trees recovers the carbon lost in the disturbance and in decomposition of trees killed by the disturbance (Kashian and others 2006).

The commercial thinning (181 - 288 acres) actions as proposed in the Fallen Bear alternatives would have similar effects on carbon fluxes and storage. However, the initial reduction in aboveground biomass would be less than the reductions with shelterwood, seed tree, and clearcut with reserves. Commercial thinning would reduce the strength of the current carbon sink of these stands, but it is not clear whether commercial thinning activities would convert the treated stands from a carbon sink to a carbon source. Future prescribed burning and thinning would continue to maintain carbon stocks and NEP at a lower level than would occur if the stands were permitted to develop higher tree densities. Although commercial thinning would reduce standing carbon stocks, compared to the no action alternative, these treatments would reduce the amount of carbon likely to be released to the atmosphere due to insect, disease and fire disturbance (Finkral and Evans 2008).

By increasing the probability that large, fire- and insect-resistant trees would persist over time, commercial thinning of stands may sustain large carbon stocks and positive NEP over a longer time period than stands more prone to high-severity fire and other disturbances (Canadell and others 2007; Fellows and Goulden 2008). Krankina and Harmon (2007) observe that "higher carbon stores on land might mean the risk of higher future carbon emissions as the changing climate is expected to cause a higher rate of forest disturbance." They suggest several general measures that can increase the stability of forests in changing environments and reduce the risk of losses of carbon. These recommended measures include: (1) selecting for species with relatively high resistance to drought, fire, insects, and pathogens; and (2) reducing fuel loads through thinning to improve stand resilience (EA pp. 48-49, 51-54). The purpose and need and the action alternatives in the Fallen Bear project are consistent with these recommendations for protecting carbon gains against the potential impacts of future climate change.

The impacts of the action alternatives on global carbon sequestration and atmospheric concentrations of CO_2 are miniscule. However, the forests of the United States significantly reduce atmospheric concentrations of CO_2 resulting from fossil fuel emissions. The forest and wood products of the United States currently sequester approximately 200 teragrams (a teragram equals 10^{12} grams) of carbon per year (Heath and Smith 2004). This rate of carbon sequestration offsets approximately 10% of CO_2 emissions from burning fossil fuels (Birdsey and others 2006). U.S. forests currently contain 66,600 teragrams of carbon. The short-term reduction in carbon stocks and sequestration rates resulting from the proposed Fallen Bear Project are imperceptibly small on global and national scales, as are the potential long-term effects.

The currently large carbon sink in U.S. forests is a result of past land use changes, including the re-growth of forests on large areas of the eastern U.S. harvested in the 19th century, and 20th century fire suppression in the western U.S. (Birdsey and others 2006). The continuation of this large carbon sink is uncertain because some of the processes promoting the current sink are likely to decline and projected increases in disturbance rates such as fire and large-scale insect mortality may release a significant fraction of existing carbon stocks (Pacala and others 2008; Canadell and others 2007). Management actions - such as those proposed in Fallen Bear – that improve the resilience of forests to climate-induced increases in behavior, frequency and intensity of disturbances such as fire, and utilize harvested trees for long-lived forest products and renewable energy sources may help sustain the current strength of the carbon sink in U.S. forests (Birdsey and others 2007).

2-13: The Fallen Bear EA (p. 6) describes the harvest prescriptions for Alternative B. The Fisheries Report (p. 20) identifies that in Tumbledown Creek Alternatives B and C would have regeneration harvest on 0.3% of the drainage and commercial thin on 3% of the drainage. In Bruin Creek Alternative B and C would have regeneration harvest on 4.1% and 1.8%, respectively, and commercial thin on 2.5% and 0.75%, respectively. Steven Creek would have no regeneration harvest under either alternative and under Alternative B would have commercial thin on 8.3% of the drainage. For the non-fish bearing drainages Alternative B and C would have regeneration harvest on 1.63% and 0.7%, respectively and commercial thin on 4.4% and 1.8% respectively of the drainages. For Alternative B, estimated volumes for Tumbledown drainage are 2.4 MMBF, for Bruin drainage 3.3 MMBF, for the combined non-fish/face drainages 1.9 MMBF, and for Stevens drainage the commercial thin would produce an estimated 0.7 MMBF.

2-14: Cumulative effects to the fisheries resource of Alternative B are discussed on pages 37- 38 of the Fallen Bear EA. The cumulative effects section references information about specific effects from the implementation of this alternative under the heading of "Direct and Indirect Effects" in conjunction with the existing condition of the streams as described in the Fisheries Report (pp. 7-12). Bedload movement and streambed scour are indirect effects to the fisheries habitat that are addressed in the Water Resources Report and the EA (p. 32) which states, "No substantial change is expected in stream channel processes of storing and transporting material because the estimated small increase in water yield would not substantially change stream flows outside the realm of natural conditions and sediment size would not shift appreciably and sediment aggradation is not expected (Water Resources Report p. 26)".

2-15: The fisheries report in the EA looks at more factors than just bedload movement and streambed scour. The results of the action alternatives are presented on pages 36–40 of the Fallen Bear EA. The section of the EA titled "Consistency with Forest Plan and Regulatory Framework" on page 40 states that NFMA, pertaining to westslope cutthroat trout and bull trout, and ESA, pertaining to bull trout, would be met.

Letter #3 – J. Juel, The Lands Council; and others; 12/29/08

3-1: The Fallen Bear EA gives a summary of the environmental consequences of the alternatives (EA p. 1). It refers to information contained in resource reports, and each resource report gives information about the existing condition of the affected environment for that resource. The reports are available on the IPNF website or can be obtained from the St. Joe Ranger District Office in St. Maries, Idaho (EA p. 1). Existing conditions were the basis for project development (EA pp. 1-2) and the cumulative effects analysis (EA pp. 28, 31-32, 34, 37, 39, 42-47, 49, 53, 55, 57, 61, 65-71, 73- 74, 76-77). Descriptions of existing conditions are incorporated in the discussions of direct and indirect effects for some resources in the EA (EA pp. 29, 30, 31, 32, 34, 36, 37, 38, 39, 41, 42, 43, 44, 45, 46, 50-51, 56, 57, 62, 63, 65, 66, 67, 68, 69, 70, 72, 73, 74, 75, 76, 77).

3-2: The cumulative effects analysis for each resource includes effects from past, present, and reasonably foreseeable future activities that are pertinent for each resource. Past actions considered in cumulative effects analysis include those that contributed to establishing the baseline conditions of the project area today (EA p. 28). The Fallen Bear EA provides a summary of the environmental consequences. Further details about effects are found in the reports for each resource.

3-3: The Idaho Panhandle National Forests is committed to accomplishing road decommissioning work as quickly and efficiently as possible given budget, contract, and timber market-related conditions. From 1991 to 2006 the IPNF decommissioned 1,466.5 miles of road (IPNF Forest Plan Monitoring and Evaluation Report for 2005 and 2006 p. 75). The St. Joe Ranger District decommissioned approximately 247 miles of road between 1992 and 2008 (project file T-2).

3-4: We have no record of when or why the partial road recontouring on Road 3698AUA occurred or why it was coded as decommissioned. It may have been a recording error because most of the road surface is intact. Environmental documents that were prepared for previous projects in the area do not indicate a commitment to decommission the road, and we explained that transportation analysis for this project determined that the road would be needed for future management (Management Activity Report p. 10). Road 3698AUA is not included in the 240 miles of road decommissioning on the St. Joe Ranger District previously discussed in the response to Comment 3-3.

3-5: One purpose of the project is to reduce management-related erosion and sediment (EA p. 2). After the Fallen Bear Project is implemented, roads would be left in conditions to reduce sediment. Of the 95.4 miles of existing roads (not including FH 50), 34.3 miles would be reconstructed or reconditioned (Transportation Report pp. 7-9). Of the roads not proposed for reconstruction or reconditioning, 52.3 would be stored or decommissioned (T-5). That leaves 1.3 miles of road open or gated and accessible for road maintenance and 7.8 miles that would be barriered (T-5). Culverts on these barriered roads may be removed or replaced and the road surface may be water barred or seeded if necessary (EA p. 14).

We don't have exact figures to determine how many miles of roads in the Fallen Bear Project Area were built without current BMPs or are not up to current BMP standards, but as stated previously the intent of the project is to reduce management-related erosion and sediment. The proposed activities would implement BMPs (EA pp. 15, 35). We do have data for the Quartz Gold Assessment Area that was used for the Quartz Gold EAWS and RAPS (T-3). The table below shows the miles of road constructed in the Quartz Gold Area by year based on photo interpretation. The IPNF began implementing current best management practices in the late 1980s, so it's possible that approximately 400 miles of road were designed and built in the Quartz Gold Area without current BMPs. This does not mean all of those roads are currently causing problems. Between 1995 and 1999 we decommissioned 36.7 miles of road in the Quartz Gold Area.

Year	1949	1958	1969	1972	1975	1984	1996	Total
Miles of Road	50	4	249	64	27	45	9	448

3-6: The process for the St. Joe Ranger District Travel Management Plan is ongoing at this time. The activities proposed by the action alternatives that affect motorized travel (e.g. closed roads) were reviewed and included in the proposed action. The Proposed Action for the Travel Management Plan was sent out to the public on October 30, 2008.

3-7: Roads are a controversial issue on the national forests. Roads can be good because they make possible the production of commodities that society needs (e.g. timber, cattle, minerals) and roads can also provide access for a wide range of recreational activities, but roads can also harm streams and wildlife habitat. Roads are a necessary requirement in managed landscapes to provide for human uses and silvicultural treatments. Roads, however, can bring negative impacts to both aquatic and terrestrial species. One of the major findings of the Integrated Scientific Assessment (1996) relates to the fact that where open road densities are high, both aquatic and terrestrial integrity have suffered.

An alternative with no road construction was considered, but it was not analyzed in detail (EA p. 5).

To reduce open road density on managed landscapes the Fallen Bear Project stresses minimization of road density and limits new road construction to those roads absolutely necessary to meet silvicultural objectives. Existing roads no long necessary for the long-term management of the area would be obliterated.

The existing transportation system was reviewed to determine if there are any unnecessary roads or roads that are causing unacceptable resource damage (EA pp. 1-2; Transportation Report; project file PD-2: Roads Analysis Process). The Fallen Bear Project would decommission 31.4 miles of unneeded road (EA p. 7). This would provide for an overall reduction in road densities within the project area and contribute both to a

reduction in road maintenance costs and over the longer term provide for improvements in water quality and fish populations within the project area (EA pp. 31, 35, 36-40).

The proposed road construction would provide access for initiating treatments in priority timber stands and for their long-term management. The project would minimize the amount of road construction to only that necessary for management-related access (Transportation Report p. 5).

Road storage activities (Road Prescription C) would also reduce the amount of road maintenance required within the project area. For instance, 18.3 miles of existing road and all new system road would be put into the long-term storage prescription (Road Prescription C), the intent of which is to leave the road in such a condition that it would not require any maintenance until it is needed again (EA p. 14). These treatments would minimize open road density within the project area.

3-8: In the Fallen Bear EA the terms "long-term storage" and "decommissioning" are used interchangeable with "Road Management Prescription C" and "Road Management Prescription D", respectively. These terms are defined in the Fallen Bear EA on pages 14 and 15 under the descriptions of Road Management Prescriptions C and D.

3-9: The overall existing condition of roads to be reconstructed is generally inadequate for resource protection or anticipated use or the road is impassable for the design vehicle. Spot reconstruction on some roads would also occur, where the primary disturbance is confined to a limited area, such as culvert installations, rebuilding a shoulder or addition of turnouts. Areas between the spots generally would need reconditioning (reshaping and processing the road surface and ditches and brushing the shoulders). Most of the work described as reconstruction and reconditioning would actually be maintenance (FSM 7705) to restore the road to its original condition (EA pp. 12-13). The effects of road reconstruction are discussed in the EA on pages 36-39, 41-42, and 56-57. It is also discussed in the reports for fisheries (pp. 20-23 and 25-26), noxious weeds (p. 11-12 and 14-15), soils (p. 16), TES plants (pp. 12-13 and 16-17), water resources (pp. 23, 27, and 29), and wildlife (pp. 18, 19, 60, and 61).

3-10: The decision to proceed with the Fallen Bear Project was in part because of the roads analysis process conducted by an interdisciplinary team. During this process the interdisciplinary team weighed the need for each road against its environmental risks (PD-2: RAPs). Once a proposed action was developed we asked for public comment on it (PI-2). At that time The Lands Council thanked us for proposing to reduce road density in the area and did not identify other roads to be kept or to be decommissioned (PI-10). The "high" rating you refer to on page 27 of the EA is for vulnerability risk for fisher and marten which is related to open road density. Areas with greater than or equal to 1 mile per mile^2 of open road densities have a high risk to trapping vulnerability where there are trapping seasons (Wildlife Report p. 34). Following proposed activities road density ratings for fisheries range from "low" to "high" with most considered "moderate", depending on drainage and alternative (EA pp. 36, 37, 38, 39; Fisheries Report Table 6 p. 16).

3-11: Future needs for stored roads are mostly related to silvicultural treatment (PD-2: RAPs). The EA estimates stored roads would not be needed for the next 15 to 25 years, but may be needed at some time after that (EA p. 14).

