BUSSEL 484
FEIS

APPENDIX C: USFWS Concurrence & Biological Assessments

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Upper Columbia Fish and Wildlife Office
11103 East Montgomery Drive
Spokane, Washington 99206

May 19, 2007

Ranotta McNair, Forest Supervisor
Idaho Panhandle National Forests
3815 Schreiber Way
Coeur d'Alene, Idaho 83815-8363

Subject: Bussel 484 Project; FWS Ref. 1-9-08-I-0080 (File No.: 105.0600)

Dear Ms. McNair:

This responds to your May 16, 2008, letter referencing a Biological Assessment (BA) for the Bussel 484 Project on the St. Joe Ranger District. Your letter was received in our office on May 19, 2008, and requested our concurrence with your determination of effect for the Canada lynx (*Lynx canadensis*; lynx), and bull trout (*Salvelinus confluentus*).

The proposed project will entail: approximately 2,137 acres of commercial timber harvest consisting of 1,486 acres of commercial thinning, 521 acres of group shelterwood harvest, 53 acres of seed tree harvest, and 78 acres of clear-cut harvest with reserves; fuel treatments that will include 181 acres of slashing, 307 acres of broadcast and 289 acres jackpot burning, 230 acres of grapple piling and burning; planting of conifer seedlings, composed of a mix of early-seral western white pine (*Pinus monticola*), western larch (*Larix occidentalis*), ponderosa pine (*Pinus ponderosa*), and Douglas-fir (*Pseudotsuga menziesii*) on approximately 367 acres; pocket gopher (*Thomomys talpoides*) control on 367 acres to protect tree regeneration; approximately 575 acres of precommercial thinning, 309 acres of which will also entail white pine pruning; 5.0 miles of road construction, 0.5 miles of which will be temporary; 5.4 mile of road reconstruction; approximately 32.3 miles of road put into long-term storage or decommissioned; culvert removal and/or upgrades; and conversion of motorized trail to non-motorized trail.

A portion of the proposed project area is within the re-delineated Grandmother Mountain Lynx Analysis Unit (LAU). Currently lynx habitat conditions within the LAU are well within the forest plan standards required for management of LAUs by the Northern Rockies Lynx Management Direction (NRLMD). Implementation of the proposed project will maintain lynx habitat conditions within the LAU consistent with the NRLMD. No precommercial thinning of lynx habitat will occur within the LAU, and no vegetation management will occur within multistoried stands or late successional forests currently providing winter snowshoe hare (*Lepus americanus*) habitat within the LAU. Pocket gopher control treatments will consist of 0.5

percent strychnine or 2.0 percent zinc phosphide treated oats placed underground by hand into pocket gopher burrows.

The proposed project area is located within the Bussel Creek watershed. Bussel Creek is a tributary of Marble Creek, which flows into the St. Joe River. The St. Joe River is inhabited by bull trout. There are no known barriers preventing bull trout from accessing Marble Creek, and perhaps even the Bussel Creek watershed and its tributaries. Electrofishing surveys conducted in several creeks, including Bussel and Marble Creeks, in 2003 and 2004 did not detect the presence of bull trout. However, it is possible that bull trout could utilize creeks within the project area on a seasonal basis for foraging. No timber harvest will occur within any riparian habitat conservation areas (RHCAs) within any of the creeks within the project area. Some thinning and pruning may occur within RHCAs to improve riparian vegetation health. However, to enhance large wood debris recruitment to the creeks, felled trees will not be removed from the RHCA, and to maintain bank stability, no thinning will occur within 50 feet of any streambank. The proposed new road construction has no new stream crossings and will not be built within RHCAs. Placement of roads into long-term storage or road decommissioning, which may entail removal of culverts, may temporarily increase sediment within the affected creek(s). However, reducing the number of stream crossings and road mileage within RHCAs is expected to reduce sediment over the long-term, which would be beneficial to bull trout. Pocket gopher control will not occur within RHCAs, and placement of strychnine or zinc phosphide treated oats will not occur in areas with saturated soils or during periods of or forecasted periods of heavy precipitation.

We have reviewed the information provided and concur with your finding that the proposed project "may affect, but is not likely to adversely affect" Canada lynx or bull trout. Concurrence by the U.S. Fish and Wildlife Service is contingent upon implementation of the project as presented in the BA.

This concludes informal consultation pursuant to section 7(a)(2) of the Endangered Species Act of 1973, as amended (Act). This project should be re-analyzed if new information reveals that effects of the action may affect listed species or critical habitat in a manner, or to an extent, not considered in this consultation; if the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this consultation; and/or if a new species is listed or critical habitat is designated that may be affected by this project.

If you have further questions about this letter, or your responsibilities under the Act, please contact Bryon Holt at the above address (telephone: 509-893-8014; fax: 509-891-6748).

Sincerely,

Suzanne Audet

for Supervisor

cc: IDFG, CdA, ID.
FS, IPNF, CdA SO (Attn: Shanda Dekome)

Reply to: St. Joe Ranger District Date: 05/16/2008

Subject: Biological Assessment (BA) for the Bussel 484 Project

To: District Ranger, Chuck Mark

This biological assessment, prepared in accordance with U.S. Forest Service (USFS) 2672.41, evaluates the possible effects on habitat and populations of bull trout *Salvelinus confluentus* from activities associated with the proposed Bussel 484 project.

1. THREATENED SPECIES: Bull trout (Salvelinus confluentus)

Endangered Species Act Regulations

Threatened and Endangered species are managed under authority of the Federal Endangered Species Act (36 U.S.C. 1531-1544) and the National Forest Management Act (16 U.S.C. 1600-1614). The Endangered Species Act requires that Federal agencies ensure all actions that they "authorize, fund, or carry out" are not likely to jeopardize the continued existence of any threatened or endangered species. Agencies are also required to develop and carry out conservation programs for threatened and endangered species.

The U. S. Fish and Wildlife Service (USFWS) lists bull trout as a fish species that occur, potentially occur, and/or habitat exists within the St Joe River (Biannual Species List for the Idaho Panhandle National Forests; FWS Reference List 1-9-08-SP-0067 (105.0100), April 9, 2008. The coterminous United States population of the bull trout (Salvelinus confluentus) was listed as threatened on November 1, 1999 (64 FR 58910).

2. PROGRAM: Timber Harvest

3. LOCATIONS: Shoshone County, Idaho
Idaho Panhandle National Forests
St. Joe Ranger District

Potentially Affected Bull Trout Streams: St. Joe River/Marble Creek

Activity Area Location: (see project file map)

The Bussel 484 Project Area is located within the Bussel Creek Watershed which is a tributary of Marble Creek and is eight miles northeast of Clarkia, Idaho in Shoshone County. It includes portions of Township 43 and 44 North; Range 2 and 3 East, Boise Meridian. The entire project area falls within Compartment 484 and covers 14,646 acres. Of this, approximately 2,454 acres are privately owned, so approximately 83% of the analysis area is National Forest System land. There are no inventoried roadless areas within or adjacent to the project area.

4. TIME PERIOD: This project could begin in 2008. All treatments, including burning and site clean-up, are expected to be completed by 2015.

5. PROPOSED ACTION:
Timber Harvest: Approximately 2,137 acres would be treated with commercial timber harvest. The commercial timber harvest would consist of the following:

Table 1

Silvicultural Prescription				Yarding Method			
Commercial Thin	Group Shelterwood	Seedtree	Clearcut w/ Res.	Cable (not skyline)	Skyline	Ground-based	Helicopter
1,486 acres	521 acres	53 acres	78 acres	79 acres	795 acres	552acres	712 acres

Fuel Treatment: Fuels resulting from timber harvest would be treated. This would include approximately 316 acres of yarding tops, 1,732 acres of lopping, 181 acres of slashing, 230 acres of grapple piling followed by pile burning, 20.2 miles of hand fireline construction, 307 acres of broadcast burning, and 289 acres of jackpot burning. Biomass removal for the St. Maries School District Fuels to Schools Project would be a by-product of the proposed fuel treatment. Piled material may be used for the Fuels to Schools Project.

Reforestation: Conifer seedlings would be planted on approximately 367 acres in areas proposed for regeneration harvest. Planting would supplement the expected natural regeneration. Planted conifer seedlings would enhance diversity, assure timely reforestation, and contribute to long-term desired habitat conditions. All planting would be a mix of species, but would predominantly be early-seral western white pine, western larch, and ponderosa pine (where appropriate), mixed with Douglas-fir and other species appropriate for the habitat type and site conditions.

Pocket Gopher Control: Baiting may be done to control pocket gophers on approximately 367 acres in areas proposed for regeneration harvests if needed to protect regeneration. Baiting would include placing either 0.5% strychnine treated oats or 2.0% zinc phosphide oats into pocket gopher tunnels by hand. An initial treatment would be followed by additional treatments, if needed, to minimize losses in the regeneration and meet stocking objectives. This area/activity was not addressed in the pocket gopher control consultation (FWS Ref. 1-9-08-I-0038), completed on January 22, 2008.

Timber Stand Improvement: Approximately 575 acres of precommercial thinning will be implemented to improve the growing conditions of the selected trees by eliminating competition for light and nutrients. This includes 309 acres of white pine pruning that will be done in areas that are also thinned. Precommercial thinning will occur in previously harvested immature stands to improve or accelerate diameter increment growth and to improve the average form of the trees retained in the stand. Existing roads will be used for getting to stands for precommercial thinning. Stands will remain fully stocked following thinning.

System and Temporary Road Construction and System Road Reconstruction:

Approximately 4.5 miles of system road and 0.5 miles of temporary road will be constructed on National Forest System lands to facilitate timber harvest. An additional 0.2 miles of road will be constructed across lands owned by Potlatch Corporation (see *Cost Share Roads* below). When harvest-associated work is completed all 4.7 miles of the new system road will be placed into storage (Road Management Prescription C) for future use and will not be designated for motorized vehicle use. The 0.5 miles of temporary road would be placed into prescription D (see page 4) and no longer provide access and would be fully recontoured to the natural slope when yarding operations served by that road are complete. A total of 5.4 miles of road will be reconstructed.

- **Prescription C:** This is a long-term "storage" with no foreseeable use for the road in the next 15 to 25 years, but it may be needed at some future date. Some low impact roads that do not have a reasonably foreseeable need in the future, may also be closed at this level. The road would be outsloped and have the drainage structures removed. The intent of this prescription is to put the road into "long-term storage" where the road is not a sediment source and does not channel water. The road prism is basically left intact but in a condition that would not require any maintenance. All water courses and problem areas would be stabilized. The roadbed may require light scarification, water bars, and/or decompaction. The road would be seeded and/or planted to establish a vegetative cover in the road

prism. Traffic is usually controlled with a permanent barrier or by recontouring the beginning of the road. Roads with a higher probability of future use (based on management area direction, interdisciplinary team concurrence, current harvest prescriptions, extension possibilities, etc.) should remain on the transportation system. Generally, the management strategy is to discourage, eliminate or prohibit all motorized use. On some routes, use of vehicles less than 50 wide may be acceptable.

Cost Share Roads: Approximately 0.2 miles of road would be constructed on Potlatch Corporation lands under the Merry Creek Cost Share Supplement to facilitate timber harvest on National Forest System lands. The agreement would be supplemented to add construction across Potlatch Corporation lands. New construction may be shared and the Forest Service would buy into Roads 226J and 226M or the new construction may be done with an easement under the Merry Creek Cost Share Supplement.

Access Management: Approximately 20.3 miles of roads will be open to all licensed vehicles, 18.5 miles of roads and trails will be open to vehicles less than 50 inches wide, 31.9 miles of roads and trails will be available for non-motorized use only, and 10.7 miles of road will no longer provide access. The selected alternative will result in higher quality ATV routes with more loops and it will provide three areas of wildlife security to improve the amount and distribution of wildlife security in the area. For additional information see the following table. The selected alternative will:

- Install effective restriction devices throughout the project area.
- Remove the gate on Road 1498. The road is currently open and the proposed action is to leave the road open, so there is no need for the gate.
- Construct 0.3 miles of new trail for motorized vehicles less than 50 inches wide between Roads 1901C and 3590A.
- Convert Bussel Creek Trail 258 (6.5 miles in and outside of the project area) to non-motorized use, remove culverts, harden stream crossings, and install an effective restrictive device.
- Designate Lines Creek Historical Trail as open to motorized vehicles less than 50 inches wide (3.0 miles).
- Repair 2.9 miles of the Norton Creek Railroad Grade and designate that part open to motorized vehicles less than 50 inches wide. During the analysis it became apparent that there would be unacceptable impacts to cultural resources from providing ATV access to the remaining 1.4 miles of the Norton Creek Railroad Grade. Therefore, ATV access will not be allowed on this portion of the grade and motorized access will be blocked with physical barriers.

Table 2: Existing and Selected Road and Trail Access on NFS lands in the Project Area

Roads	Existing Access	Selected Alternative Access	Net Change
Open	31.8 miles	20.3 miles	-11.5 miles
Motorized < 50”	28.4 miles	13.1 miles	-15.3 miles
Non-motorized	6.4 miles	26.1 miles*	+19.7 miles
Trails			
Motorized <50”	6.6 miles	5.4 miles	-1.2 miles
Non-Motorized	4.2 miles	5.6 miles	+1.4 miles

Includes 4.5 miles of new road construction

Road Management Prescriptions: The selected alternative decommissions as many high-risk, lower-value roads as possible. Approximately 32.3 miles of existing roads will be put into Road Management Prescription C or D, and 49 culverts will be removed.

Table 3: Existing and Selected Road Management Prescriptions for NFS Lands

Roads	Existing Condition	Selected Alternative Rx	Net Change	Selected Rx for newly constructed system roads	Selected Alternative Net Change
Open	24.3 miles	20.3 miles	-4.0 miles	0	-4.0 miles
Rx A	17.7 miles	5.2 miles	-12.5 miles	0	-12.5 miles

Rx B	23.2 miles	7.9 miles	-15.3 miles	0	-15.3 miles
Rx C	1.4 miles	21.6 miles	+ 20.2 miles	4.5 miles	+24.7 miles
Rx D	0.0 miles	10.7 miles	+ 10.7 miles		+10.7 miles

- **Prescription D:** Roads "closed" at this level generally have a higher potential for failure than roads with a C prescription and there is a very low probability of needing the road in the future. The road should be decompacted and have major fills, embankments, and higher failure risk areas pulled up onto the roadbed and stabilized. Drainage structures would be removed from stream channels and the adjacent slopes restored to resemble natural condition. The goal of this prescription is to restore site productivity, eliminate the potential of road failures, and reestablish natural water infiltration and drainage patterns. Recontouring or partial pullback is based on site specific conditions and could range from about 20 to 100 percent of the roads length. Prescription D may require only partial recontouring, only pulling up the amount of fill necessary to stabilize the slope condition. Some cut and fill slopes or parts of cut and fill slopes may be evident in areas of recontouring. Following prescription implementation, roads would be removed from the National Forest Road System but tracked as historic routes in the INFRA database. The road management strategy is to eliminate all motorized use. In some exceptional cases, the roadway could be converted for use as a trail.

  Prescription A: Gated - These roads are generally needed for administrative or fire protection purposes with use restricted for resource concerns and/or facility protection. Road use is intermittent and generally only open for a specific use or time period (e.g. timber sale or firewood collection). These roads remain on the transportation system for current and future needs. Road maintenance is at a custodial level to protect the road investment and to minimize damage to adjacent land and resources. The roads are on a maintenance schedule to check for erosion and/ or other maintenance needs. The roadbed should have sufficient inslope, outslope or driveable water bars to facilitate good drainage. Traffic is usually controlled with a gate. Some motorized public uses may be acceptable on some routes (i.e. ATV routes, single track use).

  Prescription B: This prescription is similar to A, but the use and need for the road is anticipated to occur at a lower frequency. The road may remain "closed" for a period of 5 to 15 years between uses but remains on the transportation system for future use. Temporary bridges and culverts assessed to have a higher risk of failure would be removed, and the road surface may be water barred and seeded. Traffic is usually controlled with a physical static barrier (such as a guardrail, concrete or earth barrier). The management strategy is to eliminate all over 50" width motorized use during "closure" periods. Use by vehicles under 50" width may be accepted, discouraged, eliminated or prohibited.

Aquatic Habitat Improvement:

Riparian Planting: Native conifers and shrubs would be planted in some riparian areas up to a total of approximately 1.8 miles along Bear and Little Bear Creeks and in other parts of the Bussel Creek Drainage. This would be accomplished over a period of 10 to 15 years.

Large Woody Debris Placement: A helicopter and hand crews would be used to place 100-200 cover logs in the stream channel of Bear Creek and mechanical equipment would be used to place 100-200 cover logs in upper Bussel Creek to increase stream cover, improve fish habitat and large woody debris to increase stream cover, improve fish habitat and large woody debris. This would take place over 2.5 to 3.0 miles of stream channel in Bussel and Bear creek drainages.

Fish Migration Barrier Removal: To eliminate two human-created fish passage barriers two culverts on Road 1900 would be replaced with culverts specifically designed for fish passage.

Stream Crossing Rehabilitation: Approximately forty-nine stream crossings would be removed throughout the project area as part of the road management prescription changes discussed above.

6. REQUIRED DESIGN FEATURES and MITIGATION

In addition to the previously displayed activities, all design elements, mitigation requirements will be implemented in full as written, unless otherwise noted, or as explicitly modified. These measures represent all practical means to avoid or minimize environmental effects in the context of taking action to achieve the project's purpose and need.

The following discussion identifies the principal design, mitigation and monitoring measures.

1) Air Quality

A. Proposed burning activities follow procedures outlined by the North Idaho Smoke Management Memorandum of Agreement. Currently, the period of air quality monitoring and restriction is March 1 to November 30.

   i. During this period, all burning by the Forest Service is regulated to prohibit or restrict burning where stagnant weather conditions result in poor smoke dispersion and by conducting prescribed burns when ventilation and air quality conditions are good.

   ii. The project is within Airsheds 12a and 12b, which contain no EPA designated non-attainment areas for pollutants. The project area does not contain any Class I Airsheds as designated by the Clean Air Act.

   iii. Burning during any time of the year is regulated by the Idaho State Department of Environmental Quality, which issues burning closures when necessary to protect air quality. The Forest Service cooperates with the State by requesting approval to burn through the Montana/Idaho Airshed Management System in compliance with the Idaho State Implementation Plan.

   iv. Particulate matter projections will be sent to the North Idaho Smoke Management Group one day prior to ignition.

B. Measures used to mitigate effects of prescribed burning on air quality will include:

   i. Broadcast and understory burning will be accomplished as much as practical in the spring and early summer with spring-like conditions. This will reduce the total emissions by burning less of the duff and larger fuels. Risk of fire escape is also less in the spring months than during summer and early fall months.

   ii. The discretion to terminate burns when air quality is threatened.

   iii. Slash piles will be constructed as clean as practical and be burned as dry as practical to enhance efficient combustion.

2) Cultural Resources

A. All known cultural resource sites, eligible or potentially eligible to the National Register of Historic Places, will be protected or mitigated as directed by the National Historic Preservation Act. Any future discovery of cultural resources sites or caves will be inventoried and protected if found to be of cultural significance. A provision will be included in contracts to ensure protection of the sites.

B. Directional felling will be used in timber harvest units along historic railroad and near eligible cultural resources, a buffer will be established near eligible cultural resources, and no logs will be dragged or skidded over the grade or eligible cultural resources. The appropriate Zone or Forest level archaeologist will accompany the layout personnel to ensure that a sufficient buffer is implemented.

3) Fish

A. In-channel activity would occur during base flows after July 15.

B. Inland Native Fish Strategy Standards and Guidelines are specific based upon the proposed activity, i.e. timber harvest, road management, pre-commercial thinning, etc. Standard buffer widths (summarized in Table 4) apply to activities within this project area unless otherwise designated by the district fisheries biologist or district hydrologist. During the layout of units the widths may be greater based on ground conditions. Standard buffer widths are described in Table 4 below.

Table 4 Summary of Inland Native Fish Strategy (INFS) RHCA Widths

INFS Category	Description	RHCA Width
1	Fish-bearing streams	300 feet from either side of channel
2	Permanent, flowing, non-fish-bearing stream	150 feet from either side of channel
4	Seasonal, flowing or intermittent streams; Wetlands < 1 acres; Landslide prone areas	50 feet (non-priority watersheds)

A. Straw bales would be used to mitigate effects of culvert removals where culverts that are fish migration barriers are replaced on Road 1900. Two straw bales placed in the stream at culvert removal sites caused a significant reduction in fine sediment yield (Foltz and others 2007).

B. Areas of exposed soil will be mulched and seeded as needed where large woody debris enhanmnet work is done in RHCAs.

4) Gopher Baiting

The following criteria would be followed during gopher baiting project implementation:

A. Follow manufacturer's recommendations for use.

B. No gopher baiting treatment will occur:

   i. Within INFS RHCA buffers;

   ii. In areas with saturated soil;

   iii. During periods of, or forecasted periods of heavy precipitation.

C. Treated bait will only be applied outside of INFS designated buffers on Category 1, 2, 3, and 4 water bodies.

D. Treated bait will not be stored or transferred within 300 feet of any stream or live water.

E. Treated bait will only be applied to dry soils.

F. Treated bait will not be applied during any forecasted or actual precipitation event.

G. Treated bait will not be directly applied to or discarded in open water bodies such as lakes, streams, ponds, and wetlands.

H. Treated bait will be applied by a licensed applicator in accordance with Idaho State law.

I. Initial setting of bait will occur after July 1.

J. A mandatory provision for bait spill cleanup and disposal will be included in contracts.

K. The application of bait will be monitored by a Forest Service employee, who has been trained in animal damage control.

L. Follow-up gopher control effectiveness surveys will be completed. Any evidence of non-target wildlife/fish mortality will be reported and dead animals will be collected for analysis where possible in order to determine the cause of death.

M. Existing closed gates used to access units will be locked after each entry and exit.

N. Activity behind closed gates and earth barriers will be scheduled for completion prior to August 30th. An extension may be allowed based on extenuating circumstances (fire, weather, etc.) after interdisciplinary review.

O. Earthen barriers removed to allow access for project activities will be replaced upon completion of the unit and before August 30th.

P. Roads that have naturally revegetated will not be cleared to improve access.

5) Noxious Weeds

The following preventative measures will be taken to reduce the risk of noxious weed introduction and spread in accordance with the St. Joe Weed Control EIS (ROD 10/12/99).

A. A provision will be included in all contracts that will require all off-road logging and construction equipment (including machinery used in restoration projects) to be cleaned prior to entering the project area to remove dirt, plant parts, and material that may carry weed seeds.

B. Mulching agents, such as hay or straw, will be certified weed-free prior to use.

C. All seed used for revegetation and erosion-control purposes will be certified weed-free.

D. After implementation, project areas will be reviewed for new populations of noxious weeds. If new populations are found more intensive surveys will be conducted, sites will be mapped, and treatment will be scheduled.

E. If new populations of noxious weeds are found, treatment will be implemented in accordance with priorities set by the noxious weed program. New invader species will be slated for eradication immediately upon discovery. Other weed infestations will be treated according to the direction in the St. Joe Noxious Weed Project EIS and district priorities.

F. All weed treatments will be monitored for effectiveness.

G. To the degree practicable gravel used for road maintenance will be certified from weed free-sources. Gravel sources will be inspected for the presence/absence of noxious weeds prior to utilization of gravel in the project area as appropriate.

6) Old Growth

No timber harvest or road construction will occur in allocated old growth stands.

7) Plants (Threatened, Endangered, and Sensitive)

If Threatened, Endangered, and Sensitive (TES) species are discovered during project implementation, an agency Botanist will be notified so that measures could be taken to maintain population viability. Measures to protect population viability and habitat for all known and newly discovered occurrences will include altering or dropping proposed units from activity, modifying the proposed activity, or implementing buffers around plant occurrences. Provisions for protection of Endangered Species, and settlement for environmental cancellation will be included in contracts.

Table 5: Site–Specific Design Features for Protection of Known Populations of Plant Species at Risk

Unit #	Green bug-on-a-stick moss (*Buxbaumia viridis*)	Naked mnium moss (*Rhizomnium nudum*)	Comments	Site-tree height buffer
41	One occurrence on the edge of the unit.	None in unit.	Formerly *Units 14 and 17*.	One
84	Two occurrences in unit.	One occurrence in unit.		Three
114	Two occurrences in unit.	None in unit.		Two
134	One occurrence in unit.	None in unit.		One
148	Two occurrences in unit.	None in unit.		Two
170	One occurrence in unit.	None in unit.		One
175	One occurrence just outside of unit.	None in unit.	Just outside of the edge of the unit, need to be careful during implementation to not affect shading.	None
176	None in unit.	One in riparian buffer.		None
198	Two occurrences, one in the unit and one on the edge of the unit.	One occurrence on the edge of the unit.	Just outside of the edge of the unit, need to be careful during implementation to not affect shading.	One
200	One occurrence on edge of unit.	None in unit.		One
215	One occurrence in unit.	None in unit		One
224	Two occurrences in unit.	None in unit.		Two
248	None in unit.	Two occurrences in unit.		Two

Unit #	Green bug-on-a-stick moss (*Buxbaumia viridis*)	Naked mnium moss (*Rhizomnium nudum*)	Comments	Site-tree height buffer
254	None in unit.	One occurrence just outside of unit.	Just outside of the edge of the unit, need to be careful implementation to not affect shading.	None
296	None in unit.	One occurrence in unit.		One
311	One occurrence on boundary of unit 321	One occurrence on boundary of unit 321 in same location as *Buxbaumia.*	On border of Unit 321.	One
321	One occurrence in unit.	One occurrence in unit in same location as *Buxbaumia*.	This is another location than the occurrences on the border of Unit 311.	One

8) Precommercial Thinning

A. The maximum diameter of felled trees will be seven inches. Cull trees that exceed the diameter limit will be girdled in lieu of felling to provide additional cavity-nesting habitat.

B. Snags or dead trees will not be cut unless they pose a safety hazard. Snags cut for safety reasons will preferably be left where they fall.

C. Directional felling will be used to minimize slash depths. Trees that cannot be directionally felled will be bucked in lengths not to exceed six feet.

D. Slash will be pulled back a minimum of four feet away from all system road cut banks to prevent slash from falling into ditches and culverts.

E. Established game trails will be kept clear of slash by directional felling and slash pullbacks to maintain travel linkages.

F. A 50-foot no-activity buffer will be maintained along all wetted defined channels, springs, and seeps within and adjacent to thinning units.

G. Existing closed gates will be locked after each entry and exit.

H. Activity behind closed gates will be scheduled for completion prior to the opening of the elk any-weapon hunting season (commonly referred to as “rifle season”). An extension may be allowed based on extenuating circumstances (fire, weather, etc.) after interdisciplinary review.

I. Earthen barriers or other restrictive devices that are removed to allow access for project activities will be replaced upon completion of the unit (within one week) and before October 10th each year.

J. Activity will be conducted using existing access – i.e. no brush will be cleared or other improvements made to roads/trails for pre-commercial thinning activities.

9) Recreation

A. Existing dispersed recreation sites used for harvest operations activities will be restored or rehabilitated if motorized access to the sites would remain available after project implementation.

B. Contractors will follow permit provisions required for camping on National Forest System lands.

C. Where skid trails approach or intersect open roads or designated ATV routes, restrictive devices or debris such as logs, brush and rocks will be placed to effectively stop vehicle use.

D. Warning signs will be placed to inform visitors of logging activities in areas where logging traffic may interfere with recreational traffic.

E. Before trails are officially designated for ATV use they will be reconstructed to standards for ATV use (REC-9).

10) Soil and Water

A. All activities will comply with:

i. Standards identified in the Inland Native Fish Strategy (INFS) EA Decision Notice and Finding of No Significant Impact, signed in July 1995. All alternatives will implement standard riparian habitat conservation area (RHCA) widths specified by INFS (see Table 4). These buffer zones are no-entry for harvest and equipment. Exceptions are described in the Standards and Guidelines, General Riparian Area Management (RA-2) that states: Trees may be felled in riparian habitat conservation areas when they pose a safety risk. Keep felled trees on site when needed to meet woody debris objectives. When necessary to fall trees (for skyline/cable units); the sale administrator may approve the minimum number required and ensure that they remain where dropped.

ii. Objectives of Appendix O of the IPNF Forest Plan, Stream Protection.

iii. Protection of water quality. Best Management Practices (BMPs) will be used to achieve water quality standards (SSW-2). The Forest Service Handbook 2509.22 (Soil and Water Conservation Handbook) outlines BMPs that meet the intent of the water quality protection elements of the Idaho Forest Practices Act, Forest Plan Standards and replaces the Forest Plan Appendix S – Best Management Practices. Other site-specific BMPs may be identified and developed during layout, design or implementation of proposed activities.

iv. Requirements and erosion control guidelines of the Rules and Regulations pertaining to the Idaho Forest Practices Act, Title 38, Chapter 13, Idaho Code.

B. Areas of recent or historic landslides and slumping are considered landslide-prone areas. Although none were identified, if any are located during implementation INFS buffers for Category 4 RHCAs will be applied.

C. Tractor Yarding:

i. Ground-based yarding will be limited to slopes less than 35%.

ii. Only approved skid trail locations will be allowed.

iii. Trails will be spaced at least 100 feet apart, except where converging at intersections.

iv. Skid trail spacing closer than that listed above may be planned when winter logging occurs on at least two feet of settled snow or frozen ground or where adequate slash matting exists.

v. No excavated skid trails will be constructed.

vi. Skid trails in tractor-yarded units will be limited to less than 15% of the unit acreage to comply with IPNF Forest Plan soil quality standards and Region 1 soil quality recommendations.

vii. To minimize disturbance (soil compaction or displacement), practices such as skidding, grapple-piling and mechanical harvesters will occur over slash or on existing skid trails (Forest Plan Monitoring Reports). Units will be designed to utilize non-excavated skid trails and directional falling.

D. Skyline Yarding: The leading end of logs will be suspended during yarding.

E. Temporary Road: All temporary roads will be fully recontoured to the natural slope upon completion of activities. Temporary roads that will remain on the landscape more than one dry season will be waterbarred according to specific interval direction and at specific angles to prevent erosion. After recontouring they will then be covered with a natural, weed-free material to prevent runoff and erosion during spring and/or winter runoff events. This could be on-site slash, straw, or other suitable material.

F. For roads that will be managed as Road Management Prescriptions C and D at a minimum:

i. All culverts will be removed;

ii. All fill within the stream crossing sites will be removed;

iii. Stream gradient and valley side-slopes will be returned to as near natural conditions as possible for 200 feet on both sides of stream;

iv. Road surfaces will be decompacted to a minimum of 18 inches to facilitate and augment infiltration; and

v. The beginning of the treatment area will be fully recontoured for 300 feet or a sight-distance (which ever is less) to eliminate motorized access.

G. Prescribed burning will be done when soil moistures exceed 25% to maintain soil productivity (IPNF Updated Soil Guidelines 1998).

H. The Intermountain Forest Tree Nutrition Cooperative assembled data suggesting that soil potassium levels may be conserved in treatment units by allowing logging slash to over-winter. By leaving sufficient levels of wood on site, long-term soil productivity will be protected.

i. Potassium sources such as needles and limbs will be maintained on site by allowing slash to over-winter prior to all slash disposal treatments except where tops will be yarded (Intermountain Forest Tree Nutrition Cooperative - Garrison and Moore 1998).

ii. Tops of trees will be left in most harvest units.

iii. Silvicultural and burning prescriptions will retain sufficient levels of coarse woody debris on site after slash disposal (Graham and others 1994). The following recommendations will be used in prescriptions:

a. Douglas-fir, larch, and pine types: minimum coarse woody residues of 4-6 inches diameters well distributed through a treatment area at 10-15 tons/acre (Harvey and others 1987).

b. Grand fir / beargrass types at 7-14 tons/acre of coarse woody residues (greater than three inches diameter), western hemlock/bead lily types at 17-33 tons/acre coarse woody residues (greater than three inches diameter).

c. Subalpine fir / beargrass types at 12-23 tons/acre coarse woody residues (greater than three inches diameter) Graham and others (1994).

