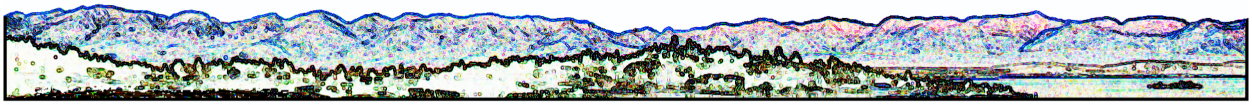
Swan View Coalition *Nature and Human Nature on the Same Path*



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November 5, 2012

Deb Mucklow
Spotted Bear District Ranger

Rob Davies
Hungry Horse District Ranger

Re: Comments on the Proposed Betty Baptiste Project
Via email PDF to comments-northern-flathead-spotted-bear@fs.fed.us

Dear Deb and Rob;

Please accept these comments into the public record for the Betty Baptiste Project. Included with these comments is a summary of and list of scientific literature we compiled with Friends of the Wild Swan. We want you to consider this literature and include it in the public record for this project. We incorporate by reference the comments submitted on this Project by FOWS.

We appreciate the following statement in your Proposed Action: "No harvest or commercial thinning would occur within Riparian Habitat Conservation Areas (RHCA), grizzly bear security core, or in inventoried roadless areas. Additionally, no old growth is targeted for treatment."

Substantial logging, however, is proposed for areas that ought to be grizzly bear security core habitat and perhaps adjacent to old growth forests. The Project must firstly establish grizzly bear security core and motorized route densities in full compliance with Amendment 19 - not log and build roads in security core now and maybe or maybe not designate it as core later! To do so is an absolute failure to assess the cumulative effects of connected and reasonably foreseeable actions under NEPA, among other things.

Indeed, an adequate Travel Analysis must firstly be completed for the Project Area or larger area to identify the minimum road system (MRS, as required by 36 CFR 212.5 and subsequent Forest Service directives). The MRS must be in full compliance with the Forest Plan and its Amendment 19 for the Project Area, Logan Dry Park grizzly bear BMU subunit and any larger area under consideration. The Project must then include as a part of its Purpose and Need its provision of the NEPA process by which the agency assesses the impacts of the MRS, alternative ways to arrive at it, and adequate assessment of all actions that are now reasonably foreseeable due to the mandates of 36 CFR 212.5, subsequent Forest Service directives, and Amendment 19, among others.

As it stands now, the Project Area and Logan Dry Park subunit provide significantly excessive motorized route densities and significantly deficient grizzly bear security that is resulting in a "taking" of threatened grizzly bear. Do not attempt to simply pass "Go" and collect $200! The Proposed Action is a lame and shameful effort to log critical wildlife habitats without firstly undertaking all necessary measures to provide adequate security and conditions for wildlife, fish, water quality and other resources.

We urge you to focus this project on road reclamation as the primary means to accomplish needed restoration to forests, watersheds and wildlife, rather than continue the mantra of more logging being the cure for all problems. And it is high time the Flathead begins fully re-contouring roads (removing the road template) it wants to be considered reclaimed, restored or decommissioned.

We believe that there is plenty of damage to the project area from roads and past logging. As will be detailed in this letter, roads remove native vegetation, spread noxious weeds, erode sediment into streams, reduce security for wildlife habitat, damage soils, and are barriers to native fish migration. Logging depletes old-growth forest habitat, damages soils and fragments wildlife habitat.

We oppose building any more roads in the project area, no matter how temporary, and oppose the notion of "improving" old growth forests by logging or thinning within or adjacent to them. We urge you instead to develop a "purpose and need" for the Project that recognizes road reclamation as the primary means to restore watershed function and reestablish wildlife connectivity - and to provide the NEPA process by which the MRS is to be fully assessed.

The rationale for our recommendations follows and is based largely in research conducted or collected by the Forest Service itself. We are also including scientific research and recommendations for maintaining and restoring old-growth forest habitat without logging, as well as scientific research for bull trout/native fish, lynx and soils. We ask that you incorporate this information into your analysis.