3-12: Road costs are discussed in the EA in terms of ecosystem management projects on page 46. Road costs are displayed in detail in the Transportation Report (pp. 6-19). Although reducing road maintenance costs was not identified as part of the purpose for this project, part of the reason for decommissioning and storing roads is to reduce the miles and therefore costs of road maintenance. All of the newly constructed roads will be put into long-term storage (Road Management Prescription C) when this project is completed (EA pp. 6, 14-15). With this prescription the road prism is basically left intact but in a condition that would not require any maintenance (EA p. 14; Transportation Report p. 11).

3-13: The EA does not say there would be no impact from constructing new roads. On the contrary, we recognize effects on water resources (EA pp. 26, 31-34; Water Resources Report pp. 4, 5, 19, 20, 22, 23, 24, 25, 27, 29, 31, 33, 34, 36, and Appendix A), wildlife habitat (EA pp. 26, 27, 63, 64, 65, 68, 72, and 76), old growth (EA pp. 28, 55, and 56), air quality (EA p. 30), fisheries (EA pp. 36, 37, 38, 39, and 40), noxious weeds (EA p. 41, 42, and 43), TES plants (EA pp. 43 and 44), cultural resources (EA p. 45), fire and fuels (EA pp. 48 and 49), trails (EA p. 56-57), soils (EA pp. 61-62), and visual quality (EA p. 63).

3-14: The Old Growth Report documents and discloses the number of acres allocated as old growth in the Fallen Bear project area and OGMU 27 and changes resulting from the analysis process (Old Growth Report pp. 2-3).

3-15: The forest vegetation analysis does give quantitative information on the historic conditions or the change in condition over time. Analysis and disclosure can be found in the Forest Vegetation Report on pages 4–13.

3-16: Reference or historic conditions were considered during the analysis of the Fallen Bear Project (Air Quality Report p. 4; Fire and Fuels Report pp. 3-4; Fisheries Resource Report p. 6; Forest Vegetation Report pp. 4-9; Noxious Weeds Report p. 5; Soils Report pp. 6-7 and 9; Botanical Biological Assessment and Evaluation p. 6; Visual Quality Report p. 2; Water Resources Report pp. 6, 19-20). The proposed action was developed based on the Ecosystem Assessment at the Watershed Scale (EAWS) for the Quartz Gold Watersheds which discussed reference conditions for many resources (PD-1 pp. 4- 8, 10-13-32, 34-50).

The consideration and discussion of historic ranges or conditions are appropriate as they provide important context for understanding how these ecosystems function and how they are likely to react to changing conditions (and are used in this analysis very much as the commenter suggest via their quote from Noss (2001)). Historic ranges or conditions are essential to understanding the past especially in the face of climate change. Understanding the historical ecosystem dynamics is critical to understanding potential future ecosystem behavior and can tell us which ecosystems are more resilient or more vulnerable in the face of global climate change. The use of historical ecological data is for information; it is not a target or a goal (USDA Forest Service, Briefing Paper, April 28, 2008).

The Fallen Bear Project's purpose and need, in part, is to accelerate or maintain the development of long-lived, early-seral, shade-intolerant species in order to increase forest resiliency following disturbance, decreasing the risk of stand loss to insects, disease and fire (EA p. 1). This is one of the strategies identified by Millar (2007) for managing under changing climatic conditions. Millar (2007) encourages the use of flexible approaches to managing forested ecosystems and acknowledges that the use of historical data has an immense value in improving our understanding of ecosystem responses to environmental changes and the setting management goals.

Effects to the following were analyzed:

- Old growth patches and interior habitat (EA pp. 4, 55-56; Old Growth Report pp. 4, 6-7),
- Amount and distribution of snags (EA pp. 12, 14, 19-23, 51, 52, 74-76; Wildlife Report pp. 14-15),
- Amounts and distribution of coarse woody debris (EA pp. 17, 19, 21, 26, 47, 51, 52, 59, 60, 62; Soils Report pp. 4, 6, 9, 10, 13-18, 20, 22, and 23),
- Soil conditions (EA pp. 17, 21, 26, 58-62; the entire Soils Report);
- Populations of MIS and TES fish and wildlife species (EA pp. 40, 66, 67- 77; Fisheries Report pp. 4, 6-7, 9, 11, 27; Wildlife Report pp. 10-13, 26, 28-29, 31, 37-38, 39, 40, 42, 43, 44, 50-51, 54-55, 57, 60-62),
- Wildland fire (EA pp. 1, 2, 13, 25, 29, 30, 31, 46-49, 50-51, 54, 56, 58-61; Air Quality Report pp. 3-7; the entire Fire and Fuels Report; Fisheries Report p. 17; Forest Vegetation Report pp. 1, 3, 4, 5, 6, 8, 9, 10, 11, 12, 18; Noxious Weeds Report p. 5; Soils Report pp. 6, 8, 9-10, 14, 15, 16, 17, 18, 20, 21; Botanical Biological Assessment and Evaluation pp. 6-7, 10, 12, 16; Visual Quality Report pp. 2 and 3; Water Resources Report pp. 4, 8, 19-20, 21, 30; and Wildlife Report pp. 4, 5, 9-10, 14)

3-17: See response to Comment 3-16.

3-18: Hayward does not mention mechanical manipulation or prescribed burning in the cited quote, but he is cautioning the use of a direct comparison to historic conditions. The Forest Vegetation analysis supports the need for improvements in species composition and distribution of stand structure based on historic conditions and a range of desired future conditions (EA pgs. 51-54). Forest-wide historic conditions are addressed at the Forest Plan level. Proposed activities are consistent with the IPNF Forest Plan. Also see responses to comments 3-16 and 3-19.

3-19: We agree that human-induced climate change is most appropriately considered "not on a project-level basis", but in the context of larger scale assessment. The effects on climate change of a project of this type and size (a total of approximately 1,400 acres) would not be discernable on the global scale.

3-20: The results of previous logging are disclosed in the discussions of existing conditions and cumulative effects for each resource. As described in the Management Activity Report and the Forest Vegetation Report, earlier timber harvesting practices differ from those used today on the IPNF and proposed in the Fallen Bear Project. Most of the previous logging in the Fallen Bear Area occurred during the 1960s and 1970s (approximately 2,660 acres of the total 4,100 acres or 65%) when management objectives, logging systems, and regeneration practices were different than they are now. Part of the purpose for this project is to address conditions that arose from earlier logging practices. For example, some of the roads that would be decommissioned with the Fallen Bear Project were built when logging systems required more roads with closer spacing between roads.

3-21: Effects of fire suppression are disclosed in the EA (pp. 29, 31, 41, 43, 44, 46, 51, 55, 56, and 58) and in resource reports (Air Quality pp. 4 and 7; Fire and Fuels pp. 4, 11, 14, and 15; Fisheries pp.17, 20, 22, 24, and 25; Forest Vegetation pp. 6, 7, 9, 10, and 12; Noxious Weeds pp. 5, 8, 12, and 16; Old Growth pp. 3, 4, and 5; Soils pp. 9, 14, 15, 20, and 21; Botanical Biological Assessment and Evaluation [TES Plants] pp. 7, 8, 14, and 18; Water Resources pp. 21and 30; and Wildlife pp. 4 and 9).

The habitat improvement in the Fallen Bear EA would be largely due to the proposed road work which would result in access changes beneficial to wildlife and improved stream and riparian habitat conditions. Slight improvements to habitat from the proposed timber harvest are recognized for northern goshawk foraging (EA p. 73), wolf (EA p. 68), elk foraging (EA p. 77); but these benefits are generally balanced by slight decreases in habitat conditions resulting from past or proposed timber harvest.

3-22: The Fallen Bear EA describes benefits of the proposed activities, but it also recognizes potential adverse effects. The following statements concerning potential adverse effects are included in the Fallen Bear EA:

> "The smoke emissions from prescribed burning activities could adversely affect air quality for short periods. Dust may increase from road construction, maintenance, and stabilization as well as project-associated vehicular traffic" (p. 30)
>
> "… road construction, timber harvest and prescribed burning would temporarily produce … additional sediment" (pp. 31 and 33)
>
> Fish migration barriers would remain where FH50 cross streams (p. 37, 38, 39, and 40)
>
> Removing stream crossings would result in some sediment addition to streams (pp. 36, 37, 38, and 39).
>
> The proposed activities are "expected to result in a static trend or in a slight increase in weed numbers in the project area over time" (pp. 41 – 43)
>
> "… indirectly, the potential risk of weeds to TES plants could increase" (p. 44)
>
> Timber harvest "would have the potential to adversely affect one cultural site" (pp. 44-45)
>
> "Timber harvest would immediately increase fuel loading …" (p. 47)
>
> "Regeneration harvests create a short-term increase in fire hazard …" (p. 47)
>
> "As regeneration becomes tall … the probability of torching increases …" (p. 48)
>
> "Areas that are commercially thinned and only have lopping prescribed … would initially have greater surface flame lengths than they had prior to harvesting due to increased surface fuel loading, increased solar insolation, and decreased wind sheltering due to decreased canopy cover." (p. 48)
>
> "… slash resulting from precommercial thinning activities increases fire hazard within thinned stands until it is incorporated into the forest floor by snow compaction and decomposition." (p. 48)
>
> "The proposed road decommissioning may result in an increase of the average cost per acre for fire suppression …" (p. 49)
>
> "Some mortality in reserve trees would be expected …" (p. 51)

"The proposed stand treatments have a potential to increase the current incidence of root and stem decays in susceptible species within the treatment areas" (p. 52)

"Stand loss to insects and other diseases is expected to remain at endemic levels …" (p. 52)

"Root and stem decays are expected to still be present in treatment stands after treatment …" (p. 53)

"After treatment these stands would not meet old growth criteria" (p. 55)

"Both action alternatives would temporarily displace three popular dispersed camp sites …" (pp. 56 and 57).

"Alternative B proposes units that would minimally affect Haggerty Trail 5" (p. 56).

"Both action alternatives propose harvest units, road reconstruction and new road construction that would affect the Blackjack Trail 86 corridor" (pp. 56 and 57)

"Motorized vehicle access would be reduced" (p. 57)

"Potential detrimental disturbance could affect up to 23 acres …" (p. 59)

"Soil compaction effects can last for decades …" (p. 59)

"Soil displacement that mixes or removes the volcanic ash surface layer reduces soil moisture holding capacity" (p. 59)

"The residual logging debris… would increase potential fire intensity and severity … Severe burning and ground disturbance could create bare soils and encourage noxious weed infestations" (pp. 59-60)

"Harvesting the tree bole would remove about 43 percent of the tree's potassium which may cause indirect effects to vegetation as nutrient sources are removed from site" (p. 60)

"… on an unpredictable site-specific basis, some drier sites may underburn at a severity level that removes all of the protective duff and litter layers ..." (p. 60)

"Direct effects of prescribed Underburning and pile burning could potentially remove woody debris that would otherwise provide long-term nutrients …" (p. 60)

"Yarding tops would remove nutrients …result in about twice as much potassium loss as bole-only yarding … so areas where tops would be yarded for 200 feet below the road may sustain a greater nutrient loss than the remaining activity areas" (p. 61)

"… the proposed activities have the potential to disturb a total of 37 acres with Alternative B and 21 acres with Alternative C" (p. 62)

"Alternative B has the potential to adversely affect one cultural site with two timber harvest units proposed next to a historic trail" (p. 62)

"This would result in a temporary increase in open road density …" (p. 64)

"… resulting in a temporary increase in open road density …" (p. 64)

"… the potential reduction in cover would likely affect wildlife movement" (p. 64)

"Treatment of these stands would reduce the quality of this timbered connection for wildlife …" (p. 65)

"… the potential reduction in cover likely would affect wildlife movement" (p. 65)

"The thinning would result in less available forage for snowshoe hare for a short period …" (p. 66)

"This stand would still qualify as lynx habitat, although the quality would be reduced" (p. 67)

"Denning habitat would be reduced by the proposed regeneration harvest …" (p. 67)

"Travel corridors would be maintained, however there would be a reduction in their effectiveness in a few spots …" (p. 68)

"Given the amount of past harvest in the project area, the reduction in timber cover would have a greater impact on ungulates than would the creation of future forage …" (p. 68)

"Approximately 437 acres of suitable fisher habitat would become unsuitable …" (p. 69)

"Despite the improved conditions the trapping-vulnerability risk would remain high" (p. 69)

"… the 13% reduction in the amount of suitable habitat could slightly reduce the ability of the project area to support fisher/marten" (p. 69)

"This would be a reduction of 0.6% in the amount of suitable, mature habitat …" (p. 69)

"would treat one 13-acre stand of habitat currently considered suitable for flammulated owls, making it unsuitable due to the reduction in canopy cover" and "The amount of suitable habitat in the project area would be reduced by 1.3%" (p. 71)

"Clearcut and seed tree units …would likely reduce upland timbered habitat quality for toads due to the drier, more open conditions …" (p. 72)

"One crossing would be near potential breeding habitat, and could affect breeding toads …" (p. 72)

"… two potential nest areas would become unsuitable …" (p. 73)