J. Wetlands identified during field review or harvest preparation will be protected by INFS buffers (50 feet for those less than one acre and 150 feet for those greater than one acre). A resource protection provision in contracts will be used to protect wetlands that may be discovered during operations.

K. Where new road NR8B is constructed through the draw it may be necessary to provide subsurface drainage to avoid moisture saturation and subsequent slope failure. Where it is necessary, horizontal drains, drainage trenches, or drainage blankets may be used to lower the subsurface water levels and to prevent groundwater from entering embankments.

L. Rodent control treatment will not occur within INFS buffers; in areas where the soil is saturated; or during periods of or forecasted periods of heavy precipitation.

M. In Unit 215 and 224 skid trails will be decompacted after use and soils will be monitored to determine effectiveness of decompaction and amount of detrimental disturbance.

N. Culverts identified as not meeting the 100-year peakflow criteria will be upgraded to meet the required size for passing this flow. Roads proposed for storage and recontouring will not be upgraded because the culverts are planned for removal.

11) Transmission Lines

A. Timber harvest roads near the large transmission lines will be kept reasonably free of equipment, products, and debris. The Bonneville Power Administration (BPA) may need to have road access for emergencies. In this case "reasonably free" means that the road could be cleared within an hour of notice and roads will be left clear and passable when contractors leave the area for more than an hour at a time. Logging trucks and equipment may be parked on the right-of-way only during emergencies. When this occurs, the truck/equipment should be grounded with a flexible wire connecting the chassis to a ground rod driven into the ground, or by making the connection to ground with a drag chain attached to the truck/equipment chassis.

B. Where units are adjacent to the transmission line right-of-way, timber will be harvested to reduce the risk of blowdown into the transmission line. Trees immediately adjacent to or under the transmission line will be harvested. If this is not possible, enough timber will be left to maintain wind firmness and reduce the risk of wind-throw into the transmission line.

C. Haul roads will remain a minimum of 50 feet from the point where steel lattice tower legs enter the earth. If this clearance cannot be met, use of road may be permitted if adequate protection for BPA structures from vehicles were provided by the use of guard devices (guard rails, posts, Jersey-type barriers, etc.) If guard devices were used, their location and design must be approved by the BPA.

D. Yarders used near the transmission line will be grounded with copper wire attached to a copper rod pounded six to eight feet in the ground. Skyline cables will be grounded as described above at the tailhold.

E. Chokers will be allowed to hit the ground before they are touched. Track mounted equipment is recommended near transmission lines to drain off induced voltage. If rubber mounted machines are used, a

chain should be dragged behind on the ground to drain off voltage. A minimum separation of 20 feet between equipment and transmission line conductors will be maintained.

F. High-lead or skyline yarding across the right-of-way will not be done.

G. Transmission lines sag on warm days or when they are weighed down by snow or heavy frost. Lines that span long distances have greater potential to sag. The distance between equipment and transmission line cables in the same place can be different with different conditions. The timber harvest prospectus will describe this to potential timber sale bidders.

H. Concentrated columns of smoke under transmission lines will be avoided in order to prevent electrical arc. Burning proposed within the right-of-way will be discussed with the BPA prior to writing the burn plan.

I. No loading of logging trucks, fueling of vehicles or equipment, log decking or storage of logs or flammable materials will be allowed on the transmission line right-of-way.

J. Logging trucks will not be loaded to a height greater then 14 feet above the roadbed. If a tree comes in contact with the transmission line, no attempt will be made to remove it. The BPA Dispatcher will be contacted immediately, 24 hours per day, seven days per week: 360-693-4703 or 800-392-0816.

K. For extreme safety-hazard trees near the transmission line, BPA may be able to provide personnel at the work site with advance notification.

L. The right-of-way width for the Dworshak-Taft No. 1 500-kV transmission line is 150 feet, measured 75 feet on each side of transmission line centerline.

12) Visual Quality

Forest Plan Visual Quality Objectives would be met through implementation of the following:

C. Harvest unit preparation and silvicultural personnel will work closely with the District or Forest visual staff to determine that design criteria are adequate for each application.

D. ***Foreground Partial Retention (Fg/PR): Unit 336:*** Activities will remain visually subordinate to the characteristic landscape, repeating the form, line, color and texture common to the surrounding area with differences in qualities of size, amount, intensity, direction and pattern.

E. ***Background Partial Retention (Bg/PR): Units 11, 14, 15, 17, 18, 30, and 32:*** Form, line color and textures not frequently found in the characteristic landscape might be introduced in these units. Changes will remain subordinate to the visual strength of the characteristic landscape.

13) White Pine Leave Tree Guidelines (Schwandt and Zack 1996)

These guidelines will be utilized in all silvicultural prescriptions for timber harvest. The objective of these guidelines is to retain and protect genetic resources which may contribute to long-term white pine restoration.

14) Wildlife

A. Slash depths next to new and reconstructed roads will not exceed 1.5 feet or if that is not practical, openings that are at least 16 feet wide will be created every 200 feet - especially on ridges and across game trails (IPNF Forest Plan Appendix Y [Leege 1984]).

B. To provide elk security, timber harvest in adjacent areas will have a ridgeline between the disturbance and security area (IPNF Forest Plan Appendix Y [Leege 1984]). This will be done by subdividing harvest areas or contract scheduling.

C. The following snag management recommendations from the Northern Region Snag Management Protocol (January 2000) will be met (where these or higher levels exist). The retention of snags and snag replacements will be applied at the scale of every 5 to 25 acres (Bull and others 1997). Replacement snags will be retained at five times the number of snags per acre.

Table 5: Snag Guidelines

Habitat	Snags / Acre Retention Prescriptions
Warm dry ponderosa pine and Douglas-fir	1-2 greater than 20” dbh
Cool Douglas-fir, warm grand fir, slope <30%	4 greater than 20” dbh
Cool Douglas-fir, warm grand fir, slope >30%	6-12 total, with 2-4 greater than 20” dbh
Cool, wet, and dry spruce, grand fir, hemlock, and alpine fir	6-12 total with 2 greater than 20” dbh

Low elevation cedar and hemlock	12 total with 4 greater than 20” dbh
High elevation spruce/fir/lodgepole pine	5-10 greater than 10” dbh
Whitebark pine/limber pine	All available

D. To meet the objectives listed above in the Snag Guidelines table:

   i. Silvicultural and burning prescriptions will be prepared with the goal of protecting snag and green tree replacement snags, and retaining recommended levels and distribution of coarse woody material during site preparation and fuels treatment.

   ii. Snags that show signs of decay, loose bark, or broken tops will not be designated for harvest (Bull et al. 1997). Exceptions will be made for road construction and log landings.

   iii. The Reserve Tree Guide (IPNF 1995) will be followed to reach objectives of the Snag and Woody Debris Guidelines (IPNF Forest Plan, Appendix X) and worker safety.

   iv. Tree-marking guidelines for wildlife reserve trees will favor the retention of large diameter trees, particularly hollow and broomed trees (Bull and others 1997) except when they pose a safety concern. Western larch, ponderosa pine, and western redcedar greater than 20 inches d.b.h. will be marked as first choices for snags and reserve trees.

   v. Snags cut for safety reasons will be left in the unit - preferably where they fall.

E. In most cases travel cover will be maintained and vegetation management will avoid making openings (i.e. areas with <30% canopy cover) within 200 feet of the ridge top or 400 feet if the other side of the ridge does not provide cover. Where openings will be created on ridges designated as potential travel areas they will meet the following criteria:

   i. Less than 300 feet wide (Heinemeyer and Jones 1994)

   ii. Limited to one side of the ridge top

   iii. Minimum of 800 feet of cover between openings (IPNF Forest Plan Appendix Y [Leege 1984])

   iv. None to be situated in a saddle (IPNF Forest Plan Appendix Y [Leege 1984]; Heinemeyer and Jones 1994)

F. Excavator-piled slash will be left unburned at a rate of one slash pile per five acres and will be constructed to provide wildlife habitat (Heinemeyer and Jones 1994).

G. Goshawk nests found before and during implementation will be protected by a 40-acre, no-activity buffer (Brewer and others 2007). Project activity will be suspended within the post fledgling areas of any active goshawk nests between April 15 and August 15 (ibid). Activity restrictions could be removed after June 30 if the nest sites are determined by the district biologist to be inactive or unsuccessful. Activity within an approximately 420-acre area surrounding each active goshawk nest will comply with the following management recommendations (Reynolds and others 1992):

   i. 20% or less in shrub/seed/sapling size class

   ii. 60% or more canopy closure in immature and older size classes

   iii. Created openings are less than two acres with a minimum of 300 feet between existing or other created openings and snag retention guidelines are applied on each acre of created opening

   iv. Non-regeneration treatment in immature and older stands is thinning from below using irregular spacing of leave trees

H. Provisions for protection of Threatened, Endangered, and Sensitive (TES) Species, and settlement for environmental cancellation will be included in contracts. If TES species and/or significant habitat are discovered during project implementation the district wildlife biologist will be notified so that if needed, measures could be taken to avoid impacts and meet Forest Plan standards. Measures could include altering or dropping proposed units, modifying the proposed activity, or implementing buffers.

I. All activity on lynx habitat in the LAU would be consistent with standards and guidelines from the Northern Rockies Lynx Management Direction (USDA 2007).

6. SELECTED AREA FOR CUMLATIVE EFFECTS ANALYSIS:

In order to determine the project's contribution to "cumulative effects," a "fisheries analysis area" was determined based on selecting an area that contains all potential project activities and defines the largest watershed area that allows for the greatest level of resolution at various geographic and temporal scales. Known past activities which occurred in the analysis area that may have had an affect on the fisheries resources and may residually be affecting the fisheries resources were considered and are discussed in the Current Condition Section below

For this analysis, the resource area of the larger Bussel Creek Watershed (14,662 acres), which is a 6th level HUC, was subdivided into smaller manageable units referred to as "subwatersheds", which are 7th level HUC's. These units are smaller components to the larger watershed. If habitat were maintained in these smaller subwatersheds there would be limited and potentially no effect to the fisheries resource on the larger watershed. One unit found outside the project area boundary and termed as a "Segment of Marble Creek"; is a stream segment found in the lower portion of the 91,160 acre Marble Creek Drainage and is approximately 8 miles long and is not broke out as a "sub-watershed". However, because the project area subwatersheds flow into Bussel Creek, which flows into lower Marble Creek, this segment is included in the analysis area because management upslope may have an indirect affect on the Marble Creek stream segment due to the stream network. The 8-mile segment of Marble Creek, included in the analysis area, starts at its confluence with Bussel Creek and ends at the confluence with the St Joe River to allow an analysis area for species with larger migratory home ranges such as bull trout and cutthroat trout.

The following analysis area discussions will focus on the fisheries resource within the subwatersheds of the Bussel 484 Project Area and the previously mentioned segment of Marble Creek and collectively will hereafter be referred to as the "fisheries analysis area" (See attached map). These discussions are arranged in the following order:

1) *Bussel Creek Subwatershed*
2) *Lines Creek Subwatershed*
3) *Norton Creek Subwatershed*
4) *Toles Creek Subwatershed*
5) *Bear Creek Subwatershed*
6) *Little Bear Creek Subwatershed*
7) *8-mile Segment of Marble Creek*

The selection of the analysis areas was based on the fact that these drainages contain fish habitat and because activities proposed in the Bussel 484 Project area could potentially affect fish habitat in these areas. The project area is NOT within a "Priority watershed" as defined in INFS (USDA 1999 Internal Memo: Key and Priority Watershed Task Team Report). Priority watersheds are watersheds that have excellent habitat or strong populations of inland native fish (with a priority on bull trout), watersheds that could provide those, or degraded watersheds with high restoration potential.

7. ANALYSIS METHODS:

Methodology Used in the Assessment and Description of the Affected Aquatic Environment
The affected environment describes the current condition of the fisheries resource within the project area. It is used to display and describe the fisheries conditions, which have the potential to be affected by the proposed action.

The proposed activities and their potential effects to water quality or changes to stream channels and fish habitat are the main concerns related to the fisheries resources.

Literature and Office Review
The assessment of existing conditions is critical to an environmental analysis because it describes the current condition of the Bussel 484 Project Area and provides a basis for comparing the effects of management alternatives. Information for the fisheries analysis was compiled using data from the field, observations, and data collected from 2002 to 2007. Additional information was gathered from the Bussel 484 *Water* and *Soils* sections; district files, historical records, aerial photographs, and published scientific literature.

GIS Technology
Geographical Information System (GIS) technology was used to combine existing databases, proposed activities and data taken from aerial photos to create maps and summary tables of existing conditions. Landtype maps and descriptions were input into GIS layers to evaluate the existing condition and for the effects analysis. Stream miles are approximations based on GIS and map analysis.

Field Review
Project area streams were quantitatively and qualitatively assessed for habitat quality, habitat quantity, and fish species presence or absence and abundance. Perennial crossings where known fish presence occurred were inventoried and evaluated for fish passage using R-1 protocols for road-stream crossings (Clarkin and others 2003).

Management Indicator Species (MIS) Selection

The analysis of direct, indirect, and cumulative effects to fish is based on effects to sensitive and management indicator fish species (MIS). Under this concept, larger groups of organisms or communities are believed to be adequately represented by a subset of the group. The Forest Plan (IPNF 1987) identifies westslope cutthroat trout and bull trout as potential Management Indicator Species (MIS) for fisheries (Forest Plan Appendix L). Currently, westslope cutthroat are known (Electro fishing Survey results) to utilize streams within the Bussel Creek Project Area for spawning, rearing, over-wintering or migration. Marble Creek is considered to have occasional usage by bull trout (St. Joe River/NF Clearwater River BA, 1998). Furthermore, these two species have similar habitat needs. Consequently, westslope cutthroat and bull trout have been selected as appropriate MIS for the fisheries analysis of this project.

Determination of Limiting Factors to the Fisheries Resource

The deviation from the desired environmental conditions affecting fisheries in the analysis area is called a limiting factor. A limiting factor is a factor that limits or reduces the ability of an area to produce the desired product (Everest and Sedell 1984). In this case the desired products are fish. Therefore, the identification of a limiting factor is developed by comparing the desired conditions to the current condition. Due to site variability, each of the subwatersheds and the Marble Creek stream segment in the Bussel 484 Project Area was analyzed as its own analysis area using a limiting factor assessment, which was conducted to focus analysis efforts on those factors, which are most important. The context of the larger Bussel Creek Watershed, which encompasses the smaller subbasins and potentially affected stream downslope (Marble Creek Stream Segment described above), was analyzed based on the combination of limiting factors found throughout the analysis area and was used to determine the cumulative effects of the project alternatives to the fisheries resource.

The USFWS (1998) developed a list of indicators and measurement parameters (Table 6), which can be used to characterize fish habitat elements and assist in the determination of limiting factors for fish (bull trout). Some of these indicators and measurement parameters are shown in Table 2 and are described in the existing condition section but will not be selected for use in assessing subwatershed or segment condition or for analyzing alternatives quantitatively, there was insufficient historic data for use in meaningful quantitative analysis or because they are elements that will not be altered by any proposed activity, i.e. the amount of the watershed at a certain elevation will not be altered by any proposed activity. However the relative concepts of all indicators shown in table 2 are discussed throughout this report at least qualitatively (which include references to the soils and water reports) as they relate to the condition of and effects to the fisheries resources.

Table 6 Indicators Considered in Limiting Factor Assessment

Indicator	Measurement Parameters
Population Characteristics	Population size, growth and survival, diversity, isolation, persistence
Stream Channel Conditions	Width to depth ratio, stream bank condition, floodplain connectivity
Flow / Hydrology	Change in peak/base flows, increase in drainage network
Watershed Condition	Sensitive landtype, road density, riparian harvest, disturbance regime, disturbance history
Water Quality	Temperature, sediment, chemical contaminants / nutrients
Habitat Access	Physical barriers
Habitat Elements	Substrate embeddedness, large woody debris, pool frequency and quality, large pools, off channel habitat, refugia

The following indicators and subsequent measurement parameters were selected for use in analyzing the existing condition for limiting factors and determining the effects of the alternatives on the fisheries resource and habitat elements in the analysis area. The indicators and measurement parameters, which were most useful and objective in determining if there are indeed limiting factors of the fisheries resource in the fisheries analysis area were selected from Table 6 and are listed in Table 7 below.

Table 7 Indicators & Measurement Parameters for Determining Limiting Factors: Indicators Chosen for Limiting Factor Assessment

Indicator	Measurement Parameters
Population Characteristics	Population size, fish assemblage (*life history*) diversity, persistence
Stream Channel Conditions	Stream bank condition, floodplain connectivity
Flow / Hydrology	Change in peak/base flows
Watershed Condition	Road density, riparian harvest
Water Quality	Sediment, chemical contaminants / nutrients, temperature
Habitat Access	Physical barriers
Habitat Elements	Large woody debris, Pools

Methodologies and Measure Parameters used in Determining Existing Condition and Effects to the Fisheries Resource

This section further discusses the methods used to measure and analyze key components or "indicators" of the fisheries resource within the cumulative effects area. These measurements are important because they help to describe the current condition, indicate limiting factors and can give insight to the overall changes from a reference condition. A clear understating of the current condition and the limiting factors of the fisheries resource will ultimately help to determine direct, indirect, and cumulative effects to the existing condition from the alternatives.

Population Characteristics

Fish Population Size: Existing Presence and distribution were determined based on 2002-2004 electro-fishing surveys and incidental sightings during habitat surveys done by the St. Joe Ranger District Fisheries Crew. Even though bull trout were not located in the analysis area, cutthroat trout populations will be discussed in relation to salmonid or (MIS) habitat condition indication. Fish population sizes in the project area streams can be characterized by the following rates; < 3 fish/100 m^2 is considered low density and > 12 fish/100 m^2 is considered excellent. This methodology and rates for determining population sizes, recommended by Joe Dupont, IDFG, was used for this project.

Life History Diversity: Existing presence and distribution were determined based on electro-fishing surveys, spawning surveys and incidental sightings during habitat surveys.

Persistence (trend): Persistence is addressed at the conclusions and determination sections of this "Biological Assessment" (BA) for bull trout.

For bull trout (Federally listed species) in the BA, a determination is made, based on the analysis of potential effects using the "Bull Trout Matrix/Checklist for Documenting Environmental Baseline and Effects of the Proposed Action(s) on Relevant Indicators" of the "Selected Alternative" to the fisheries resource. One or more of the following determinations on effects to bull trout is made for each action alternative:

1. No Effect
2. May Affect, Not Likely to Adversely Affect
3. May Affect, Likely to Adversely Affect
4. Beneficial Effect

Stream Channel Conditions

Stream Bank Condition: Existing conditions for this parameter is based on qualitative information provided in the Bussel 484 Project *Water Report*, field notes and aerial photo interpretations.

Floodplain Connectivity: Existing conditions for this parameter is based on qualitative information provided in the Bussel 484 Project *WaterReport*, field notes and aerial photo interpretations.

Flow / Hydrology

Peak Flows: Existing conditions for this parameter is based on qualitative information provided in the Bussel 484 Project *Water Report*. USGS gauged data from the St. Joe River annual-series of peak flows was used and extrapolated for the project area. The WATSED model was used to estimate increases in water yield (which can affect peak flows).

Watershed Condition

Road Density: Was determined based on miles of road (road prescriptions; open, gated and barriered) by acres within the individual drainages. These road prescriptions were selected for the road density calculation because they have a potential to produce negative effects to the stream. The remaining road prescriptions, long-term storage and decommission (re-contouring), create hydrologically inert roads and reduce sediment loss and therefore are not included in the road density calculation (Switalski et al 2004, IPNF Forest Plan Monitoring Report 2004, page 94; USDA June 1996). The influence of road density to the fisheries resource was based on research conducted for the Interior Columbia Basin Ecosystem Management Project (ICBEMP) (Lee and others 1997). That research found that the "status of four non-anadromous salmonid species (which include bull trout and westslope cutthroat trout) are less likely to use "moderate" to "highly" roaded areas for spawning and rearing and if found are less likely to be at strong population levels" (Lee and others 1997 p. 1347). Table 4 provides the ICBEMP definitions for road density ratings (Quigley and others 1996 p. 67) which were used as a baseline for describing the existing density of roads within the analysis area and there impacts on the fisheries resource.

Table 7 Total Road Density Ratings

Rating	Very Low	Low	Moderate	High	Extremely High
Densities	0.02-0.1 mi/mi^2	0.1-0.7 mi/mi^2	0.7 – 1.7 mi/mi^2	1.7 – 4.7 mi/mi^2	4.7 + mi/mi^2

Encroaching road density and RHCA road density: Utilizes the same mi/mi^2 rating system as total road density (Table 4) and is used as a baseline for describing the existing density of roads that are within 50 feet from any stream bank and there impacts on the fisheries resource.

Riparian Harvest: Riparian harvest can cause stream banks to become destabilized, shade reduction (increased stream temperatures), and reduce LWD recruitment potential. These effects can thus reduce water quality and fish habitat quality. Acres of "past riparian harvest" were determined by overlaying harvest history information with relevant riparian habitat (RHCA) widths. Riparian habitat widths are based on INFISH categories: 300 feet perennial fish bearing, 150 feet perennial non-fish bearing, and 50 feet intermittent.

Water Quality
Chemical Contaminants / Nutrients: Analysis of this parameter is based on information provided in the *Water* section.

Sediment: The TMDL and WATSED models are used to estimate sediment additions and reductions.

Temperature: Temperature data was collected on several of the streams within the fisheries analysis area using automated Onset temperature recorders. The criteria used for temperature is based on Idaho State criteria (Idaho DEQ 2005), Table 5. A stream is considered to be temperature impaired if the temperature standard is exceeded greater than 10% of the specified time period (Pettit, personal communication).

Due to the inability to deploy stream temperature monitors in early spring because of snow packs and lack of access, only some of the specified time periods for spring spawning of salmonids and juvenile rearing for bull trout were monitored. Therefore it is difficult to get accurate "days of exceedance" percentages. However, there is enough data to show temperature trends throughout the critical summer and fall months. See the individual subbasin description section below for more detail on current stream temperatures.

Table 8 Temperature Criteria Standards

Metric	**Bull Trout**	
Dates	Juvenile 6/1-8/31	Spawning 9/1-10/31
Maximum Weekly (7- day average) Maximum Temperature (MWMT)	13 °C	
Maximum Daily Average Temperature (MDAT)		9°C

Habitat Access
Physical Barriers: Culverts or dams can create migration barriers, which decrease the opportunity for dispersal of fish species. Waterfalls, channel flow intermittency, and some debris jams are part of the reference conditions. In 2004 existing culverts in the analysis area were surveyed. Culverts suspected of having existing accessibility issues were evaluated based on *Region 1 Passage Through Crossings Assessment* (See existing conditions sections for results). The analysis of this factor determines if there would be a change to the number of physical barriers and the overall affect of the existing barriers to the fisheries resource. In the Bussel 484 Project Area high gradient stream reaches in headwater locations were likely the predominant form of natural barriers historically.

Habitat Elements
LWD (large woody debris) and Pools: The description of the current habitat elements (LWD and pools) is based on quantitative surveys conducted between 2002 and 2004 according to procedures outlined in the Region 1 Fisheries Habitat Evaluation Handbook (FSH 2609.23) or the R1/R4 methodology (Overton and others 1997), woody debris inventory, a 1991 habitat surveys for Bussel Creek and Little Bear Creek (field reviewed in 2003 and 2006 respectively), historical records, aerial photographs review, review of information in the Bussel 484 Project *Water Report*, discussions with Idaho Department of Fish and Game (IDFG) and U.S. Fish and Wildlife Service (USFWS).

Quantitative information collected on LWD and pools are compared to the INFS riparian management objectives (RMOs) to help analyze the overall condition of fish habitat in the analysis area.

The INFS Interim riparian management objective for LWD in forested systems is: >20 pieces per mile (3.8 per 1000 feet); >12 inch diameter; > 35 foot in length. Due to the fact that not all ecosystems are the same and site conditions vary widely throughout the INFS zone of influence, caution must be used in assessing LWD conditions using the RMOs as a guideline or comparison tool (INFS EA 1995) . The INFS Interim riparian management objective for pools in forested systems is shown in Table 6 below.

Table 9 Pool Frequency Objectives

Wetted Width (Feet)	10	20	25	50	75	100	125
Pools Per Mile	96	56	47	26	23	18	14

**Pools per mile are converted to pools per feet for display of data.*

The interim RMOs for stream channel conditions provide the criteria against which attainment or progress toward attainment of the riparian goals are measured. Interim RMOs (as a tool) can provide the target or goal toward which manager's aim as they conduct resource management activities across the landscape (INFS EA 1995).

Methodology for Summarizing the Limited Factor Assessment

Following the descriptions of the individual drainages is a summary of the limiting factors to the fisheries resource identified for the cumulative effects area. The number and type of limiting factors are then considered in the determination of the overall condition of the fish habitat. Due to the overall negative affects that roads typically have on watersheds and fish populations (Lee and others 1997), "high" road densities will be considered a limiting factor and "extremely high" road densities will be an even greater weighted limiting factor. For the purpose of this analysis the overall condition of the fish habitat is categorized as follows:

- Unaltered: Fish habitat is considered to be "unaltered" if no limiting factors are identified.
- Adequate: Fish habitat is considered to be "adequate" if no more than two limiting factors are identified (but neither are extremely high road density).
- Moderately Altered/Moderate Risk: Fish habitat is considered to be "moderately altered" from the historic range of variability and/or moderate risk of further undesirable change if no more than three limiting factors are identified (including extremely high road density) or if no more than four limiting factors are identified (none being extremely high road density).
- Highly Altered/High Risk: Fish habitat is considered to be "highly altered" from historic range of variability and/or high risk of further undesirable change if extremely high road density and three limiting factors are identified or more than 4 limiting factors are identified.

Table 10 Limiting Factor Assessment Summary for Cumulative Effects

Subwatershed or Stream Segment	Limiting Factor Assessment Summary
Bussel Creek	Highly Altered/High Risk
Bear Creek	Highly Altered/High Risk
Little Bear Creek	Highly Altered/High Risk
Toles Creek	Moderately Altered/Moderate Risk
Norton Creek	Highly Altered/High Risk
Lines Creek	Highly Altered/High Risk
Lower Marble Creek Segment (approx. 8 miles)	Highly Altered/High Risk

The scale of the Bussel 484 Project Area within the Bussel Creek Watershed (14, 662 acres) in relation to the much larger Marble Creek Watershed (91,160 acres) would tend to render most effects to the much larger adjacent watershed quantitatively immeasurable beyond the temporal and spatial boundaries of the analysis area. Indicators considered in the limiting factor assessment for the large Marble Creek Watershed, as it relates to the 8-mile section of the river found down stream of the project area are analyzed mostly qualitative to more adequately depict potential effects of the proposed alternatives to the fisheries resource down stream of the project area.

Desired Future Condition

The desired future condition for the fisheries resource is based on several sources: desired condition, as identified in the Idaho Panhandle National Forests Forest Plan, that the fisheries habitat will be improved (USDA 1987 Idaho Panhandle National Forests Forest Plan p. II-22); reference conditions; the Bear Bussel Environmental Assessment at the Watershed Scale; Inland Native Fish Strategy (INFS) guidelines 1995; literature reviews; and communication with Idaho Department of Fish and Game.

Cumulative Effects Determination

While impacts can be differentiated by direct, indirect, and cumulative, the concept of cumulative impacts takes into account all disturbances since cumulative impacts result in the compounding of the effects of all actions over time. Therefore, in order to determine the project's contribution of cumulative effects to analysis area, past activities, present activities and reasonable foreseeable activities, which occurred or may occur, are considered for their effect to the fisheries resources in the area

8. STATUS OF SPECIES AND HABITAT REQUIREMENTS:

Bull trout *(Salvelinus confluentus)* is listed as "sensitive" by Region 1 of the USDA Forest Service and as "species of special concern" by the State of Idaho. The U. S. Fish and Wildlife Service (USFWS) lists bull trout as a fish species that occur, potentially occur, and/or habitat exists within the St Joe River portion of the Idaho Panhandle National Forests. (Biannual Species List for the Idaho Panhandle National Forest; FWS Reference No. 1-9-07-SP-0054 (105.0100), January 22, 2007). The coterminous United States population of the bull trout (Salvelinus confluentus) was listed as threatened on November 1, 1999 (64 FR 58910).

The coterminous United States population of the bull trout (Salvelinus confluentus) was listed as threatened on November 1, 1999 (64 FR 58910). The threatened bull trout occurs in the Klamath River Basin of south-central Oregon and in the Jarbidge River in Nevada, north to various coastal rivers of Washington to the Puget Sound and east throughout major rivers within the Columbia River Basin to the St. Mary-Belly River, east of the Continental Divide in northwestern Montana (Cavender 1978, Bond 1992, Brewin and Brewin 1997, Leary and Allendorf 1997).

Throughout its range, the bull trout is threatened by the combined effects of habitat degradation, fragmentation and alterations associated with: dewatering, road construction and maintenance, mining, and grazing; the blockage of migratory corridors by dams or other diversion structures; poor water quality; incidental angler harvest; entrainment (a process by which aquatic organisms are pulled through a diversion or other device) into diversion channels; and introduced non-native species (64 FR 58910).

The bull trout was initially listed as three separate Distinct Population Units (DPSs)(63 FR 31647, 64 FR 17110). The preamble to the final listing rule for the United States coterminous population of the bull trout discusses the consolidation of these DPSs, plus two other population segments, into one listed taxon and the application of the jeopardy standard under section 7 of the ESA relative to this species (64 FR 58930):

Although this rule consolidates the five bull trout DPSs into one listed taxon, based on conformance with the DPS policy for purposes of consultation under section 7 of the Act, we intend to retain recognition of each DPS in light of available scientific information relating to their uniqueness and significance. Under this approach, these DPSs will be treated as interim recovery units with respect to application of the jeopardy standard until an approved recovery plan is developed. Formal establishment of bull trout recovery units will occur during the recovery planning process.

Bull trout population status reviews have found considerable reductions in the distribution and abundance throughout their historic range (USDA Forest Service 1996a, An assessment of the conservation needs of Bull Trout; Rieman and McIntyre 1993).

Bull trout in the St. Joe River system is considered genetically unique when compared to other Columbia River halotypes. A 1992 review of bull trout stocks on the Idaho Panhandle National Forests considered the St. Joe River system to be at moderate risk of extinction (Cross 1992).

BULL TROUT LIFE HISTORY/HABITAT CHARACTERISTICS

Bull trout exhibit both resident and migratory life-history strategies throughout much of their current range (Rieman and McIntyre 1993). Resident bull trout complete their entire life cycle in the tributary (or nearby) streams in which they spawn and rear. Migratory bull trout spawn in tributary streams where juvenile fish rear one to four years before migrating to either a lake (adfluvial), river (fluvial), or in certain coastal areas where they reach maturity, to saltwater (anadromous) (Cavender 1978, McPhail and Baxter 1996, Fraley and Shepard 1989, Goetz 1989). Resident and migratory life-history forms may occur together but it is unknown if they represent a single population or separate populations and it is unknown if individual bull trout may give rise to offspring exhibiting either resident or migratory behavior (Rieman and McIntyre 1993). The multiple life-history strategies found in bull trout populations provide important spatial and genetic diversity that helps protect these populations from environmental stochasticity.