Scientific Findings on Roads and Roadless Lands

Virtually without exception, science is finding that ecological integrity remains highest in areas that remain unroaded and unmanaged and is lowest in areas that have been roaded and managed. As the density of roads increases, aquatic integrity and wildlife security decreases, while the risk of catastrophic wildfire and the occurrence of exotic weeds increases. The simplest and most cost-effective thing the Forest Service can do to maintain and restore aquatic and ecosystem integrity is to stop building roads and to obliterate in an environmentally sound manner as many roads as possible. This conclusion is supported by the following:

"Areas that are more highly roaded actually have a higher potential for catastrophic wildfires than inventoried roadless areas. Other national assessments have arrived at the same conclusions. [] The fire occurrence data revealed the following key points:

- Nationally, the average size of a large wildfire is greater on NFS lands outside of an inventoried roadless area;

- Nationally, the average size of a large wildland fire started by humans is greater on land outside of inventoried roadless areas;

- Regardless of the cause, a wildland fire ignition was nearly 2 times as likely to occur outside of an inventoried roadless area;

- A human ignited wildland fire is nearly 4 times as likely to occur outside of an inventoried roadless area." (Forest Service Roadless Area Conservation DEIS, page 3-157; hereafter USFS 2000).

"The U.S. Fish and Wildlife Service [] found that bull trout are exceptionally sensitive to the direct, indirect, and cumulative effects of roads. Dunham and Rieman [] demonstrated that disturbance from roads was associated with reduced bull trout occurrence. They concluded that conservation of bull trout should involve protection of larger, less fragmented, and less disturbed (lower road density) habitats to maintain important strongholds and sources for naturally recolonizing areas where populations have been lost." (USFS 2000, page 3-82, parenthesis in original).

"Hitt and Frissell [] showed that over 65% of waters that were rated as having high aquatic biological integrity were found within wilderness-containing subwatersheds. [] Trombulak and Frissell [] concluded that [] the presence of roads in an area is associated with negative effects for both terrestrial and aquatic ecosystems including changes in species composition and population size." (USFS 2000, pages 3-80-81).

"High integrity [forests] contain the greatest proportion of high forest, aquatic, and hydrologic integrity of all [] are dominated by wilderness and roadless areas [and] are the least altered by management. [] Low integrity [forests have] likely been altered by past management [] are extensively roaded and have little wilderness." (USFS 1996a, pages 108, 115 and 116).

"Much of this [overly dense forest] condition occurs in areas of high road density where the large, shade-intolerant, insect-, disease- and fire-resistant species have been harvested over the past 20 to 30 years. [] Fires in unroaded areas are not as severe as in the roaded areas because of less surface fuel, and after fires at least some of the large trees survive to produce seed that regenerates the area. Many of the fires in the unroaded areas produce a forest structure that is consistent with the fire regime, while the fires in the roaded areas commonly produce a forest structure that is not in sync with the fire regime. [] In general, the effects of wildfires in these areas are much lower and do not result in the chronic sediment delivery hazards exhibited in areas that have been roaded." (USFS 1997a, pages 281-282).

"Increasing road density is correlated with declining aquatic habitat conditions and aquatic integrity [] An intensive review of the literature concludes that increases in sedimentation [of streams] are unavoidable even using the most cautious roading methods." (USFS 1996b, page 105).

"This study suggests the general trend for the entire Columbia River basin is toward a loss in pool habitat on managed lands and stable or improving conditions on unmanaged lands." (McIntosh et al 1994).

"The data suggest that unmanaged systems may be more structurally intact (i.e., coarse woody debris, habitat diversity, riparian vegetation), allowing a positive interaction with the stream processes (i.e., peak flows, sediment routing) that shape and maintain high-quality fish habitat over time." (McIntosh et al 1994).

"Although precise, quantifiable relationships between long-term trends in fish abundance and land-use practices are difficult to obtain (Bisson et al. 1992), the body of literature concludes that land-use practices cause the simplification of fish habitat []." (McIntosh et al 1994).

"Land management activities that contributed to the forest health problem (i.e., selective harvest and fire suppression) have had an equal or greater effect on aquatic ecosystems. If we are to restore and maintain high quality fish habitat, then protecting and restoring aquatic and terrestrial ecosystems is essential." (McIntosh et al 1994).