"Approximately 119 acres of potential goshawk nesting habitat would become unsuitable in the Bruin Creek drainage. Approximately 66 acres of potential nesting habitat would be made unsuitable in the Tumbledown Creek drainage" (p. 73)

"… would move foraging habitat in the Tumbledown Creek Area further from its desired condition …" (p. 73)

"…clearcut and seedtree units would affect foraging suitability …" (p. 73)

"… two potential nest areas would become unsuitable …81 acres of potential goshawk nesting habitat would become unsuitable …32 acres of potential nesting habitat would be made unsuitable …" (p. 73)

"Foraging habitat quality would be affected. Some stands …would decrease in quality …" (p. 74)

"… clearcut and seedtree units would affect foraging suitability …" (p. 74)

"… would no longer be considered able to provide foraging habitat. They would remain unsuitable for pileated woodpecker winter foraging for decades … reduction in canopy cover and basal area along with incidental removal of snags for safety would reduce the quality of winter forage habitat" (p. 74)

"… 110 acres would become openings after treatment and would no longer provide nesting habitat … remain unsuitable for pileated woodpecker nesting for decades …affect 16 acres of optimal nesting habitat in one stand … 94 acres would affect suitable nesting habitat, reducing it … would reduce the overall nesting habitat … would affect nesting habitat …36 acres of optimal nesting habitat would be affected, along with 285 acres of suitable nesting habitat. Optimal nesting habitat would be reduced … reduction in canopy cover and basal area … would reduce the quality of nesting habitat" (p. 75)

" … would reduce foraging habitat by 125 acres (1.7%) and reduce the quality of another 366 acres (4.9%). Optimal nesting habitat (allocated old growth) would be reduced by 1.8% …" (p. 75)

"… would reduce foraging habitat by 69 acres, and reduce the quality of another 229 acres … would no longer provide foraging habitat …remain unsuitable for pileated woodpecker winter foraging for decades …" (p. 75)

"… 54 acres of suitable nesting habitat would become openings …and would no longer provide nesting habitat … would remain unsuitable for pileated woodpecker nesting for decades …" (p. 75)

"Regeneration harvests would reduce suitable nesting habitat … would reduce the overall nesting habitat …" (p. 76)

"… would affect 199 acres of suitable nesting habitat for woodpeckers … would reduce the quality of nesting habitat" (p. 76)

"… would decrease habitat conditions for elk in the project area over the short term …" (p. 76)

"… reduction in canopy … is likely to decrease the habitat quality for elk over the short term" (p. 77)

"… still below the target level …" (p. 77)

"… still below 20% and therefore would still have a negative effect on the Bruin EHP" (p. 77).

3-23: The regulatory framework is outlined in the EA (p. 62) and in the Soils Report (pp. 3, 22-23) and provides the principle sources of direction for protecting soils. As Lacy (2001 p. 21-22) states (additional comments are made in italics):

> "[o]f all public natural resource laws, the National Forest Management Act (NFMA) provides by far the greatest protection to the soil resource. Nevertheless, despite the fact that NFMA covers management of almost 192 million acres of national forests (which includes the IPNF) and grasslands across the United States, this is still less than a third of the public lands.
>
> In addition, many of NFMA's strongest soil protecting provisions apply specifically to logging operations (such as the Fallen Bear EA) and not to the myriad other uses that occur on the national forests, such as livestock grazing, recreation, mineral extraction, and so forth.
>
> …..NFMA focuses mainly on timber harvest planning (such as the Fallen Bear EA), mandating that the Forest Service perform inventories (see Soils Report and associated project file), plan in accordance with the NEPA (see Fallen Bear EA), consider the physical (Soils Report p. 7-9; 12-22, EA p. 58-62) and economic suitability of the lands (EA p. 45-46), provide for diversity of plant and animal communities (see Purpose and Need EA p. 1; EA p.43-44 for plants; EA p. 63-77 for wildlife), and follow certain harvesting guidelines and practices (Soils Report p. 31; EA p. 17, 21 for soils and p. 15-23 for all design features).
>
> NFMA contains a fair number of provisions dealing with soil degradation, both with respect to inventory and planning, and management standards. First, the Secretary is required to obtain inventory data on soil and other "renewable resources" (IPNF Soil Survey 1999). During the planning process, the Secretary must identify as "not suited for timber production" any lands where logging cannot be performed "without irreversible resource damage to soils productivity or watershed conditions" (S-19). Forest planning also must provide for "evaluation of existing or potential watershed conditions that will influence soil productivity" (Soils Report p. 6-11). The Act requires that the Forest Service "insure that timber will be harvested from National Forest System lands only where (i) soil, slope, or other watershed conditions will not be irreversibly damaged" (Soils Report p. 7-9, 22-23; EA p. 62). All "vegetative manipulation" must "[a]void permanent impairment of site productivity and ensure conservation of soil and water resources" (Soils Report p. 22-23; EA p. 62).
>
> ….Finally, perhaps the most significant management standard in the regulations specifies that forest management practices must "[c]onserve soil and water resources and not allow significant or permanent impairment of the productivity of the land" (Soils Report p. 22-23, 31; EA p. 17, 21, 62).
>
> The Forest Service has also developed somewhat extensive internal standards in its Forest Service Manual (FSM) and Forest Service Handbook (FSH) (Soils Report p.3, 22-23; Soil-R-89).

As the above excerpt from Lacy (2001) points out, NFMA does provide for the Forest Services' primary regulatory framework and, as shown with above comments in italics, this project has covered every aspect of it. Soil and water conservation practices (SWCH FSH 2509.22 – USDA 1988c) are also in place to provide for best management practices and are included as design features (Water Report Appendix). They would be applied during timber harvest and road decommissioning, construction, maintenance, and reconstruction to minimize soil erosion and maintain acceptable soil productivity (Seyedbagheri 1996; Lynch and Corbett 1989, 1990; Idaho DEQ 2001; USDA 2002) (Soils Report p. 16). The Soil and Water Conservation Practices Handbook outlines BMPs that protect the soil and water resources at a higher level than do existing Idaho Forest Practices rules and regulations, thereby incorporating all Idaho State standards.

Impacts of the proposed management actions on soil productivity are also discussed from a general aspect in the EA (pp. 58-62) and in the Soils Report on pages 5, 6, 9, and 10, displayed in a project specific summary table on p. 11, and analyzed for the proposed activities on pages 12-23.

3-24: Overland flow occurs when precipitation rates exceed the infiltration rate of the soil and varies with different soil textures and slopes. One of the most unique qualities of the ash-capped soils that cover north Idaho – and the Fallen Bear project area – are that they have high water-holding capacities. Page 5 of the Soils Report states:

> "…compaction results in a 15% or more increase in bulk density, or a 50% reduction in water infiltration rates. Soil compaction reduces the supply of air, water, and nutrients to plants. Roads, ground-based yarding, and dozer piling are the major contributors to compaction".

On page 13, the discussion continues and acknowledges that "[c]ompaction and rutting reduces soil permeability and infiltration, which can cause soil erosion."

The primary areas where overland flow can become a concern are roads and burned soils. The Soils Report mentions that "[p]eriodic large pulses of erosion may occur during intense water yield and overland flow events in interaction with road drainage systems" (p. 8) and discusses overland flow and reduced infiltration in regards to water-repellant soils after high burn severities on pages 5, 9, 10, 15, and 18. Areas compacted from logging activities are usually irregular, scattered, and well buffered between vegetated sections so that overland flow is highly unlikely or settles out within the vegetation.

Best management practices (BMPs) following the Soil and Water Conservation Handbook (2509.22) are in place (EA p. 15; Water Report Appendix A) and require (among other items), waterbar installation on skid trails where most compaction occurs. Soil design features (EA pp. 17, 59 and Soils Report pp. 27, 29, 31) include slash mats where accumulations of woody debris also discourage compaction, erosion, or above-mentioned overland flow as bare areas on soils are reduced.

As for the Myrtle Creek citation, the statement refers to an alteration in storage and transmission of soil moisture (below ground) due the removal of plant communities (i.e. primarily trees which act as pumps) and the potential increase of soil water (below ground) which can affect water yield and stream sediment regimes.

3-25: The cumulative effects section starts on p. 20 of the Soils Report, continues on to page 22 (p. 58 in EA) and adds to the previous discussion of direct and indirect effects. It acknowledges that

> "[t]he cumulative result of Alternative B would reduce productivity on approximately 23 acres (Table Soil-3) of National Forest System land in the Fallen Bear Project Area. This is ~5% of the 482 acres of proposed activity area. Under Alternative C, approximately 13 acres (Table Soil-3) of National Forest System land would be affected which amounts to a ~4% loss of productive land base on the 294 acres of proposed activity area".

These findings are repeated in the regulatory consistence section (EA p. 62; Soils Report p. 22-23).

If a sum of all proposed soil disturbances is not enough, a detailed delineation by unit is clearly outlined and quantified in Table Soil-3 in the Soils Report (p. 11) and includes existing and potential cumulative disturbances from proposed activities – and yes, they are acknowledged even though they are less than 15%.

In addition, an entire section labeled "Detrimental Soil Disturbance" (Soils Report p. 16-17) assesses effects of timber harvest, roads, and fuels treatments and more "based on their potential to create detrimental impacts and to affect soil productivity" (p. 16).

Overall, past existing impacts to soils on proposed units for this project are low because of the steep terrain of the area that required primarily skyline logging in the past, which has had little to no impact on long-term soil productivity (Soils Report p. 20). As a matter of fact, less than 20% (91 acres in Alternative B and 45 acres in Alternative C) of the soils would be harvested with ground-based equipment so that potential disturbance on soils and soil productivity are low.

3-26: The National Forest Management Act (NFMA) requires that "management systems not produce substantial and permanent impairment of the productivity of the land" (U.S.C. 1602(3))

In addition to the requirement to not produce substantial and permanent impairment of productivity of the land, NFMA also instructs the Forest Service to: "Insure that timber will be harvested from National Forest System lands only where – (i) soil, slope or other watershed conditions will not be irreversibly damaged."

The Region 1 and other Forest Service regions developed Regional Soil Quality Standards as a guideline to assist in compliance with the NFMA requirements. The Regional Soil Quality Standard identifies important soils characteristics and sets detrimental disturbance thresholds beyond which productivity may be impaired. It further provides a detrimental disturbance requirement of less than 15% of the area exceeds the thresholds.

Robert F. Powers, a research Soil Scientist for the Forest Service, notes that while "net primary productivity" is the fundamental indicator of a forest's well being, it is extremely difficult to measure (Powers 2002). Powers further states:

> "Monitoring soil and site processes is not feasible at an operational scale. Therefore, USDA Forest Service monitoring strategy centers on measurable soil variables, which, if altered beyond a threshold, indicate that potential productivity has been degraded. These thresholds of soil quality are based partly on research, but largely on professional judgment."

In 1998, Powers and others described the Forest Service monitoring strategy as focusing on measurable soil disturbance variables such as compaction, ground cover, soil displacement and organic matter abundance that influence important site processes. This is the suggested focus because, "Monitoring soil and site processes is not operationally feasible." So it is through discussion of the soil quality standards that soil productivity is disclosed.

This strategy further provides that each Forest Service region develop "standards" for each variable that mark thresholds for detrimental soil disturbance.

> "A threshold for detrimental disturbance is defined as a change in any monitoring variable sufficient to trigger a 15 percent decline in soil productivity from that of the pre-disturbed condition, a value judged to be the smallest change detectable statistically at operational levels of monitoring. This does not imply that absolute productivity has declined 15 percent, but merely that a detrimental disturbance threshold has been passed" (Powers et al. 1998).

Both in Powers and others (1998) and Powers (2002) there is the acknowledgement that these soil quality thresholds are based partly on research but largely on professional judgment; though the professional judgment of senior research and academic soil scientists. This threshold approach is accepted in the scientific literature and cited in such examples as:

Block R, Van Rees KCJ, Pennock DJ. 2002. Quantifying harvesting impacts using soil compaction and disturbance regimes at a landscape scale. *Soil Science Society of America Journal* 66:1669-1676

Geist, J.M.; Hazard, J.W.; and Seidel, K.W. 1989. Assessing physical conditions of some Pacific Northwest volcanic ash soils after forest harvest. *Soil Sci. Soc. Am. J.*53: 946-950.

Moffat AJ. 2003. Indicators of soil quality for UK forestry. *Forestry* 76(5): 547-568. Rab MA. 1999. Measures and operating standards for assessing Montreal process soil sustainability indicators with reference to Victorian Central highlands forest, southeastern Australia. *Forest Ecology and Management* 117: 53-73.

Rab, M.A. 2004. Recovery of soil physical properties from compaction and soil profile disturbance caused by logging of native forest in Victorian Central Highlands, Australia. *Forest Ecology and Mgt*. 191 329-340.