Migratory corridors link seasonal habitats for all bull trout life histories. The ability to migrate is important to the persistence of bull trout (Rieman and McIntyre 1993; Gilpin, *in litt.* 1997; Rieman et al. 1997). Migrations facilitate gene flow among local populations when individuals from different local populations interbreed, or stray, to nonnatal streams. Local populations that are extirpated by catastrophic events may also become reestablished by bull trout migrants. However, it is important to note that the genetic structuring of bull trout indicates that there is limited gene flow among bull trout populations, which may encourage local adaptation within individual populations, and that reestablishment of extirpated populations may take a very long time (Spruell et al. 1999, Rieman and McIntyre 1993).

Bull trout are iteroparous (they spawn more than once in a lifetime), and both repeat- and alternate-year spawning has been reported, although repeat-spawning frequency and post-spawning mortality are not well documented (Leathe and Graham 1982, Fraley and Shepard 1989, Pratt 1992, Rieman and McIntyre 1996). The iteroparous reproductive system of bull trout has important repercussions for the management of this species. Bull trout require two-way passage up and downstream, not only for repeat spawning but also for foraging. Most fish ladders, however, were designed specifically for anadromous semelparous (fishes that spawn once and then die, and therefore require only one-way passage upstream) salmonids. Therefore even dams or other barriers with fish passage facilities may be a factor in isolating bull trout populations if they do not provide a downstream passage route.

The size and age of bull trout at maturity depends upon the life-history strategy and habitat limitations. Growth of resident fish is generally slower than migratory fish; resident fish tend to be smaller at maturity and produce fewer eggs (Fraley and Shepard 1989, Goetz 1989). Bull trout normally reach sexual maturity at four to seven years and may live longer than 12 years.

Bull trout typically spawn from late August to November during periods of decreasing water temperatures. Redds are often constructed in stream reaches fed by springs or near other sources of cold groundwater (Goetz 1989, Pratt 1992, Rieman and McIntyre 1996). Migratory bull trout frequently begin spawning migrations as early as April and have been known to move upstream as far as 155 miles to spawning grounds (Fraley and Shepard 1989, Swanberg 1997). Depending on water temperature, egg incubation is normally 100 to 145 days (Pratt 1992), and after hatching, juveniles remain in the substrate. Time from egg deposition to emergence of fry may exceed 200 days. Fry normally emerge from early April through May, depending on water temperatures and increasing stream flows (Pratt 1992, Ratliff and Howell 1992). The age at migration for juveniles is variable. Ratliff (1992) reported that most juveniles reached a size to migrate downstream at two years of age, with some migrating at one and three years of age. Pratt (1992) had similar findings for age-at-migration of juvenile bull trout from tributaries of the Flathead River. The seasonal timing of juvenile downstream migration appears similarly variable.

BULL TROUT HABITAT REQUIREMENTS

Bull trout are found primarily in cold streams, although individual fish are found in larger, warmer river systems throughout the Columbia River basin (Fraley and Shepard 1989; Rieman and McIntyre 1993, 1995; Buchanan and Gregory 1997; Rieman et al. 1997a). Water temperature above 59 degrees Fahrenheit is believed to limit bull trout distribution, a limitation that may partially explain the patchy distribution within a watershed (Fraley and Shepard 1989, Rieman and McIntyre 1995). Spawning areas are often associated with cold-water springs, groundwater infiltration, and the streams with the coldest summer water temperatures in a given watershed (Pratt 1992, Rieman

and McIntyre 1993, Rieman et al. 1997a, Baxter et al. 1999). Goetz (1989) suggested optimum water temperatures for rearing bull trout of 44 to 46 degrees Fahrenheit and for egg incubation of 35 to 39 degrees Fahrenheit. Bull trout distribution and abundance is positively correlated with pools and complex forms of cover, such as large or complex woody debris and undercut banks, but may also include coarse substrates (cobble and boulder) (Rieman and McIntyre 1993; Jakober 1995; MBTSG 1998). All life-history stages of bull trout are associated with these habitat components (Fraley and Shepard 1989, Goetz 1989, Hoelscher and Bjornn 1989, Sedell and Everest 1991, Pratt 1992, Thomas 1992, Rich 1996, Sexauer and James 1997, Watson and Hillman 1997). Large pools, consisting of a wide range of water depths, velocities, substrates, and cover, are characteristic of high quality aquatic habitat and an important component of channel complexity. Reduction of wood in stream channels, either from present or past activities, generally reduces pool frequency, quality, and channel complexity (Bisson et al. 1987; House and Boehne 1987; Spence et al. 1996). Large woody debris (LWD) in streams enhances the quality of habitat for salmonids and contributes to channel stability (Bisson et al. 1987). It creates pools and undercut banks, deflects streamflow, retains sediment, stabilizes the stream channel, increases hydraulic complexity, and improves feeding opportunities (Murphy 1995). By forming pools and retaining sediment, LWD also helps maintain water levels in small streams during periods of low stream flow (Lisle 1986 *in* Murphy 1995). Juvenile and adult bull trout frequently inhabit side channels, stream margins, and pools with suitable cover (Sexauer and James 1997). Maintaining bull trout habitat requires stability of stream channels and of flow (Rieman and McIntyre 1993).

The function of headwater streams and their importance to downstream supported fisheries has been reviewed by Bilby and Likens (1980) and Schlosser (1982). Their work suggests that organic debris dams are an important component of small stream ecosystems and that their loss results in considerable seasonal and annual variation in the trophic structure and total biomass of aquatic ecosystems.

Stream channel equilibrium (stability) is the balance between sediment yield, water yield, and channel morphology, which exists within a stream system. Studies indicate that shifts away from channel equilibrium can result in negative changes in the structure and function of stream ecosystems (Bilby and Likens 1980, Schlosser 1982) and their dependent fish populations. Bisson and Sedell (1982) reported that where stream channels have become destabilized, riffles elongated and in many cases extended through former pool locations resulting in loss of pool volume. They suggested that declines in older fish might be the result of their dependency upon deeper water habitats. The persistence of bull trout over time can best be provided by maintaining lateral and in-stream habitat complexity in association with channel stability (Karr and Freemark 1983, Karr and Dudley 1981).

The function of headwater streams and their importance to downstream supported fisheries has been reviewed by Bilby and Likens (1980) and Schlosser (1982). Their work suggests that organic debris dams are an important component of small stream ecosystems and that their loss results in considerable seasonal and annual variation in the trophic structure and total biomass of aquatic ecosystems.

Stream bottom and substrate composition are also highly important for bull trout (Pratt 1992), especially for juvenile rearing and spawning site selection (Rieman and McIntyre 1993; Graham et al. 1981; McPhail and Murray 1979). Fine sediments can influence incubation survival and emergence success (Weaver and White 1985) but might also limit access to substrate interstices that provide important cover during rearing and over-wintering (Goetz 1994; Jakober 1995; USDI 1999a). Rearing densities of juvenile bull trout have been shown to be lower when there are higher percentages of fine sediment in the substrate (Shepard et al. 1984). Due to this close connection to substrate, bed load movements and channel instability can negatively influence the survival of young bull trout.

Bull trout are opportunistic feeders, with food habits primarily a function of size and life-history strategy. Like other apex predators, they require a large prey base and a large home range. Sub-adult and adult migratory bull trout move throughout and between basins in search of prey. Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macro-zooplankton, and small fish (Boag 1987, Goetz 1989, Donald and Alger 1993). Adult and sub-adult migratory bull trout are primarily piscivorous, known to feed on various fish species (Fraley and Shepard 1989, Donald and Alger 1993).

9. AFFECTED ENVIRONMENT

Reference Conditions

The following summarizes the reference conditions, which were known to exist, or which were expected in the Bussel 484 Project Area before modern human management activities began. Very little specific information is available for the project area because detailed descriptions were not completed prior to the beginning of management activities in the early 1900s. Reference conditions are therefore inferred based on the physical conditions, which could occur in areas with topography, geology, rainfall, etc similar to the project area. INFS riparian management objectives (RMOs) can also give some quantitative guidance to what typical forested ecosystem streams in a reference condition may have had in terms of LWD quantity and quality and pool quality and abundances. There are some limitations in using INFS RMOs as guidance or a "cook book" for quantitative stream habitat needs or condition because of variability in site-specific conditions. However, INFS RMOs can and will be used throughout this analysis as a guidance tool for comparing "what might have been there pre management" versus "What is there today"? Reference conditions are also based on the known and documented habitat needs of the native species of the project area.

Population Characteristics

Fish Population Size: Bull Trout (Salvelinus confluentus): There is no historic quantitative data that would indicate a population size for the St. Joe River System. Bull trout are native to the St. Joe River system and historically utilized habitat in the Marble Creek Drainage (Macley 1940, Fields 1935), possibly even in the Bussel Creek Drainage because Bussel Creek flows into Marble Creek, which flows directly into the St Joe River, which is inhabited by an adfluvial (fish that live in lakes and migrate into rivers or streams to spawn) population of bull trout. There are no barriers that would prevent bull trout from accessing Marble Creek or Bussel Creek from the St. Joe River. However, not all the stream reaches in the project area would have had suitable habitat for fluvial (fish that spawn in streams or rivers and overwinter or live year-round in streams or rivers) or adfluvial bull trout because they are small, high-gradient streams that are not typically associated with quality pools for resting and riffles with appropriate substrate for spawning, which are requirements for bull trout persistence.

Life History Diversity: Historically, Bussel Creek and many of its tributaries may have had seasonal fluvial, adfluvial and resident usage of all native St. Joe River Basin fish species, which included sculpin, bull trout, and westslope cutthroat trout. This is because the analysis area tributaries are directly connected to the St Joe River, which was and is inhabited by adfluvial and fluvial populations of these native species; and there are no major barriers that would have prevented these species from accessing the Marble Creek or Bussel Creek drainages or permanently isolating fish from accessing suitable habitats across the landscape. However, waterfalls, channel flow intermittency, high stream gradients and some debris jams are part of the reference conditions that naturally and continually fragment and isolate aquatic habitats for various periods of time.

Persistence: Individuals likely used all available suitable habitats for a variety of life stages and life history strategies. Populations of fish species likely thrived in pre-management (Reference Conditions) throughout the St Joe river basin.

Stream Channel Conditions

Stream Bank Condition: Biologically preferred conditions of bull trout also provide insight into reference conditions (such as streambanks and stream channels) for aquatic resources in the Bussel 484 Analysis Area. The preferred habitat of bull trout and westslope cutthroat trout can be generalized as cold, clear streams that possess rocky, silt-free riffles for spawning and slow, deep pools for feeding, resting, and over-wintering (Young 1995; Reel and others 1989). Stable undercut streambanks likely provided cover and protection to salmonids. Streambanks were likely very stable, vegetated and functioning appropriately within a natural range of variability as limited disturbances, other than wildfires, would have significantly impacted riparian vegetation and thus streambanks.

Floodplain Connectivity: Prior to the beginning of management activities in the early 1900s the influence of roads and riparian activities on floodplains was nonexistent, as roads were not yet built. Floodplains and stream channels would have interacted functionally in accordance with natural processes because watersheds were undisturbed (Macy 2008, Bussel 484 Project DEIS, *Water* and *Soils* Reports).

Flow / Hydrology

Peak Flows: Water yields, which can affect sediment yields, were in balance through natural process, such as fire, mass failure and climatic events (Macy 2008, Bussel 484 Project DEIS, *Water* and *Soils* Reports).

Watershed Condition

Watershed Road Density / Encroaching Road Density and RHCA Road Density: Prior to the beginning of management activities in the early 1900s the influence of road density to the fisheries resource was nonexistent, as roads were not yet built (Macy 2008, Bussel 484 Project DEIS, *Water* and *Soils* Reports).

Water Quality

Each subwatershed or stream segment would historically have had natural amounts levels of nutrients, bacteria, pH, dissolved gas, toxic substances, dissolved oxygen, temperature, ammonia, habitat, sediment, and turbidity levels that supported aquatic life (Macy 2008, Bussel 484 Project DEIS, *Water* and *Soils* Reports).

Chemical Contaminants / Nutrients: Each subwatershed or stream segment would historically have had natural amounts nutrients.

Sediment: Each subwatershed or stream segment would historically have had natural amounts sediment inputs.

Temperature: Prior to the beginning of management activities in the early 1900s the influence of roads and riparian activities on riparian areas was nonexistent. Stream temperatures within the project area would have been within the natural range of variability.

Habitat Access

Physical Barriers: Fish would have had unimpeded access to all suitable habitat. However, waterfalls, channel flow intermittency, high stream gradients and some debris jams were part of the reference conditions that naturally and continually fragmented and isolated aquatic habitats and fish species for various periods of time.

Habitat Elements

Large Woody Debris and Pools: Salmonids generally require cool, clear water; clean gravel substrates; well-vegetated banks for shading and bank stability; abundant instream cover such as boulders, logs, and undercut banks; and unobstructed migratory corridors (Bjornn and Rieser 1991). Stream habitats likely would have been influenced by woody debris constrictions and local confinement, which typically produce scour pools and riffles. Large woody debris in streams forms pools and retains sediment and other particular organic matter (Beechie, 1997).

In-stream woody debris and long-term periodic large woody debris recruitment is a key component to stable streambanks and quality fish habitat. Due to the forested nature of the ecosystem and stream gradients within the project area, aquatic habitats would likely have included a diverse mix of fast and slow water habitats depending greatly on the abundance of in-stream LWD and periodic recruitment of LWD. It is also expected that beaver activity would have had an influence on channel morphology and associated habitat conditions in the area.

The preferred habitat of bull trout can be generalized as cold, clear streams that possess rocky, silt-free riffles for spawning and slow, deep pools for feeding, resting, and over-wintering (Young 1995; Reel and others 1989). Therefore it is inferred that habitat elements preferred by bull trout existed in the reference state.

Existing Condition

This section further discusses and analyzes the existing condition of key components or “indicators” of the fisheries resource within the cumulative effects area. These indicators are important because they help to describe the existing condition, indicate limiting factors and can give insight to the overall changes from a reference condition.

Analysis of effects from historical activities (federal and/or non-federal) is important in determining causes of the existing condition and can help determine potential cumulative effects of present and future activities (federal and/or non-federal)on the fisheries resources in the analysis area. A list of historic activities and there potential effects to the environment which has contributed to the development of the existing condition of the fisheries resources in the analysis area is found below in Table 8. Some historical activities have had little effect on existing conditions of the fisheries resources and others have had significant effects. Historical activities that have had a significant effect on the current condition of the fisheries resources are discussed in more detail in the following Existing Condition

section of this document. Incremental and collective effects from past, present and reasonably foreseeable federal and/or non-federal activities to the fisheries resources are discussed in the Cumulative Effects sections below.

Table 11 Historical Activities that Occurred in the Area

Historic Activity	Potentially Effects To Stream or Fish Habitat	References
Railroad construction	Increased stream temperature (loss of shade), sedimentation, stream bank degradation	(Macy 2008, Bussel 484 Project DEIS, *Water* and *Soils* Reports).
Splash dams	Stream channels and stream banks degraded, Habitat loss (i.e. pools and LWD), Sedimentation	(Macy 2008, Bussel 484 Project DEIS, *Water* and *Soils* Reports).
Log drives	Stream channels and stream banks degraded, Habitat loss (i.e. pools and LWD), Sedimentation	(Macy 2008, Bussel 484 Project DEIS, *Water* and *Soils* Reports).
Mechanical site preparation	Increased stream temperature (loss of shade in RHCAs), Stream Channels degraded, Habitat loss (i.e. pools and LWD), Sedimentation if done in RHCAs	(Macy 2008, Bussel 484 Project DEIS, *Water* and *Soils* Reports).
Prescribed burning	Potential sedimentation if done within RHCA	(Macy 2008, Bussel 484 Project DEIS, *Water* and *Soils* Reports).
Tree planting	No Indication of past effects. Some planting may have occurred in the RACA thus helping to reduce stream temperatures long term.	n/a
Road construction	When construction occurred within RHCAs Increased stream temperature (loss of shade in RHCAs), Stream Channels degraded, Habitat loss (i.e. pools and LWD, physical fish barriers), Sedimentation, diminished quality of spawning gravels channel network loss, Floodplain/channel disconnection may have occurred.	(Macy 2008, Bussel 484 Project DEIS, *Water* and *Soils* Reports).
Road maintenance	Minimal sedimentation if done within RHCAs.	Road Maintenance BMP. St Joe Ranger District Road Maintenance BA.
Pre-commercial thinning	Stream Channels, Habitat (i.e. pools and LWD), Pre-commercial thinning done in RHCA could have increased the health and growth rates of trees and stands that will eventually fall in streams creating cover and habitat for fish from LWD.	
Pocket gopher control	No effects	St. Joe Ranger District, Pocket gopher control, monitoring report 2002.
Transmission line maintenance	No Indication of past effects	n/a
Firewood gathering	No Indication of past effects. Removal of potential LWD in RHCAs may have occurred but is not known.	n/a
Camping	Minimal effects if any	n/a
Berry picking	No Indication of past effects	n/a
Christmas trees (personal-use)	No Indication of past effects	n/a

Motor vehicle use: full-size, ATV, and motorcycle	Where occurrence is inside RHCAs Stream channels and stream banks degraded, Sedimentation can occur.	(Bussel 484 Project DEIS, *Fish*, *Water* and *Soils* Reports).
Fire Suppression	Minimal Affects for the 2007 elm street fire. Earlier suppression efforts reduced effects of natural fire frequency leading to heavier fuel load which may have increased the potential for higher severity fires.	(Bussel 484 Project DEIS, *Fire/Fuels* Reports).
Wildfires	Increased stream temperature (loss of shade), sedimentation, stream bank degradation (i.e. loss of pools and LWD). Historically (pre 1900's) fire would likely have had effects that were within a natural rage of variability and local fauna and flora would have been adapted.	Bussel 484 Project DEIS, *Fish*, *Water* and *Soils* Reports). Bussel 484 Project DEIS, *Fire/Fuels* Reports).
Weed control under the St. Joe Noxious Weed EIS	No Indication of past effects	n/a
Timber Harvest	For the entire Bussel Creek Watershed 2034 acres since 1960 has been harvested of which 400 acres were within RHCAs**,** When Harvest occurred within RHCAs Increased stream temperature (loss of shade in RHCAs), Stream Channels degraded, Habitat loss (i.e. pools and LWD), Sedimentation, Floodplain/channel disconnection may have occurred.	Bussel 484 Project DEIS, *Fish*, *Water* and *Soils* Reports).

Population Characteristics

Fish Population Size:

Bull trout *(Salvelinus confluentus)* is listed as "sensitive" by Region 1 of the USDA Forest Service and as "species of special concern" by the State of Idaho. The U. S. Fish and Wildlife Service (USFWS) lists bull trout as a fish species that occur, potentially occur, and/or habitat exists within the St Joe River portions of the Idaho Panhandle National Forests. (Biannual Species List for the Idaho Panhandle National Forest; FWS Reference No. 1-9-07-SP-0054 (105.0100), January 22, 2007). The coterminous United States population of the bull trout (*Salvelinus confluentus*) was listed as threatened on June 10, 1998 (64 FR 58910).

Bull trout population status reviews have found considerable reductions in the distribution and abundance throughout their historic range (USDA Forest Service 1996a, An assessment of the conservation needs of bull trout; Rieman and McIntyre 1993). However, the IPNF Forest Plan monitoring reports indicate that bull trout populations appear to be stable throughout most of northern Idaho (USDA Idaho Panhandle Forest Plan Monitoring and Evaluation Reports 1998, 2000, 2002 and 2003).

Genetic analysis has shown bull trout populations in the St. Joe River system to be a unique stock though they are closely linked to the upper Columbia River clad - one of three major groupings of bull trout throughout the Columbia and Klamath River drainages (Williams, unpublished). In a status review of bull trout on the Idaho Panhandle National Forests stocks from the St. Joe River system were considered to be at moderate risk of extinction (Cross 1992).

Currently, bull trout are known to occupy habitat in the St. Joe River and many of its tributaries. Occasional bull trout presence is "probable" for Marble Creek Mainstem (St. Joe River/NF Clearwater Basins B.A.). This is because Marble Creek is a direct tributary to the St Joe River, which is inhabited by an adfluvial population of bull trout, and there are no barriers that would prevent bull trout from accessing Marble Creek. There are no historic records of bull trout occurring in Bussel Creek or any of its tributary streams found within the project area. No bull trout were located during most recent surveys of the streams found within the project area and no recent data exists that confirms the presence of bull trout in Marble Creek.

Life History Diversity: Bussel Creek and many of its tributaries likely have seasonal fluvial, adfluvial and resident usage of sculpin and westslope cutthroat trout and possibly bull trout (although they have not been documented in the project area). This is because the analysis area tributaries are connected, by Marble Creek, to the St Joe River which was and is inhabited by adfluvial and fluvial populations of these native species, and there are no major barriers that would have prevented these species from accessing the Marble Creek or Bussel Creek Drainages or permanently isolating fish from accessing suitable habitats across the landscape. However, waterfalls, channel flow intermittency, high stream gradients and some debris jams are part of the reference conditions that naturally and continually fragmented and isolated aquatic habitats for various periods of time. Even though it is possible for bull trout to access the analysis area streams other than Marble Creek, they likely do not currenty use these streams due to elevated stream temperatures and other deraded watershed conditions described below.

Non-native species: Rainbow trout were planted in the St. Joe within the segment of river adjacent to the project area in the 1960s. Recent surveys have not located rainbow trout within any of the tributaries of the project area.

Stream Channel Conditions

Streambank Condition: Recent habitat data shows that most of the major tributaries in the analysis area currently have a high percentage of stable "undercut streambank" which can indicate excellent fish habitat. Some existing streambank and channels in the analysis area were likely degraded by historical dam and bridge construction. Stream channels may have been cleared and/or flooded which would have destabilized or eliminated streambanks (Macy 2008, Bussel 484 Project DEIS, *Water* Report). Quantitative and qualitative field surveys from 2002 to 2006 confirmed some marginal stream habitat conditions reported following 1991 surveys within some of the drainages. Stream habitat conditions in 1991 included predominately low gradient riffle habitat (70 percent area surveyed within the uppermost reach of Bussel Creek in 1991). This condition may be due to stream bank and channel degradation, from log drives and riparian harvest, which can decrease sinuosity, increase sediment (which fill in pools) and thus straighten and homogenize the stream channel. Bisson and Sedell (1982) reported that where stream channels have become destabilized, riffles elongated and in many cases extended through former pool locations resulting in loss of pool volume. 2002-2006 qualitative and quantitative surveys revealed that large woody debris abundance was considered very low in some analysis area streams and moderate to high in others. Stream banks may have also been degraded due to a lack of bank and channel stabilizing LWD.

Recent surveys indicate a need to improve stream habitat and riparian conditions in selected streams and reaches within the fisheries analysis area because some stream channels and riparian conditions (stream banks) have likely been altered by human activity (i.e. riparian harvest, log drives and road construction). The reduction of mature forests within riparian areas of some streams from wildfire, timber harvest and road building within the RHCA has reduced the potential for recruitment of large woody debris which influences stream bank stability. The change and reduction in the quality and quantity of stable streambanks as well as other instream habitats from past activities has possibly impacted the density and diversity of the fish populations in these streams.

Beaver dams were noted on 1998 field maps (Macy 2008, Bussel 484 Project DEIS, *Water* Report). More recent beaver activity was noted in the analysis area in 2003. Therefore, it is assumed that beavers are potentially persistent in the analysis area. Beaver dams may naturally affect streambanks because they trap sediment, flood channels and cause aggradations in the upstream vicinity of the dam.

Comparisons of historical (1933, 1965, 1979) and recent aerial photographs were used to determine that channel and riparian (stream banks) conditions in the entire analysis have improved since 1933, and the historic log drives. The inherent result of past log drives likely degraded stream channels and streambanks in some sections (Macy 2008, Bussel 484 Project DEIS, *Water* Report).

The 1933 aerial photographs show a managed and burned landscape, creek valley bottoms heavy with depositional areas, and a relatively wide stream channels (in the larger streams) that are braided or have multiple channels and degraded streambanks. Overall, vegetation on streambanks was sparse in 1933, either from fire or harvest or both. There was almost no riparian vegetation present in some stream reaches according to the 1933 photos (Macy 2008, Bussel 484 Project DEIS, *Water* Report).

The 2002 aerial photographs show that the riparian areas are well vegetated and the stream channels are generally a single thread with adjacent vegetated floodplain and stream bank in the valley bottom. Field crew photographs also

document the well-vegetated riparian areas. The landscape, riparian zone and streambanks are recovering from the sparse vegetative conditions present in 1933. The stream channels and streambanks appear stable in the 2002 photos with no evidence of substantial deposition based on comparing the 1933 to the 2002 photos. Splash dams were built to facilitate moving logs downstream (log drives) and are visible in 1933 aerial photographs. Remnants of the splash dams are still visible in 2007. Splash dams interrupted sediment transport processes and stored sediment upstream of their location. These aggraded areas are currently riparian meadows where some channel and streambank adjustment may still be occurring. Vegetated meadows currently exist where splash dams were located in 1933. The resilience of the stream and landscape is evidenced in the 2002 photos and 2004 NAIP image compared to 1933 conditions. In 2002 valley walls no longer exhibit signs of erosion and appear vegetated or are stable slopes (Macy 2008, Bussel 484 Project DEIS, *Water*).

Floodplain Connectivity: Channel depth cannot be determined from aerial photographs. The photo analysis did not show large areas of current deposition as would be expected if substantial entrenchment were occurring. Developed floodplains are found on many streams in the Bussel 484 Analysis Area. These floodplains are generally narrow, well vegetated, and have good lateral connectivity to the stream. However, the moderately confined nature of the valleys limits extensive floodplain development. The largest floodplains are located upstream of old splash dams where large amounts of sediment are stored behind the dams. These larger floodplains are approximately 100-150 feet wide. Minimal floodplain widths are in the higher headwater elevations or where bedrock constriction creates a narrow valley bottom like at Bussel Creek cross-sections 6 and 7. Some stream channels have been disconnected and confined from their floodplains in areas due to high riparian road densities.

Flow / Hydrology

Peak Flows: Many peak flows in northern Idaho are associated with mid-winter rain-on-snow events and rain-on-spring-snow events with peaks that are usually higher and of shorter duration than normal spring high flows (MacDonald and Hoffman 1995). These types of peak events can be difficult to predict because their frequencies are random, and they do not occur on an annual basis. They are dependent on certain climatic conditions such as air temperature, snowpack characteristics, rain-on-snow elevations, and intensity and duration of precipitation (Berris and Harr 1987; Kappesser 1991). A review of discharge (relatively short term) records from the Calder, Idaho gauging station on the St. Joe River and extrapolated data for Bussel Creek indicates that peak flows are not appreciably changing. Water yield and peak flows may have subtly increased since timber harvest and road-building activities began, because of decreased transpiration and increased water delivery by road collection and drainage features. Openings created by timber harvest may have increased snow accumulation. Increased water yield or changes in peak flows has the ability to increase sediment transport (Leopold and others 1964).

It is likely that a decrease in water yield and peak flows would occur over time (relatively long term) as the vegetation within these watersheds becomes denser and utilizes more soil moisture and the canopy intercepts more precipitation. Increased water yield or changes in peak flows has the ability to increase sediment transport (Leopold and others 1964).

Watershed Condition

Road Density (Encroaching Road Density and RHCA Road Density): Roads built in the Bussel Creek watershed were historically used for forest management activities such as fire suppression and timber harvest. Analysis of 1933 photos showed trails or roads across the landscape and some that ended at the valley bottoms.

The influence of road density on the fisheries resource was based on research conducted for the Interior Columbia Basin Ecosystem Management Project (ICBEMP) (Lee and others 1997). That research found that the “status of four non-anadromous salmonid species (which include bull trout and westslope cutthroat trout) are less likely to use moderately to highly roaded areas for spawning and rearing and if found are less likely to be at strong population levels” (Lee and others 1997 p. 1347)

Roads primarily influence salmonid by obstructing fish passage and degrading spawing, incubation, and juvenile rearing habitat (Furniss et al. 1991).

In a study done by *Young et al. 1991*, it was found that watersheds that had higher total road density, roads in use and road stream crossings exhibited higher percentages of fine sediment.

High road density can compromise an area's ability to support fish by increasing the potential for disturbance by humans, habitat fragmentation, sedimentation, and encouragement of OHV use in adjacent or nearby riparian areas.

The total road density rating, based on Table 12, for the fisheries analysis area is "High" with an average of approximately 4.6 miles of road per square mile. There is about 104 mile of road within the entire Bussel Creek watershed, which includes all subwatersheds.

The highest road density is in the Norton Creek Subwatershed at 6.05 mi/mi^2 and the lowest road density is found in the Lines Creek Subwatershed at 2.24 mi/mi^2.

Among other watershed conditions, Table 9 below displays the road densities for the individual subwatersheds, as well as the total road density for the entire fisheries analysis area but not including the road density in the Marble Creek Drainage (which is "high" to "extremely high"). This includes roads on private land. Table 7 above gives the basis for road density ratings.

Table 12 Watershed Conditions and Habitat Access

Drainage Name	Drainage Area (Acres)	Sensitive landtypes (Acres)	Total Road Density[1] (mi/mi^2)	Total Road Density Ratings	Encroaching Road Density[2] (mi/mi^2)	RHCA Road Density[3] (mi/mi^2)	Past Harvest in RHCA (acres)	Human Caused Physical Barriers[4]
Bussel	4,919	413	5.1	Extremely high	.17	.90	180	N
Bear	1,198	120	4.98	Extremely high	.08	2.2	38	N
Little Bear	878	111	5.86	Extremely high	.05	1.0	39	N
Toles	2,432	183	2.62	High	.04	.4	76	N
Norton	3190	293	6.05	Extremely high	.1	.90	50	2H
Lines	2,045	175	2.24	High	.05	.23	17	N
Bussel Watershed Totals	14,662	1,295	4.5	High	.10	.69	400	2H

All numbers are approximate and are derived from IPNF GIS information queries (F-4).
1 = Based on total watershed acres; 2 = Based on encroachment into 50' stream buffer
3 = Based on encroachment into RHCA buffers; N = No Barrier; H = Human created

Watershed Conditions and Habitat Access for the Marble Creek 8-mile section of stream found below the project area were analyzed qualitatively to adequately depict the existing condition and potential effects of the alternatives to the much larger watershed area and fisheries resource down stream of the project area. See the Individual Subwatershed/Segment Existing Condition Discussion and Limiting Factor Assessment below.

Riparian Harvest: The 1933 aerial photographs show a managed and burned landscape with sparse vegetation even within the riparian zones of the analysis area. There was almost no riparian vegetation present in some stream reaches according to the 1933 photos (which is in part due to an unknown amount of riparian harvest). Table 12 above shows the amount of recorded riparian harvest per subwatershed since 1960. The amount of riparian harvest that has occurred since 1960 appears to be minimal.

The 1933/2002 aerial photograph comparison indicates that the riparian vegetation in the areas that had past riparian harvest is recovering well (Macy 2008, Bussel 484 Project DEIS, *Water* Report).

Water Quality

Chemical Contaminants/Nutrients: Chemical Contaminants and nutrients are currently not an issue within the project area (Macy 2008, Bussel 484 Project DEIS, *Water* and *Soils* Reports).

Sediment: Sediment yield is expected to be above reference conditions because of road construction, stream crossings and routing to the stream system (Macy 2008). Sediment movement within stream channels likely increased with the removal of LWD that once provided stability over decades (Montgomery and Buffington 1998). Removal of LWD during log drives of the early 1900s probably changed channel morphology from LWD forced step pool to plane bed, which decreased aquatic habitat diversity (Lower Marble Creek EA, 1997). The DEQs TMDL model identifies a current sediment level of 387 tons/year in the Bussel Creek Watershed (DEQ 2003 p. 42). The WATSED model identifies a relative current sediment level of 548 tons/year in the Bussel Creek Watershed.

