APPENDIX D

Moose Post-Fire EIS Interdisciplinary Team's Response to the 1995 Beschta Report[1]

Beschta *et al*., 1995 contains general principles and recommendations for post-fire salvage and other treatments on Federal land in the interior Columbia and Upper Missouri Basins. The interdisciplinary (ID) team reviewed the report and considered pertinent information in the design of the proposed action and alternatives, and analysis of potential environmental consequences. The following documents the team's consideration of the report's recommendations. In addition, various portions of Chapter 3 of the EIS also address and respond to these same recommendations.

"Findings and Recommendations For Fire Management and Salvage Logging"

1. "Ongoing human activity and the residual effect of past activity continue to threaten watershed ecosystem integrity."

- "The ability of ecosystems to recover has been substantially compromised due to past management activity."
- "Attempting to continue to manage fire and its consequences without altering or controlling other threats to ecosystems integrity, including logging, grazing, road building, and mining is scientifically and pragmatically unsound."

Moose ID Team Response:

The ID team does not dispute this point of Beschta *et al*., but we believe that human intervention can help to undo the undesirable effects of past management and hasten the restoration of the watershed. The Interior Columbia River Basin ecosystem management project identified Big Creek as a watershed with high integrity. However, the Moose ID team recognizes that there are degraded conditions within the watershed that are the result of past management activities. A description of these conditions can be found in the Affected Environment descriptions in the Soils, Hydrology, Wildlife, and Fisheries sections of Chapter 3 of the DEIS. An Ecosystem Assessment at the Watershed Scale (EAWS) for Big Creek in 1999 addressed overall watershed ecosystem integrity. Information gathered during the EAWS process was used to develop a Watershed Restoration Plan for Big Creek (see exhibit Q-35 in project record). The Watershed Restoration Plan provides a description of completed, continuing, and future site-specific rehabilitation efforts of the Flathead National Forest designed to restore proper watershed function.

The historic timber harvest and road construction activities responsible for the degraded conditions in the watershed were conducted before the development of modern land management philosophy, which emphasizes watershed and ecosystem protection. This philosophy is embodied in Forest Plan Standards and Guidelines that require the use of Best Management Practices and adherence to specific protections for soils, water quality, fish habitat, and wildlife. The action alternatives proposed would have long-term benefits to watershed integrity. The closure of at least 56 miles of road, upsizing culverts to accommodate higher peak flows, and other road maintenance performed in conjunction with Best Management Practices would all lead to reduced sediment and water yield from the road system in the future. Speeding up vegetative recovery in the fire through planting would improve the soil holding capacity of a site. Low-impact harvest techniques would minimize soil disturbance and retain a biological legacy of organic material on all units.

[1] *B*eschta, R.L.; Frissell, C.A.; Gresswell, R. [and others]. 1995. *Wildfire and salvage logging: recommendations for ecologically sound post-fire salvage logging and other post-fire treatments on Federal lands in the West*. Corvallis, OR: Oregon State University.

2. "Fires are an inherent part of the disturbance and recovery patterns to which native species have adapted."

- "Fires are a part of the pattern of disturbance and recovery that provides a physical template for biological organization at all levels."
- "The 'patchiness' of fire is a desirable characteristic, and many species depend on the environmental influences that fires create."

Moose ID Team Response:

The FEIS recognizes in several places that fire is an inherent part of disturbance and recovery patterns in the Big Creek and Coal Creek drainages. For instance:

"Consequently, harvest of dead trees will leave stands with irregular forest structure. Gaps or patches of openings will be interspersed with live green trees from sapling, pole, and mature size classes. The residual structure will be represented by a mixture of live green trees of all sizes, small diameter dead trees, and large diameter snags."

"Disturbances such as insects, disease, and fire, are all a natural part of the ecosystem, with the wildlife, vegetation, and other components of the ecosystem evolving and responding to the influence of these processes for many thousands of years."