The aerial disturbance requirement providing that less than 15% of an area may exceed the detrimental disturbance threshold is based the assumption that productivity will not be substantially and permanently impaired as long as less than 15% of the area has experienced detrimental soil disturbance. "The assumption (is) that site quality will be maintained if less than 15% of an area is detrimentally impacted after disturbance (Dumroese and others, 2000; Powers and others 1998). Productivity may be impaired on up to 15% of an area, but that the impairment should be neither substantial nor permanent on that 15% of the area. Dumroese and others (2000) found that "relatively small disturbances (15% of the area) … appear to result in relatively small losses …and, at these levels current guidelines seem to be adequate. However, as the areal extent of disturbance gets larger, (the) analyses indicate that substantial losses … can occur. This 85/15% standard means that at least 85% of the area is NOT detrimentally disturbed. On the 15% that does experience detrimental soil disturbance, a professional soil scientist will assess the potential effect that the soil disturbance may have on productivity. Detrimental soil disturbance does not mean that substantial nor permanent impairment has occurred.

The "management systems" of the proposed action are a response to the above NFMA direction to maintain long-term productivity and improve the yield of tangible and intangible goods and services while maintaining a way to balance supply and demand of renewable forest resources.

Monitoring of previously harvested timber sale units on the Lolo National Forest suggested that in units 35 to 45 years old, detrimental soil disturbance appeared to have dissipated. The monitoring and subsequent data

analysis, demonstrates that initial detrimental disturbance resulting from ground-based timber harvesting diminishes over time without active reclamation, and initial detrimental disturbance does not irreversibly damage activity area soils. Further the report shows that detrimental disturbance greater than 15% did not result in impairment of productivity. Findings on the IPNF have been similar and can be reviewed in the 2005, 2006, and 2007 Forest Plan Monitoring Reports.

Scientific uncertainty and controversy is addressed in the Soils Report (p. 5) and, as stated in the previous paragraphs of this section, is a complex issue of which the Forest Service is aware of. A review of the regional soil quality standards is currently underway with the objective to update the standards in the near future.

3-27: It is not quite clear where the statement "inattention to retaining adequate amounts of large woody debris in past timber removal operations" comes from because the IPNF monitors coarse woody debris (CWD) before and after timber operations (Forest Plan Monitoring 2002, 2004, 2005, 2006, 2007). Monitoring results have shown that the forest, with little exception, has continuously met CWD requirements as mandated by regional and Forest Plan standards.

As a matter of fact, the Fallen Bear on-site evaluation of existing conditions (S-1) identified three units (EA pp. 17, 60, 62; Soils Report p. 23, 31) – which have not been previously harvested (see Table Soil-3) that currently contain reduced amounts of CWD. Reasons why organic content in these units is low was discussed on p. 10 in the Soils Report and reads:

> "A good amount of coarse-woody debris is present in most units with the exception of Units 151, 183A, and 183B. Unit 151 is located on steep shallow soils and contains numerous rock outcrops and a low overall tree count compared to adjacent stands (S-1). Units 183A & B were affected by a fire in 1910 that likely reduced woody debris (S-1). Organic matter content varies throughout the activity areas (S-1) but is generally low to optimum for most surveyed units, which are primarily south- and west facing. Localized variability and depths are natural and usually correlate to habitat type and aspect with excessive needle cast often decreasing the establishment of a more herbaceous ground cover, especially in moister habitats."

Based on these findings and associated importance of maintaining CWD, the proposed timber harvest would actually promote an increase in material which otherwise would remain as low as it currently is. The design features (EA p. 17; Soils Report p. 23, 31;) therefore include:

> "Recommendations in *Managing Coarse Woody Debris in Forests of the Rocky Mountains* (Graham and others 1994) would be used to retain sufficient levels of coarse woody debris on site after slash disposal. Special attention to meet coarse woody debris levels would be given to Units 151, 183A, and 183B that are currently low."

3-28: Also see response to comment 3-24. Under the header "Existing Site Conditions and Past Activities" in the Soils Report (p. 10), findings from field visits (S-1) were summarized as follows:

> "In 2006 and 2007, the proposed units were field checked and data was recorded to estimate the degree of soil disturbance (S-1). Onsite assessment followed guidelines in Niehoff (2002) and included shovel tests on random transects to determine soil characteristics, compaction, organic matter depth, and coarse-woody debris content of proposed activity areas. Transects were also supplemented by visual observation and photos during the walk-through (S-1).
>
> Soils are generally well drained light to dark or reddish brown silt loams that formed in volcanic ash and the underlying parent material. Gravel and rock fragment content varies between 5-80% and increases in amount and size depending on shallowness or depth to bedrock.
>
> Site visits have been made to all proposed units in order to assess existing conditions and to field check the data records (S-1). More than three quarters of the proposed activity areas have 4 percent or less existing soil detrimental disturbance (Table Soil-3). In general, impacts were found to be localized, are limited to small areas within each unit, and are often associated with disturbance from game trails. Many of the proposed harvest units have not been entered in the past. Where old stumps are present, the ground in proximity is often undisturbed and no visible or physical evidence of logging remains. In areas where roads or skid trails are visible, the soil may be compacted, may also only show slight disturbance, or has recovered. Due to the

> steepness of the terrain, the most recent past logging activities have primarily utilized skyline systems or ground-lead cable that, in steep terrain, caused little soil disturbance.

Given that the majority of the proposed harvest units have not had any previous management activities, existing hydrological impacts are absent.

Detrimental soil conditions and the hydrological implications are defined in the Soils Report (p. 5) and state:

> "For volcanic ash-influenced surface soils, compaction results in a 15% or more increase in bulk density, or a 50% reduction in water infiltration rates. Soil compaction reduces the supply of air, water, and nutrients to plants. Roads, ground-based yarding, and dozer piling are the major contributors to compaction."

The discussion (p. 13) further continues with:

"[c]ompaction, rutting, displacement, and severe burning can affect the soils physical, chemical, and biological properties, which indirectly can affect the growth and health of trees and other plants. Compaction and rutting reduces soil permeability and infiltration, which can cause soil erosion. Displacement reduces plant growth where topsoil and organic matter are removed. Severely burned soils can become hydrophobic (water repellent) and lead to increased erosion, runoff, and/or reduced productivity.

3-29: Timber yield is not expected to be reduced. On the contrary, the EA states that management of vegetative resources would improve the resilience to disturbances that could otherwise result in substantial risk of stand loss (EA p. 1). The proposed action would meet soil quality standards that were developed to ensure maintenance of soil productivity (EA p. 62; Soils Report p.22-23).

Potential reductions in timber yield due to cumulative impacts of soil damage are exceptionally difficult to determine because of an array of factors that play a role over the lifespan of a tree or stand. These include soil texture, amount of disturbance and depth, competition with undergrowth, insects, disease, climate, species composition, etc. – this is a complex issue that requires a level of research that cannot be undertaken by the IPNF.

The most current and applicable research that addresses this subject is Powers and others (2005), which compiles findings of the first decade of the North American Long Term Soil Productivity Study. It states:

> "Forest productivity response to soil compaction depended both on soil texture and on whether an understory was present. Growth tended to be <u>reduced</u> by compaction on clayey soils and <u>increased</u> on sandy soils [emphasis added]. Effects are attributed to losses of aeration porosity on clays and improvements in available water holding capacity on sands. Trees growing without understory competition generally were unaffected by severe soil compaction through the first 10 years. But 10-year production generally was less on severely compacted plots if an understory was present. Presumably, this reflects differential degrees of root competition for soil resources and access to old root channels. In time, compaction effects should be more evident in stands lacking an understory. Even at 10 years the LTSP study is in its infancy …"

Miller and others (2004) suggested that forecasts of reduced timber yield from degraded soils are uncertain because tree response to soil disturbance is greatly affected by other site-specific, growth-determining factors. Gomez and others (2002) also found that impacts, such as from compaction, depend strongly on soil texture and soil water regime and that soil physical values, per se, are not always reliable criteria for evaluation.

3-30: Design features to protect soil and site productivity would be implemented as part of the action alternatives to ensure that activities are consistent with Forest and Regional standards in terms of soil compaction, displacement, and nutrient retention (Soils Report p. 16). Noxious weeds and their associated treatment are discussed in the cumulative effects section (Soils Report p. 21 and Project File Section B; EA p. 15, 41-43).

Weeds, however, are not only a concern with disturbance from proposed management activities but also in association to fire. Though the main purpose of need for the Fallen Bear project is not fire related to fuels treatment, the desire to reduce the risk of stand loss to insects, disease, and to accelerate and maintain fire-

adapted species is clearly made (EA p. 1-2). The EA and the Soils Report therefore also speaks towards weeds in association to fire disturbance (EA p. 58; Soils Report pp. 9, 15).

The noxious weed report also discusses each action's risk of increasing noxious weeds. For example page 16 states,

> … road construction would disturb established seed beds and soil, thus becoming a high risk area for potential noxious weeds establishment. Direct effects can be mitigated for by employing measures to prevent weed colonization (Design Features A-G). However, even with associated weed control methods, weed species may colonize disturbed areas. The extent of weed expansion may be minimized, but is dependent on so many factors that it is difficult to quantify.

Therefore the implications are that without implementing design features the action, in this case road construction, would allow for colonization. The EA also speaks to the reduction of native vegetation and plant species diversity (see existing and historic conditions on page 5).

3-31: The quote, "[t]here would be no compaction or displacement beyond the currently existing levels" (EA p. 58) is clearly associated with the No-Action Alternative.

The EA did not include information on the current existing levels of disturbance and where they can be found, but this information is included in the Soils Report. Table Soil-3 has therefore be incorporated into the response to comments (see following page) to make it easier for the reader to find the pertinent information.

In the Soils Report, currently existing conditions were evaluated during on-site monitoring (S-1), the results for all units were displayed in Table Soil-3 (Soils Report p. 11), discussed in the "Existing Conditions" section of the Soils Report (pp. 6-10), and also addressed in the environmental consequences section of the Soils Report (pp. 17, 20).

Restoration of management–induced soil damage is considered by decommissioning between 157 to 159 acres (35 – 36 miles) of roads under Alternative B and C, respectively (Soils Report p. 22). Decommissioning of these roads would therefore move over one third of the existing roads in the Fallen Bear project area towards recovery – quite a consideration.

3-32: Table Soil-3 (Soils Report p. 11 and next page) provides an itemized summary of existing conditions as well as all proposed activities in Alternative B Modified and displays what potential disturbance levels would be expected – all units would meet regional and forest plan standards (S-8 and 9). Existing disturbance is very low to begin with (S-1) and, since the majority (~80%) of the harvest will be undertaken with skyline equipment in units that have had very little previous disturbance, impacts will be limited. Old skyline corridors are usually reused though adjustments may be made if layout calls for it - impacts would still remain well below 15%.

3-33: Post-harvest monitoring over the years has continuously shown that overall impacts of harvest activities remain within regional and forest plan standards (Forest Plan Mon 2003, 2004, 2005, 2006, 2007). Results from such monitoring and overall observations weigh in heavily in predicting the outcome of proposed projects. Reference to past monitoring can be found on p. 5 and 12 of the Soils Report. The proposed action includes post-harvest monitoring of some units where ground-based equipment is proposed on all or part of the units. Soils would be monitored after completion of harvest and fuel treatment activities to verify expected results (EA p. 59).

From SSR (p. 11) Table Soil-3. Summary of existing conditions and potential impacts from proposed management activities for Alternatives B and C following R1 Soils Quality Standards.

Unit	Activity Area Acres* (Alt C in parenthesis)	Proposed Treatment	Proposed Logging System	Proposed Fuels Treatment	Existing Detrimental Disturbance %	Potential Disturbance from Proposed Activities#		Potential Disturbance from proposed Activities#	
						Alt B		Alt C	
						Est. Acres	Unit Total %	Est. Acres	Unit Total %
40	40 (0)	CC/RES	S	UB	4	1.6	4	-	-
96A	6 (0)	CC/RES	T	UB	3	0.8	13	-	-
96B	8 (0)	CC/RES	S	UB	3	0.2	3	-	-
97	15 (14)	CC/RES	S	UB	5	0.8	5	0.8	5
103	2 (2)	CT	S	Lop	2	0.03	2	0.03	2
109	19 (19)	CT	S	Lop, YTR	2	0.4	2	0.4	2
127A	10 (10)	SW	T	UB	2	1.3	13	1.3	13
127B	14 (14)	SW	S	UB	2	0.3	2	0.3	2
132	15 (15)	CT	S	None	5	0.8	5	0.8	5
148	19 (0)	CT	S	YTR, LS, UB	0	0.4	2	-	-
150	15 (0)	SW	S	UB	0	0.3	2	-	-
151	13 (0)	SW	S	UB	0	0.3	2	-	-
159	21 (21)	CC/RES	S	UB	0	0.4	2	0.4	2
165A	4 (0)	CT	T	GP	7	0.5	13	-	-
165B	8 (0)	CT	S	Lop	7	0.6	7	-	-
167	9 (9)	CC/RES	S	UB	0	0.2	2	0.2	2
181	11 (11)	ST	S	UB	0	0.2	2	0.2	2
183A	5 (3)	CT	T	GP	0	0.7	13	0.7	13
183B	8 (8)	CT	S	Lop, YTR	0	0.2	2	0.2	2
189	28 (28)	CT	S	Lop	0	0.6	2	0.6	2
198A	6 (6)	SW	T	UB (Lop, GP)	0	0.8	13	0.8	13
198B	14 (14)	SW	S	UB (Lop)	0	0.3	2	0.3	2
199A	21 (18)	CT	T	GP	2	2.7	13	2.7	13
199B	8 (11)	CT	S	Lop, GP	2	0.6	8	0.6	8
206A	2 (0)	CT	T	Lop	3	0.3	13	-	-
206B	20 (0)	CT	S	Lop	3	0.6	3	-	-
211A	9 (0)	CT	T	GP	0	1.2	13	-	-
211B	14 (0)	CT	S	Lop	0	0.3	2	-	-
226(A)	0 (1)	CT	T	Lop, YTR(GP)	0	-	-	0.1	13
226(B)	57 (56)	CT	S	Lop, YTR	0	1.1	2	1.1	2
227A	9 (6)	ST	T	UB	2	1.2	13	0.8	13
227B	4 (7)	ST	S	UB	2	0.08	2	0.1	2
233(A)	0 (1)	CT	T	Lop, YTR(GP)	0	-	-	0.1	13
233(B)	21 (20)	CT	S	Lop, YTR	0	0.4	2	0.4	2
271A	19 (0)	CT	T	GP	2	2.5	13	-	-
271B	9 (0)	CT	S	Lop	2	0.2	2	-	-
Total acres	**483 (293)**					**22.9**		**12.9**	