Past burning within the Bussel Creek watershed may have caused high sediment delivery to stream channels (Macdonald and Coe 2007 pp. 154-155) due to massive loss of vegetation. This also may have caused some of the aggradation evident in the 1933 aerial photographs. Although in a reference state, sediment yields were in balance through natural process such as fire, mass failure and climatic events.

The 1998 DEQ, 303(d) list had Bussel Creek tributaries (Little Bear and Bear Creeks) identified as non-supporting beneficial uses because of bacteria, sediment and temperature. Bussel Creek is listed on Idaho's 2002, 303(d) list of Water Quality Limited Water Bodies. The pollutants of concern are temperature and sediment. Bussel Creek is a tributary to Marble Creek, which is not listed for sediment. The Bussel 303(d) listing applies to the entire Bussel Creek Watershed. TMDLs were developed for Bear and Little Bear Creeks within the Bussel Creek watershed. The Bear and Little Bear sediment TMDL calls for reducing sediment by 14 tons/year from National Forest System (NFS) lands and 7 tons/year from non-NFS (private and state lands).

Temperature: The 1998 and 2008 DEQ, 303(d) list had Bussel Creek tributaries (Little Bear and Bear Creeks) identified as non-supporting beneficial uses because of temperature. Stream temperatures in both streams currently exceed federal (10 degree Celsius seven-day running average from May 1-September 1) and state (9 degree Celsius daily maximum spawning standard from September 1-October 31) bull trout temperature standards (DEQ, 2003). Bussel Creek is a tributary to Marble Creek, which is also listed for temperature. The Bussel Creek 303(d) listing for temperature applies to the entire Bussel Creek Watershed.

The temperature TMDL calls for increasing shade canopy over the stream channels by 20-80% in Bear and Little Bear Creeks. Past riparian timber harvest and fires may have had negative effects to stream temperatures by reducing canopy and thus exposing channels to solar radiation. See the individual subbasin description section below for more detail on current stream temperatures.

Habitat Access

Physical Barriers: In the Bussel 484 Project Area high gradient stream reaches in headwater locations are the predominant form of natural barriers. There are also two human-caused fish barriers in the Bussel 484 Project Area on road 1900 on Norton Creek mainstem and a tributary to Norton Creek. Approximately 3 miles of fish habitat in the Upper Norton Creek Drainage is not currently being fully seeded due to these two migration barriers.

Habitat Elements

Large Woody Debris: Wildfire burning 48% of the Bussel Creek watershed may have caused a reduction in LWD long-term recruitment while in some cases wildfires may have increased LWD inputs from the residual dead and windfall trees.

Fisheries field crews collected recent data on the woody material associated with stream channels. Large woody debris data was collected in the mainstems of Lines Creek, Toles Creek, Norton Creek, Bear and Little Bear Creek. Only 1991 qualitative data exists for Bussel Creek itself. See individual subwatershed discussion section below for summarized LWD data.

The overall average for all the reaches surveyed in the fisheries analysis area is approximately five pieces of LWD per 1,000 feet which is above the INFS standard of >3.8 pieces per 1000ft; >12 inch diameter; >35ft long**.** Several reaches were below INFS standards and several reaches were well above the standards for LWD abundance. See individual subwatershed descriptions section below for more details on LWD for each subwatershed.

Several stream reaches throughout the analysis have a low abundance of LWD relative to INFS RMO target that is likely due to historic removal of LWD from stream channels, riparian harvest (which reduces recruitment availability), log drives (which can destroy or remove riparian vegetation) and road building.

Pool Habitat: Removal of LWD during log drives of the early 1900s probably changed channel morphology from LWD forced step pool to plane bed, which decreased aquatic habitat diversity (Macy 2008). Bisson and Sedell (1982) reported that where stream channels have become destabilized, riffles elongated and in many cases extended through former pool locations resulting in loss of pool volume.

Some stream channels and riparian conditions have been altered by human activity i.e. riparian harvest, log drives, road construction. The reduction of mature forests within riparian areas of some streams in the project area reduces the potential for recruitment of large woody debris which influences instream cover, and pool habitat. Wildfire in 48% of the Bussel Creek watershed may also have reduced LWD within riparian areas, which likely would have

reduced pool habitat dependent on wood for its formation. The reduction in the quality and quantity of the instream habitat i.e. pools, impacted the density and diversity of the fish population in these streams. Pool frequency can also be affected by sediment delivery to the stream channels as inputs of sediment can cause aggradations and pool filling. This type of affect to stream channels occurs in natural landscapes i.e. affects from wildfire or beaver activity, and in managed landscapes i.e. affects from logging or road building.

Spawning and rearing habitat is created by a diversity of habitat characteristics (Baltz and others 1991; Moore and Gregory 1988; Rieman and Apperson 1989; Campbell and Neuner 1985). Habitat diversity is determined based on the percentages of the different habitats present in the stream. A very high percentage of one habitat type reduces the amount of diversity in that reach.

The majority of the reaches surveyed from 1991 to 2005 in the fisheries analysis area did not meet the INFS RMO target objective for pool frequency. Although some reaches were close to meeting the target, others were not. See the Individual Subwatershed/Segment Existing Condition Discussion below for more detail.

Habitat Elements Summary: In general Bussel Creek reaches were found to have the lowest pool frequencies relative to the INFS RMO target frequencies. Little Bear Creek was found to exceed INFS RMO target frequencies for pools in two of its three reaches and was only slightly below in the other reach. The lowest Little Bear Creek reach had the least amount of large woody debris (4 pieces/1000 feet), but it does meet the INFISH objective of 4 pieces/1000 feet. The remaining reaches all exceed the INFISH woody debris objective, ranging from 5 – 8 pieces/1000 feet.

Individual Subwatershed/Segment Existing Condition Discussion and Limiting Factor Assessment:

Bussel Creek Subwatershed

Bussel Creek is an Undesignated Surface Waters (IDAPA 58.01.02.110.11). Beneficial uses applied to undesignated waters are cold water aquatic life, and primary or secondary contact recreation (IDAPA 58.01.02.101.01.a).

Bussel Creek is a large tributary to Marble Creek fed by various unnamed tributaries along with Bear, Little Bear, Toles, Norton and Lines Creek. The Bussel Creek subwatershed is approximately 4,919 acres. During 1991 a stream survey was conducted to inventory habitat on Bussel Creek. In 2003 a field review indicated the in stream habitat had not notably changed. Bussel Creek is approximately 10 miles long with several small, high gradient, perennial and intermittent non-fish-bearing tributaries totaling to about 30 miles of perennial and non-perennial stream in the drainage. Bussel Creek exhibits low sinuosity and would be classified as straight to meandering pool-riffle or plane bed (Montgomery and Buffington1998) or higher gradient (A) headwater channels and moderate gradient (B) to lower gradient (C) and (E) stream channels (Rosgen 1994).

Historically Bussel Creek had two splash dams used for the transportation of logs. LWD was removed from the channel, and riparian areas were affected. Private timber harvest has and will likely continue to occur in the headwater sections of Bussel Creek. A large Bonneville Power Administration (BPA) transmission line crosses Bussel Creek. Since 1960, approximately 180 acres of timber harvest has occurred within the RHCAs as well as 1,888 acres of commercial harvest or burn within the Bussel Creek and Lines Creek subwatersheds. Bussel Creek Subwatershed has also experienced historic activity (See Table 9).

Aerial photographs show that Bussel Creek is moderately confined by valley walls with little opportunity for extensive floodplain development. Extensive human activity occurred throughout the watershed prior to the 1933 aerial photographs.

Bussel Creek Population Characteristics
Fish Population Size: ***No bull trout were located.***

Life History Diversity: Bussel Creek and many of its tributaries may have seasonal fluvial, adfluvial and/or resident sculpin and westslope cutthroat trout and possibly bull trout (although they have not been documented in the Bussel Creek Watershed.

Persistence: Fish numbers for this subwatershed are likely to remain at low levels due to the lack of pools, LWD and riparian cover.

Bussel Creek Stream Channel Conditions
Stream Bank Condition: The 1991 habitat data and 2002 field verification shows that very little of the stream bank in Bussel Creek is considered "undercut" which can limit fish habitat if other forms of cover are not available. Overall the 1933/2002 aerial photo comparisons indicate that streambanks within Bussel Creek have become well vegetated and stable over time.
Floodplain Connectivity: Developed floodplains are found in the Bussel Creek Subwatershed. These floodplains are generally narrow, well vegetated, and have good lateral connectivity to the stream. However, the moderately confined nature of the valleys limits extensive floodplain development and connectivity. The largest floodplains are located upstream of old splash dams where large amounts of sediment are stored behind the dams. These larger floodplains are approximately 100-150 feet wide. Minimal floodplain widths are in the higher headwater elevations or where bedrock constriction creates a narrow valley bottom like at Bussel Creek cross-sections 6 and 7.. Some stream channels reaches have been disconnected and confined from their floodplains in areas due to high riparian road densities.

Bussel Creek Flow / Hydrology
Peak Flows Water yield is not currently an issue in the project area, nor the Bussel Creek Subwatershed (Macy 2008, Bussel 484 Project DEIS, *Water* Report).

Bussel Creek Watershed Condition
Road Density (Encroaching Road Density and RHCA Road Density): Total road density for this subwatershed is considered "Extremely High" and "Moderate" within the RHCA and the encroaching road density is "low" (Table 12). Currently there are about 39 miles of road within the subwatershed. Most of the roads in the Bussel Creek Subwatershed are found in the head waters of Bussel Creek.

Riparian Harvest: Records show that since 1960 timber harvest has occurred within approximately 180 acres of the Bussel Creek RHCA Buffer. This riparian harvest has likely decreased shade by reducing canopy cover within the drainage.

Bussel Creek Water Quality
Chemical Contaminants/nutrients: There are no identified point source pollutants within Bussel Creek Subwatershed (Macy 2008, Bussel 484 Project DEIS, *Water* Report).

Sediment: Bussel Creek is listed on Idaho's 2002, 303(d) list of Water Quality Limited Water Bodies for sediment concerns.

Temperature: Bussel Creek is listed on Idaho's 2002, 303(d) list of Water Quality Limited Water Bodies for temperature concerns. Temperature monitoring was conducted just below the confluence of Bussel and Bear Creek from spring to fall during 2002-2004. As shown on Table 13, it is very likely that temperatures exceeded the standard greater than 10% of all the specified time periods (Apr 15 - Oct 31) in 2002, 2003 and 2004. The data indicates that stream temperatures are not meeting water quality standards in Bussel Creek and current conditions would not support bull trout presence.

Lack of shade within the Bussel Creek Subwatershed is likely the main factor affecting stream temperatures in Bussel Creek. Canopy and riparian cover within and near the upper Bussel Creek stream channel between the Lines Creek confluence upstream to the USFS boundary was noted to be very poor (10 percent in lower reach section) to moderate (30 percent in upper reach section) during stream surveys and site reviews in 2003. It was noted that young conifers are slowly becoming established in the upper reach however few trees are present between the Lines Creek confluence and FS Road 758 bridge crossing.

Table 13 Bussel Creek: Days of Temperature Exceedance/Days Deployed

	Year Collected		
Temperature Standards	**2002**	**2003**	**2004**
Spring Salmonid 13 C Instantaneous (Apr 15-July 15)	N/A	24 of 41	23 of 28
Spring Salmonid 9 C Daily Average (Apr 15-July 15)	N/A	33 of 41	25 of 28
Juvenile Bull Trout 13 C Instantaneous (Jun 1-Aug 31)	32 of 45	63 of 88	62 of 75

Bull Trout Spawning 9 C Average (Sept 1-Oct 31)	9 of 38	12 of 35	7 of 41

Bussel Creek Habitat Access
Physical Barriers: There are no known fish barriers in the Bussel Creek Subwatershed.

Bussel Creek Habitat Elements
Pool Abundance: During 1991 a survey was used to inventory habitat and pools. This survey was field verified in 2003.

Table 14 Bussel Creek Pool Frequency Information

Reach	# of Pools	Length of Reach	#/1000 feet	INFS RMO # / 1000 feet
1	3	1390	2.2	8.9
2	3	1798	1.7	4.9
3	5	5025	1.0	4.9
4	11	6169	1.8	10.6
5	5	3001	1.7	10.6
6	1	2406	0.4	10.6
7	28	4883	5.7	10.6
8	39	4708	8.3	18.18

Table 14 indicates that all of the reaches surveyed within the Bussel Creek Subwatershed did not meet the INFS RMO's target objective for pool frequency.

Large Woody Debris: Adequate information on LWD was not collected during the 1991 survey. During field verification in 2003 it was noted that LWD abundance was low in Bussel Creek. This condition may be due to stream bank and channel degradation, from log drives and riparian harvest, which can decrease sinuosity, increase sediment (which fill in pools) and thus straighten and homogenize the stream channel Bisson and Sedell (1982).

Bussel Creek Summary
Based on the above information the following are limiting factors for bull trout habitat: 1) Extremely high road densities 2) Low number of pools throughout Bussel Creek 3) Low abundance of LWD in Bussel Creek 4) High stream temperatures 5) 303d listed sediment impaired 6) low abundance of fish. The overall condition of the fish habitat in Bussel Creek is considered to be ***Highly Altered/High Risk***.

Bear Creek Subwatershed

Bear Creek is a tributary to Bussel Creek. The 1,198-acre Bear Creek Subwatershed has had past logging and road building activities. The roughly 200 acres of privately owed land in the headwaters has been heavily clearcut in the past and has high road density. Some illegal ATV use has been noted in the subwatershed which has caused riparian degradation totaling about 2 acres throughout the Bear and Little Bear Subwatersehds. This degradation has caused only minor sedimentation and vegetation disturbance issues to this point. However if ATV traffic in these subwatersheds increases larger areas of riparian degradation could occur. Some illegal ATV use has been noted in the subwatershed. Records show that timber harvest has occurred within approximately 38 acres of the Bear Creek RHCA Buffer. Since 1960 only 610 acres have been harvested in the Bear Creek Subwatershed and the adjacent Little Bear Creek Subwatershed combined. Bear Creek is designated by the State of Idaho as "water quality limited" for sediment and temperature and has a TMDL. There are approximately six miles of fish bearing and non-fish bearing stream within the Bear Creek Subwatershed.

Bear Creek Populations Characteristics
Population Size: ***No bull trout were found.***

Life History Diversity: Bear Creek may have seasonal fluvial, adfluvial and/or resident use by adult and juvenile sculpin and westslope cutthroat trout. There are no major barriers that would prevent these species or bull trout

from accessing the Marble Creek or Bear Creek Drainage or permanently isolate fish from accessing suitable habitats across the landscape.

Bear Creek Stream Channel Conditions

Stream Bank Condition: Bear Creek is a Rosgen Type E channel. In 2003, the stream channel was very stable with very little bank cutting or sloughing. 90-95 percent of the stream Bank was estimated to be stable. Undercut banks, grasses/sedges, and, alder were providing 95 percent of the riparian cover in the proposed project area. Overhead cover from standing timber within riparian areas is non-existent within much of the area. Overall the stream bank conditions in Bear Creek appear to be stable.

Floodplain Connectivity: Developed floodplains are found on Bear Creek. These floodplains are generally narrow (with some open meadow), well vegetated, and have good lateral connectivity to the stream. However, the moderately confined nature of the valleys limits extensive floodplain development and connectivity. Very few stream channel reaches have been disconnected or confined from their floodplains within Bear Creek, due to "very low" encroaching road densities.

Bear Creek Flow / Hydrology

Peak Flows: The Water section identifies that water yield is not currently an issue in the Bear Creek Subwatershed **(**Macy 2008, Bussel 484 Project DEIS, *Water* Report).

Bear Creek Watershed Condition

Road Density (Encroaching Road Density and RHCA Road Density): There are 9.32 miles of road within the subwatershed. Based on road densities shown on Table12, the total road density rating for this subwatershed is considered "Extremely High." However, the majority of this road is in private land near the ridge tops and headwaters of the Subwatershed: not near the streams. RHCA road density is rated as "High" and encroaching road density is rated as "Very Low".

Riparian Harvest: Records show that since 1960 timber harvest has occurred within approximately 38 acres of the Bear Creek RHCA Buffer. This is a relatively low amount and likely has not decreased shade enough to increase stream temperatures to appreciable levels within the drainage.

Bear Creek Water Quality

Chemical Contaminants/Nutrients: Chemical contaminants/nutrients are not an issue in this subwatershed (Water section). Sediment: Bear Creek is identified as non-supporting beneficial uses because of sediment and is 303 (d) listed. The Bear Creek sediment TMDL calls for reducing sediment by 14 tons/year from National Forest System (NFS) lands and 7 tons/year from non-NFS lands (Water section).

Temperature: Bear Creek is also on the 303 (d) list as not supporting beneficial uses because of temperature. The temperature TMDL calls for increasing shade canopy over the stream channels by 20-80% in Bear Creek. TMDL load reductions are required for support of beneficial uses (fish). According to 1993 DEQ data stream temperatures in Bear Creek exceeded federal and state bull trout temperature standards (DEQ 2003). The federal standard is 10 degree Celsius seven-day running averages from May 1-September 1, and the state standard is 9 degree Celsius daily maximum spawning standards from September 1-October 31. Temperature monitoring was conducted just below the Bussel Creek Trail #258 crossing spring to fall during 2003-2004.

Table 15 Bear Creek: Days of Temperature Exceedance/Days Deployed

	Year Collected	
Temperature Standards	**2003**	**2004**
Spring Salmonid 13 C Instantaneous (Apr 15-July 15)	0 of 41	0 of 28
Spring Salmonid 9 C Daily Average (Apr 15-July 15)	22 of 41	21 of 28
Juvenile Bull Trout 13 C Instantaneous (Jun 1-Aug 31)	0 of 88	0 of 75
Bull Trout Spawning 9 C Average (Sept 1-Oct 31)	3 of 34	1 of 41

As shown on Table 15, it is very likely that temperatures did not exceed the temperature standard greater than 10% of all the specified time periods in 2003 and 2004. The data indicates that stream temperatures are not meeting

water quality standards for spring salmonid daily average. In general the data collected by the FS in 2003 and 2004 indicates that temperatures in Bear Creek are indicative to what salmonids need based on DEQ standards for most of the spring, summer and fall. Improved riparian conditions may be resulting in cooler 2003 and 2004 temperatures than the earlier (mid 1990s) DEQ temperature data shows.

Bear Creek Habitat Access

Physical Barriers: No human-created migration barriers were located on Bear Creek. Natural and temporal migration barriers exist in the upper drainages. Idaho DEQ, in their St. Joe Subbasin Assessment and TMDL lists 65 stream crossings in Bear/Little Bear Creeks and 71 for Bussel Creek (DEQ 2003 p. 36). Field investigations determined that there are actually about 20 stream crossings in Bear/Little Bear Creeks (Macy 2008, Bussel 484 Project DEIS, *Water* Report**)**. None were found to be migration barriers.

Bear Creek Habitat Elements

Pool Abundance: Bear Creek was surveyed using the R1/R4 method during 2002 to collect pool information.

Table 16 Bear Creek Pool Frequency Information

Reach	*# of Pools*	*Length of Reach*	*#/1000 feet*	*INFS RMO # / 1000 feet*
1	17	676	25.1	18.18
2	51	3587	14.2	18.18
3	54	7130	7.6	18.18
4	3	692	4.3	18.18

As shown in Table 16, the INFS target RMO pool frequency for Bear Creek was met in Reach 1 only. The longest reach (#3) had less than half the target RMO for pools recommended by INFS. Predominate stream habitat included runs (58 percent area surveyed in 2002), pools (35 percent area surveyed in 2002), and low gradient riffle (6 percent area surveyed in 2002). In general Bear Creek is not meeting RMOs for pool habitats.

Large Woody Debris: Riparian harvest that reduces stream shading can cause increases in temperature, reduce the amount of potential woody debris recruitment and can cause stream bank instability (Chamberlin and others 1991; Lee and others 1997). Approximately 38 acres of past harvest within the RHCA has occurred in the Bear Creek Subwatershed. As shown in Table 14, Reach 1 has the least amount of all types of woody debris and the least amount of large woody debris of all reaches. This may be a result of past timber harvest or wildfire in the riparian zone.

Table 17 shows the total number of wood for each reach within the INFS wood standard size limitations per 1000ft. Reach 4 is the only reach that meets the INFS wood objective. Most of Bear Creek is an E type Channel flowing through meadows which typically have limited LWD equipment available and can be viewed as a continuous pool in many sections. RMO's may be an inappropriate guidance tool for this drainage given the predominant channel type.

Table 17 Pieces of Qualifying LWD per 1000 Feet

Reach #	*# / 1000 feet*
1	0
2	0.279
3	0.14
4	4.3

Bear Creek Summary

Based on the above information the following are limiting factors to bull trout habitat : 1) Lack of LWD; 2) Extremely High total road density; 3) Lack of pool habitat; 4) 303d temperature listing and TMDL; 5) 303d sediment listing and TMDL. Based on the factors listed above the overall condition of the fish habitat in Bear Creek is considered to be ***Highly Altered/High Risk.***

Little Bear Creek Subwatershed

Little Bear Creek is a small tributary to Bear Creek and is about 676 feet from the confluence of Bear Creek and Bussel Creek. The 878-acre Little Bear Creek Subwatershed has had past logging and road building activities.

Privately owed land in the headwaters has been heavily clearcut in the past and has high road density. Records show that timber harvest has occurred within approximately 39 acres of the Little Bear Creek RHCA Buffer.

Little Bear Creek is designated by the State of Idaho as "water quality limited" for sediment and temperature. Total maximum daily loads (TMDL) load reductions are required for support of beneficial uses.

There are approximately 4 miles of fish bearing and non-fish bearing stream within the Little Bear Creek Subwatershed. In the lower two reaches this stream is a small meandering low gradient channel. It is highly entrenched with undercut banks typical of E-type channels. Low flow is common throughout the summer months. Vegetation consisting mainly of alder and grasses are very dense along most of the stream.

Little Bear Creek Population Characteristics
Fish Population Size: ***No bull trout found in Little Bear Creek.***

Life History Diversity: Little Bear Creek may have seasonal fluvial, adfluvial and/or resident adult and juvenile sculpin and westslope cutthroat trout. There are no major barriers that would have prevented these species or bull trout from accessing the Marble Creek or Little Bear Creek Drainages or permanently isolating fish from accessing suitable habitats across the landscape.

Little Bear Creek Stream Channel Conditions
Stream Bank Condition: Little Bear Creek is an open meadow Rosgen Type E channel. In 2003, the stream channel was very stable with very little bank cutting or sloughing. Undercut banks, grasses/sedges, and alder were providing 95 percent of the riparian cover in the Little Bear Creek main stem. Overall the stream bank conditions in Little Bear Creek appear to be stable.

Floodplain Connectivity: Developed floodplains are found on Little Bear Creek. These floodplains are generally narrow, well vegetated, and have good lateral connectivity to the stream. However, the moderately confined nature of the valleys limits extensive floodplain development and connectivity. Very few stream channel reaches have been disconnected or confined from their floodplains within Little Bear Creek due to "Very Low" encroaching road densities.

Little Bear Creek Flow / Hydrology
Peak Flows: Water yield is not currently an issue in the Little Bear Creek Subwatershed **(**Macy 2008, Bussel 484 Project DEIS, *Water* Report).

Little Bear Creek Watershed Condition
Road Density (Encroaching Road Density and RHCA Road Density): There are about 8 miles of road within the subwatershed. As indicated by road densities shown in Table 12, the total road density rating for this subwatershed is considered "Extremely High." However, the majority of this road is in private land near the ridge tops and headwaters of the subwatershed, which are not encroaching on the streams. RHCA road density is rated as "moderate" and encroaching road density is rated as "Very Low".

Riparian Harvest: Records show that since 1960 timber harvest has occurred within approximately 39 acres of the Little Bear Creek RHCA Buffer. This is a relatively low amount and likely has not decreased shade at significant levels within the drainage.

Little Bear Creek Water Quality
Chemical Contaminants/Nutrients: Chemical contaminants/nutrients are not an issue in this subwatershed *(Water* section*).*

Sediment: Little Bear Creek is 303 (d) listed by DEQ for non-support due to sediment. The sediment TMDL that calls for reducing sediment by 14 tons/year from National Forest System (NFS) lands and 7 tons/year from non-NFS lands applies.

Temperature: Little Bear Creek is 303 (d) listed by DEQ for non-support due to temperature concerns (Water section). The TMDL that calls for increasing shade canopy over the stream channels by 20-80% applies *(Water*

section). Temperature monitoring was conducted in a section of steam just above the confluence with Bear Creek from spring to fall during 2003-2004.

Table 18 Little Bear Creek: Days of Temperature Exceedance/Days Deployed

Temperature Standards	Year Collected	
	2003	2004
Spring Salmonid 13 C Instantaneous (Apr 15-July 15)	0 of 41	0 of 28
Spring Salmonid 9 C Daily Average (Apr 15-July 15)	22 of 41	21 of 28
Juvenile Bull Trout 13 C Instantaneous (Jun 1-Aug 31)	0 of 88	0 of 75
Bull Trout Spawning 9 C Average (Sept 1-Oct 31)	11 of 35	3 of 41

As shown in Table 18 it is very likely that temperatures did not exceed the state temperature standards greater than 10% in the specified time periods of (Apr 15 –July 15 at 13 C instantaneous) (June 1- Aug 31 at 13 C instantaneous) in 2003 and 2004 as well as (Sept 1-Oct 31 9 C daily average) in 2004. The data indicates that stream temperatures are not meeting water quality standards only from April 15 to July 15 for 9 C daily average and Sept 1-Oct 31 9 C daily average for 2003. In general the data indicates that temperatures in Little Bear Creek are indicative of what salmonids need based on DEQ standards for most of the spring, summer and fall.

Little Bear Creek Habitat Access

Physical Barriers: No human-created migration barriers were located on Little Bear Creek. Natural and temporal migration barriers exist in the upper drainages. Field investigations determined that there are about 20 stream crossings in Bear/Little Bear Creeks. None were found to be migration barriers.

Little Bear Creek Habitat Elements

Pool Abundance: Little Bear Creek was surveyed in 1991 and was field reviewed in 2006. No significant changes from the 1991 surveys for fish habitat (pools) were noted in 2006.

Table 19 Little Bear Creek Pool Frequency Information

Reach	*# of Pools*	*Length of Reach*	*# / 1000 feet*	*INFS RMO # / 1000 feet*
1	31	1337.5	23.2	18.18
2	61	2569	23.7	18.18
3	7	886	7.9	18.18

As shown in Table 19, the INFS RMO pool frequency target for Little Bear Creek was exceeded in Reaches 1 and 2, which are the longest reaches. The shortest reach (#3) had less than half the standard for pools recommended by INFS. In general, Little Bear Creek is meeting RMOs for pool habitats for most of the main stem surveyed.

Large Woody Debris: Adequate information on LWD was not collected during the 1991 survey. During a 2006 field review it was noted that wood abundance was moderate to low.

Little Bear Creek Summary

Based on the above information the following are limiting factors for the Little Bear Creek Subwatershed: 1) Lack of adequate LWD 2) Extremely High total road density 3) 303d temperature listing and TMDL 4) 303d sediment listing and TMDL. Based on the factors listed above the overall condition of the fish habitat in Little Bear Creek is considered to be ***Highly Altered/High Risk*.**

Toles Creek Subwatershed

The 2432-acre Toles Creek Subwatershed which drains directly into Bussel Creek has had past logging and road building activities. Since 1960 only 622 acres have been harvested in the Toles Creek Subwatershed. Trail 258,

which runs up the stream from the 758 road crossing, is causing relatively low levels of impact to riparian vegetation and stream channels within RHCAs. Toles Creek is one of the bigger drainages in the project area with many fish-bearing tributaries. There are approximately 12 miles of fish bearing and non-fish bearing stream within the Toles Creek Subwatershed.

Toles Creek Population Characteristics
Population Size: ***No bull trout found.***

Life History Diversity: Toles Creek likely has seasonal fluvial or adfluvial use by adult and juvenile sculpin and westslope cutthroat trout. There are no major barriers that would prevent these species or bull trout from accessing the Marble Creek or Toles Creek Drainage or permanently isolating fish from accessing suitable habitats across the landscape.

Toles Creek Stream Channel Conditions
Stream Bank Condition: Toles Creek has sections of open meadow Rosgen Type E channel and a moderate gradient B channel in the main stem. Small, higher gradient tributaries are A and B type channels. Although there has been some harvest within the RHCAs, field notes and aerial photo interpretation indicates that Toles Creek stream channels are very stable and have very little bank cutting or sloughing. Undercut banks, grasses/sedges, conifers and alder provide 95 percent of the riparian cover in the Toles Creek main stem (Macy 2008, Bussel 484 Project DEIS, *Water* Report). Habitat data shows that roughly 60 percent of the stream bank in Toles Creek is considered "undercut bank" which can indicate excellent fish habitat. It was also noted in 2003 field surveys that the upper reaches are more heavily timbered. Overall the stream bank conditions in Toles Creek appear to be stable.

Floodplain Connectivity: Developed floodplains are found on Toles Creek. These floodplains are generally narrow, well vegetated, and have good lateral connectivity to the stream. However, the moderately confined nature of the valleys limits extensive floodplain development and connectedness *(Water* section*).* Very few stream channel reaches have been disconnected or confined from their floodplains within Toles Creek due to "very low" encroaching road densities.

Toles Creek Flow / Hydrology
Peak Flows: Water yield is not currently an issue in the Toles Creek Subwatershed **(**Macy 2008, Bussel 484 Project DEIS, *Water* Report).

Toles Creek Watershed Condition
Road Density (Encroaching Road Density and RHCA Road Density): There are about 10 miles of road within the subwatershed. Based on the densities shown in Table 12, the total road density rating for this subwatershed is considered "High." RHCA road density is rated as "low" and encroaching road density is rated as "very low".

Riparian Harvest: Records show that since 1960 timber harvest has occurred within approximately 76 acres of the Toles Creek RHCA Buffer. This is a relatively low amount and likely has not decreased shade at significant levels within the drainage.

Toles Creek Water Quality
Chemical Contaminants/Nutrients: Chemical contaminants/nutrients are not an issue in this subwatershed (*Water* section).

Sediment: Because Toles Creek is within the Bussel watershed the 303d listing for Bussel Creek applies to Toles Creek.

Temperature: Because Toles Creek is within the Bussel watershed the 303d listing for Bussel Creek applies to Toles Creek also. Temperature monitoring was conducted in a section of stream just above Trail 258 spring to fall during 2003-2004.

Table 20 Toles Creek: Days of Temperature Exceedance/Days Deployed

Temperature Standards	Year Collected		
	2002	2003	2004
Spring Salmonid 13 C Instantaneous (Apr 15-July 15)	N/A	0 of 41	1 of 28
Spring Salmonid 9 C Daily Average (Apr 15-July 15)	N/A	28 of 41	23 of 28
Juvenile Bull Trout 13 C Instantaneous (Jun 1-Aug 31)	0 of 46	12 of 88	0 of 75
Bull Trout Spawning 9 C Average (Sept 1-Oct 31)	5 of 26	12 of 34	3 of 41

It is very likely that temperatures did not exceed the DEQ state temperature standards greater than 10% in the specified time periods of (Apr 15 –July 15 at 13 C instantaneous in 2003 and 2004) (June 1- Aug 31 at 13 C instantaneous in 2002 and 2003) and (Sept 1-Oct 31 9 C daily average) in 2003 and 2004. The data indicates that stream temperatures are not meeting water quality standards for exceedance from April 15 to Aug 15 for 9 C daily average and Sept 1-Oct 31 9 C daily average (see Table 20).