"The majority of the Big Creek drainage (including the portion burned over in the Moose Fire of 2001) had not experienced a large-scale or stand replacing fire for over 200 years. Mature and old forest conditions dominated the watershed. The long fire interval and resulting extensive area of mature forest type created a landscape of relatively high vulnerability to effects from disturbances such as fire or bark beetles. The vast blowdown and resulting large-scale spruce beetle epidemic in the 1950s and 60s illustrate this, as does the Moose Fire event to some degree. These both were natural events, not unprecedented and not unpredictable, considering the fire regimes within the area, the long fire-free interval, and the forest conditions across the landscape."

"Wildland fire was a dominant disturbance in the Big Creek watershed prior to the 1930s."

"While the fish populations in the watershed certainly experienced large fires and epidemics of bark beetle related mortality in the past, it is unclear whether the depressed contemporary populations are capable of coping with the extremes of these disturbance types."

The Moose Post-Fire Project is not an attempt to "fix the problem" of the Moose Fire. The ID team recognizes that wildfire is a natural component of our environment that is beneficial, and even essential, for many native species of plants and animals. The vast majority of the burned area would receive no treatment, but would be allowed to respond to the fire as natural processes determine it should. The action alternatives were crafted to retain the ecological benefits of the fire while responding to the needs of society and goals of the Flathead Forest Plan.

3. "There is no ecological need for immediate intervention on the post-fire landscape."

- "With respect to the need for management treatments after fires, there is generally no need for urgency, nor is there a universal ecologically-based need to act at all."

Moose ID Team Response:

The Moose Post-Fire Project is intended to respond to an array of needs: social, economic, and regulatory, as well as ecological. The Moose Post-Fire Assessment identified a high potential for bark beetle populations within the fire to influence Douglas-fir and spruce stands outside the fire perimeter, including some that are privately owned, and this became a key purpose and need for the Moose Post-Fire Project. See Chapter 1 of the FEIS for an explanation of the purpose and need. A beetle epidemic could have significant economic and aesthetic impacts upon nearby landowners. Important Flathead National Forest resources within the Big Creek watershed, such as old growth and

riparian timber stands, are also at risk from a bark beetle outbreak. The vegetation section of Chapter 3 of the FEIS provides a detailed analysis of the risks associated with the potential Douglas-fir and spruce bark beetle epidemics. We also felt there was an economic need to salvage trees, especially on lands within the fire where timber production is the primary goal, as designated by our Forest Plan. Many members of the local community support salvaging burned trees, and said so during the initial public scoping for the project (project record exhibit D-2). Burned trees deteriorate rapidly and lose their economic value if not harvested in a timely manner.

The Moose ID team does believe there are ecological benefits that can be realized through rapid intervention in the burned area. The Burned Area Emergency Recovery (BAER) team replaced seven culverts with larger ones to better accommodate the increased runoff that is likely to occur because of the fire, possibly preventing many tons of sediment from reaching streams. Numerous biodegradable straw "wattles" were positioned across hill slopes in a severely burned drainage to help prevent rill and gully formation, with their attendant risk of erosion and hill slope failure. Speeding up vegetative recovery in the fire through planting of native species would improve the soil holding capacity of a site and benefit wildlife by inhibiting the establishment of unpalatable invasive plants.

Beschta *et al.* calls for a conservative approach. We feel we have taken a very conservative approach by proposing to treat 2900 acres of a 35,000-acre fire that affected national forest system lands. We have considered the soils unit by unit, and we would be treating less than 10 percent of the area burned on national forest system lands.

4. "Existing condition should not be used as "baseline" or "desired" conditions upon which to base management objectives."

Moose ID Team Response:

The Big Creek EAWS considered the historic range of variability of resource conditions as a baseline. Our desired conditions and management objectives are based on our Forest Plan. The existing condition is compared to the desired condition, and this determines what actions might be appropriate to move closer to desired conditions. Desired conditions state what environmental, social, or commodity values are desirable for a particular land base.

Recovery goals and habitat indices for listed species such as the grizzly bear and the bull trout are based upon the best available science, and incorporate data from population viability models. Habitat quality measures such as home range sizes and streambed fine sediment concentrations have been developed by reviewing appropriate scientific literature and, where possible, gathering reference data in undisturbed wilderness areas.