CT – Commercial Thin
ST – Seed Tree
SW – Shelterwood
CC/RES – Clearcut w. Reserves
T - Tractor
S-Skyline

UB – Underburn
GP – Grapple Pile
Lop – Lop
YTR – Yard Tops within 200 feet of Road

#Results include existing conditions. Refer to Table Soil-4 for coefficients used to predict potential detrimental disturbance for proposed logging and slash treatment scenarios including burning and piling. The level of disturbance increase also depends on the amount or lack of existing skid trails. Activity units that have had little prior disturbance will show a greater incremental increase in potential detrimental disturbance than those units that already contain a network of existing skid trails. Little to no increase in disturbance is expected there because equipment would re-use existing skid trails and move on slash mats whenever possible.
*differences in acres due to rounding

3-34 & 3-35: It is unclear why the commenter "implies that some unspecified loss of potassium would cause long-term impacts on soil productivity" when his previous sentence quotes the Soils Report (p. 17) as, "about ±43 percent of the tree's potassium" would be removed.

The Soils Report goes into great detail addressing soil productivity, especially in regards to potassium and other nutrients – refer to section 5.2 titled "Low Potassium Sites - Sites Containing Geologic Formations that are Naturally Deficient in Potassium Bearing Minerals" (p. 5-6). Potassium is further discussed in the Soils Report on p. 13, 17-19 (also EA p. 60-61). Foliar analysis conducted on various geologies on the St. Joe Ranger District to determine nutrient levels in stands was also included in the analysis (Soils Report p. 6; S-15).

Potential reductions in long-term soil productivity and timber yield due to removal of nutrients from past management activities are exceptionally difficult to determine because of an array of factors that play a role over the lifespan of a tree or forested stand. These include and are not limited to inherent geologic characteristics, amount, maturity, and species of trees removed, competition with undergrowth, climate, weathering, etc. – hence separating this complexity is not to just to simply express or calculate a number, it requires a level of research that cannot be undertaken by the IPNF.

Based on current knowledge, recommendations from the Intermountain Forest Tree Nutrition Co-Op (Garrison and Moore 1998), and scientific evidence (Baker and others 1989; Barber and Van Lear 1984; Edmonds 1987; Garrison-Johnston 2003; Garrison-Johnston and others 2007, 2004, 2003; Moore and others 2004a and b, 1994; Palvianen and others 2004; and Stark 1979), design features are incorporated to ensure conservation of nutrients (EA p. 17; Soils Report p. 31). This is achieved by allowing slash to remain for one wet season before treatment of excessive activity fuels takes place, which allows potassium to leach out of these materials and recycle back into the soils.

3-36: Spreadsheet calculations for new and existing system roads for both alternatives are available in S-9 and are delineated in feet, miles, and acres itemized for each proposed harvest unit to which they pertain. These references are cited in the Soils Report on p. 21 and 22. In conjunction with Maps 2, 3, 5, and 6, all road related questions by the reader can therefore be addressed. The calculations were utilized during the analysis of Forest Plan standards (S-8). All log landings would be located on already existing system roads (EA p. 59; Soils Report p. 16; project file document S-20).

3-37: Detailed information regarding MIS and TES species is located in the Fisheries Report pages 6-7. Populations and distributions of wildlife species are discussed throughout the Wildlife Report (pp. 5-14, 22, 29-31, 33, 35-36, 41, 45, and 47); however, the Fallen Bear wildlife analysis uses amount of suitable habitat as the basis for determining whether the proposed activities would affect species based on the quantity and quality of habitat necessary (EA pp. 4, 5, 27, 65, 68, 69, 70, 71, 72, 73, 74, 75, 76, and the associated pages in the Wildlife Report referenced in the EA).

3-38: Field reviews confirmed wildlife habitat conditions on the ground (Wildlife Report pp. 3, 10, 11, 12, 13, 30, 32, 35, 43, 47, 53, and project file WL-2, Wl-3, WL-4, Wl-7, WL-10, WL-22, WL-23, WL-25, WL-32). The analysis covers amount and distribution of mature and old growth forest (EA pp. 5, 25, 49, 55, 56, 64, 65, 67, 76; Forest Vegetation Report 7-8; Old Growth Report p. 5; Wildlife Report p. 5-6, 34-35, 52-53,), amount and distribution of snags (EA pp. 12, 14, 19-23, 51, 52, 74-76; Wildlife Report pp. 14-15), old growth patches and interior habitat (EA pp. 4, 55-56; Old Growth Report pp. 4, 6-7), and amounts and distribution of coarse woody debris (EA pp. 17, 19, 21, 26, 47, 51, 52, 59, 60, 62; Soils Report pp. 4, 6, 9, 10, 13-18, 20, 22, and 23).

3-39: The Fallen Bear EA provides a summary of the environmental consequences and cumulative effects (EA pp. 28, 31, 32, 34, 37, 39, 42, 43, 44, 45, 46-47, 49, 53, 55, 57, 61, 65, 66, 67, 68, 69, 70, 71, 73, 74, 76, 77), and additional details about effects are found in the reports for each resource. The cumulative effects analysis for each resource includes effects from past, present, and reasonably foreseeable future activities that are pertinent for each resource. Past actions considered in cumulative effects analysis include those that contributed to the baseline conditions of the project area today (EA p. 28). This area never included and currently does not include a grazing allotment. It is highly unlikely that even incidental grazing ever occurred because of the project area's location and topography, so effects of grazing are not included in the cumulative effects analysis.

3-40: The existing conditions for wildlife reflect results of previous management activities and natural conditions (Wildlife Report p. 3-6). Projects may have impacted habitat in the past, but that does not necessarily mean those acres became unsuitable for wildlife habitat. The most meaningful way to consider past projects is to look at the resulting conditions existing today, and the Fallen Bear wildlife analysis does that. The analysis compares remaining habitat conditions with habitat requirements (Wildlife Report pp. 3, 8-62).

3-41: The Fallen Bear EA summarizes the foreseeable environmental effects of the Fallen Bear proposal for determining whether or not to prepare an environmental impact statement (EA p. 1), and the Fallen Bear Project Wildlife Report gives the details of the wildlife analysis. It describes the quantity and quality of habitat necessary for each species (Wildlife Report pp. 8-15, 22-24, 29-30, 32-34, 38-41, 43, 45-46, 51-52, 57-58), discusses the methodology used for measuring the habitat (pp. 2-8, 16-62), and explains the conclusions drawn with reasons for considering the underlying evidence reliable (pp. 8-62). The best currently available science was used in these determinations (Wildlife Report pp. 62-66), and field reviews confirmed habitat conditions on the ground (Wildlife Report pp. 3, 10, 11, 12, 13, 30, 32, 35, 43, 47, 53, and project file WL-2, WI-3, WL-4, WI-7, WL-10, WL-22, WL-23, WL-25, WL-32)

3-42: The cited language from the Forest Plan is not a standard. It is an objective (Forest Plan P. II-5). The standards for old growth on the IPNF are found at page II-29 of the Forest Plan and say nothing about maintaining 40 percent of the maximum potential for old growth. An objective is not a standard, but it is a target or goal to work toward.

The "40% maximum potential" was taken from Thomas' (editor) *Wildlife Habitats in Managed Forests* (1979), but applies to snag habitat (not just old growth). The Fallen Bear wildlife analysis used more refined models applied at a Regional as well as Forest scale to determine effects to species and populations of flammulated owl, northern goshawk, black-backed woodpecker, fisher/marten and pileated woodpecker, and other species that use snags (wildlife report pp. 3, 9-10, 14-15, 32-33, 37-38, 40, 45-46, and 50-52).

3-43: The assumption that 40 percent population potential equates to 40 percent of maximum old growth is incorrect. Most species, including species associated with old growth, utilize a variety of habitats although they may be dependent upon a particular habitat component. For example, goshawk, an old growth associated species, and the management indicator species of old growth haibtat, utilizes other habitats as well. Indeed, Reynolds (1992) recommends maintaining post fledging family areas in 10% grass/shrub, 10% seedling/sapling, 20% in pole size or young forests, and 60% in mid-aged to old forests across each post fledging family area. The Forest Plan objective to maintain 40 percent population potential does not equate to maintaining 40 percent of the maximum old growth, which is one component of the species habitat. The forest vegetation report used for the Fallen Bear EA shows historic distribution of mature/large/old growth for the St. Joe Basin (Forest Vegetation Report p. 8). The wildlife report states the amount of late successional habitat is above historic average levels for the project area and the St. Joe River Drainage (Wildlife Report p. 5). Alternative B Modified will result in 46 to 48 percent of the Fallen Bear Project Area in mature/large structural stages or allocated old growth (Forest Vegetation Report p. 16). Compliance, documentation and disclosure of Forest Plan Old Growth Standards are found in the Old Growth Report on page 5-7.

3-44: Evaluation of science referred to in comments by the public was reviewed by agency specialists. Project file document PI-6 shows how scientific references provided during scoping were used or considered. Project file document PI-27 shows how references provided during the 30-day comment period were used or considered. Each resource report lists references for scientific literature used for analysis. See response to comment #3-93.

3-45: 36 CFR 219 no longer includes the requirements for a minimum number of reproductive individuals, however, NFMA requires forest plans to achieve goals which "… provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives …". The Fallen Bear alternatives would maintain viability of management indicator species as required by the IPNF Forest Plan (EA pp. 16, 40, 69, 70, 71, and 72). As discussed above in the response to Comment 3-41, the Fallen Bear wildlife analysis uses amount of suitable habitat as the basis for determining whether the proposed activities would affect species' viability.

3-46: As discussed in that *Old-Growth Forest Types of the Northern Region* (Green and others 2005), there are three minimum criteria applied to standards for determining their old growth status based on habitat type group and forest cover type:

1. minimum age of trees
2. number of TPA/DBH with a minimum age
3. minimum basal area for trees ≥5" dbh

The associated characteristics are relatively broad ranges of other stand characteristics such as canopy layers, snags and down wood but are not included as minimum criteria. These characteristics can be expected to be present, or develop, to some extent in stands meeting the minimum criteria for old growth.

3-47: The Fallen Bear project was developed to improve resilience to disturbances such as insects, disease, and fire, not eliminate them (EA pp. 1-2). The Fallen Bear Project Area has not had any large fires in the past six years or any recent extensive insect outbreaks, so the project would have little to no effect on black-backed woodpeckers because post-fire areas or areas with extensive bark beetle outbreaks would not be treated (Wildlife Report p. 10).

3-48: The Fallen Bear Project would not eradicate habitat for black-backed woodpeckers. The Fallen Bear Project Area has not had any large fires in the past six years or any recent extensive insect outbreaks, so the project would have little to no effect on black-backed woodpeckers because post-fire areas or areas with extensive bark beetle outbreaks would not be treated (Wildlife Report p. 10).

3-49: At the Regional level, Samson (2006) provides a broad level analysis designed to aid in placing a species in context at the larger population level and addressing NFMA requirements, and is based on numerous peer-reviewed studies. This broad scale analysis concluded that short-term viability of the black-backed is not an issue in the Northern Region.

3-50: Effects of fire suppression on black-backed woodpeckers are disclosed in the Wildlife Report on pages 4 and 9. As discussed above, Samson concluded that short-term viability of the black-backed is not an issue in the Northern Region.

3-51: See discussion in the Wildlife Report on page 14. It states that providing numbers of snags that have been shown to support viable populations is a prudent approach to managing for viable/sustainable populations of woodpeckers and other species that use snags. Recent studies indicate that viable woodpecker populations occurred in areas with about four snags per acre (Bull and others 1997 pp. 28, 31). Bull and others (1997 p. 31) recommends providing snags in every 5- to 25-acre stand to satisfy distribution needs. Snags and defective and/or diseased trees are most abundant in mature timbered stands. Sixty-six percent of the Fallen Bear project area is in a mature timber size class, indicating that adequate snag levels exist (wildlife report p. 14).

3-52: Habitat needs of pileated woodpeckers are discussed in detail in the Wildlife Report (pp. 51-52). Old growth block sizes are covered in the discussion of Forest Plan Old Growth Standard 10(F) (Old Growth Report p. 6).