Toles Creek Habitat Access

Physical Barriers: No human-created migration barriers were located on Toles Creek. Natural temporal migration barriers may exist in the upper drainage.

Toles Creek Habitat Elements

Pool Abundance: Toles Creek was surveyed using R1/R4 methods during 2002.

Table 21 Toles Creek Pool Frequency Information

Reach	# of Pools	Length of Reach	# / 1000 feet	INFS RMO # / 1000 feet
1	91	8,961.8	10.2	18.18
2	20	2391	8.4	18.18
3	8	2274	3.5	18.18

The INFS target RMO for pool frequency in Toles Creek was not met in any of the reaches (Table 21). However, the data indicates that 43% of the habitats surveyed for all reaches were pools. This could mean that the number of individual pools is low but the size (length) of the pools is relatively large in this stream, which could indicate, good for fish. Or, this could be due to lumping of habitat types during the survey, which could reduce the total number of individual pools. According to the data Toles Creek is not meeting RMOs for pool habitats for most of the main stem surveyed however pool habitat is more predominant in this stream than the data indicates. Pools are likely at appropriate levels for this type of stream environment and channel type.

Large Woody Debris: Table 22 below shows that reach 2 has the least amount of woody debris due to fact it is a meadow section typically with limited sources. LWD is likely at appropriate levels for this type of stream environment and channel type. Reach 1 meets INFS RMO targets for LWD.

Table 22 Pieces of qualifying LWD per 1000 feet

Reach #	# / 1000 feet
1	4.46
2	0.42
3	2.2

Toles Creek Summary

Based on the above information the following are limiting factors for the Toles Creek Subwatershed: 1) Temperature 303d listing applies 2) Sediment 303d listing applies 3) High Road Densities. Based on the factors listed above the overall condition of the fish habitat in Toles Creek is considered to be ***Moderately Altered/Moderate Risk.***

If not for the 303d listings that applied to the entire Bussel Creek Watershed, Toles would be considared relativly "unaltered". Which is reflective of the habitat data collected for this stream and is likely due to fact that Toles Creek Watershed has had the least amount of documented watershed/riparian disturbance**.**

Norton Creek Subwatershed

The 3190-acre Norton Creek Subwatershed, which drains directly into Bussel Creek, has had past logging and road building activities. Since 1960, 1,188 acres have been harvested in the Norton Creek Subwatershed. Norton Subwatershed is the largest drainage flowing into Bussel Creek within the analysis area. According to the aerial photos, most of the past logging and road building activity within this drainage has occurred in the headwater areas. The old Norton Creek Railroad Grade along the stream currently has some sporadic ATV use. There are approximately 11.5 miles of fish bearing and non-fish bearing stream within the Norton Creek Subwatershed.

Norton Creek Population Characteristics
Fish Population Size: ***No bull trout found.***

Fish Assemblage Diversity: Norton Creek may have seasonal fluvial, adfluvial or resident use by adult and juvenile sculpin and westslope cutthroat trout. There are no major barriers that prevent these species or bull trout from accessing the Marble Creek or Norton Creek drainage or permanently isolating fish from accessing suitable habitats across the landscape.

Norton Creek Stream Channel Conditions
Stream Bank Condition: Norton Creek periodically changes from an open meadow Rosgen Type E channel to a moderate gradient B channel in the main stem. Small, higher gradient tributaries are A and B type channels. Although there has been some past harvest within the RHCAs, field notes and aerial photo interpretation indicate that Norton Creek stream channels are currently stable and have very little bank cutting or sloughing *(Water* section*)*. Undercut banks, grasses/sedges, conifers and alder provide a large percentage of the riparian cover in the Norton Creek main stem. Habitat data shows that roughly 50 percent of the stream bank in Norton Creek is considered "undercut" which can indicate excellent fish habitat.

Floodplain Connectivity: Very few stream channel reaches have been disconnected or confined from their floodplains within Norton Creek due to "very low" encroaching road densities.

Norton Creek Flow / Hydrology
Peak Flows: The Water section identifies that water yield is not currently an issue in the project area, nor the Norton Creek).

Norton Creek Watershed Condition
Road Density (Encroaching Road Density and RHCA Road Density): There are about 30 miles of road within the Norton Creek Subwatershed. The total road density rating for this subwatershed is considered "Extremely High." RHCA road density is rated as "low" and encroaching road density is rated as "moderate" (Table 12).

Riparian Harvest: Records show that since 1960 timber harvest has occurred within approximately 50 acres of the Norton Creek RHCA Buffer. This is a relatively low amount and likely has not decreased shade at significant levels within the drainage.

Norton Creek Water Quality
Sediment: Because Norton Creek is within the Bussel watershed the 303d listing for Bussel Creek applies to Norton Creek also.
Temperature: Because Norton Creek is within the Bussel watershed the 303d listing for Bussel Creek applies to Norton Creek also. Temperature monitoring was conducted from spring to fall during 2002-2004 in a section of stream just below Road 758 and in a pool just above where Road 1900 crosses a tributary to Norton Creek.

Table 23 Norton Creek: Days of Temperature Exceedance/Days Deployed

Temperature Standards	Year Collected		
	2002	2003	2004
Spring Salmonid 13 C Instantaneous (Apr 15-July 15)	0 of 20	4 of 7	3 of 36
Spring Salmonid 9 C Daily Average (Apr 15-July 15)	0 of 20	7 of 7	23 of 36
Juvenile Bull Trout 13 C Instantaneous (Jun 1-Aug 31)	0 of 67	41 of 54	27 of 83
Bull Trout Spawning 9 C Average (Sept 1-Oct 31)	0 of 28	12 of 20	3 of 33

Table 24 Upper Norton Creek Tributary: Days of Temperature Exceedance/Days Deployed

Temperature Standards	Year Collected
	2003
Spring Salmonid 13 C Instantaneous (Apr 15-July 15)	0 of 7
Spring Salmonid 9 C Daily Average (Apr 15-July 15)	0 of 7
Juvenile Bull Trout 13 C Instantaneous (Jun 1-Aug 31)	0 of 54
Bull Trout Spawning 9 C Average (Sept 1-Oct 31)	1 of 34

As shown on Table 23, it is very likely that temperatures did not exceed the DEQ state temperature standards greater than 10% in any specified time periods in 2002 in the Norton Creek main stem. The data shows that temperatures did exceed the DEQ state temperature standards greater than 10% (Apr 15 –July 15 at 9 C daily average in 2003 and 2004) (June 1- Aug 31 at 13 C instantaneous in 2003 and 2004) and (Sept 1-Oct 31 9 C daily average) in 2003 and 2004.

For the upper Norton Creek Tributary the data indicates that stream temperatures did not exceed the DEQ state temperature standards greater than 10% in any specified time periods during 2003 (the only year data was collected by the USFS) (Table 24).

Chemical Contaminants/Nutrients: Contaminants/nutrients are not an issue in this stream segment (Macy 2008, Bussel 484 Project DEIS, *Water* Report).

Norton Creek Habitat Access

Physical Barriers: There are two human created physical barriers on the main stem of the Norton Creek in the upper watershed. These physical barriers are blocking migration for cutthroat trout and limiting access to approximately three miles of suitable habitat.

Norton Creek Habitat Elements

Pool Abundance: Norton Creek was surveyed using R1/R4 methods in 2003. The table below shows the 2003 summarized pool data for the main stem.

Table 25 Norton Creek Pool Frequency Information

Reach	*# of Pools*	*Length of Reach (feet)*	*# / 1000 feet*	*INFS RMO Pool # / 1000 feet*
1	160	17,392	9.2	10.6
2	13	1,095	11.9	18.18

The INFS target RMOs for pool frequency in Norton Creek was not met in either of the reaches surveyed. The data, however, indicates that in the very large Reach 1, pools are prevalent and very close to meeting the RMO. In Reach 2, pool abundance was at 60 % of the RMO (Table 25). Almost 70 % percent of the habitat types within both reaches were classified as “runs” which can often be confused with long pools in E type channels due to that fact that they typically have very low width to depth rations. So there may be more pool habitat than the data shows. Pools are likely near appropriate levels for this type of stream environment and channel type.

Large Woody Debris: Table 26 shows the total number of pieces of LWD that meet the RMOs for piece size limitations. Both reaches exceed INFS standard for LWD.

Table 26 Pieces of Qualifying LWD per 1000 feet

Reach #	# / 1000 feet
1	19.84
2	18.26

Norton Creek Summary
Based on the above information the following are limiting factors for the Norton Creek Subwatershed: 1) Temperature 303d listing applies 2) Sediment 303d listing applies 3) "Extremely High" road densities 4) Fish migration barriers exist. Based on the factors listed above the overall condition of the fish habitat in Norton Creek is considered to be ***Highly Altered/High Risk*.**

Lines Creek Subwatershed

The 2045-acre Lines Creek Subwatershed, which drains directly into Norton Creek, has had past logging and road/railroad building activities. There are approximately 10 miles of fish bearing and non-fish bearing stream within the Lines Creek Subwatershed. Since 1960 1,188 acres were harvested in the Lines Creek Subwatershed. Much of the past logging and road building activity within this drainage occurred in the headwater areas. The old railroad grade/trail along the stream currently has some sporadic ATV use. The trail system crosses Lines Creek and some of its tributaries in many places. This was originally a hiking trail but has recently been used by ATVs as well.

Lines Creek Population Characteristics
Population Size: ***No bull trout were found.***

Life History Diversity: Lines Creek likely may have seasonal fluvial, adfluvial and/or resident use by adult and juvenile sculpin and westslope cutthroat trout. There are no major barriers that would prevent these species or bull trout from accessing the Marble Creek or Lines Creek Drainages or permanently isolating fish from accessing suitable habitats across the landscape.

Lines Creek Stream Channel Conditions
Stream Bank Condition: Lines Creek main stem periodically changes from a Rosgen Type C channel to a moderate gradient B channel in the main stem. Small higher gradient tributaries are A and B type channels. Although there has been some past harvest within the RHCAs, field notes and aerial photo interpretation indicate that Lines Creek stream channels are currently stable and have very little bank cutting or sloughing. Undercut banks, grasses/sedges, conifers, and alder provide a large percentage of the riparian cover in the Lines Creek main stem (Macy 2008, Bussel 484 Project DEIS, *Water* Report). Habitat data shows that roughly 60 percent of the stream bank in Lines Creek is considered "undercut" which can indicate excellent fish habitat. Overall, the stream bank conditions in the Lines Creek Subwatershed appear to be stable. ATVs, however, have caused some isolated stream bank disturbance in Lines Creek.

Floodplain Connectivity: Developed floodplains are found on Lines Creek. These floodplains are generally narrow, well vegetated, and have good lateral connectivity to the stream. However the moderately confined nature of the valleys limits extensive floodplain development and connectivity *(Water* section*)*. Some stream channel reaches have been disconnected and confined from their floodplains in areas due to "Moderate" encroaching road densities.

Lines Creek Flow / Hydrology
Peak Flows: Water yield is not currently an issue in the Lines Creek Subwatershed **(**Macy 2008, Bussel 484 Project DEIS, *Water* Report).

Lines Creek Watershed Condition
Road Density (Encroaching Road Density and RHCA Road Density): There are about 7 miles of road within the Lines Creek Subwatershed. The total road density rating for this subwatershed is considered "High." RHCA road density is rated as "Moderate" and encroaching road density is rated as "Low" (Table 12).

Riparian Harvest: Records show that since 1960 timber harvest has occurred within approximately 17 acres of the Lines Creek RHCA Buffer. This is a relatively negligible amount.

Lines Creek Water Quality
Sediment: Because Lines Creek is within the Bussel Watershed the 303d listing for Bussel Creek applies to Lines Creek also.

Temperature: Because Lines Creek is within the Bussel watershed the 303d listing for Bussel Creek applies to Lines Creek also. Temperature monitoring was conducted in a section of stream just up from the confluence with Norton Creek from spring to fall during 2003-2004. The results are shown below.

Table 27 Lines Creek: Days of Temperature Exceedance/Days Monitors Were Deployed

Temperature Standards	Year Collected	
	2003	2004
Spring Salmonid 13 C Instantaneous (Apr 15-July 15)	2 of 4	1 of 36
Spring Salmonid 9 C Daily Average (Apr 15-July 15)	4 of 4	18 of 36
Juvenile Bull Trout 13 C Instantaneous (Jun 1-Aug 31)	34 of 51	16 of 83
Bull Trout Spawning 9 C Average (Sept 1-Oct 31)	11 of 20	1 of 33

As shown in Table 27 it is very likely that temperatures in Lines Creek did not exceed the DEQ state temperature standards greater than 10% in the specified time period of (Apr 15 –July 15 at 13 C instantaneous in 2004) and (Sept 1-Oct 31 9 C daily average in 2004). The data shows that temperatures did exceed the DEQ state temperature standards greater than 10% (Apr 15 –July 15 at 9 C daily average in 2003 and 2004) (June 1- Aug 31 at 13 C instantaneous in 2003 and 2004) and (Sept 1-Oct 31 9 C daily average) in 2003.

Chemical Contaminants/Nutrients: Contaminants/nutrients are not currently an issue in this subwatershed (Macy 2008, Bussel 484 Project DEIS, *Water* Report).

Lines Creek Habitat Access
Physical Barriers: No human-created migration barriers were located on Lines Creek. Natural temporal migration barriers may exist in the upper drainage.

Lines Creek Habitat Elements
Pool Abundance: Lines Creek was surveyed using R1/R4 methods during 2003. Pool frequency results are shown below.

Table 28 Lines Creel Pool Frequency Information

Reach	# of Pools	Length of Reach (feet)	# / 1000 feet	INFS RMO # / 1000 feet
1	37	4107	9.0	18.18
2	32	3450	9.3	18.18

The INFS target RMO for pool frequency in Lines Creek was not met in either of the reaches surveyed. The data indicates that in both reaches pool abundance was at 50 % of the RMO indicating some habitat exists but not at optimum levels (Table 28).

Table 29 Pieces of Qualifying LWD per 1000 feet

Reach #	# / 1000 feet
1	3.4
2	2

Large Woody Debris: Table 29 shows the total number of pieces of LWD that meet the RMOs for piece size limitations per 1000 feet. The data shows that both reaches are close to the INFS RMOs for LWD.

Lines Creek Summary
Based on the above information the following are limiting factors for fish production in the Lines Creek Subwatershed: 1) Temperature 303d listing applies 2) Temperature 303d listing applies 3) Low abundance of fish 4) Low abundance of pools 5) High road densities. Based on the factors listed above the overall condition of the fish habitat in Lines Creek Subwatershed is considered to be ***Moderately Altered/Moderate Risk*.**

Marble Creek "8-Mile Stream Segment"

This segment of Marble Creek is not within the project area but is within the fisheries analysis area because it is directly down stream of the Bussel Creek Watershed and could be affected by the project. For the purposes of this analysis the Marble Creek Segment to be primarily discussed starts at the mouth (confluence with the St. Joe River) and ends directly above the confluence with Bussel Creek.

Habitat and electrofishing data from 2003 and 2004 in the Bussel Creek Watershed, which is a large tributary to Marble Creek, found no bull trout. Bull trout historically utilized habitat in the Marble Creek Drainage (Macley 1940; Fields 1935). There have been no recent surveys but occasional bull trout presence is "probable" for Marble Creek (St. Joe River/NF Clearwater Basins B.A.). This is because Marble Creek is a direct tributary to the St Joe River, which is inhabited by an adfluvial population of bull trout and there are no barriers that prevent bull trout from accessing Marble Creek.

Marble Creek Habitat Condition Summary
Marble Creek is a large drainage, covering about 91,160 acres or 142.4 sq. miles. There is mixed ownership within this basin, with Forest Service jurisdiction of approximately 50% of the land (St. Joe River/NF Clearwater Basins B.A.). Headwater elevations range from 6000-6800 feet, and the mouth is at about 2400 feet (Lower Marble EA 1997). The lower half of Marble Creek is primarily a large Rosgen B type channel with stream gradients averaging between 2 and 5 %. The average channel width is about 60-80 feet. Much of the lower half of Marble Creek (Including the 8-Mile segment found in the analysis area) is aggraded, lacking pools and lacking LWD (Lower Marble EA 1997). The upper portions of Marble creek, has a mix of C, B and A type channels. Marble Creek has significantly changed from its reference condition. The Marble Creek contribution to the fisheries resource was addressed in the fisheries summary of the St. Joe Geographic Area (Cross, unpublished document). This document included Marble Creek within the portion of the St. Joe drainage which has modified by human activity. The document reported that the channel conditions and associated fish habitat of this section are presently on a downward trend of mixed severity and pose a risk to the metapopulation structure of the native fish community (Cross unpublished document). Marble Creek does have populations of cutthroat trout throughout the entire drainage. Overall fish densities in the Marble Creek Drainage are likely reduced from historic conditions due to the loss and depredation of complex habitat. The DEQ currently has Marble Creek listed as impaired below Hobo Creek due to temperature. Fish habitat within Marble Creek has been influenced by natural events such as fire and floods, as well as human activities such as mining, timber harvest, road construction, splash dams, log drives and the removal of in-stream large woody debris (Lower Marble Creek EA) which have caused channels to become destabilized, riffles elongated and in many cases extended through former pool locations resulting in loss of pool volume which can be detrimental to adult bull trout because they rely on cool deep water habitats. Splash dams and surface erosion have played a major role in changing reaches of lower and middle Marble Creek from a transport system to a depositional system and therefore decreasing the quality and quantity of pools (Lower Marble EA 1997). The 8 mile segment in the cumulative effects area is within this lower and middle segment of Marble Creek. Riparian (~ 3.7+ mi/mi^2) and watershed (~ 3.9+ mi/mi^2) road densities are considered high within the entire Marble Creek Drainage. Most of the road exists in the Lower portions of Marble Creek (in the analysis area) where rd # 321

runs parallel to the stream channel within much of the RHCA. Very little road is found in the upper portions of the Marble Creek Watershed (Lower Marble EA 1997).

Based on the above information the following are limiting factors for fish production in the Marble Creek Stream Segment: 1) Temperature 303d listing 2) "High" RHCA road densities; 3) Degraded stream bank condition 4) Low LWD abundance 5) Low abundance of pools

The overall condition of the fish habitat in the Marble Creek Stream Segment is considered to be ***Highly Altered/High Risk***; therefore, fish habitat is considered to be ***Highly Altered*** from the historic range of variability and/or at moderate risk of further undesirable change.

10. ENVIRONMENTAL EFFECTS

The following effects analysis will focus on the effects of the proposed action to the fisheries resource. The existing condition section above also indicated a need to improve fish habitat in terms of temperature, LWD and pools. The action alternatives shown in chapter 2 of the DEIS, proposes to address some of these issues.

Effects Analysis

Table 30 lists the **present and on-going activities**, which are common to the No-Action Alternative and the action alternatives. Some of these activities are Forest Service authorized activities others are general uses which do not require specific authorization. This table provides a summary of the direct and indirect effects from the individual activities. These activities and their effects were taken into consideration during the cumulative effects analysis.

Environmental Consequences

Proposed Action

Direct and Indirect Effects

The direct and indirect effects of the proposed treatments are discussed with respect to the (1) fish population characteristics, (2) stream channel condition, (3) peak flows/hydrology, (4) watershed condition, (5) water quality (6) physical barriers (7) habitat access, and (8) habitat elements. As previously discussed, analyzing potential changes to these indicators or elements that may occur due to the proposed management is key in determining the overall affects to the fisheries resource in the fisheries analysis area. For this discussion the effects to the individual sub watersheds and stream segment within the fisheries analysis area are discussed collectively. However, effects to the individual subwatersheds and stream segment are summarized in Table 31 below.

Fish Population Characteristics

Implementation of RHCA buffers on project activities would ensure that riparian areas and stream channels are not subjected to any direct effects from harvest or other treatment activities such as road building and road decommissioning. Indirect effects would also be substantially moderated by the presence of these buffers as large woody debris would be retained aiding in stabilizing stream banks, reducing sediment delivery potential to streams, maintaining riparian shade, maintaining habitat-forming large woody debris and protecting fish habitat (INFS EA 1995) (McCaffery et. al 2007).

> ***Timber Harvest:*** **(see map)** Timber harvest would not occur within the riparian habitat conservation area (RHCA) (Design Feature 9A, Chapter 2 FEIS) in any of the subwatersheds within the fisheries analysis area. The Water report indicates that some short term sediment could be generated from the harvest units. Monitoring reports have shown that RHCA buffers were highly effective in blocking sediment from harvest units from moving towards streams (Forest Plan Monitoring Report 2006, Bitterroot National Forest). Fish Strategy (INFS) documents that RHCA buffers are generally effective reducing sediment in non-channelized

flow from reaching stream channels (INFS 1995, p. A-5). Therefore, there are no expected appreciable direct or indirect effects to fish population characteristics from timber harvest activities because habitat and water quality would not be significantly affected.

New Road Construction: The proposed road construction has no new stream crossings and would not be built within RHCAs. When harvest-associated work is completed the new system road would be placed into long-term storage (Rx C) for future use and would not be designated for motorized vehicle use. Roads placed into long-term storage (Rx C) would be much less impactive to fish populations as these types of roads typically produce less sediment than "Open" roads (McCaffay et. al 2007). In Rx C, the road would be outsloped and have the drainage structures removed. There would be a net increase of 24.7 miles of RX C (stored) road by the end of the project. The 0.5 mile of Temporary road would be fully recontoured to the natural slope when yarding operations and the need for the road are complete (by 2015) as well as being made impassable to motor vehicle traffic and revegetated. The new road construction would not even temporarily change the current road density "rating" (see methods for rating system) for any of the individual Subwatersheds or the Marble Creek Section. A short term increase in sedimentation could occur from new road construction (Macy 2008, Bussel 484 Project DEIS, *Water* Report). Sedimentation would not likely reach any stream channels due to RHCA Buffers. The direct/indirect results of this action on fish populations would not likely to increase the overall existing impact roads are currently having on fish populations and would likely have no significant effect on species assemblage diversity throughout the fisheries analysis area because habitat would not be significantly effected.

Road Reconstruction: 5.4 miles of road reconstruction would occur because some existing roads would require upgrading to allow for safe timber haul, improve drainage, and improve water quality. Reconstruction would include the installation of drain dips and culverts, grading, clearing, dust abatement, and resurfacing. GIS quarries shows that only .07 miles (spread out evenly over three drainages) of the road reconstruction would occur within encroaching stream segments (less than 50 feet from stream). Sediment from construction, use and the crossing would be expected to be short term because it would settle out and be stored behind existing LWD immediately down stream of the crossing (Foltz et. al 2007). Large woody debris in streams forms pools and retains sediment and other particular organic matter (Beechie, 1997). The water modeling efforts conclude that there would be a net reduction in sediment to the channels from this activity from improved crossings and road surface (Macy 2008, Bussel 484 Project DEIS, *Water* Report**)**. The overall effect of the sediment reduction would be a benefit to fish populations.

Access Management: Currently, ATV use causes risk to riparian zones within the fisheries analysis area because currently the use is highly unmanaged (See Bear Creek Description Above). Field notes and site visits have revealed riparian degradation to stream channels and riparian vegetation due to ATVs in undesignated areas. The proposed Access would reduce motorized access on roads and trails by approximately 28 miles. This reduction would be an overall improvement to the fisheries resource as less impact to riparian areas would likely occur.

Specifically the conversion of the Bussel Creek Trail 258 (6.5 miles) to non-motorized use will be an improvement to the current situation that has caused riparian damage by ATVs in past.

The offical designation of the Lines Creek Trail and a portion of Norton Creek Railroad Grade Trail to < 50" motorized would not change the existing condition to the fisheries resource, as ATVs currently use portions of this trail system. However before proposed ATV trails are officially designated for ATV use they would be reconstructed to trail standards, meet BMPs and conform to the 2004 IPNF Trail Maintenance BA (see design features). Current conditions of the trail/riparian interfaces would be improved. Vegetation regrowth on the roads and trials would reduce fine sediment in stream thereby conferring positive effect on stream habitat (McCaffay et. al 2007).

The construction 0.3 miles of new trail for motorized vehicles less than 50 inches wide between Roads 1901C and 3590A would not occur within the RHCA and would have no effect on fish.

Stream Crossing Removals and Recontouring: Following Road Rx D implementation, 10.7 miles of road would be removed from the National Forest Road System. Road recontouring and removal of stream crossings are expected to increase short term sediment but would reduce sediment dramatically in the long term (Macy 2008, Bussel 484 Project DEIS, *Water* Report**)** (McCaffay et. al 2007). Road recontouring and specifically, removal of stream crossings, will create a short-term increase in primarily fine materials to the stream channels

(Macy 2008, Bussel 484 Project DEIS, *Water* Report**)** (McCaffay et. al 2007). The primary concern from this type of material would be the direct effects to incubating eggs however the timing of the removal would occur only after fry emerge (after July 15th) therefore there would be no significant impacts to fish.

Long-term stream crossing removals/recontouring would reduce the total existing "encroaching" (most impactive) road length by 1.10 miles and the total existing RHCA road miles by 1.8 miles. Most of the encroaching mileage would be reduced in the Toles Creek, Norton Creek and Bear Creek subwatersheds. Removal of chronic, perpetual sediment sources such as stream crossing and roads may cause a limited temporary exceedance in turbidity but is not likely to negatively affect fish population characteristics (Foltz et. al 2007). The short term sediment increases may displace some bull trout (if they were present) for a period but would not reduce the population densities throughout the area. Overall the activity would reduce the road density in the project area even with the proposed new road construction and should substantially improve beneficial use support (Macy 2008, Bussel 484 Project DEIS, *Water* Report**)** and specifically benefit fish populations and life history diversity.

Fuels Reduction: Fuel reduction activities are prescribed in accordance with silvicultural prescriptions and are intended to facilitate the achievement of silvicultural objectives while fulfilling the requirements of Forest Plan protection standards. Fuel treatment activities have the ability to generate sediment which could degrade fish habitat and thus effect population. However, fire effects to ecosystems are related to their frequency, severity and timing of occurrence which are, in turn, affected by climate conditions, vegetation type, fuel loads and landscape features (Agee1993; Pine and others 1996). Fuel treatments would not occur within the riparian habitat conservation area (RHCA) in any of the subwatersheds within the fisheries analysis area. RHCA buffers would greatly reduce the risk of sediment, generated by fuels treatment activities, reaching stream channels. Field monitoring has shown that RHCA buffers were highly effective in blocking sediment from burned areas from moving towards streams and that the vegetative components stayed unaltered (Forest Plan Monitoring Report 2006, Bitterroot National Forest). Fuel treatments such as lop-and-scatter, grapple piling and burning, and broadcast burning are not likely to reduce canopy cover **(**Jerman 2008, Bussel 484 Project DEIS, *Fire/Fuels* Report**)**. With no reduction in canopy there is likely no change in groundwater recharge rates from fuels treatments **(**Macy 2008, Bussel 484 Project DEIS, *Water* Report**)** and therefore reducing sediment transport potential to streams.

Pocket Gopher Control: No effects are likely to "adversely" effect the water resource including fish populations from the placement of rodenticide due to design features. Past monitoring reports indicate that RHCA buffers were effective in protecting water quality with this activity *St. Joe RD Pocket Gopher Control, Fisheries BA 2008*. EPA documents effects from rodenticide application (Macy 2008, Bussel 484 Project DEIS, *Water* Report**)**. Design features for gopher poisoning include: Follow manufacturer's recommendations for use; and no gopher baiting treatment within INFS RHCA buffers, in areas with saturated soil, or during periods of or forecasted periods of heavy precipitation.

Timber Stand Improvement: Approximately 575 acres of pre-commercial thinning is proposed to improve the growing conditions of the selected trees by eliminating competition for light and nutrients. This includes 309 acres of white pine pruning that would be done in areas that are also thinned. Precommercial thinning would occur in previously harvested immature stands to improve or accelerate diameter increment growth and to improve the average form of the trees retained in the stand. On NFS lands the tree and stand size classes in intermediate harvest areas are expected to increase due to retention of larger tree classes combined with improved growth and vigor of trees and stands (Vegetation report DEIS). Thinning and pruning within RHCA buffers would benefit the stream by enabling healthy and vigorous growth of shade giving vegetation (decreased temperatures sooner in time) and enhance a source of future LWD (for creating pools). No felled trees would be removed from the RHCA and no thinning would occur within 50 feet (to maintain bank stability) of any streambank. Effects from the proposed timber stand improvement would have no appreciable negative affect to any of the critical habitat elements/indicators in the analysis area. Overall long term benefits to habitat elements from improved riparian vegetation are predicted.

Riparian Planting: Planting native conifers and shrubs in Little Bear and Bear Creek drainages, where reestablishment is needed and as described in the existing condition section, would enhance and restore riparian areas by increasing shade (thus reducing stream temperatures), stabilizing stream banks and ensuring future large woody debris recruitment. It is expected that riparian plantings would partially assist in reaching the long term the target of increased streamside shade in Bear and Little Bear Creeks by 20-80% as the TMDL requires.

Large Woody Debris Placement: Large woody debris in streams forms pools and retains sediment and other particular organic matter (Beechie, 1997). Placement of up to 200 cover logs in Bear Creek and 200 cover logs in Bussel Creek stream channels (over approximately 2.5 to 3 miles of stream) would increase the quantity and quality of critical pool habitat and increase the amount of cover as well as the stream's ability to trap fine sediment. A log source has not been identified. Logs would not be attained within a RHCA buffer. Because the current condition of the habitat within these areas would be improved and more habitats would be available, it is likely the fish population densities would increase, survival rates would increase and higher seeding rates would occur in other reaches throughout the larger Bussel Creek Watershed.

Fish migration barrier removal: The proposed action is to replace two culverts on Road 1900 in the Upper Norton Creek Subwatershed that are currently barriers to fish passage. The replacement of these two human created migration barriers would allow improved migration access to approximately three miles of fish habitat and would improve overall fish population seeding and densities throughout the watershed. The replacement of these two human created migrations barriers will likely cause minimal site-specific short-term stream bank disturbance and sedimentation during construction. Straw bales will be used to mitigate short term effects of culvert removals. Mitigation consisting of two straw bales placed in the stream at removal sites caused a significant reduction in fine sediment yield from an average of 67kg to an average of 1.6kg (Foltz et. al 2007). The primary concern from this type of work would be effects to incubating eggs from short term sediment however the timing of the removal would occur only after fry emerge (after July 15th), therefore there would be limited impacts to fish.

Stream Channel Condition

Timber Harvest: Would not occur within the RHCA area in any subwatersheds within the fisheries analysis area. It is not expected that tree removal outside of RHCAs as proposed would change the existing condition of streambanks or floodplains throughout the analysis area and would only cause short-term site-specific indirect effects to stream bank disturbance if water yield increased significantly. The water report indicates that water yield is not likely to significantly increase.

New Road Construction: Streamside roads are likely to be the most impactive road segments (Dose and Roper 1994). No new road construction would occur within the RHCA buffers.

Road Reconstruction: 5.4 miles of road reconstruction would occur because some existing roads would require upgrading to allow for safe timber haul, improve drainage, and improve water quality. Reconstruction will include the installation of drain dips and culverts, grading, clearing, dust abatement, and resurfacing. Short-term negligible streambank disturbance would occur at site-specific locations where culverts are installed. BMP and design features would greatly reduce risk of effects. Seeding and mulching can be very effective in stabilizing disturbed stream banks (*2006-2007 Gold Center Creek Restoration Project effectiveness monitoring*).

Access Management: The proposed access management would create more protection to riparian areas. The reduction in access and management of the access would be an overall improvement to the fisheries resource as less impact to riparian areas and stream banks would likely occur.