5. "Fire suppression throughout forest ecosystems should not automatically be a management goal of the highest priority."

Moose ID Team Response:

Fire suppression is used to meet land management objectives related to protection of life, property and resources. General fire suppression recommendations are outside the scope of this salvage proposal and analysis. The Flathead Forest Plan presently requires that all wildland fires be suppressed unless they occur in a wilderness area covered by an approved Fire Management Plan. At the same time the Moose Fire was burning, several large fires were allowed to burn on Flathead National Forest lands in wilderness areas.

6. "The region's ecosystems, not just forests, are under severe strain."

- "Virtually all western landscapes have been subjected to severe disruption by human activities."
- "From a watershed perspective…. the primary cure rests in curtailing human activities known to be damaging and counterproductive, and repairing or restoring roads that act as a permanent sources of adverse impact."

Moose ID Team Response:

The Moose ID team agrees that many of the region's ecosystems have been impacted by human activities. The western United States has witnessed rapid population growth in recent decades, and the Flathead Valley is no exception, being one of the fastest growing counties in Montana. Along with this increase in population has come increased demand for forest resources, including timber, recreation, food, and fuel. Despite this, timber production from Flathead National Forest land has been reduced substantially in recent years, and access for recreation and other purposes has been made more difficult by road closures intended to provide greater security for wildlife. Public land management requires a balance between ecosystem protection and suitable resource utilization to meet the needs of society. The direction for achieving that balance on the Flathead National Forest is contained in the Forest Plan, which was developed to comply with numerous federal laws, and has guided the ID team during the development of this project.

Beschta *et al*. calls for repairing or restoring roads to ease the strain on ecosystems. A major component of the Moose Post-Fire Project is road decommissioning, with alternatives ranging from 56 to 87 miles of road to be decommissioned. See Chapter 2 of the FEIS. In addition, another foreseeable project on a similar timeline as this project (refer to the introduction section in Chapter 3) is proposing to repair and maintain approximately 177 miles of road within the Big Creek and Coal Creek drainages by the application of Best Management Practices. This project is currently going through the planning process in a separate project; however, the cumulative effects of these actions have been considered in this FEIS.

"Post-Fire Principles"

"We recommend that management of post-fire landscapes should be consistent with the following principles:"

7. "Allow natural recovery and recognize the temporal scales involved with ecosystem evolution. "

- "Human intervention on the post-fire landscape may substantially or completely delay recovery…. or accentuate the damage."
- "There is little reason to believe that post-fire salvage logging has any positive ecological benefits, particularly for aquatic ecosystems."
- "There is considerable evidence that persistent, significant environmental impacts are likely to result from salvage projects…These impacts include soil compaction and erosion, loss of habitat for cavity nesting species, loss of structurally and functionally important large woody debris."

Moose ID Team Response:

Analysis of the potential effects of the Moose Post-Fire Project by the ID team did not indicate a risk that ecosystem processes would suffer any measurable delay as a result of the proposed activities. As noted elsewhere, approximately 91 percent of the burned area would be allowed to recover naturally. Soils, seed banks, and live vegetation would be protected in harvest units through the use of low-impact harvest techniques and adherence to Best Management Practices. The specific protective measures are discussed in Appendix C and the vegetation and soils sections of Chapter 3 of the DEIS.

The Burned Area Emergency Rehabilitation effort seeded 190 acres within the fire where soil erosion was a concern, and the species used were either native or annual species that will not impact long-term succession. Our intervention would promote species diversity and reforestation in areas lacking in seed source either due to previous harvest or high fire intensities. In stands where serotinous lodgepole pine seed is abundant, planting promotes species diversity in what would otherwise become a monoculture. National Forest System lands are managed under multiple use and sustained yield mandates where social benefits are considered. Human intervention on the Moose Fire would allow for the recovery of salvageable wood products for society, and reduce the impact of bark beetles on green stands outside the fire. These are both items forest managers and many sectors of the public have deemed desirable (See Forest Plan, and project record exhibit D-2).

8. "No management activity should be undertaken which does not protect soil integrity."