3-53: The felling of snags during the log harvesting operation is done in accordance with OSHA guidelines that incorporate Forest Service snag mgt guidelines. Safety is the responsibility of the contractor. Not all snags are felled; snags that do not pose a safety hazard are not felled. Temporary roads are not routine procedure in a timber sale. If the temporary road is not identified in the planning and preparation process the sale administrator, in conjunction with the appropriate specialists, look at location and need.

3-54: Upland habitat for boreal or western toads is discussed in terms of mesic timbered habitat (EA p. 72). Cumulative effects on timbered habitat are discussed in the EA on page 72 and in the Wildlife Report on pages 44-45.

3-55: This project complies with the current regulatory direction for management of old growth under the Forest Plan for the Idaho Panhandle National Forest (USDA Forest Service 1987) (Old Growth Report pp. 5-

7). Additional information on the statistical accuracy of the Forest Service Old Growth inventories for the IPNF can be found in "Review of Old Growth Assessment for The Idaho Panhandle National Forests" by Zack (2006) in the project file (OG-21).

3-56: As discussed on page 5 of the Fallen Bear Old Growth Report, the IPNF Forest Plan Old Growth Standard 10a directed that the definition of old growth developed by the Regional Old Growth Task Force be applied for all projects developed subsequent to the development of those definitions. The analysis is in compliance with that direction through utilization of the *Old-Growth Forest Types of the Northern Region* (Green and others 2005) in determining whether stands meet minimum criteria for old growth.

As discussed in that document, there are three minimum criteria applied to standards for determining their old growth status based on habitat type group and forest cover type:

1. minimum age of trees
2. number of TPA/DBH with a minimum age
3. minimum basal area for trees ≥5" dbh

The associated characteristics are relatively broad ranges of other stand characteristics such as canopy layers, snags and down wood but are not included as minimum criteria. These characteristics can be expected to be present, or develop, to some extent in stands meeting the minimum criteria for old growth.

3-57: The "adequacy of the 10% old-growth standard" is not analyzed for this project. The project is in compliance with the current regulatory direction for management of old growth under the Forest Plan for the Idaho Panhandle National Forest (USDA Forest Service 1987) (Old Report page 5-7).

3-58: Potential effects for firewood cutting are considered for snag numbers and availability (Wildlife Report page 4). Two maps depicting open roads through or adjacent to old growth were added to the project file to address this comment (OG-27, OG-28). OG-27 shows 3.1 miles of existing roads through or adjacent to old growth, and OG-28 shows 0.63 miles of open roads through or adjacent to old growth after implementation of Alternative B Modified. This demonstrates that unrestricted access would be reduced from the existing condition and potential effects to snag habitat and recruitment of down woody debris in old growth would also be reduced. Forest Highway 50 which in the St. Joe Wild and Scenic River Corridor is not included in these numbers because firewood cutting is not permitted in wild and scenic river corridors.

3-59: The Fallen Bear Old Growth Report demonstrates compliance with Forest Plan Old Growth Standard 10(f) which describes desirable patch sizes (p. 6). Old Growth Standard 10(f) states, "One or more old-growth stand per old-growth unit should be 300 acres or larger ... The remaining old-growth management stands should be at least 25 acres in size. Preferred size is 80 plus acres". Alternative B Modified will result in the same old growth patches as Alternative C. The Fallen Bear Old Growth Report states,

> In Alternative C, OGMU 27 (Avery, 02), the allocated old growth would occur in ten patches (project file OG-16). These patches range in size from 12 to 1,280 acres, and average approximately 291 acres. Nine of the ten patches are greater than 25 acres. All nine of those patches are greater than 80 acres. Of the patches greater than 80 acres, seven are greater than 100 acres. Of those seven patches greater than 100 acres, two are greater than 300 acres. The largest patch in this OGMU is 1,280 acres. All these patches are comprised of multiple stands (project file OG-17).

3-60: Townsend's big-earred bats are only known to occur on the Kaniksu (northern) portion of the IPNF. The species is not known or suspected in the project area (Wildlife Report p. 13).

3-61: The MIS and sensitive species associated with old growth habitat (pileated woodpecker, goshawk, marten/fisher, black-backed woodpecker, and flammulated owl) use mature and other forest habitats in addition to old growth. Black-backed woodpeckers prefer mature and old growth forests and fire or insect damaged stands (Wildlife Report p. 9). Fisher prefer late seral stage coniferous and mixed forest habitat, and marten associate closely with late-successional stands of mesic conifers (Wildlife Report p. 33). Flammulated owls are associated with relatively open, older forests featuring ponderosa pine and Douglas-fir that are correlated with drier habitats (Wildlife Report p. 40). Goshawks have a wide distribution in the Northern

Region and use a variety of forest types, structures, and successional stages; but they are primarily associated with late successional habitat. For nesting they utilize mature to old stands on gentle to moderately steep slopes. Forest habitat, pole stage or larger, which is open enough to allow unimpeded flight through the understory is considered suitable for foraging (Wildlife Report p. 45).

The Fallen Bear old growth project file document OG-10 discloses that the old growth identified by FIA inventory is consistent with *Old-Growth Forest Types of the Northern Region* (Green and others 2005). Forest Plan standards for old growth are met will all alternatives (Old Growth Report pp. 5-7).

3-62: The contribution of fire suppression to changes in stand composition and density in Interior-West ecosystems is well documented (Quigley & Arbelbide 1997; Brown 2000; Graham and others 2004; Keane and others 2002). Field reviews and analysis of stand exam data of the project area indicate that much of the project area contains stand structure and composition expected of locations from which fire has been excluded for nearly a century. A site-specific analysis of stand data to draw a direct link between historical fire suppression and tree density, independent of the numerous other factors involved, was not carried out. Forest composition and tree densities are discussed in the Fallen Bear Forest Vegetation Report (pp. 4-8).

3-63: Fragmentation, connectivity and spatial distribution of and effects on patches is discussed in the Fallen Bear EA on pages 4, 19, 20, 26, 41, 44, 47, 56, 63, 64-65 and in the referenced resource reports. The quality of timbered connections and blocks of habitat for wildlife is discussed in the Wildlife Report on pages 20-21 and 60-61.

3-64: Project file document WL-9 is a map of wildlife travel corridors used for the wildlife analysis.

3-65: Unit layout and marking will be done in accordance with the silvicultural prescriptions and any design features set forth with the NEPA documentation. In cases where travel corridors identified within the NEPA analysis intersect harvest units, adequate timber will be retained through leave trees retention or unit boundary adjustments. Project file document WL-40 gives details for canopy cover retention levels by unit, and WL-42 discusses basal area retention changes for units within travel corridors.

3-66: All lands within the cumulative effects areas are National Forest System lands. The activities are listed to show what was considered in the analysis. Activities that are pertinent for each resource were considered. The EA (pp. 28-32, 34, 36-39, 41-47, 49-51, 53, 55-57, 61-63, 65-77) and resource reports give information about the existing conditions that are the basis for the cumulative effects analysis. Past actions considered in cumulative effects analysis include those that contributed to establishing the baseline conditions of the project area today (EA p. 28). The Fallen Bear EA provides a summary of the environmental consequences. Further details about cumulative effects are found in the reports for each resource.

3-67: The most meaningful way to consider past projects is to look at the resulting conditions existing today, and the Fallen Bear analysis did that (see response to Comment 3-1 above); however, environmental documents for previous projects were reviewed (ACT-11). The most recent document was The Bruin Beetle Salvage Timber Sale Decision Notice signed in 1990. It was the only previous analysis done under the current forest plan. The other documents were completed in 1982 or before prior to the IPNF Forest Plan with primary goals being timber salvage or timber production.

Descriptions of past projects within the project area and their effects on the various resources are discussed in the EA (pp. 28-32, 34, 36-39, 41-47, 49-51, 53, 55-57, 61-63, 65-77) and in the Air Quality Report (p. 7), Cultural Resources Report (p. 3), Fire and Fuels Report (pp. 15-16), Fisheries Report (pp. 17-18), Forest Vegetation (pp. 5-9), Noxious Weeds Report (pp. 4-6), Soils Report (pp. 4, 10-11, 20), Botanical Biological Assessment and Evaluation ([TES Report] pp. 6-8, 13, 18), Visual Quality Report (p. 3), Water Resources Report (pp. 11-12, 18, 20-22, 29-31), and Wildlife Report (pp. 3-5).

3-68: Part of the purpose of the project is to reduce management-related sedimentation to benefit aquatic resources (EA p. 2). The long-term reduction in sediment would improve water quality and beneficial use support (EA p. 35). Design features which work towards achieving beneficial uses are presented on pages 15, 16, 21, and 22 of the EA. Conditions for fisheries would be maintained or improved (EA pp. 37-40). The RAPS, project file document PD-2, identifies the risks to the aquatic resources from each of the roads in the project area and was used to develop the proposed actions for roads in the project area.

3-69: The EA describes effects to stream temperature on pages 31-35, in the Water Report (pp. 23, 26, 32, 36, and 37), and in the Fisheries Report (pp. 4, 8-14, 17, 19).

3-70: The Water Report discusses water yield and peak flows on pages 9 and 11. Data specific to peak flow for the St. Joe and the project area are in project file document W-5.

3-71: Existing conditions for the project area is described in the Water Report on pages 10-20. Information specific to stream channel conditions are discussed in the Water Report on page 17.

3-72: Part of the purpose for this project is to reduce management-related erosion and sedimentation, and we recognize the risk of mass failure increases where stream-crossing culverts do not comply with the IPNF Forest Plan standard of accommodating a 100-year flood flow (EA p. 2; PD-2 RAPS p. 1). The action alternatives would proactively deal with erosion sources by decommissioning approximately 32 miles of roads and storing an additional 30 miles of road (over one half of the existing roads in the Fallen Bear Project Area). Sediment would decrease once all activities are completed (EA p. 31). With Alternative C (and Alternative B Modified) 115 of the 168 existing culverts at stream crossings would be removed when roads are stored or decommissioned (EA p. 33). This equates to removing 68% of the stream crossings in the project area.

3-73: The Quartz Gold Roads Analysis Process considered miles of road on landtypes with high sensitivities and high mass failure potential (PD-2 RAPS p. 1). This information was used to identify roads to be stored or decommissioned as part of the Fallen Bear Proposed Action.

For soils the analysis area is the proposed harvest unit. For this reason, existing roads elsewhere in the project area are not reviewed for soils (Soils Report p. 3). However, proposed new system roads were analyzed in regards to landtypes and mass failure potential and no concerns were found (EA p. 61; S-18; Soils Report p. 20, 21). The water resource report discusses mass failures with respect to roads as well (EA p. 32, 34; Water Report pp. 11, 12, 17, 20, 21, 25, 29, 32, and 37).

One purpose of the project is to reduce management-related erosion and sediment (EA p. 2). After the Fallen Bear Project is implemented, roads would be left in conditions to reduce sediment. Of the 95.4 miles of existing roads (not including FH 50), 34.3 miles would be reconstructed or reconditioned (Transportation Report pp. 7-9). Of the roads not proposed for reconstruction or reconditioning, 52.3 would be stored or decommissioned (T-5). This project would decommission approximately 32 miles of road, which would move over half of the existing road miles towards a recovering trend (Soils Report p. 17, 22). The roads identified for decommissioning are usually those that are not needed anymore or where removal of failing pipes is beneficial. Also see reply to comment 3-74.

3-74: There are no high mass failure potential landtypes present in any of the proposed activity areas (Soils Report pp. 8, 19, 20; S-4 and 5). The analysis area for direct, indirect, and cumulative effects on soil resources encompasses all land <u>within</u> individual treatment units and landings (Soils Report p. 3; USDA FS 1999c) and does not require that the whole project area be field verified.

However, the cumulative effects analysis did include a closer look at slope stability and found that:

> "[n]one of the harvest units in the proposed project area are spatially associated with any past harvest activities (i.e. downslope or upslope) adjacent to potentially unstable slopes. All proposed activity units were identified as presently stable or not relevant to having a cumulative effect" (Soils Report p. 20).

For the Fallen Bear Project,

> "[n]o active slides or slumps were found during the field assessment with the exception of an unstable fill slope on Road 3310UA above Haggerty Creek between Units 97 and 96B (W-8, W-9). Two small shoots containing signs of movement and erosion have developed in association with a failing fill slope and the slope below it. The road is proposed to be decommissioned" (Soils Report p. 8).

The EA (p. 32, 34) and the Water Resource Report also discuss mass failures with respect to these roads (pp. 11, 12, 17, 20, 21, 25, 29, 32, and 37).

Field verification and observations regarding mass failure potentials, other stability, or erosion concerns are made and recorded during on-site field monitoring - no concerns were found (S-1) beyond those identified above. Additional input from other individuals who are knowledgeable about the area and site conditions may also be incorporated and followed up on – once again, no concerns were found.

3-75: The Water Report discloses existing conditions for the streams of the project area (pp. 10-20).

3-76: The Water Report discusses Range of Natural Variability (pp. 19-20).

3-77: The Water Report utilizes the WATSED model to develop comparative values, not absolute values for sediment increase (p. 5) and quantifies comparative sediment increases (pp. 25, 26, 34, and 35).