Specifically the conversion of the Bussel Creek Trail 258 (6.5 miles) to non-motorized use will be a major improvement to the current situation that has caused stream bank damage by ATVs in past.. This would improve the current condition of the trail/riparian interface thus improving the current condition of fish habitat and will likely have positive effects on steam channels (less degredation) and vegetation regrowth on the roads and trials would reduce fine sediment in stream thereby conferring positive effect on stream habitat (McCaffay et. al 2007).

The construction 0.3 miles of new trail for motorized vehicles less than 50 inches wide between Roads 1901C and 3590A would not occur within the RHCA and would have no effect on fish.

Before ATV trails are officially designated they would meet conditions previosly stated.

Fuels Reduction: Fuel treatments would not occur within the riparian habitat conservation area (RHCA) in any of the subwatersheds within the fisheries analysis area. RHCA buffers would greatly reduce the risk of impacts to stream channels from fuel treatments that can cause sedimentation channel stabilizing vegetation would be maintained (Forest Plan Monitoring Report 2006, Bitterroot National Forest).

Pocket Gopher Control: No effects to the streambanks or floodplains are expected from the placement of rodenticide if design features are followed. EPA documents effects from rodenticide application (Macy 2008, Bussel 484 Project DEIS, *Water* Report**)**. Design features for gopher poisoning include: Follow manufacturer's recommendations for use; and no gopher baiting treatment within INFS RHCA buffers, in areas with saturated soil, or during periods of or forecasted periods of heavy precipitation.

Stream Crossing Removals and Recontouring: It is expected that any stream bank disturbance caused by culvert removals and recontouring would be short-term. As stream channels, streambanks and recontoured areas reseed and become stabilized, a long-term sediment reduction would likely occur Macy 2008, Bussel 484 Project DEIS, *Water* Report**)**.

Short term effects of stream bank disturbance caused by culvert removals and recontouring would be reduced by BMPs and design features. There would likely be an overall long-term improvement to floodplain connectedness in some areas were encroaching road is recontoured.

Riparian Planting: Native conifers and shrubs would be planted in some portions of the riparian areas along approximately 1.8 miles of Bear and Little Bear Creeks stream channel and in portions of the riparian areas and along stream channels in other parts of the Bussel Creek Drainage. This would be accomplished over a period of 10 to 15 years. Riparian vegetation will enhance and help restore riparian areas by stabilizing streambanks and improving channel and thus floodplain interactions (Boon P. J. et al 1992 p 267).

Large woody debris placement: Large woody debris placement in the stream channel of Bear Creek and upper Bussel Creek would have minimal negative effect on the condition of streambanks. Where streambanks and soils are disturbed during placement of LWD, native seeding, riparian shrub planting and mulching would ensure bank stabilization and minimize sedimentation (*2006-2007 Gold Center Creek Restoration Project effectiveness monitoring*). The overall effect of the aquatic habitat improvement would also improve the current condition of the streambanks and floodplains within Bear, Little Bear and Bussel Creek.

Fish Migration Barrier Removal: Two culverts on Road 1900 that are currently barriers to fish passage would be replaced. The replacement of these two human-created migration barriers would likely cause minimal site-specific, short-term stream bank disturbance during construction. To minimize effects disturbed streambanks will be seeded and mulched after activity is complete.

Flow/Hydrology

Timber Harvest: Harvest activity (including harvest-generated fuels treatment) and new road construction are modeled by WATSED. The results shown in the W*ater* section indicate a slight increase in flows over the next several years.

New Road Construction: No appreciable changes in water yield or peak flows from the new road construction are expected *(*Macy 2008).

Road Reconstruction: 5.4 miles of road reconstruction would improve drainage, and improve water quality. It is not likely that this activity alone would directly change water yield or peak flows appreciably throughout the analysis area *(*Macy 2008**)**.

Access Management: No appreciable changes in water yield or peak flows from the access management activities are expected *(*Macy 2008**)**.

Fuels Reduction: Fuel treatments would not occur within the riparian habitat conservation area (RHCA) in any of the subwatersheds within the fisheries analysis area. Appreciable changes in water yield are not expected with this activity (Macy 2008**)**.

Pocket Gopher Control: No effect to the water yield or peak flows is expected from the placement of rodenticide due to design features.

Stream Crossing Removals and Recontouring: No appreciable changes in water yield or peak flows from the stream crossing removals and recontouring activities are expected because of the small areas being treated in relation to the overall size of the subdrainages affected.

Aquatic Habitat Improvement: No appreciable changes in water yield or peak flows from riparian planting and large woody debris placement activities are expected because no trees would be cut. No appreciable changes in

water yield or peak flows from the fish migration barrier removal activities are expected because this is a site-specific action that will not change hydrology.

Watershed Conditions

Timber Harvest: Timber harvest would not occur within the RHCA (See design features) in any subwatershed within the fisheries analysis. However, road construction would occur with the analysis area watersheds to facilitate harvest activity.

New Road Construction: Based on the methods previously described for determining road density ratings as they relate to fisheries the new road construction does not change the current road density rating for any of the individual Subwatersheds. Road density ratings in the fisheries analysis area are currently "high." With the proposed new road construction, the road density rating would increase to the lowest end (4.7 mi/mi^2) of the "Extremely High" category. However, following Road Rx D implementation (by 2015), 10.7 miles of road would be removed from the National Forest Road System in the project area, so there would be a net reduction of 4.7 miles of road and a reduction in total road density to 4.3 mi/mi^2 ("high" category) in the project area with this alternative. Furthermore, in this case because streamside roads are likely to be the most impactive road segments (Dose and Roper 1994) and no new road construction would occur within the RHCA buffers it is not expected that road construction and road density increase would appreciably change the current condition of the watershed and subwatersheds and their impacts to the fisheries resources. When the harvest-associated work is completed (by 2015) the 4.7miles of the new system road (including the .2 miles of cost share raod) would be placed into long-term storage (Rx C) for future use and would not be designated for motorized vehicle use making them even less impactive. Once these stored roads become vegetated and hydrologically stabilized, they would become relatively inert from a watershed condition standpoint (Switalski et al 2004). Placing these new roads into long-term storage would greatly reduce effects from by decreasing the potential for disturbance by humans, habitat fragmentation, sedimentation, and encouragement of ATV use (McCaffery et. al 2007). Temporary roads would be fully recontoured to the natural slope when yarding operations served by the roads are complete.

Road Reconstruction: 5.4 miles of road reconstruction would improve drainage, and improve water quality on the current road system. Road reconstruction does not change road density ratings in the analysis area. Overall the effects would be an improvement to the water quality within the subwatersheds affected by road reconstruction.

Access Management: Access management will not have an effect on road density and there would be no harvest in RHCA due to access.

Fuels Reduction: Fuel treatments would not occur within the riparian habitat conservation area (RHCA) in any of the subwatersheds within the fisheries analysis area. RHCA buffers would greatly reduce risks of impacts to existing watershed condition.

Pocket Gopher Control: No effect to road density and no riparian harvest will occur from this action.

Stream Crossing Removals and Recontouring: The total reduction in sediment due to the proposed stream crossing removals and recontouring within the fisheries analysis area would be an overall improvement to the high road density situation and a benefit to fish habitat and fish populations as well as an improvement to a (303d listed) sediment impaired watershed.

Aquatic Habitat Improvement: Riparian vegetation planting would enhance and restore riparian areas by increasing shade (thus reducing stream temperatures), stabilizing stream banks and ensuring long-term LWD recruitment, which would counteract some of the past impacts of riparian road and riparian harvest in these areas. Fish migration barrier removal would not change or cause effects to road densities and would cause no riparian harvest.

Water Quality

Timber Harvest:

Sediment: Timber harvest would not occur within the RHCA in any subwatershed within the fisheries analysis area. Although modeling estimates indicate increased sediment from harvest, all proposed harvest units have low surface erosions hazard ratings and, therefore, soil erosion is not expected within the harvest units (Macy 2008). Also the adequacy of buffers in preventing sediment delivery to stream channels needs to be considered,

because even if sediment is generated, there may be no sediment delivered to stream channels. INFS documents that RHCA buffers are believed to prevent sediment in non-channelized from reaching stream channels (INFS 1995 p. A-5).

Temperature: Timber harvest would not occur within the RHCA (design features) in any subwatershed within the fisheries analysis area. Overall the protection and retention of riparian vegetation, would allow for the continued recovery and vegetative growth within riparian zones, which would continually provide shade to the stream channels. This shade would reduce stream temperatures as overall cover increases over time.

Chemical contaminants or nutrients: are not expected to have any effects on fish or fish habitat within the analysis area. BMPs would be required if chemicals would be used. BMPs and design features should prevent any type of fuel contamination; therefore, timber harvest activities would have no effect on the water quality by increasing chemical contaminants. These BMPs include:

- PRACTICE 11.07 - Oil and Hazardous Substance Contingency Planning
- PRACTICE 11.11 - Petroleum Storage and Delivery Facilities and Management
- PRACTICE 15.11 - Servicing and Refueling of Equipment

New Road Construction:
Sediment: Streamside roads are likely to be the most impactive road segments (Dose and Roper 1994). No new road construction would occur within the RHCA. Monitoring reports have shown that RHCA buffers were highly effective in blocking sediment from moving towards streams (Forest Plan Monitoring Report 2006, Bitterroot National Forest).

Temperature: No new road construction would occur within the RHCA buffers. No measurable change in stream temperatures are expected as a result of proposed road construction activities.

Chemical Contaminants: No Chemical Contaminants or harmful nutrient levels are expected from this action (see above).

Road Reconstruction: Sediment: 5.4 miles of road reconstruction would improve drainage, and improve water quality. Road reconstruction will in the long-term reduce sediment (Macy 2008).

Temperature*:* No measurable change in stream temperatures are expected due to the road reconstruction activities as no stream shade or canopy would be removed.

Chemical Contaminants: No Chemical Contaminants or harmful nutrient levels are expected from this action.

Access Management:

Sediment: If the proposed action were implemented, there would be an overall improvement to the fisheries resource, as less impact from sedimentation would likely occur relative to the existing condition. Specifically, the conversion of Bussel Creek Trail 258 (6.5 miles) to non-motorized use would be a major improvement to the current situation that has caused sedimentation to streams by ATVs. To ensure future riparian protection, these trails would be designed and constructed or reconstructed to meet standards for the specified use before they are designated for ATV. Additionally, subsequent to designation, maintenance of the trails would meet BMPs and conform to the 2004 IPNF Trail Maintenance BA. This would improve the current condition of the trail/riparian interface thus decreasing the potential for sedimentation relative to the current condition.

The construction 0.3 miles of new trail for motorized vehicles less than 50 inches wide between Roads 1901C and 3590A would not occur within the RHCA and would have no effect on fish.

Temperature: Field notes and site visits revealed riparian degradation to stream channels and riparian vegetation due to ATVs in undesignated areas. Specifically the proposal to convert Bussel Creek Trail 258 (6.5 miles) to non-motorized use would be a major improvement to the current situation that has caused riparian vegetation damage by ATVs. To ensure future riparian protection, these trails would be designed and reconstructed to meet standards for the ATV use before they are designated for ATV use. This would improve the current condition of the trail/riparian interface thus minimizing the current impacts to the riparian vegetation important for stream shading.

Chemical Contaminants: No chemical contaminants or harmful nutrient levels are expected from this action.

Fuels Reduction: Fuel treatments would not occur within the riparian habitat conservation area (RHCA) (Design Feature) in any of the subwatersheds within the fisheries analysis area. RHCA buffers would greatly reduce risks of impacts to the existing water quality within the analysis area. No increase in stream temperatures and no appreciable increase in sediment are expected with this activity. See BMPs for chemical contaminants above.

Pocket Gopher Control: No effect to the temperature, sediment or from chemical contaminants is expected from the placement of rodenticide due to RHCA buffers (St. Joe Ranger district Pocket Gopher Control BA 2008).

Stream Crossing Removals and Recontouring:

Sediment: According to the TMDL model, road recontouring and removal of stream crossings proposed in Alternative B are expected to substantially reduce sediment yield. Ultimately, stream crossing removals and recontouring would reduce the total existing encroaching road length by 1.10 miles and the total existing RHCA road length by 1.8 miles which reduce long-term sediment delivery to streams. Most of the encroaching mileage would be reduced in the Toles Creek, Norton Creek and Bear Creek Subwatersheds.

Temperature: Recontouring would allow for increased vegetation on old road beds which could positively affect adjacent stream channel temperatures by increasing shade.

Chemical Contaminants: No chemical contaminants or harmful nutrient levels are expected from this action.

Riparian Planting and Large Woody Debris Placement: Riparian vegetation planting would enhance and restore riparian areas by increasing shade (thus reducing stream temperatures), stabilizing streambanks (reducing risks of sedimentation) and ensuring long-term LWD recruitment, which would counteract some of the past impacts of high road densities and road densities within riparian areas. The overall effect of the aquatic habitat improvement on stream temperatures and sedimentation would be long-term improvement. Effects from short-term stream bank disturbances and sedimentation caused by placement of LWD, would be reduced by, seeding and mulching disturbed sites after activity is complete (Design Features).

Fish Migration Barrier Removal: The replacement of two human-created fish migration barriers would likely cause minimal site-specific, short-term bank disturbance and sedimentation during construction. To minimize effects disturbed sites around the culverts will be seeded and mulched after activity is complete to ensure minimal impact from sedimentation. Dewatering may occur to minimize turbidity levels and sedimentation.

No chemical contaminants or harmful nutrient levels are expected from this action due to BMP's.

Habitat Access

Timber Harvest: This action would have no effect on fish habitat access.

New Road Construction: No new road construction would occur within the RHCA buffers. New road construction action would not cause a migration barrier to fish.

Road Reconstruction: Reconstruction will include the installation of drain dips and culverts, grading, clearing, dust abatement, and resurfacing. This work will not effect fish habitat access.

Access Management: No access management action would cause a migration barrier to fish. Trails would be reconstructed to trail standards, meet BMPs and conform to the 2004 IPNF Trail Maintenance BA.

Fuels Reduction: Fuel treatments would not occur within the riparian habitat conservation area (RHCA) (Design Feature) in any of the subwatersheds within the fisheries analysis area. No change to the existing condition of habitat access would occur from this action.

Pocket Gopher Control: No change to the existing condition of habitat access would occur from this action.

Stream Crossing Removals and Recontouring: No stream crossing removal or recontouring would cause a migration barrier to fish.

Aquatic Habitat Improvement: Riparian planting and large woody debris replacement would not cause a migration barrier to fish. The replacement of two human-created migration barriers on Road 1900 would allow

improved migration access to approximately three miles of fish habitat and would improve overall fish population seeding and viability throughout the watershed.

Habitat Elements

Implementation of RHCA buffers on project activities would ensure that riparian areas and stream channels are not subjected to any direct effects from timber harvest or road building activities. Indirect effects would also be substantially moderated by the presence of these buffers as large woody debris would be retained to stabilize streambanks, reduce sediment delivery potential to streams, maintain riparian shade, maintain habitat forming LWD and protect fish habitat.

Timber Harvest: Timber harvest would not occur within the RHCA in any subwatershed within the fisheries analysis area. This action would have no effect on future LWD recruitment to fish streams or the amount and/or quality of pool habitats.

New Road Construction: No new road construction would occur within the RHCA. Therefore this action would have no effect on future LWD recruitment and no effect on the amount and/or quality of pool habitats to fish streams.

Road Reconstruction: Reconstruction will not change the existing conditions of the habitat elements i.e. pools and LWD would not be affected.

Access Management: To ensure future riparian protection, these trails would be designed and reconstructed to meet standards for ATV use as stated above before they are designated for OHV use. This would improve the current condition of the trail/riparian interface thus improving the current condition of fish habitat in these areas. Proposed changes to access management would not reduce LWD or pools within The RHCAs. However there may be an improvement to pool quality in some areas as sedimentation is reduced.

Stream Crossing Removals and Recontouring: Proposed stream crossing removals and recontouring would not reduce LWD or pools within the RHCAs. However, there may be an improvement to pool quality in some areas as sedimentation is reduced.

Fuels Reduction: Fuel treatments would not occur within the riparian habitat conservation area (RHCA) in any of the subwatersheds within the fisheries analysis area. No change to the existing condition of habitat elements would occur from this action.

Pocket Gopher Control: No change to the existing condition of habitat elements would occur from this action.

Aquatic Habitat Improvement

Riparian Planting: Riparian vegetation planting would enhance and restore riparian areas by increasing shade (thus reducing stream temperatures), stabilizing stream banks and ensuring forming LWD recruitment long term.

Large Woody Debris Placement : Large woody debris placement of 100-200 cover logs in the stream channel of Bear Creek and 100-200 cover logs in Bussel Creek (approximately 2.5 to 3 miles of stream) would restore and enhance fish habitat, increase stream cover, increase the quantity and quality of pools and large woody debris with emphasis on meeting Inland Native Fish Strategy (INFS) objectives for large woody debris as defined in INFS p. A-4, Table A-1 (>12 inches in diameter and >35 feet in length).

Fish Migration Barrier Removal: Proposed fish migration barrier removal would not reduce LWD or pools within the RHCAs. However, this action would allow pool habitats above the existing migration barriers to become fully utilized by migrating fish.

Table 30 - Summary of Effects of Current and Reasonable Foreseeable Actions

Activity	Present	Reasonably Foreseeable	Type of Potential Effect	Direct/Indirect Effects	Reference
NFS Lands: Present and On-Going Activities					
Grandmother Mountain	X			Minimal	Grandmother Mountian Land Exchange EIS

Land Exchange					2007
Timber harvest:	X	X	Increase sedimentation, temperature and chemical contamination, decrease in large woody debris	Minimal	No harvest within 300' of a fish stream. No harvest within RHCA buffers.
Road maintenance	X	X	Increase sedimentation, temperature and chemical contamination, decrease in large woody debris	yes	Programmatic Road Maintenance BA, 2004 Bull Trout Determination: May affect, not likely to adversely affect.
Pocket gopher control		X	Chemical contamination	Not likely	2002 monitoring data, St. Joe Ranger district Pocket Gopher Control BA 2008
Transmission line maintenance	X	X	sedimentation	No effect	
Firewood gathering	X	X	Potential for reduction in LWD recruitment	Minimal	Firewood permit specifies no firewood cutting within 300' of a stream. Programmatic Road Maintenance. BA, 2004 Determination: May affect, not likely to adversely affect.
Camping	X	X	Alteration of streambanks and increased nutrient loading	Minimal	St. Joe River/NF Clearwater Basins BA, July 1998
Berry picking	X	X	Primarily due to influence of roads and trails	Minimal based on road and trail locations	St. Joe River/NF Clearwater Basins BA, July 1998. Programmatic Road Maintenance. BA, 2004 Determination: May affect, not likely to adversely affect.
Christmas trees (personal-use)	X	X	Potential for reduction in LWD recruitment	Minimal	Permit specifies no cutting within 300' of a stream. Programmatic Road Maintenance. BA, 2004 Determination: May affect, not likely to adversely affect.
Motor vehicle use: full-size, ATV, and motorcycle	X	X	Alteration of streambanks and increased nutrient loading, sedimentation	yes	Bussel watershed Field obsevations 2006. Programmatic Trail Maintenance. BA, 2004Bull Trout

					Determination: May affect, not likely to adversely affect.
Trail maintenance	X	X	Increased sediment, temperature & chemical contamination; decreased LWD	Minimal	Programmatic Trail Maintenance. BA, 2004Bull Trout Determination: May affect, not likely to adversely affect.
Fire Suppression	X	X	Reduction of shading due to felling of hazard trees in RHCA, Chemical contamination	Minimal based on implementation of INFISH Guidelines.	St.Joe River/NF Clearwater Basins BA, July, 1998
Wildfires	X	unknown	Reduction of shading in RHCA, Chemical contamination, Sedimentation	Unknown based on severity	Contigiency plans St Joe Ranger district
Weed control under the St. Joe Noxious Weed EIS	X	X	chemical contamination	No Effect	St. Joe Noxious Weeds EIS, Oct 1999
Tree Planting		X	none	No Effect	
Pre-Commercial Thinning		X	Increase sedimentation, temperature and chemical contamination, decrease in large woody debris	Minimal based on implementation of INFISH Guidelines.	No harvest within 300' of a fish stream. No harvest within RHCA buffers.
Tree Pruning		X	none	No Effect	
Road construction		X	Increase sedimentation, temperature and chemical contamination, decrease in large woody debris	Minimal based on implementation of INFISH Guidelines.	Minimal Road Building within RHCA buffers (INFS Guidelines). Programmatic Road Maintenance BA, 2004 Bull Trout Determination: May affect, not likely to adversely affect.
Non- NFS Lands: Present and On-Going Activities			**Discussed above for alternative A.**		

Cumulative Effects Area

For this project the entire fisheries analysis area was selected as the cumulative effects area.

The cumulative effects analysis takes into consideration; past activity, current conditions, future foreseeable actions, non-Forest Service managed activity, and proposed actions.

- A list of Past activities is found in table 11.
- Current conditions, which were described previously in this document.

- Present and future foreseeable actions utilized in this analysis are listed in the EIS and the effects are described in Table 27.
- Non-Forest Service activity.
- Information about the proposed action comes from the descriptions provided in the EIS and the descriptions of the Direct/Indirect effects of the individual drainages.

Cumulative Effects Summary:

To recap, the evaluated effects of the proposed action, there would be a net reduction of sediment long term through road recontourning and road closures. There would be a net reduction in open roads and total road densities would be reduced. Approximately 4.5 miles of new system road (closed after project use RX C) and 0.5 miles (closed after project use RX C) of temporary road would be constructed on National Forest System lands and approximately 0.2 miles (RX D after use) of road would be constructed on Potlatch Corporation lands under the Merry Creek Cost Share Supplement to facilitate the timber harvest on National Forest System lands. However no new road construction would occur within the RHCA buffers. 5.4 miles of road reconstruction would occur because some existing roads would require upgrading to allow for safe timber haul, improve drainage, and improve water quality. Reconstruction would include the installation of drain dips and culverts, grading, clearing, dust abatement, and resurfacing. GIS quarries shows that only .07 miles (spread out evenly over three drainages) of the road reconstruction would occur within encroaching stream segments (less than 50 feet from stream).

The proposed action would ultimately reduce motorized access on roads and trails by approximately 28 miles. Following Road Rx D implementation, 10.7 miles of road would be removed from the National Forest Road System. Long-term the proposed stream crossing removals/recontouring would reduce the total existing "encroaching" (most impactive) road length by 1.10 miles and the total existing RHCA road miles by 1.8 miles. Road recontouring reduces long term sediment delivery to streams (McCaffery et al. 2007).

Fuel treatments would not occur within RHCA in any of the subwatersheds within the fisheries analysis area. RHCA buffers would greatly reduce the risk of sediment, generated by fuels treatment activities, reaching stream channels. Field monitoring has shown that RHCA buffers were highly effective in blocking sediment from burned areas from moving towards streams and that the vegetative components stayed unaltered (Forest Plan Monitoring Report 2006, Bitterroot National Forest).

Although modeling estimates indicate increased sediment from the proposed timber harvest Macy (2008) explains that all proposed harvest units have low surface erosions hazard ratings and that soil erosion is not expected within harvest units. Also the adequacy of buffers in preventing sediment delivery to stream channels needs to be considered, because even if sediment is generated, there may be no sediment delivered to stream channels.

No adverse effects are expected to the water resource including fish populations from the placement of rodenticide due to design features. Past monitoring reports indicate that RHCA buffers were effective in protecting water quality with this activity (*St. Joe RD Pocket Gopher Control, Fisheries BA 2008).*

Approximately 575 acres of pre-commercial thinning is proposed to improve the growing conditions of the selected trees by eliminating competition for light and nutrients. Thinning and pruning within RHCA buffers would benefit the stream by enabling healthy and vigorous growth of shad giving vegetation (decreased temperatures sooner in time) and enhance a source of future LWD (for creating pools). No felled trees would be removed from the RHCA and no thinning would occur within 50 feet (to maintain bank stability) of any streambank.

Planting native conifers and shrubs (time period) in Little Bear and Bear Creek drainages, where reestablishment is needed and as described in the existing condition section, would enhance and restore riparian areas by increasing shade (thus reducing stream temperatures in 303d listed streams), stabilizing stream banks and ensuring future large woody debris recruitment. It is expected riparian plantings would assist in reaching in the long term the target of increased streamside shade in Bear and Little Bear Creeks by 20-80% as the TMDL requires. Placement of up to 200 cover logs in Bear Creek and 200 cover logs in Bussel Creek stream channels would increase the quantity and quality of critical pool habitat and increase the amount of cover as well the stream ability to trap fine sediment.

Two culverts on Road 1900 in the Upper Norton Creek Subwatershed that are currently barriers to fish passage would be replaced and would allow improved migration access to approximately three miles of fish habitat and would improve overall fish population seeding and densities throughout the watershed.

All but one of the subwatersheds and the Marble Creek stream segment were assessed as being *Highly Altered/High Risk* therefore, fish habitat is considered to be *Highly Altered* from the historic range of variability and/or at high risk of further undesirable change. Lines Creek Subwatershed was assessed as being *Moderately Altered/Moderate Risk.* The conditions of these subwatersheds and the stream segment of Marble Creek are largely due to incremental effects of substantial past management overtime throughout the analysis area as described above. "Limiting factors" or "issue indicators" affecting the fisheries resources are the lack of adequate LWD, extremely "high" total road density ratings, 303d temperature listing and TMDL, 303d sediment listing and TMDL, degraded stream bank condition and low abundance of pools.

Negative effects (described above) from existing roads within the analysis area are well documented. However as stated in Macy (2008) the proposed reduction in miles of FS road, the road recontouring, and access management would help to reduce sediment from 303d listed streams and move conditions toward achieving prescribed TMDLs in the long term throughout the analysis area.

No future or foreseeable road construction is planned by any land owner. However If substantial road building, other than what is proposed in this project, occurs in the analysis area in the future by any land manager there may be an increase in sediment loads and negative effects to fish habitat at some level. It would be difficult to predict effects of any future road construction because quantity and locations are not known. Conversely if existing roads are closed (structures pulled) or recontoured in the future there could be a reduction in sediment a further reduction in long term sediment.

The watershed report indicates that the reasonably foreseeable timber harvest (497 acres) on private land in the head waters of Bussel Creek would generate some sediment. The report indicates that harvest activities proposed on private land would increase short term sediment and water yield. Increased sediment could have an overall negative effect to fish habitat quality (Gucinski et al. 2001). However this sediment would be greatly reduced by the implementation of the rules pertaining to the Idaho Forest Practices Act, Title 38, Chapter 13, Idaho Code that are designed to protect the environment and decrease sediment generation. Furthermore, there may be a decrease in water yield in the future as vegetation becomes denser and utilizes more soil moisture and intercepts more precipitation. The water report indicates that there would be no appreciable cumulative effects from sediment to beneficial uses (fish) do to the implementation of BMP's and State Water Quality Standards to Bussel Creek or the surrounding areas.

Cumulatively in the long term water quality and riparian conditions throughout the analysis area would be improved by the implementation of present and foreseeable activities (LWD placement, Riparian planting, barrier removals, road recontouring and road storage, ATV access management), as well as the implementation of BMPs and State Water Quality Standards which aim to maintain or improve Beneficial uses.

Stream temperatures would continue to decrease over time as trees within riparian zones/INFS buffers continue to grow and create more shading.

In stream LWD debris, which is important in creating excellent fish habitat and pools, would increase overtime as trees within riparian zones/INFS buffers continue to grow and naturally fall into (recruitment) the streams.

The current condition section of this report documents the current condition that resulted from past activities in the in Marble Creek (specifically The Marble Creek 8-Mile Stream Segment). Macy 2008, indicates that existing and reasonable foreseeable activities in the Bussel Creek watershed would likely have no appreciable negative effects to water quality or beneficial uses (Fish) and therefore there would be no appreciable negative effects to water quality or beneficial uses in Marble Creek. Cumulatively the Marble Creek watershed will continue to have issues with water quality (mainly temperature) until riparian zones and riparian vegetation recovers more fully and roads (mainly riparian) are reduced thus increasing shade and reducing sediment.

Long term through the implementation of BMPs and rules pertaining to the Idaho Forest Practices Act, Title 38, Chapter 13, Idaho Code, the proposed reduction in watershed roads (especially riparian), planting of riparian trees and shrubs and the placement of LWD within the Bussel Creek Watershed and project area would increase the water quality in the entire analysis area (including Marble Creek) and would benefit native fish species.

11. Effects Determination

Based on the information presented in the Effects Analysis, Direct/Indirect and Cumulative Effects Summary, which is based on the implementation of the listed design features, this project is not likely to result in any significant long term or short term degradation of analysis area streams. The proposed activities **May Affect** but are **Not Likely to Adversely Affect** bull trout or its habitat. Some aspects of this project are likely to result in long term and short term improvement and benefits to fish habitat and water quality of analysis area streams.

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Literarature Cited

Averett, R., and C. MacPhee. 1971. Distribution and Growth of Indigenous Fluvial and Adfluvial Cutthroat Trout (*Salmo clarki*), St. Joe River, Idaho. Northwest Science, 45(1):38-47.

Baltz, D. M., B. Vondracek, L. R. Brown, and P. B. Moyle. 1991. Seasonal changes in microhabitat selection by rainbow trout in a small stream. Trans. Amer. Fish. Soc. 120(2):166-176.

Bilby, R. E. and G. E. Likens. 1980. Importance of organic debris dams in the structure and function of stream ecosystems. Ecology 61(5):1107-1113.

Bisson, P. A. and J. R. Sedell. 1982. Salmonid populations in streams in clearcut vs old growth forest of western Washington. In: Meehan, W.R., T.R. Merrall, J.W. Matthews Eds. Fish and Wildlife Relationships in Old-Growth Forests. Proceedings of a Symposium. Amer. Inst. Fish. Res. Bios. pp 121-130.

Bjornn, T. C. 1957. A Survey of the Fishery Resources of Priest and Upper Priest Lakes and their Tributaries, FR-24-R, 1955-1957. State of Idaho, Department of Fish & Game.

Bjornn, T. C. 1975. The St. Joe River Cutthroat Fishery - A Case History of Angler Preference. Presented at the Western Assoc. of State Game Commissioners. pp 1-2.

Bjornn,T. C. and G. A. Liknes. 1986. Life History, Status and Management of Westslope Cutthroat Trout. IN The Ecology and Management of Interior Stocks of Cutthroat Trout. Special Publication of the Western Division, American Fisheries Society. pages 57-64.

Bjornn, T. C., and D. W. Reiser. 1991. Habitat requirements of salmonids in streams. Pages 83 – 138 *in* Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats, W. R. Meehan, editor. American Fisheries Society Special Publication No. 19, Bethesda, MD.

Burroughs, E. R., and J. G. King. 1989. Reduction of soil erosion on forest roads. Gen. Tech. Rep. INT-264. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermoutain Research Station, 21 p.

Cross, P. David. 1992. Status of bull trout on the Idaho Panhandle National Forests. USDA Forest Service, Coeur d'Alene, Idaho.

Campbell, R. F. and J. H. Neuner. 1985. Seasonal and diurnal shifts in habitat utilized by resident rainbow trout in western Washington Cascade mountain streams. In: F. Olson, R. G. White, and R. H. Hamre Technical Eds. Proceedings of the Symposium on Small Hydropower and Fisheries. pp 39-48.

Dolloff, C. A. and G. H. Reeves. 1990. Microhabitat partitioning among stream-dwelling juvenile coho salmon *Oncorhynchus kisutch* and Dolly Varden, *Salvelinus malma*. Canadian Journal of Fisheries and Aquatic Sciences 47:2297-2306.