- "Soil loss and compaction are associated with both substantial loss of site productivity and with off-site degradation (water quality)."
- "Reduction of soil loss is associated with maintaining the litter layer."
- "Although post-burn soil conditions may vary depending upon fire severity, steepness of slope, inherent erodibility, etc., soils are particularly vulnerable in burned landscapes."
- "Post-burn activities that accelerate erosion or create soil compaction must be prohibited."

Moose ID Team Response:

Design criteria in our project ensure soil integrity in all action alternatives; they minimize displacement, compaction or erosion of soil (see Chapter 2 of EIS). Logging systems are based on steepness of slope and fire severity, in addition to access. For example, no ground-based systems are proposed on high fire severity areas. The Moose ID team recognizes the impact of fire upon soils.

> Page 3-155: "High burn severity sites have modified surface soil properties."
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> Page 3-155: "Soils on these sites" (*high burn severity*) "are highly susceptible to erosion and physical soil disturbance, especially when ground based equipment operates on them."

The WEPP model predicts the fire will produce 125,000 tons of sediment. Salvage activities are projected to produce an additional 500 tons, or 0.4 percent of that occurring naturally (See hydrology section of FEIS). Protection of soils and prevention of erosion has been a primary tenet of the planning process for the Moose Post-Fire Project, and there are numerous references to this topic in the document.

> Page 2-11: "Minimize ground disturbance by using helicopters, skyline cable systems, and other mechanized equipment that has proven capability to be light on the land, (such as rubber tired skidders or feller/bunchers)."
>
> Page 2-11: "Operate equipment only when soils are at an acceptable level of dryness."
>
> Page 3-164: "Ground based equipment would not operate on soils mapped as high burn severity."
>
> Page 3-165: "The proposed harvest treatments have the potential to decrease soil erosion compared to the current erosion rates on burned soils. This would occur because they would hasten the rate at which debris and litter cover the burned soils, protecting soils from sheet erosion."
>
> Page 3-165: "The proposed road management would have a long-term benefit to soil productivity."

9. "Preserve species' capability to naturally regenerate."

- "If warranted, artificial regeneration should use only species and seed sources native to the site, and should be done in such a way that recovery of native plants or animals is unhampered."

Moose ID Team Response:

Nothing we are proposing affects the capability of species to regenerate (see vegetation section in Chapter 3 of the EIS). There are areas lacking a conifer seed source due to past management or because of high fire severity. Hand planting native conifers would promote the re-establishment of forest stands containing a natural diversity of tree species. The Moose Post-Fire Project recognizes the value of promoting the reestablishment of native plant species.

> Page 3-25: "Seedlings planted on national forest system lands almost always (the exception is rust-resistant white pine) come from seed sources native to the site, and are native species found on the habitat types being planted (Beschta *et al.* 1994). This would be the case on the Moose project as well."

10. "Do not impede the natural recovery of disturbed systems."

Moose ID Team Response:

Our project is designed to enhance natural recovery and would not impede it. Natural successional development would occur on 24,124 acres of the 25,984 acres of the Moose Fire within Big Creek. As described above, there are areas lacking a seed wall, which is necessary to the natural recovery of conifer trees. Where a seed source is lacking because of the fire or past management actions, exotic weed species may delay recovery of the native vegetation. The Flathead Forest will combat the spread of exotic and invasive weed species, which are often opportunistic colonizers of disturbed sites such as the Moose Fire area. Non-native plant species such as spotted knapweed are capable of excluding native plant species and significantly impeding the recovery of the ecosystem.

A significant benefit of the project is the long-term reduction in sediment production and water yield deriving from the decommissioning of 56 to 87 miles of road within the Big Creek drainage. The return of these roads to a vegetated condition with unrestricted stream channels will allow natural geomorphic processes to govern stream recovery.

"Recommendations On Post-Fire Practices"

11. "Salvage logging should be prohibited in sensitive areas."

- "Logging on sensitive areas is often associated with accelerated erosion and soil compaction."
- "Salvage logging by any method must be prohibited on sensitive sites, including: severely burned areas (no duff layer), on erosive soils, on fragile soils, in roadless areas, in riparian areas, on steep slopes, or any site where accelerated erosion is possible."