"Native fishes are most typically extirpated from waters that have been heavily modified by human activity, where native fish assemblages have already been depleted, disrupted, or stressed []." (Moyle et al 1996).

"Restoration should be focused where minimal investment can maintain the greatest area of high-quality habitat and diverse aquatic biota. Few completely roadless, large watersheds remain in the Pacific Northwest, but those that continue relatively undisturbed are critical in sustaining sensitive native species and important ecosystem processes (Sedell, et. al 1990; Moyle and Sato 1991; Williams 1991; McIntosh et al. 1994; Frissell and Bayles 1996). With few exceptions, even the least disturbed basins have a road network and history of logging or other human disturbance that greatly magnifies the risk of deteriorating riverine habitats in the watershed." (Frissell undated).

"[A]llocate all unroaded areas greater than 1,000 acres as Strongholds for the production of clean water, aquatic and riparian-dependent species. Many unroaded areas are isolated, relatively small, and most are not protected from road construction and subsequent timber harvest, even in steep areas. Thus, immediate protection through allocation of the unroaded areas to the production of clean water, aquatic and riparian-dependent resources is necessary to prevent degradation of this high quality habitat and should not be postponed." (USFWS et al 1995).

"Because of fire suppression, timber harvest, roads, and white pine blister rust, the moist forest PVG has experienced great changes since settlement of the project area by Euroamericans. Vast amounts of old forest have converted to mid seral stages." (USFS/BLM 2000, page 4-58).

"Old forests have declined substantially in the dry forest PVG []. In general, forests showing the most change are those that have been roaded and harvested. Large trees, snags, and coarse woody debris are all below historical levels in these areas." (USFS/BLM 2000, page 4-65).

"High road densities and their locations within watersheds are typically correlated with areas of higher watershed sensitivity to erosion and sediment transport to streams.

Road density also is correlated with the distribution and spread of exotic annual grasses, noxious weeds, and other exotic plants. Furthermore, high road densities are correlated with areas that have few large snags and few large trees that are resistant to both fire and infestation of insects and disease. Lastly, high road densities are correlated with areas that have relatively high risk of fire occurrence (from human caused fires), high hazard ground fuels, and high tree mortality." (USFS 1996b, page 85, parenthesis in original).

In simpler terms, the Forest Service has found that there is no way to build an environmentally benign road and that roads and logging have caused greater damage to forest ecosystems than has the suppression of wildfire alone. These findings indicate that roadless areas in general will take adequate care of themselves if left alone and unmanaged, and that concerted reductions in road densities in already roaded areas are absolutely necessary.

Indeed, other studies conducted by the Forest Service indicate that efforts to "manage" our way out of the problem are likely to make things worse. By "expanding our efforts in timber harvests to minimize the risks of large fire, we risk expanding what are well established negative effects on streams and native salmonids. [] The perpetuation or expansion of existing road networks and other activities might well erode the ability of [fish] populations to respond to the effects of large scale storms and other disturbances that we clearly cannot change." (Reiman et al 1997).

"Timber harvest, through its effects on forest structure, local microclimate, and fuels accumulation, has increased fire severity more than any other recent human activity. If not accompanied by adequate reduction of fuels, logging (including salvage of dead and dying trees) increases fire hazard by increasing surface dead fuels and changing the local microclimate. Fire intensity and expected fire spread rates thus increase locally and in areas adjacent to harvest". (USFS 1996c, pages 4-61-72).

"Logged areas generally showed a strong association with increased rate of spread and flame length, thereby suggesting that tree harvesting could affect the potential fire behavior within landscapes...As a by-product of clearcutting, thinning, and other tree-removal activities, activity fuels create both short- and long-term fire hazards to ecosystems. Even though these hazards diminish over time, their influence on fire behavior can linger for up to 30 years in dry forest ecosystems of eastern Oregon and Washington". (Huff et al 1995).

The answer, therefore, is not to try managing our way out of this situation with more roads and timber harvest/management. In summary:

• Roads have adverse effects on aquatic ecosystems. They facilitate timber sales which can reduce riparian cover, increase water temperatures, decrease recruitment of coarse woody debris, and disrupt the hydrologic regime of watersheds by changing the timing and quantity of runoff. Roads themselves disrupt hydrologic processes by intercepting and diverting flow and contributing fine sediment into the stream channels which clogs spawning gravels. High water temperatures and fine sediment degrade native fish spawning habitat.