Everest, F. H., R. L. Beschta, J. C. Scrivener, K. V. Koski, J. R. Sedell, and C. J. Cederholm. 1987. Fine sediment and salmonid production: A paradox. Pages 98-142 in Salo and Cundy (1987).
Fairchild, M. P. 2004. History and Distribution of Fishes in the Lower West Branch of the Priest River, with Particular Emphasis on Bull Trout (*Salvelinus confluentus*). USDA Forest Service, Priest Lake Ranger District, 7 p.

Fields. 1935. Five year fish and game report. St. Joe National Forest. U.S.D.A., Forest Service. 12p.

Fraley, J., T. Weaver, and J. Vashro. 1989. Cumulative effects of human activities on bull trout (*Salvelinus confluentus*) in the upper Flathead drainage, Montana. Headwaters Hydrology. American Water Resources Assoc. pp 111-119.

Furniss, M. J., T. D. Roelofs, and C. S. Yee. 1991. Road Construction and Maintenance. Pages 297-323 *in* William R. Meehan, editor. Influences of Forest and Rangeland Management on Salmonid Fisheries and Their

Habitats. American Fisheries Society. Special Publication 19.

Goetz, F. 1989. Biology of the Bull Trout *Salvelinus confluentus* a Literature Review. Williamette National Forest, Eugene, Oregon.

Gorman, O. T. and J. R. Karr. 1978. Habitat structure and stream fish communities. Ecology 59(3):507-515.

Hickman, T. and R. F. Raleigh. 1982. Habitat suitibility index models: cutthroat trout. FWS/OBS-82/10.5. WELUT, Fort Collins, Co. 38p.

Idaho Department of Environmental Quality. 2000. Draft Priest River Subbasin Assessment and Total Maximum Daily Load. Prepared by Glen Rothrock, Watershed Coordinator, Coeur d'Alene Regional Office, pp. 202.

Karr, J. P. and D. R. Dudley. 1981. Ecological perspectives on water quality goals. Env. Man. 5:55-68.

Karr, J. R. and K. E. Freemark. 1983. Habitat selection and environmental gradients: dynamics in the "stable" tropics. Ecology. 64:6:1481-1494.

Maclay, D. J. 1940. Tentative Fish Management Plan, St. Joe National Forest. USDA Forest Service. 25p.

Moore, K. M. S. and S. V. Gregory. 1988. Summer Habitat Utilization and Ecology of Cutthroat Trout Fry (*Salmo clarki*) in Cascade Mountain Streams. Can. J. Fish. Aquat. Sci. 45:1921-1930.

Naiman, R. J., E. V. Balian, K. K. Bartz, R. E. Bilby, and J. J. Latterell. 2002. Dead wood dynamics in stream ecosystems. USDA Forest Service Gen. Tech. Rep. PSW-GTR-181, p. 23-48.

Rieman, B. E. and K. A. Apperson. 1989. Status and analysis of salmonid fisheries, Westslope cutthroat trout synopsis and analysis of fishery information. Project F-73-R-11, Subproject No. II, Job No. 1. Idaho Department of Fish and Game, Boise, Idaho. 114 pp.

Rieman, B. E. and J. D. McIntyre. 1993. Demographic and habitat requirements for conservation of bull trout. Gen. Tech. Rep. Int-302. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 38 p.

Schlosser, I. J. 1982. Trophic structure, reproductive success, and growth rate of fishes in a natural and modified headwater stream. Can. J. Fish. Aquat. Sci. 39:968-978.

St. Joe River Subbasin Assessment and TMDLs (DEQ, 2003).
(USDA Idaho Panhandle Forest Plan Monitoring and Evaluation Reports 1998, 2000, 2002 and 2003).

USDA Forest Service. 1995. Inland Native Fish Strategy Environmental Assessment. USDA, Forest Service Intermountain, Northern, and Pacific Regions.

USDA Forest Service 1998. Biological assessment for the St. Joe River Basin/ NF Clearwater. Idaho Panhandle National Forests. U.S.D.A. Forest Service Northern Region. Coeur d'Alene, Idaho. 145p.

USDA Forest Service. 2004. Hydrologic analysis for Compliance with the Idaho Department of Environmental Quality established Total Maximum Daily Load requirements. Prepared by J. J. Cobb, Hydrologist.

USFWS. 2002. Draft Recovery Plan for the Bull Trout and Proposed Critical Habitat. U.S. Fish & Wildlife Service, Pacific Region, Portland, OR.

Waters, T. F. 1995. Sediment in streams: sources, biological effects, and control. American Fisheries Society Monograph 7.

Wydoski, R. S., and R. R. Whitney. 2003. Inland fishes of Washington, 2nd edition,

CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF PROPOSED ACTION(S) ON RELEVANT INDICATORS

Project Name: Bussel 484 Project
Authorizing Agency: **US Forest Service** Management Unit(s): **USFS**
6th HUC Watershed: **170103040303_** Subwatershed Name: **Marble Creek/Bussel Creek**

Action Type: Timber

Specific Actions (list): See Detailed BA

Pathway	Indicators	Status of Baseline	Effects of the Action(s)	Basis for Rationale
Subpopulation Characteristics	Subpopulation Size	FA/**FR**/UR /	R/**M**/D/NA	The Marble Creek Watershed is currently documented as "occasional bull trout presence" (St. Joe River/NF Clearwater Basins B.A.).
	Growth and Survival	FA/**FR**/UR /	R/**M**/D/NA	The population has a low growth and survival status (based on Rieman et al 1993) and has a moderate extinction risk.
	Life History Diversity and Isolation	FA/**FR**/UR /	R/**M**/D/NA	Migratory form may be present in Marble Creek (St. Joe River/NF Clearwater Basins B.A)
	Persistence and Genetic Integrity	FA/**FR**/UR /	R/**M**/D/NA	No exotics have been recently found in the HUC. St Joe Ranger District Electorofishing 2002-2004.
Water Quality .	Temperature	FA/FR/**UR** /	**R**/**M**/D/NA	303d listed for temperature below Hobo Creek in Marble Cr. All of Bussel creek drainage is 303d listed for Temperature. TMDL within the Bussel Drainage (Bear and little Bear Cr). Some of the proposed action activities are intended to improve stream temperature. RHCA buffers will maintain stream temperatures in short term and long term
	Sediment	FA/FR/**UR** /	**R**/**M**/D/NA	Listed 303d for sediment for all of Bussel Drainage. Some of the proposed action activities are intended to decrease sediment. RHCA buffers will maintain protection from sedimentation short term and long term
	Chemical Contaminants/Nutrients	**FA**/FR/UR /	R/**M**/D/NA	No concerns due to lack of grazing
Habitat Access	Physical Barriers	FA/FR/**UR** /	**R**/M/D/NA	Human created migration barriers are found within the HUC (Norton Creek) old splash dams in Marble Creek.
Habitat Elements	Substrate Embed.	FA/**FR**/UR /	R/**M**/D/NA	High Riparian Road densities In HUC
	LWD	FA/**FR**/UR /	**R**/**M**/D/NA	In general instream LWD is low abundance. Some of the proposed action activities are intended to improve LWD. RHCA buffers

				will maintain stream LWD recruitment in short term and long term.
	Pool Frequency & Quality	FA/**FR**/UR/	**R**/**M**/D/NA	In general instream habitat is low abundance.
	Off-channel habitat	**FA**/FR/UR/	R/**M**/D/NA	Not conducive to channel type and road paralleling. Some tributaries have areas of good off channel habitat in the Bussel Drainage
	Refugia	FA/**FR**/UR/	R/**M**/D/NA	Amount of riparian roads are to high
Channel Condition and Dynamics	Width/Depth Ratio	FA/**FR**/UR/	R/**M**/D/NA	Channels straitened by riparian roads. W/D ratio likely high.
	Streambank Condition	**FA**/FR/UR/	R/**M**/D/NA	In general stream banks are functioning and recovering from past activities
	Floodplain Connectivity	FA/**FR**/UR/	R/**M**/D/NA	connectivity conditions are functioning were riparian roads do not exist
Flow/Hydrology	Change in Peak/Base Flows	**FA**/FR/UR/	R/**M**/D/NA	Macy 2008, Bussel 484 project DEIS water report.
	Increase in Drainage Networks	FA/**FR**/UR/	R/**M**/D/NA	High road densities
Watershed Conditions	Road Density and Location	FA/**FR**/UR/	R/**M**/D/NA	High Road densities
	Disturbance History	FA/**FR**/UR/	R/**M**/D/NA	Area was burned in 1910 and has had harvest. Some historic mining (1890s) in a few tributary streams in HUC. Extensive road building, harvest, log drives.
	Riparian Conservation Areas	**FA**/FR/UR/	**R**/**M**/D/NA	Intact or recovering except at some road/stream crossings.
	Disturbance Regime	**FA**/FR/UR/	R/**M**/D/NA	High precipitation zone, so can be susceptible to destabilization from specific localized events. Channels are resilient.
Integration of Species and Habitat Conditions	Habitat Quality and Connectivity	FA/**FR**/UR/	**R**/**M**/D/NA	Low quality habitat, mainly because of temperature and lack of shade and pools/LWD, and sediment that likely does not support bull trout.

Status: Functioning Appropriately - FA Functioning at Risk - FR Functioning at Unacceptable Risk - UR

Effect: R - Restore: the action will result in a positive change in the indicator evaluated
M - Maintain: the action will have no effect on the status of the indicator evaluated
D - Degrade: the action will result in a negative change in the indicator evaluated
PJ: Professional Judgment

	Idaho Panhandle National Forests St. Joe Ranger District	**St. Maries Office** **222 S. 7th St. Suite 1** **St. Maries, ID 83861**

Bussel 484
Listed Wildlife Species BA

INTRODUCTION

T&E species are managed under the authority of the Endangered Species Act (ESA) (PL 94-205, as amended) and the National Forest Management Act (PL 94-588). USDA Forest Service policy (FSM 2672.4) requires that a review of activities be completed to determine how a proposed action may affect any threatened, endangered, or proposed species. This Biological Assessment (BA) documents the analysis and determinations of effects on listed wildlife species from the proposed Bussel 484 project on the St. Joe Ranger District of Idaho Panhandle National Forests.

PROPOSED ACTION

The proposed action (Alternative B Modified from the Bussel 484 FEIS) includes the following activities:

Timber Harvest : Approximately 2,137 acres would be treated with commercial timber harvest. The commercial timber harvest would consist of the following:

Silvicultural Prescription				Yarding Method			
Commercial Thin	Group Shelterwood	Seedtree	Clearcut w/ Res.	Cable (not skyline)	Skyline	Ground-based	Helicopter
1,486 acres	521 acres	53 acres	78 acres	79 acres	795 acres	552acres	712 acres

Fuel Treatment: Fuels resulting from timber harvest would be treated. This would include approximately 316 acres of yarding tops, 1,732 acres of lopping, 181 acres of slashing, 230 acres of grapple piling followed by pile burning, 20.2 miles of hand fireline construction, 307 acres of broadcast burning, and 289 acres of jackpot burning. Biomass removal for the St. Maries School District Fuels to Schools Project would be a by-product of the proposed fuel treatment. Piled material may be used for the Fuels to Schools Project.

Reforestation: Conifer seedlings would be planted on approximately 367 acres in areas proposed for regeneration harvest. Planting would supplement the expected natural regeneration. Planted conifer seedlings would enhance diversity, assure timely reforestation, and contribute to long-term desired habitat conditions. All planting would be a mix of species, but would predominantly be early-seral western white pine, western larch, and ponderosa pine (where appropriate), mixed with Douglas-fir and other species appropriate for the habitat type and site conditions.

Pocket Gopher Control: Baiting may be done to control pocket gophers on approximately 367 acres in areas proposed for regeneration harvests if needed to protect regeneration. Baiting would include placing either 0.5% strychnine treated oats or 2.0% zinc phosphide oats into pocket gopher tunnels by hand. An initial treatment would be followed by additional treatments, if needed, to minimize losses in the regeneration and meet stocking objectives.

Timber Stand Improvement: Approximately 575 acres of pre-commercial thinning is proposed to improve the growing conditions of the selected trees by eliminating competition for light and nutrients. This includes 309 acres of white pine pruning that would be done in areas that are also thinned. Precommercial thinning would occur in previously harvested immature stands to improve or accelerate diameter increment growth and to improve the average form of the trees retained in the stand. Existing roads would be used for getting to stands for precommercial thinning.

System and Temporary Road Construction and System Road Reconstruction:

Approximately 4.5 miles of system road and 0.5 miles of temporary road would be constructed on National Forest System lands to facilitate timber harvest. An additional 0.2 miles of road construction is proposed across lands owned by Potlatch Corporation (see *Cost Share Roads* below). When harvest-associated work is completed all 4.7 miles of the new system road would be placed into Road Management Prescription C for future use and would not be designated for motorized vehicle use. A total of 5.4 miles of road would be reconstructed.

Cost Share Roads: Approximately 0.2 miles of road would be constructed on Potlatch Corporation lands under the Merry Creek Cost Share Supplement to facilitate timber harvest on National Forest System lands. The agreement would be supplemented to add construction across Potlatch Corporation lands. New construction may be shared and the Forest Service would buy into Roads 226J and 226M or the new construction may be done with an easement under the Merry Creek Cost Share Supplement.

Access Management: Approximately 20.3 miles of roads would be open to all licensed vehicles, 18.5 miles of roads and trails would be open to vehicles less than 50 inches wide, 31.9 miles of roads and trails would be available for non-motorized use only, and 10.7 miles of road would no longer provide access. The proposed action would result in higher quality ATV routes with more loops and it would provide three areas of wildlife security to improve the amount and distribution of wildlife security in the area. The proposed action would:

- Install effective restriction devices throughout the project area.
- Remove the gate on Road 1498. The road is currently open and the proposed action is to leave the road open, so there is no need for the gate.
- Construct 0.3 miles of new trail for motorized vehicles less than 50 inches wide between Roads 1901C and 3590A.
- Convert Bussel Creek Trail 258 (6.5 miles in and outside of the project area) to non-motorized use, remove culverts, and harden stream crossings.
- Designate Lines Creek Historical Trail as open to motorized vehicles less than 50 inches wide (3.0 miles).
- Repair 2.9 miles of the Norton Creek Railroad Grade and designate that part open to motorized vehicles less than 50 inches wide. During the analysis it became apparent

that there would be unacceptable impacts to cultural resources from providing ATV access to the remaining 1.4 miles of the Norton Creek Railroad Grade. Therefore, ATV access will not be allowed on this portion of the grade and motorized access will be blocked with physical barriers and restore the entire Norton Creek Railroad Grade and designate it open to motorized vehicles less than 50 inches wide (4.3 miles).

Existing and Selected Road and Trail Access on NFS lands in the Project Area

Roads	Existing Access	Selected Alternative Access	Net Change
Open	31.8 miles	20.3 miles	-11.5 miles
Motorized < 50”	28.4 miles	13.1 miles	-15.3 miles
Non-motorized	6.4 miles	26.1 miles*	+19.7 miles
Trails			
Motorized <50”	6.6 miles	5.4 miles	-1.2 miles
Non-Motorized	4.2 miles	5.6 miles	+1.4 miles

*Includes 4.5 miles of new road construction

Road Management Prescriptions: The proposed action decommissions as many high-risk, lower-value roads as possible. Approximately 32.3 miles of existing roads would be put into Road Management Prescription C or D, and 49 culverts would be removed.

Existing and Selected Road Management Prescriptions for NFS Lands

Roads	Existing Condition	Selected Alternative Rx	Net Change	Selected Rx for newly constructed system roads	Selected Alternative Net Change
Open	24.3 miles	20.3 miles	-4.0 miles	0	-4.0 miles
Rx A	17.7 miles	5.2 miles	-12.5 miles	0	-12.5 miles
Rx B	23.2 miles	7.9 miles	-15.3 miles	0	-15.3 miles
Rx C	1.4 miles	21.6 miles	+ 20.2 miles	4.5 miles	+24.7 miles
Rx D	0.0 miles	10.7 miles	+ 10.7 miles		+10.7 miles

- **Open:** These roads are open for all types of vehicles.
- **Prescription A: Gated** - These roads are generally needed for administrative or fire protection purposes with use restricted for resource concerns and/or facility protection. Road use is intermittent and generally only open for a specific use or time period (e.g. timber sale or firewood collection). These roads remain on the transportation system for current and future needs. Road maintenance is at a custodial level to protect the road investment and to minimize damage to adjacent land and resources. The roads are on a maintenance schedule to check for erosion and/ or other maintenance needs. The roadbed should have sufficient inslope, outslope or driveable water bars to facilitate good drainage. Traffic is usually controlled with a gate. Some motorized public uses may be acceptable on some routes (i.e. ATV routes, single track use).
- **Prescription B:** This prescription is similar to A, but the use and need for the road is anticipated to occur at a lower frequency. The road may remain “closed” for a period of

5 to 15 years between uses but remains on the transportation system for future use. Temporary bridges and culverts assessed to have a higher risk of failure would be removed, and the road surface may be water barred and seeded. Traffic is usually controlled with a physical static barrier (such as a guardrail, concrete or earth barrier). The management strategy is to eliminate all over 50" width motorized use during "closure" periods. Use by vehicles under 50" width may be accepted, discouraged, eliminated or prohibited.

- **Prescription C:** This is a long-term "storage" with no foreseeable use for the road in the next 15 to 25 years, but it may be needed at some future date. Some low impact roads that do not have a reasonably foreseeable need in the future, may also be closed at this level. The road would be outsloped and have the drainage structures removed. The intent of this prescription is to put the road into "long-term storage" where the road is not a sediment source and does not channel water. The road prism is basically left intact but in a condition that would not require any maintenance. All water courses and problem areas would be stabilized. The roadbed may require light scarification, water bars, and/or decompaction. The road would be seeded and/or planted to establish a vegetative cover in the road prism. Traffic is usually controlled with a permanent barrier or by recontouring the beginning of the road. Roads with a higher probability of future use (based on management area direction, interdisciplinary team concurrence, current harvest prescriptions, extension possibilities, etc.) should remain on the transportation system. Generally, the management strategy is to discourage, eliminate or prohibit all motorized use. On some routes, use of vehicles less than 50 wide may be acceptable.
- **Prescription D:** Roads "closed" at this level generally have a higher potential for failure than roads with a C prescription and there is a very low probability of needing the road in the future. The road should be decompacted and have major fills, embankments, and higher failure risk areas pulled up onto the roadbed and stabilized. Drainage structures would be removed from stream channels and the adjacent slopes restored to resemble natural condition. The goal of this prescription is to restore site productivity, eliminate the potential of road failures, and reestablish natural water infiltration and drainage patterns. Recontouring or partial pullback is based on site specific conditions and could range from about 20 to 100 percent of the roads length. Prescription D may require only partial recontouring, only pulling up the amount of fill necessary to stabilize the slope condition. Some cut and fill slopes or parts of cut and fill slopes may be evident in areas of recontouring. Following prescription implementation, roads would be removed from the National Forest Road System but tracked as historic routes in the INFRA database. The road management strategy is to eliminate all motorized use. In some exceptional cases, the roadway could be converted for use as a trail.

Aquatic Habitat Improvement:

Riparian Planting: Native conifers and shrubs would be planted in some riparian areas up to a total of approximately 1.8 miles along Bear and Little Bear Creeks and in other parts of the Bussel Creek Drainage. This would be accomplished over a period of 10 to 15 years.

Large Woody Debris Placement: A helicopter and hand crews would be used to place 100-200 cover logs in the stream channel of Bear Creek and mechanical equipment would be used to place 100-200 cover logs in upper Bussel Creek to increase stream cover, improve fish

habitat and large woody debris to increase stream cover, improve fish habitat and large woody debris. This will take place over 2.5 to 3.0 miles of stream channels within the Bussel and Bear Creek drainages.

Fish Migration Barrier Removal: To eliminate two human-created fish passage barriers two culverts on Road 1900 would be replaced with culverts specifically designed for fish passage.

Stream Crossing Rehabilitation: Approximately forty-nine stream crossings would be removed throughout the project area as part of the road management prescription changes discussed above.

Forest Plan Management Area Changes:

During analysis of this project, there were stands (units) proposed for treatment that were tentatively identified as allocated to Management Area 9 (MA 9), which indicates constraints related to vegetation management and specifically timber management. Review of the applicable portion of Management Area 9 description in the forest plan describes these areas as "…consists of areas of non-forest lands, lands not capable of producing industrial products, lands physically unsuited for timber production, and lands capable of timber production but isolated by the above type lands or nonpublic ownership. …".

Stand 484-04-022 (Unit 99): This stand is approximately 42 acres in size with about 6.5 acres mapped as MA-9 and about 35.5 acres mapped as MA 1 in the GIS management area layer.

Stand 484-03-023 (Unit 336): Forty-nine acres in size, of which about 8 are selected for treatment.

Stands 484-04-91 (Unit 70) and 484-04-106 (Unit 95): These stands have only 0.27 acres and 0.18 acres delineated as MA 9 on the GIS management area layer, with the remainder of these stands being MA 1. This appears to be a minor mapping difference, probably due to adjustment in scale from 1:200,000 to 1:24,000.

Stand 484-03-030 (Unit 141) and Stand 484-03-054 (Unit 97): Twenty-six and 37 acres in size, respectively. Nine acres and 23 acres are selected for treatment with this project, respectively. Due to ownership patterns and geographic features at the time of the forest plan, this stand was generally isolated from other NFS lands. Due to acquisition of the private holdings, this stand is no longer isolated from other NFS lands. A review of recent stand examination data reflected a productive timbered site, with no indication of any particular harsh conditions.

Analysis indicated that these stand are suitable for timber management. Therefore, following the forest plan timberland suitability adjustment procedure (see IPNF Forest Plan, Appendix M), these stands are being reallocated from MA 9 to MA 1 (suitable lands designated for timber production) and it is appropriate to change the mapping of the MA 9 boundary to better reflect that condition. These adjustments will be monitored in accordance with the forest plan.

Required Design Features and Mitigation

The following design and mitigation measures would be implemented in full as written. These

measures represent all practical means to avoid or minimize environmental effects in the context of taking action to achieve the project's purpose and need.

1) Air Quality

A. Proposed burning activities follow procedures outlined by the North Idaho Smoke Management Memorandum of Agreement. Currently, the period of air quality monitoring and restriction is March 1 to November 30.

   i. During this period, all burning by the Forest Service is regulated to prohibit or restrict burning where stagnant weather conditions result in poor smoke dispersion and by conducting prescribed burns when ventilation and air quality conditions are good.

   ii. The project is within Airsheds 12a and 12b, which contain no EPA designated non-attainment areas for pollutants. The project area does not contain any Class I Airsheds as designated by the Clean Air Act.

   iii. Burning during any time of the year is regulated by the Idaho State Department of Environmental Quality, which issues burning closures when necessary to protect air quality. The Forest Service cooperates with the State by requesting approval to burn through the Montana/Idaho Airshed Management System in compliance with the Idaho State Implementation Plan.

   iv. Particulate matter projections will be sent to the North Idaho Smoke Management Group one day prior to ignition.

B. Measures used to mitigate effects of prescribed burning on air quality will include:

   i. Broadcast and understory burning will be accomplished as much as practical in the spring and early summer with spring-like conditions. This will reduce the total emissions by burning less of the duff and larger fuels. Risk of fire escape is also less in the spring months than during summer and early fall months.

   ii. The discretion to terminate burns when air quality is threatened.

   iii. Slash piles will be constructed as clean as practical and be burned as dry as practical to enhance efficient combustion.

2) Cultural Resources

A. All known cultural resource sites, eligible or potentially eligible to the National Register of Historic Places, will be protected or mitigated as directed by the National Historic Preservation Act. Any future discovery of cultural resources sites or caves will be inventoried and protected if found to be of cultural significance. A provision will be included in contracts to ensure protection of the sites.

B. Directional felling will be used in timber harvest units along historic railroad and near eligible cultural resources, a buffer will be established near eligible cultural resources, and no logs will be dragged or skidded over the grade or eligible cultural resources. The appropriate Zone or Forest level archaeologist will accompany the layout personnel to ensure that a sufficient buffer is implemented.

3) Fish

A. In-channel activity will only occur during base flows, July 15 through September 1.

B. Inland Native Fish Strategy (INFS) Standards and Guidelines are specific based upon the proposed activity, i.e. timber harvest, road management, pre-commercial thinning, etc. Standard buffer widths (summarized in the following table) apply to activities within this project area unless otherwise designated by the district fisheries biologist or district hydrologist. During the layout of units the widths may be greater based on ground conditions.

Summary of Inland Native Fish Strategy RHCA Widths

INFS Category	Description	RHCA Width
1	Fish-bearing streams	300 feet from either side of channel
2	Permanent, flowing, non-fish-bearing stream	150 feet from either side of channel
4	Seasonal, flowing or intermittent streams; Wetlands < 1 acres; Landslide prone areas	50 feet (non-priority watersheds)

4) Gopher Baiting

The following criteria would be followed during gopher baiting project implementation:

A. Follow manufacturer's recommendations for use.

B. No gopher baiting treatment will occur:

   i. Within INFS RHCA buffers;

   ii. In areas with saturated soil;

   iii. During periods of, or forecasted periods of heavy precipitation.

C. Treated bait will only be applied outside of INFS designated buffers on Category 1, 2, 3, and 4 water bodies.

D. Treated bait will not be stored or transferred within 300 feet of any stream or live water.

E. Treated bait will only be applied to dry soils.

F. Treated bait will not be applied during any forecasted or actual precipitation event.

G. Treated bait will not be directly applied to or discarded in open water bodies such as lakes, streams, ponds, and wetlands.

H. Treated bait will be applied by a licensed applicator in accordance with Idaho State law.

I. Initial setting of bait will occur after July 1.

J. A mandatory provision for bait spill cleanup and disposal will be included in contracts.

K. The application of bait will be monitored by a Forest Service employee, who has been trained in animal damage control.

L. Follow-up gopher control effectiveness surveys will be completed. Any evidence of non-target wildlife/fish mortality will be reported and dead animals will be collected for analysis where possible in order to determine the cause of death.

M. Existing closed gates used to access units will be locked after each entry and exit.

N. Activity behind closed gates and earth barriers will be scheduled for completion prior to August 30th. An extension may be allowed based on extenuating circumstances (fire, weather, etc.) after interdisciplinary review.

O. Earthen barriers removed to allow access for project activities will be replaced upon completion of the unit and before August 30th.

P. Roads that have naturally revegetated will not be cleared to improve access.

5) Noxious Weeds

The following preventative measures will be taken to reduce the risk of noxious weed introduction and spread in accordance with the St. Joe Weed Control EIS (ROD 10/12/99).

A. A provision will be included in all contracts that will require all off-road logging and construction equipment (including machinery used in restoration projects) to be cleaned prior to entering the project area to remove dirt, plant parts, and material that may carry weed seeds.

B. Mulching agents, such as hay or straw, will be certified weed-free prior to use.

C. All seed used for revegetation and erosion-control purposes will be certified weed-free.

D. After implementation, project areas will be reviewed for new populations of noxious weeds. If new populations are found more intensive surveys will be conducted, sites will be mapped, and treatment will be scheduled.

E. If new populations of noxious weeds are found, treatment will be implemented in accordance with priorities set by the noxious weed program. New invader species will be slated for eradication immediately upon discovery. Other weed infestations will be treated according to the direction in the St. Joe Noxious Weed Project EIS and district priorities.

F. All weed treatments will be monitored for effectiveness.

G. To the degree practicable gravel used for road maintenance will be certified from weed free-sources. Gravel sources will be inspected for the presence/absence of noxious weeds prior to utilization of gravel in the project area as appropriate.

6) Old Growth

No timber harvest or road construction will occur in allocated old growth stands.

7) Plants (Threatened, Endangered, and Sensitive)

If Threatened, Endangered, and Sensitive (TES) species are discovered during project implementation, an agency Botanist will be notified so that measures could be taken to maintain population viability. Measures to protect population viability and habitat for all known and newly discovered occurrences will include altering or dropping proposed units from activity, modifying the proposed activity, or implementing buffers around plant occurrences. Provisions for protection of Endangered Species, and settlement for environmental cancellation will be included in contracts.

Site–Specific Design Features for Protection of Known Populations of Plant Species at Risk

Unit #	Green bug-on-a-stick moss (*Buxbaumia viridis*)	Naked mnium moss (*Rhizomnium nudum*)	Comments	Site-tree height buffer
41	One occurrence on the edge of the unit.	None in unit.	Formerly *Units 14 and 17*.	One
84	Two occurrences in	One occurrence in		Three

Unit #	Green bug-on-a-stick moss (*Buxbaumia viridis*)	Naked mnium moss (*Rhizomnium nudum*)	Comments	Site-tree height buffer
	unit.	unit.		
114	Two occurrences in unit.	None in unit.		Two
134	One occurrence in unit.	None in unit.		One
148	Two occurrences in unit.	None in unit.		Two
170	One occurrence in unit.	None in unit.		One
175	One occurrence just outside of unit.	None in unit.	Just outside of the edge of the unit, need to be careful during implementation to not affect shading.	None
176	None in unit.	One in riparian buffer.		None
198	Two occurrences, one in the unit and one on the edge of the unit.	One occurrence on the edge of the unit.	Just outside of the edge of the unit, need to be careful during implementation to not affect shading.	One
200	One occurrence on edge of unit.	None in unit.		One
215	One occurrence in unit.	None in unit		One
224	Two occurrences in unit.	None in unit.		Two
248	None in unit.	Two occurrences in unit.		Two
254	None in unit.	One occurrence just outside of unit.	Just outside of the edge of the unit, need to be careful implementation to not affect shading.	None
296	None in unit.	One occurrence in unit.		One
311	One occurrence on boundary of unit 321	One occurrence on boundary of unit 321 in same location as *Buxbaumia*.	On border of Unit 321.	One
321	One occurrence in unit.	One occurrence in unit in same location as *Buxbaumia*.	This is another location than the occurrences on the border of Unit 311.	One

8) Precommercial Thinning

A. The maximum diameter of felled trees will be seven inches. Cull trees that exceed the diameter limit will be girdled in lieu of felling to provide additional cavity-nesting habitat.

B. Snags or dead trees will not be cut unless they pose a safety hazard. Snags cut for safety reasons will preferably be left where they fall.

C. Directional felling will be used to minimize slash depths. Trees that cannot be directionally felled will be bucked in lengths not to exceed six feet.

D. Slash will be pulled back a minimum of four feet away from all system road cut banks to prevent slash from falling into ditches and culverts.

E. Established game trails will be kept clear of slash by directional felling and slash pullbacks to maintain travel linkages.

F. A 50-foot no-activity buffer will be maintained along all wetted defined channels, springs, and seeps within and adjacent to thinning units.

G. Existing closed gates will be locked after each entry and exit.

H. Activity behind closed gates will be scheduled for completion prior to the opening of the elk any-weapon hunting season (commonly referred to as "rifle season"). An extension may be allowed based on extenuating circumstances (fire, weather, etc.) after interdisciplinary review.

I. Earthen barriers or other restrictive devices that are removed to allow access for project activities will be replaced upon completion of the unit (within one week) and before October 10th each year.

J. Activity will be conducted using existing access – i.e. no brush will be cleared or other improvements made to roads/trails for pre-commercial thinning activities.

9) Recreation

A. Existing dispersed recreation sites used for harvest operations activities will be restored or rehabilitated if motorized access to the sites would remain available after project implementation.

B. Contractors will follow permit provisions required for camping on National Forest System lands.

C. Where skid trails approach or intersect open roads or designated ATV routes, restrictive devices or debris such as logs, brush and rocks will be placed to effectively stop vehicle use.

D. Warning signs will be placed to inform visitors of logging activities in areas where logging traffic may interfere with recreational traffic.