Moose ID Team Response:

The team considered sensitive areas when designing the proposed action. Best Management Practices (BMPs) and the Flathead Forest Plan mandate specific protections for soils and water bodies during silviculture operations. All the action alternatives meet or exceed these standards. The primary objective of our design criteria is to minimize soil disturbance, by either using helicopter yarding, winter logging sensitive sites, no ground-based logging on high burn severity areas, or the required use of slash mats. One sub-watershed (Skookoleel North) was eliminated from consideration due to soil erosion concerns. The action alternatives do not propose salvage in riparian areas (see Chapter 2 of the EIS). Alternative 4 expands the riparian buffer widths beyond regulatory requirements.

Beschta et al. includes roadless areas in the list of sensitive areas. The roadless areas in Big Creek are political boundaries and are not inherently sensitive to erosion. Only helicopter logging systems would be used in roadless areas, which will prevent excessive soil disturbance in these areas. In addition, only trees actually infested with beetles would be removed from roadless areas. Alternatives 3 and 4 would prohibit all harvest in roadless areas.

The ID team shares the authors' concern for the protection of sensitive areas. Our concern is reflected in the requirement that all management activities utilize Best Management Practices, which are described in Appendix C of the FEIS, and include direction such as:

> Page C-4: Winter logging will be done when the ground has enough snow or is frozen enough so operations do not cause wet muddy soil to bleed into the snow or appear in tracks.

> Page C-4: Tops and branches will be left in the units to provide ground cover that reduces soil erosion rates and if needles remain provides nutrients. Whole tree yarding is not acceptable.

Page C-9: Avoid tractor skidding on unstable, wet, or easily compacted soils and on slopes that exceed 40% unless operation can be conducted without causing excessive erosion.

Page C-9: Design and locate skid trails and skidding operations to minimize soil disturbance.

12. "On portions of the post-fire landscape determined to be suitable for salvage logging, limitations aimed at maintaining species and natural recovery processes should apply."

- "Dead trees (particularly large dead trees) have multiple ecological roles in the recovering landscape including providing habitat for a variety of species, and functioning as an important element in biological and physical processes. In view of these roles, salvage logging must leave at least 50% of the standing dead trees in each diameter class; leave all trees greater than 20 inches dbh or older than 150 years; generally, leave all live trees."
- "Because of soil compaction and erosion concerns, conventional types of ground-based yarding systems should be generally prohibited."
- "Helicopter and cable systems using existing roads and landings may be appropriate, however, even these…. methods could locally increase runoff and sediment."

Moose ID Team Response:

The areas we are proposing to salvage log were chosen specifically to meet the purpose and need for reducing bark beetle populations, and silvicultural prescriptions include removing the most susceptible trees, some of which are greater than 20 inches dbh. We fully recognize the value of dead trees in biological and physical processes (see snag and downed wood habitat section in Chapter 3 of the FEIS) and intend to abide by the Forest Plan, which provides direction for retention, recruitment, and cycling of snags and coarse woody material at levels that maintain ecological processes across the landscape. All action alternatives would require that no western larch greater than 20 inches dbh would be harvested, except where they are within harvest units and within 250 feet of an open road. Because these trees would likely be taken for personal use firewood, only snags considered high quality wildlife trees would be left in these areas. These high quality wildlife snags of all species would be marked with signs prohibiting their removal. In areas outside of harvest units and within 250' of open roads, all larch > 18" would be marked and signed as wildlife trees. See Chapter 2 of the FEIS for a definition of high quality wildlife trees.

Ninety percent of the area burned on national forest system lands by the Moose Fire would have every dead tree left standing. The ten percent of the area proposed for treatment would have snags remaining to provide structure and coarse woody debris.

Potential runoff and sediment from this project are discussed in the soils and hydrology sections of Chapter 3 of the FEIS, and above in this document. All harvest and road related activities proposed in this project would be consistent with our goal of minimizing soil erosion and negative impacts to both terrestrial and aquatic environments.

13. "Building new roads in the burned landscape should be prohibited."