According to the U.S. Forest Service 82% of all bull trout populations and stream segments range-wide are threatened by degraded habitat conditions. Roads and forest management are a major factor in the decline of native fish species on public lands in the Northern Rockies and Pacific Northwest.

• An open road density (ORD) of one mile per square mile of land reduces elk habitat effectiveness to only 60% of potential. When ORD increases to six miles per square mile, habitat effectiveness for elk decreases to less than 20%. (Lyon 1984).

• Black bears in southern Appalachia begin avoiding Forest Service roads when the density exceeds 0.8 miles per square mile. (Brody 1984). Grizzly bears use habitats less than expected when ORD exceeds one mile per square mile and total road density (TRD) exceeds two miles per square mile. (Mace and Manley 1993). Open roads contribute to grizzly bear mortality by poaching and, especially during the black bear hunting season, by mistaken killing. (Holland 1985).

• Roads have a similar, devastating effect on wolves. Studies show that wolves fail to survive in areas where ORD exceeds 0.93 miles per square mile. (Thiel 1985).

• Sediment from roads, both open and closed, damages the environment. In northwest Montana, for instance, 80-90% of the sediment produced by logging and road construction generally is attributable to the road (USFS 1985). The Flathead National Forest estimates that, on one of its most pervasive and sensitive land types, one mile of road produces 98 tons of sediment, 80% of which reaches the stream bed (USFS undated).

In addition, the Forest Service estimates that only a 10% increase in fine sediment deposition in spawning gravel decreases the spawning success of bull trout by 50%. (USFS 1986). A road cut across a hillside intercepts subsurface water flow and runs it down ditches and through culverts. There it is joined by sediment-laden runoff from the roadbed and cut banks before running into a stream. Hence, subsurface water which would have once welled up from below a stream to clean bull trout spawning gravels now carries sediment from the road and land surface and deposits it onto the spawning gravels, where it smothers the eggs and fry.

"Rehabilitation of road-miles cannot be accomplished alone by gating, berming, or otherwise blocking the entrance to a road permanently or temporarily, or seasonally closing roads, but will require obliteration, recontouring, and revegetating." (U.S. Fish and Wildlife Service Regions 1 and 6. 1998a).

"Reduction of total miles of forest roads is an important component of watershed restoration. . . Many miles of roads must be 'put to bed', by pulling culverts, resloping road beds, pulling fill and replanting." (U.S. Fish and Wildlife Service. 1998b).

Old Growth Forests

Old-growth forest habitat is a diminishing resource on public lands due to many factors. Maintaining existing old-growth stands and providing for recruitment of future old growth is necessary to provide for the viability of old-growth associated wildlife species. While not perfect, the Old-Growth Forest Types of the Northern Region (Green et al, 1992) is probably the best reference available for these forests and should be used as a guide to determine old-growth forest habitat.

We strongly caution though that the minimum characteristics in Green et al, are not the recommended standards, but merely the starting point by which to determine whether a stand is classified as old growth. It is NOT to be used to "manage" old growth down to these minimum characteristics. Also, it is important to note that old-growth attributes such as decadence, large trees, old trees, snags, canopy structure, coarse woody debris, etc. are critical components of old-growth forest habitat. Stands that may not have the minimum number of large trees but contain these other important attributes should be considered "recruitment" or future old-growth and allowed to progress towards meeting the Green et al definition.

Old-growth stands function best as habitat when they are connected to other stands. Connectivity can be achieved by corridors of actual old growth or by suitable closed-canopy or mature condition of the matrix between old-growth stands (Thomas, et al. 1990, Bennett, 1999). Stands designated as future old growth that are presently mature may be suitable (Pfister, et al 2000). Linkages, should whenever possible, contain a large fraction of interior forest (i.e., 100 meters from a high contrast edge, Bennett 1999).