3-78: The Fallen Bear Fisheries Report discusses the culvert barrier under Highway 50 (pp. 10 and 13).

3-79: The purpose and need for the Fallen Bear project is described on page 1 and 2. This includes the need to "Reduce management related erosion and sedimentation." This would trend the project area towards meeting RMOs. The use of design features described on pages 15, 16, 21, and 22 also assist with the trending towards meeting RMOs.

3-80: Alternative B Modified proactively deals with erosion sources by decommissioning approximately 32 miles of roads and storing an additional 30 miles of road (over one half of the existing roads in the Fallen Bear Project Area).

The project proposes to commercially thin 250 acres and precommercially thin 775 acres where stocking levels are potentially limiting tree growth, health, and vigor. Whether or not this is considered large-scale thinning may be debatable, but the analysis indicates no significant effects will result from the proposed thinning activities. The project does not include large fuel breaks or salvage logging to reduce fuel loading. Reduction of fuel loadings is not a stated objective in the purpose and need for the project. Measures to reduce fuels created by activities proposed in the project are ancillary to those project activities that are scheduled to be accomplished in direct support of purpose and need objectives, and are not a primary feature of the project.

3-81: On June 2, 2005, Forest Supervisor for the Idaho Panhandle National Forests signed a Decision Notice and Finding of No Significant Impact that amended the Forest Plan to modify or remove objectives, standards, and monitoring requirements pertaining to fry emergence success (IPNF 2005). There are no longer any fry emergence standards and therefore they will not be addressed further.

3-82: See 3-81 for response to "fry emergence". The Water Resources report (p. 9) discusses the impact of harvested lands to peak flows caused by rain-on-snow events. Regulatory consistency with the Forest Plan is located in the Fallen Bear EA on pages 30, 31, 35, 40, 45, 49, 54, 57, 62, and Wildlife Specialist Report page 62. Cumulative effects analysis is discussed in the Fallen Bear EA on pages 28, 29-31, 32, 34, 35, 37-38, 39-40, 41-43, 43-44, 45, 46-47, 49, 51, 53, 54, 55-56, 57, 58, 61, 63, 64-77.

3-83: The original Fallen Bear Water Resources Report discussed effectiveness of design features and best management practices on page 3, and referenced the project file document W-21 "IPNF Best Management Practices Monitoring" and project file document W-20 "Best Management Practices Effectiveness Monitoring Report (Lolo NF)". As you noted, information concerning the scientific literature on BMP effectiveness was inadvertently left out of the original report. Although the Responsible Official, Forest Supervisor Ranotta McNair, is aware of the scientific literature concerning BMP effectiveness and has considered it in previous decisions on the St. Joe Ranger District (Bussel 484 FEIS p. 231; Hidden Cedar FSEIS p. 282), it was added to the revised Fallen Bear Water Resources Report (2/20/2009).

3-84: The Fallen Bear Water Resources report discusses the assumptions and limitation of the analysis models used for this project (pp. 4-6) and scientific uncertainty and controversy (pp. 6-10).

3-85: Population and distribution information is presented in the Fisheries Report (pp. 6 and 7). Project file document F-1 covers fish density. Stream reviews qualitatively report fish observations (project file documents F-4 through F-10, F-12, F-14, F-18 and F-19).

3-86: Forest Plan riparian management objectives are referenced through the use of INFS in the EA (pp. 15 and 16) and in the Fisheries Report (pp. 1, 5, 9, and 11).

3-87: The Water Resources Report describes the "natural peak" for water yield (p. 10) and the estimated "natural sediment" for sediment levels (p. 11).

3-88: The cumulative effects of fire suppression were considered for air quality, fire and fuels, fisheries, forest vegetation, noxious weeds, old growth, soils, TES plants, water, and wildlife (EA pp. 29, 31, 41, 43, 44, 46, 51, 55, 56, and 58; Management Activity Report p. 10; Air Quality Report pp. 4 and 7; Fire and Fuels Report pp. 4, 11, 14, and 15; Fisheries Report pp.17, 20, 22, 24, and 25; Forest Vegetation Report pp. 6, 7, 9, 10, and 12; Noxious Weeds Report pp. 5, 8, 12, and 16; Old Growth Report pp. 3, 4, and 5; Soils Report pp. 9, 14, 15, 20, and 21; Botany Report pp. 7, 8, 14, and 18; Water Resources Report pp. 21and 30; and Wildlife pp. 4 and 9). It would be speculative to predict the costs of suppressing a potential wildfire that may occur in the project area.

3-89: Page 3 of the Fallen Bear Economic Report states, "The financial efficiency analysis is specific to the timber harvest and ecosystem management activities associated with the alternatives (as directed in Forest Service Manual 2400-timber management and guidance found in the Forest Service Handbook 2409.18). This analysis is not intended to be a comprehensive benefit-cost or present net value (PNV) analysis. For more detailed information on the itemized cost and benefits see the project file (E-2, 3)."

3-90: A true "no-action" fire suppression alternative for the project area is not supported by the current IPNF Forest Plan, therefore analysis of such is outside the scope of the project-level EA. Reasons to continue fire suppression in the Fallen Bear Project Area include protecting old growth stands, protecting the investment in actively managed stands, and reducing potential risk to other resources in the event of a wildfire. The St. Joe Ranger District is implementing "no-action alternatives" as you describe in other areas of the district that are more remote and don't have the investments in regeneration that we have in the Fallen Bear Area.

3-91: The Fuels Report includes graphs displaying modeled results of proposed activities through the year 2060 (pp. 6-10). The varied assumptions applied to modeling fire behavior characteristics are dynamic enough that longer projections can be less meaningful. In all cases, those stands modeled display beneficial changes in fire behavior characteristics through the next 50 years.

3-92: The purpose and need of this project is to improve resilience to disturbances, such as insects, disease, and fire. As stated in the Soils Report p. 14, "[t]he proposed vegetation treatment in the project area would not necessarily prevent wildfires from occurring, but would increase the ability to suppress such a fire should ignition occur in treated areas."

Of course there is a risk in untreated areas; however, increased benefits to fire suppression and reduced fire effects from successfully completed harvest activities on treated and surrounding untreated forested land have been demonstrated in many recent scientific research papers (Certini 2005; Cram and others 2006; Graham and others 2004; Gorman 2003; Keane and others 2002) and did not require harvesting an entire watersheds to see a benefit.

3-93: Project file document PI-27 shows how references provided during the 30-day comment period were used or considered. Each resource report lists references for scientific literature used for analysis. See response to comment #3-44.

Letter #4 – J. Oppenheimer; Idaho Conservation League; 12/31/08 (after 30-day comment period)

4-1: Three things can be done to reduce open road density on managed landscapes. First, the transportation plan can stress minimization of road density and can limit new road construction to those roads absolutely necessary to meet silvicultural objectives. Second, existing roads no long necessary for the long-term management of the area can be obliterated. Third, access management restrictions can be put into place that help to mitigate and reduce the impacts of open roads.
The action alternatives would provide access for initiating treatments in priority timber stands for their long-term management. The system roads identified for construction are needed for access now and in the future (Transportation Report p. 3).

The existing transportation system was reviewed to determine if there are any unnecessary roads or roads that are causing unacceptable resource damage. Consequently, the action alternatives would decommission between 35 and 36 miles of unneeded road (EA p. 7-9, 10-12, 15). The restorative treatments (Road Prescription D) associated with the decommissioning would result in an overall reduction in road densities within the project area and contribute both to a reduction in road maintenance costs and over the longer-term provide for improvements in water quality and fish populations within the project area (EA 26, 31, 33-39).

The proposed road storage activities (Road Prescription C) would reduce the amount of road maintenance required within the project area. Approximately 23 miles of existing road and all new system road would be put into the long-term storage prescription (Road Prescription C), the intent of which is to "put the road to bed" in such a condition that it will not require any maintenance until it is needed again (EA p. 14). These treatments will reduce open road density within the project area.

4-2: Alternative B Modified will reduce the amount of road maintenance required by decommissioning approximately 32 miles of roads and storing an additional 30 miles of road. This is over half of the existing roads in the Fallen Bear Project Area. Even though Alternative B Modified includes construction of 2.14 miles of new road, it will result in a net reduction of roads in the road network.

4-3: The suggested silvicultural prescriptions are covered under the description of the commercial thin (CT) including free selection and thinning from below (EA p. 12), and pruning is part of the action alternatives (EA p. 6, 10, 13). The Vegetation Project File document VF-5 (Fallen Bear Diagnosis Matrix for the Proposed Action) shows how other silvicultural prescriptions were considered.

4-4: Size class restrictions are dependent on the silvicultural treatments proposed for each stand. As described on page 12 of the Fallen Bear EA, different silvicultural treatments would propose leaving individual or groups of trees, as they would meet resource objectives. The purpose and need of this project (EA pp. 1 – 2) identifies the need to retain fire-resistant trees, such as western larch, ponderosa pine, and white pine.

4-5 & 4-6: Small-diameter fuels produced through this project would be available for a "fuels for schools" facility and other facilities using the materials. Economic and logistic limitations on facilities that use these types of materials make it difficult to require it to be removed. One limitation to stacking non-commercial material is that, in most cases, the majority of this material is left in the woods for coarse woody debris. Design features for commercial timber harvest (EA pp. 16-17) require some small-diameter materials to be left within harvest areas for a period of time. Of the material that is brought to the landing, the purchaser will usually take everything down to a 4" top and sometimes smaller depending on the market. In most cases there is a lack of space to separate material from sawlogs and slash. Material left at the landing would be piled for burning, if it is not taken for biomass or another market-driven situation. In some cases, depending on road conditions and seasonal restrictions for wildlife security, landing slash piles are made available for firewood cutting.

Incursions on decommissioned roads for firewood gathering has not been an issue on the St. Joe Ranger District, and it wouldn't be in Fallen Bear because of the topography, recontouring of at least the beginning of decommissioned roads, and availability of firewood elsewhere.

4-7: Leave trees would be selected base on the purpose and need (EA pp. 1-3) and site-specific conditions.

4-8: Generally, the Forest Service timber sale contract does not specify a specific type of ground-based equipment unless the environmental analysis shows the need for site-specific mitigation requiring unique equipment. Therefore, it is the decision of the sale purchaser as to which type of ground base equipment shall be use within the constraints of the timber sale contract. Normally, the timber sale purchaser will use the equipment available to them during the time of purchaser operations. This can include tracked or rubber tired skidders or log forwarders.

Tracked vehicles do at times appear to create more surface soil disturbance then wheeled vehicles, especially when turning. However, in many cases wheeled vehicles create higher ground pressure and potentially deeper soil compaction than many tracked machine (Forest Engineering Research Institute of Canada 1999). In addition, a wheeled vehicle used under less than ideal circumstance can break through the slash mat and create deeper impressions, which can increase water channeling and soil erosion (Forest Engineering Research Institute of Canada 1999). This can also occur with tracked vehicle. Both systems can create adverse soil impacts if improperly operated. Both systems can compact the soil do a similar degree (Sheridan 2003). However, soil compaction is more strongly related to the number of passes over the ground rather than the type of equipment, although the type of equipment can be a factor (Sheridan 2003).

Regardless of the type of equipment used, all log skidding equipment, both wheeled and tracked, will be required to suspend the lead end of the log to reduce soil disturbance as directed within the timber sale contract.

In cases where log forwarding is used, the entire log will be suspended in bunks and not dragged on the ground. This can be a viable option in many situations. However, when compared to tracked machines, rubber-tired log forwarders may cause an increase in ground disturbance due to higher ground pressures at the tire-ground contact which may cause slash mat breakthrough. These issues can be mitigated to some degree by skidding over a thick slash mat, limiting turns (passes), adding tracks and reducing skidding distances (Forest Engineering Research Institute of Canada 1999). However; the protection of a slash mat can be limited by a high number of passes which may cause the slash mat to deteriorate, thereby exposing the duff layer and mineral soil below.

Generally, the log forwarding harvest system is used in areas with gentle slopes due to equipment limitations (side slope instability) (Forest Engineering Research Institute of Canada 1999). This limits the areas within the Fallen Bear Project Area for which forwarding can be used.

Regardless of the ground-based system utilized, mitigation measures pertaining to soil erosion are set forth within the B and C provisions of the timber sale contract. These mitigations can include limitations on skid trails, surface runoff deflection (cross ditching), erosion control seeding and the scattering of woody debris in areas of exposed mineral soil.

4-9: Logging over snow can be an excellent alternative in areas where soils are easily compacted, disturbed and eroded. This has been done in the past on the St. Joe District in areas where erosive soils of a granitic or schistose composition are present and the terrain is conducive to winter logging. The Fallen Bear project area's soils are normally not as susceptible to soil disturbance and compaction, and the analysis did not indicate a need for winter logging to protect soils.

The Fallen Bear area generally receives a lot of winter snow. This combined with many steep, out sloped and dangerous roads makes winter logging and log hauling dangerous. In addition, snowplowing increase haul costs. The combination of current lumber prices and high fuel costs limit the economic viability for winter logging within the project area. Winter logging and hauling is best accomplished in areas with more gentle ground and shorter haul distances.

4-10: Trees identified for removal would be identified to meet the purpose and need of the project (EA pp. 1-3).