- "Roads are associated with a variety of negative effects on aquatic resources, including the disruption of basin hydrology and increased chronic and acute sedimentation."
- "Under no circumstances should new roads be introduced into sensitive areas, including roadless or riparian areas."
- "Outside of these areas, road building should be avoided except where new road construction may be necessary to complete a larger program of partial or complete road obliteration. In some instances, offsetting benefits must be demonstrated. This may include cases in which a new road segment has been demonstrated to be necessary to enable the obliteration of other roads that cause significant potential or existing adverse environmental impacts."

Moose ID Team Response:

The Moose ID team agrees with the assessment of Beschta *et al*. that roads can have a substantial negative impact upon aquatic resources. The FEIS states: "Roads are the attribute of forest management that contributes the greatest volume of sediment to stream channels (Waters 1995)." None of the alternatives considered would permit the building of any roads. All action alternatives include the decommissioning of 56 to 87 miles of road. This amount of road decommissioning would provide an enormous future benefit to the aquatic ecosystem in Big Creek by reducing both water yield and sediment yield. The Flathead National Forest is also conducting, in a separate project, the upgrade of 85 miles of road in the watershed to BMP standards. The combined implementation of this BMP project and any action alternative of the Moose Post-Fire Project would be a significant improvement in the health of the aquatic environment in the watershed.

14. "Active reseeding and replanting should be conducted only under limited conditions."

- "Active planting and seeding has not been shown to advance regeneration and most often creates exotic flora. Therefore, such practices should be employed only where there are several years of evidence that natural regeneration is not occurring."
- "Native species from regional stocks that may enhance fire resistance of a site maybe planted if the effect is to not homogenize the landscape."
- "Seeding grasses into burned forests has been shown to disrupt recovery of native plants and is likely to create more problems than it solves."
- "The use of pesticides, herbicides, and fertilizers should generally be prohibited."

Moose ID Team Response:

No exotic flora is proposed for planting or seeding. Natural regeneration is expected to create a homogenous sea of lodgepole pine in many areas across the fire, as experienced on the Red Bench Fire of 1988, just a few miles to the north of the Moose Fire. The fires of 1910, 1919, and 1926 created many acres of lodgepole pine monoculture across the Flathead National Forest, which precipitated the mountain pine beetle outbreaks of the 1970s and 1980s. Planting of conifer seedlings in salvage units would enhance species diversity. Seeds are collected from local trees and grown at the regional nursery. Seedlings are out-planted according to suitable elevation and habitat type. This is standard operating procedure. Areas harvested prior to the Moose Fire require reforestation in accordance with the National Forest Management Act, and would be replanted (See vegetation section of Chapter 3 of the FEIS).

The prohibition on use of herbicides recommended by Beschta *et al*. ignores the very real problem of exotic, invasive species that can have a negative impact upon native plant and animal communities. In several of the discussion points above, the authors of Beschta *et al.* encourage land managers to allow the natural recovery of native species. This process may be greatly retarded or prevented altogether if exotic weed species are not controlled. Page 3-79 of the DEIS identifies 20 exotic, noxious weed species known to exist in the vicinity of the Moose Fire. The Flathead National Forest will use hand application of approved herbicides applied in accordance with our Noxious and Invasive Weed Control Environmental Assessment (USDA Forest Service 2000b) to control exotic plant species and promote the recovery of a native vegetation community. Large scale aerial spraying would not occur.

15. "Structural post-fire restoration is generally to be discouraged."

- "Hard structures (in-stream and on land) are not generally modeled or sited based on natural processes, and their ability to function predictably may be particularly low in dynamic post-fire landscapes."
- "Sediment management should focus on reducing or eliminating anthropogenic sources prior to their initiation (i.e., stream crossings), and protecting/maintaining natural sediment control mechanisms in burned landscapes, particularly the recruitment of large woody debris on hill-slopes and in streams."

Moose ID Team Response:

A pulse of large woody debris is expected to enter streams in the fire area in coming years. Big Creek and its tributaries will be allowed to respond to this influx of wood naturally, with no direct management intervention. Naturally occurring migration barriers may be opened in Big Creek if they form, under supervision of the hydrologist and fisheries biologist, to protect bull trout spawning. The formation of migration barriers is considered unlikely.