Interior old growth habitat (>100 meters from edge of an opening or stand of lesser age or a road) is the most important component of old-growth habitat (Baker and Knight 2000). In general larger stands are more effective as habitat than smaller stands (Pfister 2000). Fragmentation of existing patches of old growth by roads, timber harvesting or other created openings will decrease effectiveness of the patch as habitat due to the reduction in amount of interior old-growth conditions (Baker and Knight 2000).

Stands that met the Green et al definition of old growth but are burned in a forest fire do not cease to provide a valuable function to wildlife and the forest ecosystem and should not be salvage logged. This burned old growth may function differently but it is still important habitat because burned snags stand much longer than beetle-killed trees, and the fact that it burned does not change its age and age is a primary factor in old growth habitat (Pers. comm. R. McClelland).

Management Recommendations to Protect Old Growth

To protect remaining old growth, provide for recruitment of future old growth, and link these currently small and isolated patches, we suggest the following management standards.

• Use the Old-Growth Forest Types of the Northern Region as a first step in identifying old growth stands.

• All existing old growth must be preserved. The Forest Service must calculate how much old growth there is on a watershed (i.e., approximately 10,000 acres) and forest-wide basis. The recruitment of future old growth must be at least double the current area of existing old growth to achieve at least 33% old growth/recruitment old growth in each watershed. Recruitment old growth must be allowed to progress towards the old growth conditions described above. Recruitment old growth is subject to the same protections as designated current old growth.

• Designate the existing old growth and future old growth, map it and connect these stands with linkages as described above.

• Place longer-rotation or less intensive uses adjacent to designated old growth, so that a lower-intensity managed zone serves as a buffer for the old-growth system (Noss and Cooperrider 1994). Avoid placing high intensity land uses (e.g. clearcuts, roads) next to designated old growth (Pfister 2000).

• Integrate future recruitment old growth into the network. Where otherwise equivalent replacement stands exist, choose those adjacent to designated old growth as future old growth.

• No logging should take place in old growth stands. Under limited and extraordinary circumstances some thinning of sapling and pole-sized timber less than 6 inches in diameter may be appropriate but only in ponderosa pine habitat type, without using heavy equipment, and when there are no adverse effects to old-growth dependent, management indicator, sensitive, threatened or endangered species.

Native Fish and Water Quality

The best available scientific information on bull trout supports the following specific, numeric and measurable standards for protection of the Primary Constituent Elements of bull trout habitat. Protecting these PCEs in all watersheds will provide benefits for westslope cutthroat trout and other native aquatic species.

Clean- The bull trout is virtually synonymous with water quality. Bull trout require very clean water and favor streams with upwelling groundwater for spawning (Fraley & Shepard 1989; Baxter & Hauer 2000). Of the many threatened and endangered fish species, bull trout are the most sensitive to changes in water quality, particularly from fine sediments generated by logging and grazing activities. Fine sediments can smother spawning beds and degrade other habitat components. A key determinant is the level of fine sediment ≤ 6.35 mm (Weaver & Fraley 1991) and protecting upwelling groundwater. Protection of critical habitat includes standards to maintain and improve water quality and control lethal sediments. For example, fine sediments < 6.4 mm in diameter must be limited to less than 20% in spawning habitat (Espinosa 1996) and standards must be developed to maintain groundwater.

Cold- Bull trout also require colder water than other native fish. Rieman & McIntyre (1993) reported that researchers recognize temperature more consistently than any other factor influencing bull trout distribution (see also, Pratt 1992). Habitat protection efforts must seek to maintain or reacquire natural cold water conditions. Specifically, stream temperatures in current and historic spawning, rearing and migratory corridor habitats should not exceed 6-8 C for spawning, with the optimum for incubation from 2-4 C

(McPhail & Murray 1979); 10-12 C for rearing habitat, with 7-8 C being optimal (Goetz 1989); migratory stream corridors should be 12 C or less.

Complex- Critical habitat for bull trout isn't just a set of places, but rather a complex arrangement of environmental conditions. Noting that "watersheds must have specific physical characteristics to provide habitat requirements for bull trout to successfully spawn and rear," in its 1998 listing rule the Service listed the habitat components: "water temperature, cover, channel form and stability, valley form, spawning and rearing substrates, and migratory corridors." Implicit in this list of habitat requirements is the understanding that habitat critical to bull trout viability consists of a specific set of physical conditions in addition to particular places. For example, the Service explained that "[m]aintaining bull trout habitat requires stream channel and flow stability." And further explained that "[a]ll life history stages of bull trout are associated with complex forms of cover, including large woody debris, undercut banks, boulders and pools." Bull trout not only need clean, cold water, they need places to rest, hide, feed and travel.