4-11: Implementation of the treatment of western larch infected with dwarf mistletoe is proposed to reduce the spread of mistletoe from the existing overstory seed trees to the understory, as discussed in the Vegetation Report (pp. 6, 10, 14). Treatment on the 161 acres of previously harvested stands would be done to reduce the impacts of dwarf mistletoe as discussed in the *Forest Insect and Disease Leaflet 169, 1997, Larch Dwarf Mistletoe* (Beatty and others 1997) on the upcoming stand.

4-12: The number of snags and live replacement trees to be left is specified on pages 19 and 20 of the EA. The numbers of snags are based on forest types (EA p. 20 Table 13), and live trees would be retained at five times the number of snags (EA p. 20). Some flexibility is incorporated in the numbers to adjust for site-specific conditions.

4-13: With the selected alternative, Alternative B Modified, those stands will be allocated for old growth. Alternative B Modified will meet Forest Plan Old Growth Standards and does not include timber harvest in stands meeting minimum criteria for old growth; however, like in Alternative C, approximately 169 feet or 0.03 of a mile of new system road would be constructed through the edge of an allocated old growth stand (project file OG-28).

4-14: See response to comments 4-1 and 4-2. Even though Alternative B Modified includes construction of 2.14 miles of new road, it will result in a net reduction of roads in the project area.

4-15: All newly constructed roads would be put into Road Management Prescription C (long-term storage) when activities are complete (EA p. 6). Motorized vehicle use would be controlled by recontouring the beginning of the road (EA p. 14). The process for the St. Joe Ranger District Travel Management Plan is ongoing at this time. The proposed action for the Travel Management Plan was sent out to the public on October 30, 2008 and public comments are being reviewed. The travel plan will designate roads and trails that are available for motorized use by signing and making a map available. This will do a great deal to help the motorized recreationists know where they can go and will pinpoint the areas where monitoring is needed.

4-16: Design features in the Fallen Bear EA require the survey for noxious weeds post activity. Page 6-7 of the Noxious Weeds Report states,

> "Weeds were treated in portions of the project area manually and with herbicides prior to September of 1999. Weeds along Forest Highway 50 to Gold Summit are treated by Shoshone County. Re-evaluation of the area in 2005 lead to herbicide treatments in 2006 and 2007. Monitoring of sites treated in 2006/2007 was done in 2008. Spot herbicide and manual treatments where done in 2008. Biological control agents for spotted knapweed and St. John's wort were previously released in the project area."

Thank you for your support and interest in the St. Joe Ranger Districts noxious weed program.

References

Baker, T.G., G.M. Will, and G.R. Oliver. 1989. Nutrient release from silvicultural slash: leaching and decomposition of *Pinus radiata* needles. For. Ecol. and Mgmt, 27:53-60.

Barber, B.L., and D.H. Van Lear. 1984. Weight loss and nutrient dynamics in decomposing woody Loblolly pine logging slash. Soil Sci. Soc. Am. J. 48:906-910.

Beatty, J.S.; Filip, G.M.; Mathiason, R.L., 1997, Larch Dwarf Mistletoe. Forest Insect & Disease Leaflet 169. U.S. Deptartment of Agriculture, Forest Service. http://www.fs.fed.us/r6/nr/fid/fidls/fidl169.htm.

Birdsey, R., K. Pregitzer, A. Lucier. 2006. Forest carbon management in the United States: 1600-2100. Journal of Environmental Quality 35: 1461-1469.

Birdsey, R. J. Jenkins, M. Johnston, E. Huber-Sannwald. 2007. North American Forests in King, A.W., L. Dilling, G.P. Zimmerman, D. M. Fairman, R.A. Houghton, G. Marland, A.A. Rose, T. J. Wilbanks, eds. The first state of the carbon cycle report (SOCCR): The North American carbon budget and implications for the global carbon cycle, a report by the U. S. Climate Change Science Program and the Subcommittee on Global Change Research, National Oceanic and Atmospheric Administration. Ashville, NC. National Climatic Data Center: 117-126.

Block, R., K.C.J. Van Rees, and D.J. Pennock. 2002. Quantifying harvesting impacts using soil compaction and disturbance regimes at a landscape scale. Soil Sci. Soc. Am. J. 66:1669-1676.

Brown, Rick. 2000. Thinning, fire and forest restoration: a science-based approach for national forests in the interior northwest. Defenders of Wildlife. http://biodiversitypartners.org/pubs/Brown/Thinning_Fire_Forest_Rest.pdf

Canadell. J. G., D. E. Pataki, R. Gifford, R. A. Houghton, Y. Luo, M.R. Raupach, P. Smith, W. Steffen. 2007. Saturation of the terrestrial carbon sink. In Canadell, J. G., D. E. Pataki, L. F. Pitelka, eds. Terrestrial ecosystems in a changing world. Berlin: Springer-Verlag: 59-78.

Chapin, F.S.; Woodwell, G.M.; Randerson, J.T.; Rastetter, E.B.; Lovett, G.M.; Baldocchi, D.D.; Clark, D.A.; Harmon, M.E.; Schimel, D.S.; Valentini, R.; Wirth, C.; Aber, J.D.; Cole, J.J.; Goulden, M.L.; Harden, J.W.; Heimann, M.; Howarth, R.W.; Matson, P.A.; McGuire, A.D.; Melillo, J.M.; Mooney, H.A.; Neff, J.C.; Houghton, R.A.; Pace, M.L.; Ryan, M.G.; Running, S.W.; Sala, O.E.; Schlesinger, W.H.; Schulze, E.-D. 2006. Reconciling carbon-cycle concepts, terminology, and methods. Ecosystems 9: 1041-150.

Edmonds, R.L. 1987. Decomposition rates and nutrient dynamics in small diameter woody litter in four ecosytems in Washington, USA. Ca. J. For. Res. 17: 449-509.

Fellows, A. W., and M. L. Goulden. 2008. Has fire suppression increased the amount of carbon stored in western U.S. forests?, *Geophys. Res. Lett.*, 35, L12404, doi:10.1029/2008GL033965.

Finkral, A.J. and Evans, A.M. 2008. The effects of a thinning treatment on carbon stocks in a northern Arizona ponderosa pine forest. Forest Ecology and Management 255: 2743-2750.

Forest Engineering Research Institute of Canada. 1999. Harvesting Systems and Equipment in British Columbia

Garrison-Johnston, M.T., R. Lewis, and L.R. Johnson. 2007. Northern Idaho and Western Montana nutrition guidelines by rock type. IFTNC, Univ. of ID, Moscow, ID. 109 p.

Garrison-Johnston, T.M. Shaw, L.R. Johnson, and P.G. Mika. 2004. Intermountain Forest Tree Nutrition Cooperative, Presentation at the Potassium Meeting, IPNF, Coeur d'Alene, ID, April 23.

Garrison-Johnston, M. 2003. Geologic controls on tree nutrition and forest health in the Inland Northwest. Presented at GSA Ann. Mtng, Seattle, WA. 9 pp.

Garrison-Johnston, M., J.A. Moore, S.P. Cook, and G. J Niehoff. 2003. Douglas-fir beetle infestations are associated with certain rock and stand types in the Inland Northwestern United States. Env. Entomology, 32(6):1364-1369.

Geist, J.M., J.W. Hazard, K.W. Seidel. 1989. Assessing physical conditions of some Pacific Northwest volcanic ash soils after forest harvest. Soil Sci. Soc. of Am. J., 53(3):946-950.

Graham, Russell T.; McCaffrey, Sarah; Jain, Theresa B. (tech. eds.) 2004. Science basis for changing forest structure to modify wildfire behavior and severity. General Technical Report RMRS-GTR-120. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 43 p.

Hayward, Gregory D. 1994. Information needs: great gray owls. Chapter 17 In Hayward, Gregory D. and Jon Verner. 1994. Flammulated, boreal,a nd great gray owls in the United Sates: a technical conservation assessment. USDA Forest Service General Technical Report RM-253.

Heath, L.S. and J.E. Smith, 2004: Criterion 5, indicator 26: total forest ecosystem biomass and carbon pool, and if appropriate, by forest type, age class and successional change. In: Data report: a supplement to the national report on sustainable forests— 2003 [Darr, D.R. (coord.)]. FS-766A, U.S. Department of Agriculture, Washington, DC, 14 pp. Available at http://www.fs.fed.us/research/sustain/contents.htm

Horn, R., J. Vossbrink, and S. Becker. 2004. Modern forestry vehicles and their impacts on soil physical properties. Soil and Tillage Res. 79:207-219.

Jansson. K.J., and J. Johansson. 1998. Soil changes after traffic with a tracked and a wheeled machine: a case study on a silt loam in Sweden. Forestry 71(1):57-66.

Kashian, D.M., W.H. Romme, D.B.Tinker, M.G. Turner, M. G. Ryan. 2006. Carbon storage on landscapes with stand-replacing fires. BioScience 56: 598-606.

Keane, R.E., K.C. Ryan, T.T. Veblen, and others. 2002. Cascading effects of fire exclusion in the Rocky Mountain ecosystems: a literature review. General Technical Report. RMRSGTR-91. Fort Collins, CO: U.S. Dept. of Agr., Forest Service, Rocky Mountain Research Station. 24 p.

Krankina, O.N. and Harmon, M.E. 2006. Forest management strategies for carbon storage. In Forests, carbon and climate change: a synthesis of science findings, a report by The Oregon Forest Resources Institute, Oregon State University College of Forestry, and Oregon Department of Forestry: 79-92.

Millar C. I., N. L. Stephenson, S. L. Stephens. 2007. Climate change and forests of the future: managing in the face of uncertainty. Ecological Applications, 17(8). The Ecology Society of America. pp. 2145-2151.

Moffat, A.J. 2003. Indicators of soil quality for UK forestry. *Forestry* 76(5): 547-568. Rab MA. 1999. Measures and operating standards for assessing Montreal process soil sustainability indicators with reference to Victorian Central highlands forest, southeastern Australia. *Forest Ecology and Management* 117: 53-73.

Moore, J.A., D.A. Hamilton, Jr., Y. Xiao, and J. Byrne. 2004a. Bedrock type significantly affects individual tree mortality for various conifers in the inland Northwest, USA. Can. J. For. Res. 34:31-42.

Moore, J.A., P.G. Mika, T.M. Shaw, and M.I. Garrison-Johnston. 2004b. Foliar Nutrient Characteristics of Four Conifer Species in the Interior Northwest United States. West. J. Appl. For. 19(1):13-24.

Noss, R. F. 2001. Beyond Kyoto: forest management in a time of rapid climate change. Conservation Biology. 15:578-590.

Pacala, R.; Birdsey, R.A.; Bridgham, S.D.; Conant, R.T.; Davis, K.; Hales, B.; Houghton, R.A.; Jenkins, J.C.; Johnston, M.; Marland, G.; Paustian, K. 2007. The North American carbon budget past and present. In King, A.W.; Dilling, L.; Zimmerman, G.P.; Fairman, d.M.; Houghton, R.A.; Marland, G.; Rose, A.Z.; Wilbanks, T.J.; eds. The First State of the Carbon Cycle Report (SOCCR): The North American carbon budget and implications for the global carbon cycle, a report by the US Climate Change Science Program and the Subcommittee on Global Change Research, National Oceanic and Atmospheric Administration, Asheville, NC; national Climatic Data Center: 117-126.

Palviainen, M., L. Finer, A. Kurka, H. Mannerkoski, S. Piirainen, and M. Starr. 2004. Release of potassium, calcium, iron and aluminum from Norway spruce, Scots pine and silver birch logging residues. Plant and Soil 259:123-136.

Powers, R. F. 2002. Effects of soil disturbance on the fundamental, sustainable productivity of managed forests. USDA Forest Service Gen. Tech. Rep. PSW-GTR-183. 2002.

Pregitzer, K.S. and Euskirchen, E.S. 2004. Carbon cycling and storage in world forests: biome patterns related to forest age. Global Change Biology 10: 2052-2077.

Quigley, Thomas M and Arbelbide, Sylvia J. 1997. An assessment of ecosystem componenets in the interior Columbia Basin and portions of the Klamath and Great Basins: volume I. USDA Forest Service Pacific Northwest Research Station and USDI bureau of Land Management. General technical report PNW-GTR-405. June 1997.

Rab, M.A. 2004. Recovery of soil physical properties from compaction and soil profile disturbance caused by logging of native forest in Victorian Central Highlands, Australia. *Forest Ecology and Mgt*. 191 329-340.

Samson, F.B. 2006. A Conservation assessment of the northern goshawk, black-backed woodpecker, flammulated owl, and pileated woodpecker in the Northern Region, USDA Forest Service. Unpublished report on file, Northern Region, Missoula, Montana, USA.

Sheridan, G. J.. 2003. A comparison of rubber-tired and steel-tracked skidding on forest soil physical properties. The Australian Journal of Soil Research.

Stark, Nellie M. 1979. Nutrient losses from timber harvesting in a larch/Douglas-fir forest. USDA Forest Service Research Paper INT-231. July 1979. Ogden, UT

USDA Forest Service. 2008. Briefing Paper. Topic: historical ecology and climate change workshop. April 28, 2008. Wayne Owen, WFWARP 202.205.1262 wowen@fs.fed.us.