No hard structures are proposed with the Moose Post-Fire Project. Biodegradable straw wattles were placed in areas of high erosion hazard to prevent sediment from reaching streams. Best Management Practices are designed to remove anthropogenic sediment sources and all action alternatives optimize recruitment of large woody debris by streams. Hill slopes would have adequate woody debris left in accordance with Amendment 21. The maintenance of riparian buffer strips as required by INFISH would insure an adequate supply of large woody debris would be available to control sediment in streams and adjacent riparian areas.

16. " Post-fire management requires reassessment of existing management."

- "By increasing runoff, erosion, and sedimentation, fires may increase the risks posed by existing roads."
- "Therefore, post-fire analysis is recommended to determine the need for undertaking road maintenance, improvement, or obliteration."
- "There is some urgency to this reassessment as the longer appropriate treatments are put off, the more likely it is that failure will be triggered by a large runoff event."

Moose ID Team Response:

We agree with Beschta et al. that there is an urgent need to address potential problems arising from fire effects, particularly those that may overwhelm existing road structures. The BAER process and the Moose Post-Fire Assessment (USDA Forest Service 2001) considered existing management and the risks inherent in the condition of the watershed. Due to these assessments, numerous fire recovery and rehabilitation projects have been accomplished, are ongoing, or are planned, and the management activities in this project were proposed. The transportation system was assessed and 56 to 87 miles of road would be decommissioned to improve water quality and meet motorized access requirements described in Amendment 19 to the Forest Plan.

17. "Continued research efforts are needed to help address ecological and operational issues."

- "There is a need to research certain questions in order to guide post-fire management decisions. For example, some argue that salvage logging is needed because of the perceived increased likelihood that an area may reburn."
- "Research is needed on the role of dead wood in terrestrial ecosystems – in particular, how much wood should be left on a particular site and across the landscape to provide for the full range of ecosystem processes and the needs of species."
- "…new research efforts are needed to evaluate the environmental effects of alternative post-fire/salvage operations, roading activities, and site preparation."

Moose ID Team Response:

The effects analysis for both fuels and vegetation discuss the reburn issue. The team recognizes that the likelihood of an ignition does not change because an area is salvaged. What may change are fire behavior and fire effects should an ignition occur. According to Louisa Evers, fire ecologist and fire behavior analyst, considerable research has begun regarding fire ecology, fire effects, fire risks, fire recovery, and restoration as part of the Joint Fire Science Program and the National Fire Plan. There is already a considerable body of research regarding the environmental effects of salvage, road construction and management, and site preparation effects and the role of downed wood in terrestrial ecosystems.

Beschta *et al*. (1995) state "We are aware of no evidence supporting the contention that leaving large dead woody material significantly increases the probability of a reburn." We agree with the authors of the Beschta Report that

the amount of fuel does not affect the probability of reburn or wildland fire ignitions in general. The meteorological and physical processes that generate lightning, and the human behavior that leads to human-caused fires determine the probability of ignition. The purpose and need of the fuel reduction portions of the Moose Post Fire Project is not to reduce the probability of ignition or the occurrence of future fires. Rather, it is to reduce the intensity and severity of future fires, when they inevitably occur, by reducing the amount of dead vegetation that would fall to the ground and accumulate over time. There is abundant scientific evidence that increased fuel loads can result in increased fire intensity and severity. In other words, given the same weather and topographic conditions, areas with higher fuel loads would release more energy (burn hotter), exhibit longer flame lengths, have greater potential to convert to crown fires, be more difficult to contain, pose greater risks to firefighters, kill more vegetation, and damage soils more severely than areas with lower fuel loads. In addition, there is clear scientific evidence and abundant experience demonstrating large continuous areas of relatively high fuel loads are more likely to result in larger fires than areas where the spatial arrangement of high fuel loads is discontinuous.

As stated in the Beschta document, the degree of alteration of fire regimes varies across the landscape. Moist forest types (low frequency-high intensity fire regime), such those found in Big Creek, have been less altered through fire suppression activities than dry pine forests (high frequency-low severity fire regime) (Agee 1994).