Intact forests, which provide bank stability, shade and woody debris for formation and maintenance of pool habitat, are essential. Climate change will have implications for species such as bull trout because they require cold, clean water. Isaak et al (2010) state: "Riparian vegetation, for example, strongly affects near stream microclimates and minimizing near-stream disturbances associated with grazing, roadbuilding and timber harvest, or facilitating rapid vegetative recovery after these disturbances, could help buffer many streams from additional warming."

Climate change will also increase rain on snow events resulting in stream scour. Shelburg et al's (2010) study of bull trout redd scour emphasized the importance of habitat heterogeneity and refugia availability in sustaining salmonid populations at multiple spatial scales. Loss of complex fluvial spawning habitat such as large woody debris contributes to redd scour after rain on snow events. They conclude: "Processes that form complex habitat in association with LWD may partially mitigate against unfavorable discharge regimes, water and sediment yield alterations due to land-use, or future climate change."

Espinosa (1996) recommends that all streams should average ≥ 90% bank stability and that cobble embeddedness in summer rearing habitat should be < 30% and < 25% in winter rearing habitats. Additional indices include channel morphology including large woody debris, pool frequency, volume and residual pool volumes.

The Flathead Lake Biological Station has been studying the aquatic environment in the Crown of the Continent ecosystem for decades. Hauer et al (2007) found that:

> "Streams of watersheds with logging have increased nutrient loading, first as SRP and NO3, which is rapidly taken up by stream periphyton. This leads to increased algal growth that is directly correlated with the quantity of logging within the watershed. The increased periphyton increases particulate organic matter in transport as the algal biomass is sloughed into the stream. We observed this as increased TP and TN in logged watershed streams. Other studies in the CCE have shown that increased sediment loading and an incorporation of fines into spawning gravel, especially during the summer and fall base flow period, has a

> dramatic effect on the success of spawning by bull trout (Salvelinus confluentus). Experiments have shown that as the percentage of fines increases from 20% to 40% there is >80% decrease in successful fry emergence."

Hauer, et al. (1999) also found that bull trout streams in wilderness habitats had consistent ratios of large to small and attached to unattached large woody debris. However, bull trout streams in watersheds with logging activity had substantial variation in these ratios. They identified logging as creating the most substantive change in stream habitats.

> "The implications of this study for forest managers are twofold: (i) with riparian logging comes increased unpredictability in the frequency of size, attachment, and stability of the LWD and (ii) maintaining the appropriate ratios of size frequency, orientation, and bank attachment, as well as rate of delivery, storage, and transport of LWD to streams, is essential to maintaining historic LWD characteristics and dynamics. Our data suggest that exclusion of logging from riparian zones may be necessary to maintain natural stream morphology and habitat features. Likewise, careful upland management is also necessary to prevent cumulative effects that result in altered water flow regimes and sediment delivery regimes. While not specifically evaluated in this study, in general, it appears that patterns of upland logging space and time may have cumulative effects that could additionally alter the balance of LWD delivery, storage, and transport in fluvial systems. These issues will be critical for forest managers attempting to prevent future detrimental environmental change or setting restoration goals for degraded bull trout spawning streams."

Wherever possible, critical habitat protection should extend to the entire hydrologic watershed. Frissell (1999) reported complex interactions between near-surface groundwater and surface waters in bull trout streams, suggesting a more comprehensive approach to watershed protection. Baxter and Hauer (2000) reported that geomorphology and hyporheic groundwater exchange have a strong influence on bull trout redd locations.

Connected- The sciences of conservation biology and conservation genetics show that bull trout have naturally occurred throughout the Northern Rockies and Pacific Northwest in a system of connected watersheds comprising migratory meta-populations of bull trout (Rieman & McIntyre 1993). Blockages to historic migration routes, both physical and thermal, must be addressed to provide access to spawning streams and protect the genetic integrity of the bull trout. Historically occupied, but currently unoccupied habitat must be protected and reoccupied to reconnect bull trout populations throughout their range.

In addition to these standards, roadless and low road density watersheds deserve special protection measures. Numerous scientific studies and reviews have consistently reported that bull trout strong populations, presence and biomass are inversely related to road densities (Huntington 1995; Quigley, et al. 1996; Rieman, et al. 1997). Bader (2000) found that 78% of bull trout "strong populations" were in roadless area with most of the remainder directly downstream from roadless area. Quigley, et al. (1996) reported that roadless and wilderness areas can provide "strong anchors" for salmonid recovery. In recognition of this strong body of scientific evidence, the U.S. Fish & Wildlife Service (1998) recommended that remaining roadless areas within bull trout range be maintained in roadless condition.

Lynx

The Fish and Wildlife Service designated critical habitat for lynx that includes the Flathead National Forest. They determined the physical and biological features that are the primary constituent elements (PCEs) laid out in the appropriate quantity and spatial arrangement that are necessary for the conservation of the species.

These include, but are not limited to:

1. Space for individual and population growth and for normal behavior;
2. Food, water, air, light, minerals, or other nutritional or physiological requirements;
3. Cover or shelter;
4. Sites for breeding, reproduction, and rearing (or development) of offspring; and
5. Habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species.

Squires, et al. (2010) studied den selection in western Montana. They found that lynx denned in preexisting sheltered spaces created by downed logs (62%), root-wads from wind-thrown trees (19%), boulder fields (10%), slash piles (6%) and live trees (4%). Lynx overwhelmingly prefer preexisting sheltered spaces created by downed logs in mature forests.

Squires also found that lynx generally denned in mature spruce-fir forests with high horizontal cover and abundant coarse woody debris. Eighty percent of dens were in mature forest stands and 13% in mid seral regenerating stands; young regenerating (5%) and thinned (either naturally sparse or mechanically thinned) stands with discontinuous canopies (2%) were seldom used. Maintaining mature and mid-seral regenerating spruce-fir forests with high horizontal cover and abundant woody debris would be most valuable for denning when located in drainages or in concave, drainage-like basins. Management actions that alter spruce-fir forests to a condition that is sparsely stocked (e.g. mechanically thinned) and with low canopy closure (<50%) would create forest conditions that are poorly suitable for denning.

Squires (2006) results also indicate that lynx preferentially forage in spruce-fir forests with high horizontal cover, abundant hares, deep snow, and large-diameter trees during winter. The high horizontal cover found in multistory forest stands is a major factor affecting winter hare densities. Lynx tend to avoid sparse, open forests and forest stands dominated by small-diameter trees during the winter.

They also sampled vegetative characteristics at kill sites and compared these to other locations along lynx travel routes. Lynx killed prey in areas of even higher horizontal cover than they generally encountered along their snow-tracks.

During winter, lynx preferentially foraged in mature, multilayer forests with Engelmann spruce (Picea engelmannii) and subalpine fir (Abies lasiocarpa) in the overstory and midstory. Forests used during winter were composed of larger diameter trees with higher horizontal cover, more abundant snowshoe hares (Lepus americanus), and deeper snow compared to random availability; multilayer, spruce–fir forests provided high horizontal cover with tree branching that touched the snow surface. During winter, lynx killed prey at sites with higher horizontal cover than that along foraging paths. Lynx were insensitive to snow depth or penetrability in determining where they killed prey.

During summer, lynx broadened their resource use to select younger forests with high horizontal cover, abundant total shrubs, abundant small-diameter trees, and dense saplings, especially spruce–fir saplings. Based on multivariate logistic-regression models, resource selection occurred primarily at a fine spatial scale as was consistent with a sight-hunting predator in dense forests. However, univariate comparisons of patch-level metrics indicated that lynx selected homogenous spruce–fir patches, and avoided recent clear-cuts or other open patches. Given that lynx in Montana exhibit seasonal differences in resource selection, we encourage managers to maintain habitat mosaics. Because winter habitat may be most limiting for lynx, these mosaics should include abundant multistory, mature spruce–fir forests with high horizontal cover that are spatially well-distributed.