18. "The public must be educated regarding natural fires and post-burn landscapes to provide balance to the 'Smokey Bear' perspective of fires and forests."

- "Although post-fire landscapes are often portrayed as "disasters" in human terms, from an ecological perspective, fire is part of the normal disturbance regime and renewal of natural forest ecosystems."
- "Increased appreciation and understanding of natural disturbance regimes in the ecology of forest ecosystems is needed by the public, and the public's land managers."

Moose ID Team Response:

We agree with the authors that the historic portrayal of fire as an entirely harmful event failed to recognize the important role of fire in maintaining the forest ecosystem. Fire history, disturbance regimes, and the ecology of forest ecosystems are topics that have been published in three documents specific to the Moose area. The Big Creek EAWS included information on fire regimes and the historic range of variability in a variety of components of the ecosystem, the Post-fire assessment in 2001 provided information on the post-burn landscape, and this FEIS covers fire ecology in the fire and fuels section, the vegetation section, and the soils section, at the very least.

Again, from Louisa Evers, "Experience has shown that even when popular support for wildland fire use is high, this support is largely intellectual. A more emotional response is more typical once a fire happens where these same people can see it every day. The tolerance for the fire drops rapidly, especially for long duration fires that produce direct impacts from smoke and when fires threaten to move into wildland-urban interface areas." This was certainly the case with the Moose Fire in August and September of 2001.

Regional or nation-wide efforts to provide information on natural fires and post-burn landscapes are outside the scope of the Moose EIS. Locally, the Flathead National Forest is hosting tours of the burned area for the general public, during which Forest Service employees provide information regarding the role of fire in the environment.

"Recommendations Concerning Fire Management"

19. "Fire suppression activities should be conducted only when absolutely necessary and with utmost care for the long-term integrity of the ecosystem and the protection of natural recovery processes."

- "Pumping from small streams and rivers increases the risk to aquatic ecosystems from post-fire events. When pumping is utilized, it should be conducted from sufficiently large streams and lakes that the effects on aquatic biota are negligible."
- "Fire suppression should not include bulldozing stream channels, riparian areas, wetlands, or sensitive soils on steep slopes or using such areas as access routes for vehicles and other ground-based equipment."
- "Virtually no fire suppression should be permitted in wilderness areas."

Moose ID Team Response:

This recommendation is beyond the scope of the Moose Post-Fire Project EIS; however, for the record, minimum impact suppression techniques were used on the Moose Fire whenever possible. As noted above, simultaneous with the Moose Fire there were several fires burning in wilderness portions of the Flathead National Forest. No fire suppression actions were employed on these fires. Historic wilderness cabins were protected with sprinklers and reflective wrap. The specific environmental effects of fire suppression activities on the Moose Fire are discussed at length in the Cumulative Effects Analysis portions of Chapter 3 in the FEIS.

20. "When land ownerships are mixed, the federal land management agencies should establish policies to prevent conflicts between re-establishment of natural disturbance regimes on federal land and the protection of private property."

Moose ID Team Response:

This recommendation is beyond the scope of the Moose Post-Fire Project. However, the ID team agrees with this point of Beschta *et al*. The fuel reduction treatments contained in this proposal are designed to protect private property and administrative sites in the event of a future fire occurring in the project area. The Flathead National Forest allows naturally ignited fires to burn in wilderness areas if there is a valid Fire Management Plan, and the forest also maintains an active program of prescribed burning.

Additional considerations by the team:

The team also used the review of related literature by the Kelsey Beaver interdisciplinary team (Kootenai National Forest, 2001) in considering the Beschta *et al*. position paper, as well as reading the original literature by George Ice, Susan Conard, Richard Everett, Susan Husari, Alan E. Harvey, Gordon H. Reeves, James Saveland, C. Phillip Weatherspoon, Robert Zeimer, Ice and Beschta, and Louisa Evers. The team is also aware of the Chiefs Testimony to Congress and the rebuttal by the authors of the Beschta Report. We did not feel the rebuttal unveiled any new considerations.