Montana is near the southern extent of the lynx's current North American distribution. Here, boreal forests are fragmented into patches of suitable habitat at higher elevations, separated by valleys of open grasslands and dry forest types. Southern lynx populations tend to be small and relatively isolated. Therefore, movement and connectivity among groups is particularly important to maintain persistent populations and to recolonize unoccupied habitat.

Soils

Soils are the foundation of terrestrial life. Forest productivity is directly tied to soil conditions. Soil takes thousands of years to develop and is not 'renewable' on a human time scale. Soil is an ecosystem in itself that must be healthy in order to provide for healthy forests, grasslands, and aquatic systems. Actions impacting such complex systems are prone to unintended consequences. Given the life-support role soils play, special care and prudence are essential.

The National Forest Management Act (NFMA) prohibits "irreversible damage" to soils as well as "substantial and permanent impairment of productivity of land". Loss of soil (erosion) and displacement clearly cause "irreversible damage" and "permanent impairment of productivity of land". Loss of coarse woody debris causes soil damage that can last a century or more. Soil compaction negatively impacts soil productivity, overland flow, erosion, stream sedimentation, and late season flows. Soil compaction from logging can persist 50 – 80 years. (ICBEMP, Assessment of Ecosystem Components, 1997)

Avoiding soil damage is the only option; full restoration of soil damage is not generally possible. Compacted soils are not completely mechanically restorable. Mechanized decompaction is only partially effective at decompacting and can compound problems by mixing rock and mineral soil with topsoil resulting in long term reduced productivity. Replacing eroded or displaced soil is problematic. Artificial coarse woody debris replacement is not practical over large areas such as burned clearcuts.

Timber harvest practices including road building, log skidding and slash disposal have caused most soil damage on forest lands.

Nutrient recycling is a critical function of soils that historically has been damaged by treatments that negatively affect the amounts, types, and distribution of organic matter retained on site. (Graham, R. T., 1990) Many years of piling and windrowing of slash using dozer blades has removed not only the litter plus duff layers but also the thin layer of organic rich mineral soil (A horizon) from large acreages of forested lands. (McBride, personal communication) Guidelines for retaining adequate coarse woody debris should be developed based on the site potential and be within the historic range of variability for the fire regime of the site. Coarse woody debris needs to be maintained at natural levels in the interface zone, with exception granted immediately around structures and residences. (Harvey, 1987).

Control of livestock concentration, especially in sensitive riparian areas is essential to maintaining soil porosity and bulk density. The moist soils in these areas become compacted by concentrations of cattle in only a few days. (Warren, S.D., 1986; BNF soil monitoring reports) Gentle upland ridge tops and swales are other "gathering places" for cattle that require special efforts to control their distribution to protect soils from detrimental compaction.

The process of nutrient cycling on the forest lands is primarily effected through fire; this recycling is key to forest and grassland ecosystem health. Therefore, the use of fire when treating vegetation should be in accordance with the natural fire regime for the site, and organic matter left on site should be within the natural historic range of variability for the site type. (Fischer, W. C., 1987)

Mycorrhizal fungi are an essential component of productive soil. (Amaranthus, M. P., 1996) Most regeneration failures may be due to problems with mycorrhizae. Monitoring mycorrhizae needs to be part of soil condition assessments. Mycorrhizae are very temperature sensitive, so soil temperatures need to be monitored.

Monitoring of detrimental soil disturbances needs to include: compaction, displacement, rutting, severe burning, erosion, loss of surface organic matter (especially coarse woody debris), soil mass movement, soil temperature, and damage to micro-biological components of soil (especially mycorrhizal fungi).

Given that monitoring has demonstrated an extensive legacy of soil damage, it is time to include that information in watershed health assessments. There needs to be an inventory of where these highly damaged soils occur and the extent to which they are damaged. The Forest Plan needs to quantify the acreages by watershed and do cumulative effects analysis, including the road systems to understand the full impact management has had on watershed health.

We have provided you with scientific research and ask that you incorporate this information into your analysis.

Sincerely,

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PS – Lists of literature cited, by topics discussed above, are listed below.

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