E. Before trails are officially designated for ATV use they will be reconstructed to standards for ATV use.

10) Soil and Water

A. All activities will comply with:

i. Standards identified in the Inland Native Fish Strategy (INFS) EA Decision Notice and Finding of No Significant Impact, signed in July 1995. All alternatives will implement standard riparian habitat conservation area (RHCA) widths specified by INFS. These buffer zones are no-entry for harvest and equipment. Exceptions are described in the Standards and Guidelines, General Riparian Area Management (RA-2) that states: Trees may be felled in riparian habitat conservation areas when they pose a safety risk. Keep felled trees on site when needed to meet woody debris objectives. When necessary to fall trees (for skyline/cable units); the sale administrator may approve the minimum number required and ensure that they remain where dropped.

ii. Objectives of Appendix O of the IPNF Forest Plan, Stream Protection.

iii. Protection of water quality. Best Management Practices (BMPs) will be used to achieve water quality standards. The Forest Service Handbook 2509.22 (Soil and

Water Conservation Handbook) outlines BMPs that meet the intent of the water quality protection elements of the Idaho Forest Practices Act, Forest Plan Standards and replaces the Forest Plan Appendix S – Best Management Practices. Other site-specific BMPs may be identified and developed during layout, design or implementation of proposed activities.

iv. Requirements and erosion control guidelines of the Rules and Regulations pertaining to the Idaho Forest Practices Act, Title 38, Chapter 13, Idaho Code.

B. Areas of recent or historic landslides and slumping are considered landslide-prone areas. Although none were identified, if any are located during implementation INFS buffers for Category 4 RHCAs will be applied.

C. Tractor Yarding:

i. Ground-based yarding will be limited to slopes less than 35%.

ii. Only approved skid trail locations will be allowed.

iii. Trails will be spaced at least 100 feet apart, except where converging at intersections.

iv. Skid trail spacing closer than that listed above may be planned when winter logging occurs on at least two feet of settled snow or frozen ground or where adequate slash matting exists.

v. No excavated skid trails will be constructed.

vi. Skid trails in tractor-yarded units will be limited to less than 15% of the unit acreage to comply with IPNF Forest Plan soil quality standards and Region 1 soil quality recommendations.

vii. To minimize disturbance (soil compaction or displacement), practices such as skidding, grapple-piling and mechanical harvesters will occur over slash or on existing skid trails (Forest Plan Monitoring Reports). Units will be designed to utilize non-excavated skid trails and directional falling.

D. Skyline Yarding: The leading end of logs will be suspended during yarding.

E. Temporary Road: All temporary roads will be fully recontoured to the natural slope upon completion of activities. Temporary roads that will remain on the landscape more than one dry season will be waterbarred according to specific interval direction and at specific angles to prevent erosion. After recontouring they will then be covered with a natural, weed-free material to prevent runoff and erosion during spring and/or winter runoff events. This could be on-site slash, straw, or other suitable material.

F. For roads that will be managed as Road Management Prescriptions C and D at a minimum:

i. All culverts will be removed;

ii. All fill within the stream crossing sites will be removed;

iii. Stream gradient and valley side-slopes will be returned to as near natural conditions as possible for 200 feet on both sides of stream;

iv. Road surfaces will be decompacted to a minimum of 18 inches to facilitate and augment infiltration; and

v. The beginning of the treatment area will be fully recontoured for 300 feet or a sight-distance (which ever is less) to eliminate motorized access.

G. Prescribed burning will be done when soil moistures exceed 25% to maintain soil productivity.

H. The Intermountain Forest Tree Nutrition Cooperative assembled data suggesting that soil potassium levels may be conserved in treatment units by allowing logging slash to over-winter. By leaving sufficient levels of wood on site, long-term soil productivity will be protected.

   i. Potassium sources such as needles and limbs will be maintained on site by allowing slash to over-winter prior to all slash disposal treatments except where tops will be yarded (Intermountain Forest Tree Nutrition Cooperative - Garrison and Moore 1998).

   ii. Tops of trees will be left in most harvest units.

   iii. Silvicultural and burning prescriptions will retain sufficient levels of coarse woody debris on site after slash disposal (Graham and others 1994). The following recommendations will be used in prescriptions:

      a. Douglas-fir, larch, and pine types: minimum coarse woody residues of 4-6 inches diameters well distributed through a treatment area at 10-15 tons/acre (Harvey and others 1987).

      b. Grand fir / beargrass types at 7-14 tons/acre of coarse woody residues (greater than three inches diameter), western hemlock/bead lily types at 17-33 tons/acre coarse woody residues (greater than three inches diameter).

      c. Subalpine fir / beargrass types at 12-23 tons/acre coarse woody residues (greater than three inches diameter) Graham and others (1994).

J. Wetlands identified during field review or harvest preparation will be protected by INFS buffers (50 feet for those less than one acre and 150 feet for those greater than one acre). A resource protection provision in contracts will be used to protect wetlands that may be discovered during operations.

K. Where new road NR8B is constructed through the draw it may be necessary to provide subsurface drainage to avoid moisture saturation and subsequent slope failure. Where it is necessary, horizontal drains, drainage trenches, or drainage blankets may be used to lower the subsurface water levels and to prevent groundwater from entering embankments.

L. Rodent control treatment will not occur within INFISH buffers; in areas where the soil is saturated; or during periods of or forecasted periods of heavy precipitation.

M. In Unit 215 and 224 skid trails will be decompacted after use and soils will be monitored to determine effectiveness of decompaction and amount of detrimental disturbance.

N. Culverts identified as not meeting the 100-year peakflow criteria will be upgraded to meet the required size for passing this flow. Roads proposed for storage and recontouring will not be upgraded because the culverts are planned for removal.

11) Transmission Lines

A. Timber harvest roads near the large transmission lines will be kept reasonably free of equipment, products, and debris. The Bonneville Power Administration (BPA) may need to have road access for emergencies. In this case "reasonably free" means that the

road could be cleared within an hour of notice and roads will be left clear and passable when contractors leave the area for more than an hour at a time. Logging trucks and equipment may be parked on the right-of-way only during emergencies. When this occurs, the truck/equipment should be grounded with a flexible wire connecting the chassis to a ground rod driven into the ground, or by making the connection to ground with a drag chain attached to the truck/equipment chassis.

B. Where units are adjacent to the transmission line right-of-way, timber will be harvested to reduce the risk of blowdown into the transmission line. Trees immediately adjacent to or under the transmission line will be harvested. If this is not possible, enough timber will be left to maintain wind firmness and reduce the risk of wind-throw into the transmission line.

C. Haul roads will remain a minimum of 50 feet from the point where steel lattice tower legs enter the earth. If this clearance cannot be met, use of road may be permitted if adequate protection for BPA structures from vehicles were provided by the use of guard devices (guard rails, posts, Jersey-type barriers, etc.) If guard devices were used, their location and design must be approved by the BPA.

D. Yarders used near the transmission line will be grounded with copper wire attached to a copper rod pounded six to eight feet in the ground. Skyline cables will be grounded as described above at the tailhold.

E. Chokers will be allowed to hit the ground before they are touched. Track mounted equipment is recommended near transmission lines to drain off induced voltage. If rubber mounted machines are used, a chain should be dragged behind on the ground to drain off voltage. A minimum separation of 20 feet between equipment and transmission line conductors will be maintained.

F. High-lead or skyline yarding across the right-of-way will not be done.

G. Transmission lines sag on warm days or when they are weighed down by snow or heavy frost. Lines that span long distances have greater potential to sag. The distance between equipment and transmission line cables in the same place can be different with different conditions. The timber harvest prospectus will describe this to potential timber sale bidders.

H. Concentrated columns of smoke under transmission lines will be avoided in order to prevent electrical arc. Burning proposed within the right-of-way will be discussed with the BPA prior to writing the burn plan.

I. No loading of logging trucks, fueling of vehicles or equipment, log decking or storage of logs or flammable materials will be allowed on the transmission line right-of-way.

J. Logging trucks will not be loaded to a height greater then 14 feet above the roadbed. If a tree comes in contact with the transmission line, no attempt will be made to remove it. The BPA Dispatcher will be contacted immediately, 24 hours per day, seven days per week: 360-693-4703 or 800-392-0816.

K. For extreme safety-hazard trees near the transmission line, BPA may be able to provide personnel at the work site with advance notification.

L. The right-of-way width for the Dworshak-Taft No. 1 500-kV transmission line is 150 feet, measured 75 feet on each side of transmission line centerline.

12) Visual Quality

Forest Plan Visual Quality Objectives would be met through implementation of the following:

A. Harvest unit preparation and silvicultural personnel will work closely with the District or Forest visual staff to determine that design criteria are adequate for each application.

B. ***Foreground Partial Retention (Fg/PR): Unit 336:*** Activities will remain visually subordinate to the characteristic landscape, repeating the form, line, color and texture common to the surrounding area with differences in qualities of size, amount, intensity, direction and pattern.

C. ***Background Partial Retention (Bg/PR): Units 11, 14, 15, 17, 18, 30, and 32:*** Form, line color and textures not frequently found in the characteristic landscape might be introduced in these units. Changes will remain subordinate to the visual strength of the characteristic landscape.

13) White Pine Leave Tree Guidelines (Schwandt and Zack 1996)

These guidelines will be utilized in all silvicultural prescriptions for timber harvest. The objective of these guidelines is to retain and protect genetic resources which may contribute to long-term white pine restoration.

14) Wildlife

A. Slash depths next to new and reconstructed roads will not exceed 1.5 feet or if that is not practical, openings that are at least 16 feet wide will be created every 200 feet - especially on ridges and across game trails (IPNF Forest Plan Appendix Y [Leege 1984]).

B. To provide elk security, timber harvest in adjacent areas will have a ridgeline between the disturbance and security area (IPNF Forest Plan Appendix Y [Leege 1984]). This will be done by subdividing harvest areas or contract scheduling.

C. The following snag management recommendations from the Northern Region Snag Management Protocol (January 2000) will be met (where these or higher levels exist). The retention of snags and snag replacements will be applied at the scale of every 5 to 25 acres (Bull and others 1997). Replacement snags will be retained at five times the number of snags per acre.

Snag Guidelines

Habitat	Snags / Acre Retention Prescriptions
Warm dry ponderosa pine and Douglas-fir	1-2 greater than 20” dbh
Cool Douglas-fir, warm grand fir, slope <30%	4 greater than 20” dbh
Cool Douglas-fir, warm grand fir, slope >30%	6-12 total, with 2-4 greater than 20” dbh
Cool, wet, and dry spruce, grand fir, hemlock, and alpine fir	6-12 total with 2 greater than 20” dbh
Low elevation cedar and hemlock	12 total with 4 greater than 20” dbh
High elevation spruce/fir/lodgepole pine	5-10 greater than 10” dbh
Whitebark pine/limber pine	All available

D. To meet the objectives listed above in the Snag Guidelines table:

   i. Silvicultural and burning prescriptions will be prepared with the goal of protecting snag and green tree replacement snags, and retaining recommended levels and distribution of coarse woody material during site preparation and fuels treatment.

   ii. Snags that show signs of decay, loose bark, or broken tops will not be designated for harvest (Bull et al. 1997). Exceptions will be made for road construction and log landings.

   iii. The Reserve Tree Guide (IPNF 1995) will be followed to reach objectives of the Snag and Woody Debris Guidelines (IPNF Forest Plan, Appendix X) and worker safety.

   iv. Tree-marking guidelines for wildlife reserve trees will favor the retention of large diameter trees, particularly hollow and broomed trees (Bull and others 1997) except when they pose a safety concern. Western larch, ponderosa pine, and western redcedar greater than 20 inches d.b.h. will be marked as first choices for snags and reserve trees.

   v. Snags cut for safety reasons will be left in the unit - preferably where they fall.

E. In most cases travel cover will be maintained and vegetation management will avoid making openings (i.e. areas with <30% canopy cover) within 200 feet of the ridge top or 400 feet if the other side of the ridge does not provide cover. Where openings will be created on ridges designated as potential travel areas they will meet the following criteria:

   i. Less than 300 feet wide (Heinemeyer and Jones 1994)

   ii. Limited to one side of the ridge top

   iii. Minimum of 800 feet of cover between openings (IPNF Forest Plan Appendix Y [Leege 1984])

   iv. None to be situated in a saddle (IPNF Forest Plan Appendix Y [Leege 1984]; Heinemeyer and Jones 1994)

F. Excavator-piled slash will be left unburned at a rate of one slash pile per five acres and will be constructed to provide wildlife habitat (Heinemeyer and Jones 1994).

G. Goshawk nests found before and during implementation will be protected by a 40-acre, no-activity buffer (Brewer and others 2007). Project activity will be suspended within the post fledgling areas of any active goshawk nests between April 15 and August 15 (ibid). Activity restrictions could be removed after June 30 if the nest sites are determined by the district biologist to be inactive or unsuccessful. Activity within an approximately 420-acre area surrounding each active goshawk nest will comply with the following management recommendations (Reynolds and others 1992):

   i. 20% or less in shrub/seed/sapling size class

   ii. 60% or more canopy closure in immature and older size classes

   iii. Created openings are less than two acres with a minimum of 300 feet between existing or other created openings and snag retention guidelines are applied on each acre of created opening

   iv. Non-regeneration treatment in immature and older stands is thinning from below using irregular spacing of leave trees

H. Provisions for protection of Threatened, Endangered, and Sensitive (TES) Species, and settlement for environmental cancellation will be included in contracts. If TES species and/or significant habitat are discovered during project implementation the district wildlife biologist will be notified so that if needed, measures could be taken to avoid impacts and meet Forest Plan standards. Measures could include altering or dropping proposed units, modifying the proposed activity, or implementing buffers.

I. All activity on lynx habitat in the LAU would be consistent with standards and guidelines from the Northern Rockies Lynx Management Direction (USDA 2007).

Location: The Bussel 484 Project Area is located within the Bussel Creek Watershed which is a tributary of Marble Creek and is eight miles northeast of Clarkia, Idaho in Shoshone County. It includes portions of Township 43 and 44 North; Range 2 and 3 East, Boise Meridian. See the attached map.

Time Period: Implementation would begin in 2008 or 2009. Timber harvest is expected to be completed by 2013. Slash disposal, site preparation and reforestation are expected to be completed by 2015.

PROJECT ASSESSMENT AREA

The Bussel 484 Project Area was defined and delineated based on the scope of the proposed action and watershed boundaries (see attached map). The geographic scope of potential effects on wildlife was determined based on the spatial distribution of all proposed federal actions associated with the proposed action(s), the home ranges of species that may be impacted, topographical features, land ownership boundaries, the amount of area needed to determine potential effects, characteristics of the landscape surrounding the project area that may influence cumulative effects or species use of habitat, and existing analysis units (i.e. Lynx Analysis Units).

Baseline Condition

The relative distribution of the habitat type groups occurring in the project area is displayed in the following table. Habitat groups indicate the potential natural vegetation within the area.

Distribution of Habitat Types on NFS in Bussel 484 Analysis Area

Habitat Group	Potential Vegetation	Temperature and Moisture	Acres	% Area
3	Dry Forest	Moderately Warm and Moderately Dry	132	1
4	Moist Forest	Moderately Warm and Moist	879	7
5	Moist Forest	Moderately Cool and Moist	9,425	77
6	Moist Forest	Moderately Cool and Wet	902	7
7	Cool Forest	Cool and Moist	590	5
8	Cool Forest	Cool and Moist	256	2
9	Dry Forest	Cool and Moderately Dry	84	1

The following table displays the current stand composition (defined by the forest type of the species with the greatest basal area represented in the stand) for the analysis area

Forest Type Bussel 484 Analysis Area

PP	WP	WL	DF	GF/ WH	C	LP	SAF/ MH/ES	Open/ grass
<1%	3%	4%	7%	58%	11%	2%	14%	1%

PP = ponderosa pine, WP = western white pine, WL = western larch, DF = Douglas-fir, GF = grand fir, WH = western hemlock, C = western redcedar, LP = lodgepole pine, SAF = subalpine fir, MH = mountain hemlock, ES = Engelmann spruce.

LISTED SPECIES - WILDLIFE

The U. S. Fish and Wildlife Service (USFWS) identified three listed wildlife species that may occur on the Idaho Panhandle National Forests (Species list # 1-9-08-SP-0067, August 9, 2008):

- Canada lynx *(Lynx canadensis*)
- Grizzly bear *(Ursus arctos)*
- Woodland caribou *(Rangifer tarandus caribou)*

Species requiring analysis were identified based on the Species List, review of the analysis area (i.e. capable habitat), a search of district records, scientific literature, and professional knowledge of the area. The following table displays a synopsis of habitat and existing conditions.

Listed Wildlife Species

Common Name	Habitat	Existing Condition in the Assessment Area
Canada Lynx	Mesic conifer forests that provide a prey base of snowshoe hare (generally above 4,000' & in association with subalpine fir/spruce habitat types). Late and early successional stages.	Based on lynx habitat as currently mapped a portion of the WL analysis area is currently within a LAU.
Grizzly Bear	Large areas of undisturbed habitat. Low elevation riparian areas, meadows, snow chutes, shrubfields, grasslands, and open timbered stands.	Project area is not in a Grizzly Bear evaluation/recovery area, an area known to be occupied by grizzly bears, nor an area of re-occurring grizzly bear use.
Woodland Caribou	Mature to old growth forests with dense canopies over a large elevation gradient. High elevation timbered ridges with abundant lichens.	The project area is outside of the woodland caribou recovery area. The species is not known or suspected on the St. Joe Ranger District.

ANALYSIS OF EFFECTS

The Bussel 484 Project Area is not in an identified Recovery Area for the grizzly bear or woodland caribou or in proposed critical habitat for lynx. Based on the lack of sightings, the location of the project (outside of recovery areas), the existing condition (i.e. lack of remoteness and the existing and potential vegetation), and the surrounding landscape (e.g. roaded non-NFS land) there are no resident populations of listed species present in the project area or surrounding landscape. It is also highly unlikely that these listed species do or would occur in the analysis

area. There is an inconsiderably remote potential that transient individual may move through the area.

One of the specific concerns with the project is the potential for effects associated with the proposed gopher control. An analysis of effects from strychnine/zinc phosphide baiting indicates little to no potential for adverse impacts on wildlife. See Appendix A for a discussion of the potential for effects from strychnine/zinc phosphide baiting

Woodland caribou

Historically, woodland caribou were numerous enough to be hunted by the Coeur d'Alene, Kalispel and Kootenai Indians; and once ranged south to central Idaho and as far east as Missoula, Montana. Today in Idaho a small number of woodland caribou are present in the Selkirk Mountains. This is the only area in the lower 48 states where caribou live.

The project area is outside of the woodland caribou recovery area (USFWS 1993). The species or capable habitat is not present on the St. Joe Ranger District. The geographic location of the project precludes the potential for effects on the species. There would be no effect on woodland caribou.

Grizzly bear

The St. Joe Ranger District is not in a Grizzly Bear Recovery Area (USFWS 2000, USFWS 1997), nor was it included in the Bitterroot grizzly bear evaluation area in the *Grizzly Bear Recovery Plan Supplement: Bitterroot Ecosystem Recovery Plan Chapter* (USFWS 1996). Some alternatives in the Grizzly Bear Recovery in the Bitterroot Ecosystem FEIS did include the St. Joe Ranger District in an Experimental Population Area (USFWS 2000); however, there were no anticipated impacts to land use activities on public land identified (ibid). There is no known grizzly bear population occupying the St. Joe Ranger District.

In September of 2007 a male grizzly bear was shot and killed in the North Fork Clearwater River drainage south of the St. Joe Ranger District. It was determined that the bear originated from the Selkirk area which is north of the St. Joe Ranger District. Although the route this bear took is unknown, based on existing conditions (e.g. human developments) between the Selkirk area and the North Fork Clearwater River and identified linkage zones (Servheen et al. 2003), the most reasonable route for the bear to have used would have been across the upper St. Joe drainage, more specifically the area along the Idaho/Montana border. There are no verified records or reports of grizzly bears on the St. Joe Ranger district. There have been recent "credible" observations in the upper St. Joe River drainage, but these observations have not been verified despite efforts to verify at least 1 of the observations (Holt personal communication).

In light of the recent grizzly bear shooting the U.S. Fish and Wildlife Service has proposed surveying in the North Fork of the Clearwater drainage and the upper St. Joe drainage to assess if there are any grizzly bears in the area. Based on current knowledge the potential for grizzly bear occurrence on the St. Joe Ranger District can not be totally dismissed. However, there is no information to suggest any occurrence other than the possibility of transient individuals. Even the potential for transitory occurrence in the St. Joe drainage is low, and lower still outside of the upper St. Joe drainage (i.e. the Bussel 484 Project area).

The potential for grizzly bear occurrence in the Bussel 484 analysis area is inconsiderably remote.

This conclusion is based on the location of the project/analysis area, the lack of recorded sightings in the area, and the improbable likelihood of the area being used for movement of grizzly bear (e.g. the USFWS has targeted the upper St. Joe River drainage for surveys).

It is reasonable to conclude that this project would have no effect on grizzly bears. This conclusion is based on: a) the project not being in a recovery area or area of re-occurring use, b) the inconsiderably low potential for grizzly bear occurrence in the project area, c) the consistency with the *Grizzly Bear Recovery Plan Supplement: Bitterroot Ecosystem Recovery Plan Chapter* (USFWS 1996), and d) the inconsiderable potential for human/bear conflicts.

Canada Lynx

Canada lynx occur in mesic coniferous forests that have cold, snowy winters and provide a prey base of snowshoe hare (Ruediger and others 2000). In the St. Joe River drainage lynx habitat generally occurs above 4,000 feet in subalpine fir forests or cedar/hemlock habitat types when in association (within approximately 200 meters) with subalpine fir and spruce habitat types. Habitats that support their primary prey include early successional stages resulting from natural disturbance and timber harvest. Characteristics of foraging habitat include a dense, multi-layered understory that provides cover and browse at ground level and at varying snow depths throughout the winter. Multi-story mature or late successional forests with a substantial understory of conifers or small patches of shrubs and young trees also provide lynx foraging habitat.

The common component of natal den sites appears to be large woody debris. Den sites may be located within older regenerating stands or in mature conifer. For denning habitat to be functional it must be in or adjacent to foraging habitat (Ruediger and others 2000).

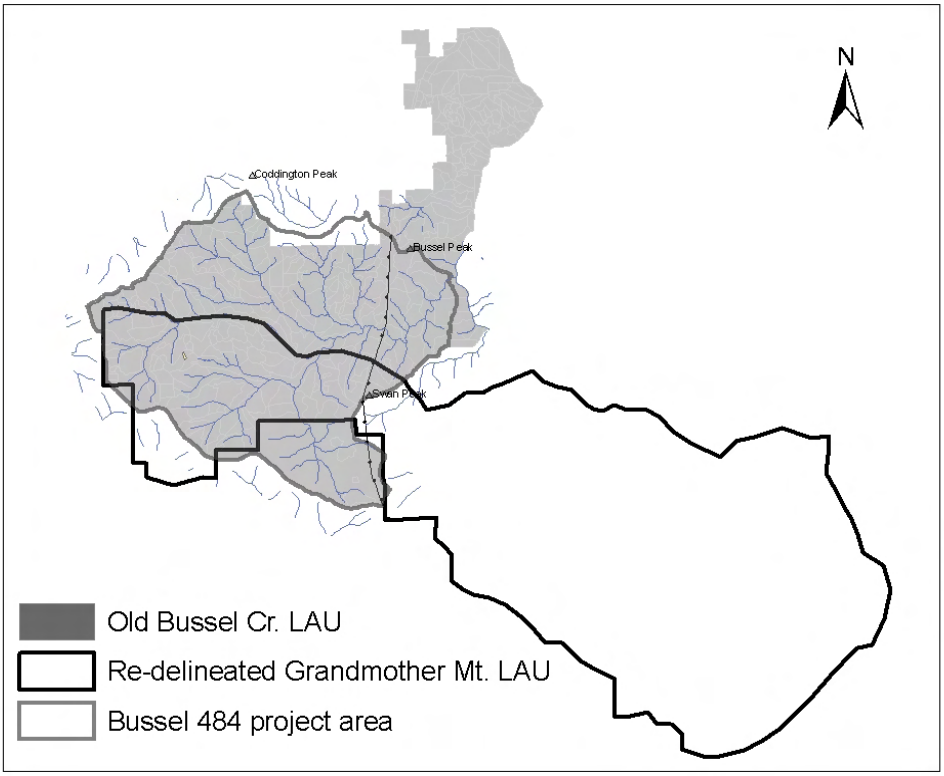
The *Canada Lynx Conservation Assessment and Strategy* (LCAS) (Ruediger and others 2000) provides an approach for management of lynx on federal lands and *Northern Rockies Lynx Management Direction* (NRLMD) *FEIS/ROD* incorporates goals, objectives, standards, and guidelines for management of lynx into the IPNF Forest Plan. As part of the programmatic planning standards, Lynx Analysis Units (LAUs) were delineated (ca. 2000) in collaboration with the USFWS to facilitate project planning. Based on potential vegetation in portions of the area and our understanding of lynx habitat at that time, the Bussel 484 area was included in the Bussel Creek LAU.

Unrelated to and independent of this proposed project the IPNF is close to finalizing remapping its lynx habitat. This effort was initiated (in 2006) by the increase in our understanding of lynx habitat and better information concerning existing primary vegetation/habitat since the initial mapping effort. The re-mapping process, a better understanding of lynx habitat, and the assessment of lynx habitat across the Forest revealed early on that some LAUs are no longer consistent with direction in the LCAS and that adjustments should be made. For example, the Bussel Creek LAU contains approximately 1,680 acres of primary vegetation (i.e. spruce/subalpine fir). This is not consistent with the LCAS guideline which states that $10mi^2$ (6,400 acres) of primary vegetation should be present within each LAU to support lynx survival and reproduction.

Prior to and independent of finalizing the lynx habitat re-mapping across the Forest, the quantity and distribution of lynx habitat within the Bussel 484 Project area was reassessed in coordination with the USFWS. The reassessment was based on the original mapping protocols in 2000 and - as stated previously - the Bussel Creek LAU did not provide sufficient subalpine fir habitat. The

reassessment resulted in dropping the old Bussel Creek LAU and re-delineating the existing Grandmother Mountain LAU to incorporate the lynx habitat in the Bussel 484 area. This resulted in improved consistency and compliance with the mapping directions contained in the LCAS (e.g. at least 6,400 acres of primary vegetation should be present in each LAU).

Lynx Analysis Units Mapping Changes



The ongoing remapping of lynx habitat, the pending issuance of the NRLMD, and the resultant unknowns relative to lynx management (e.g. quantity and distribution of lynx habitat and changes in standards) resulted in development of the proposed action and alternatives with the knowledge that some aspects of the proposal(s) may need to be modified. Now that the remapping is nearing finalization and the NRLMD is in effect the associated issues with lynx management relative to the project can be better addressed. This entailed some modifications of the proposed action (e.g. some proposed pre-commercial thinning was dropped or modified because they are potentially in lynx habitat). This analysis and the modifications of the proposed action are based on compliance with the NRLMD (and protecting lynx) regardless of the final lynx habitat remapping.

Standards and guidelines established by the NRLMD for vegetation management activities apply to the lynx habitat (i.e. primary vegetation and secondary vegetation within ≈200 meters of primary) in that portion of the analysis area in an LAU, those that are most pertinent to effects from the proposed action(s) include:

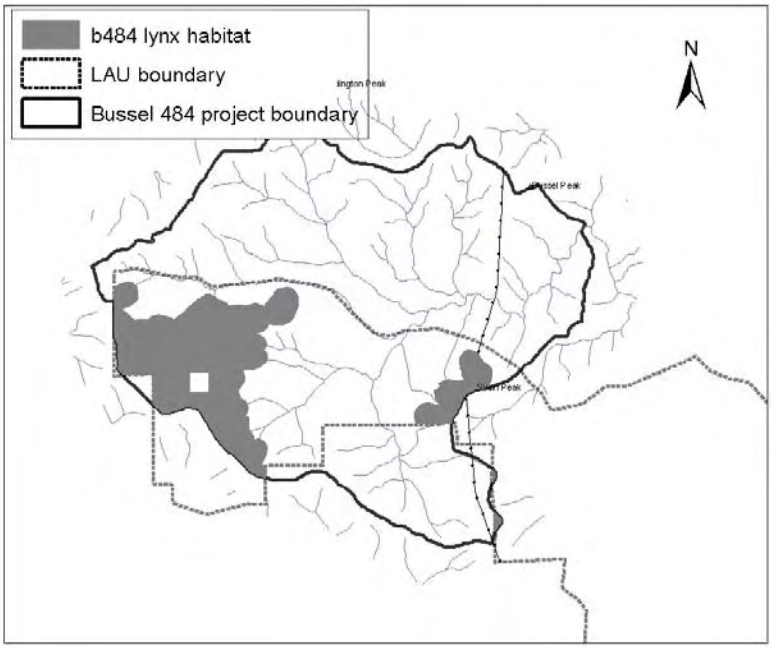
- Limit unsuitable habitat (i.e. structural stage that does not yet provide winter snowshoe hare habitat) in each LAU to ≤30%,
- Do not regenerate more than 15% of lynx habitat on NFS lands within an LAU in a ten-year period,

- Pre-commercial thinning in lynx habitat when stands provide winter snowshoe hare habitat is limited to daylight thinning planted rust-resistant white pine where 80% of the winter snowshoe hare habitat is retained,
- Do not manage vegetation in multi-story mature or late successional stands so that winter snowshoe hare habitat is reduced.

Affected Environment

Approximately 6,300 acres of the southern portion of the analysis area are included in the Grandmother Mt. LAU. Based on the IPNF lynx habitat mapping from 2000, this area contains ≈3,520 acres of lynx habitat – i.e. primary vegetation and secondary vegetation within ≈200 meters of primary vegetation (Figure 3-7).

Lynx Habitat within the Bussel 484 Project Area



The following table displays the existing condition in the Grandmother Mt. LAU.

Lynx Habitat Existing Condition in the Grandmother Mt. Lynx Analysis Unit

LAU	LAU acres (% federal)	% Unsuitable	Unsuitable last 10 years
Grandmother Mt.	31,386 (≈96+%)	<1%	<1%

Environmental Consequences

The following Table displays the proposed harvest units totally or partially in lynx habitat. These units have been field reviewed and it has been determined that the existing stand conditions do not provide snowshoe hare habitat in multistory forest stands. Treatment of these units would be consistent with the standard in the NRLMD ROD that limits vegetation management that reduces snowshoe hare habitat in multistory forests.

Proposed harvest Units Totally/Partially in Lynx Habitat

Unit	RX	Acres	Acres in Lynx Habitat	Regeneration Harvest Acres
153	CCWR	10	2	2
182	CT	18	8	
197	CT	18	15	
200	CT	14	4	
215	CT	28	25	
232	GSW	54	54	27
271	CT	27	14	
283	CT	61	20	
295	CCWR	13	13	13
301	GSW	62	33	17
310	CT	27	9	
322	CCWR	41	41	41
	Totals	373	238	100

Direct and Indirect Effects

Twelve proposed harvest units are partially or completely within potential lynx habitat. A total of approximately 238 acres of lynx habitat would be impacted. One hundred acres would receive some form of regeneration harvest and would become unsuitable lynx habitat for approximately 10 – 17 years until regenerating trees become big enough to provide habitat. The remaining 138 acres proposed for harvest would be thinned and would not become unsuitable lynx habitat. Unsuitable habitat would remain well below 30% of the Grandmother Mt. LAU and the alternatives would not regenerate more than 15% of the LAU in a 10 year period.

There would be no pre-commercial thinning in potential lynx habitat. No vegetation management would occur in multi-story mature or late successional stands that provide winter snowshoe hare habitat. The 12 proposed harvest units in lynx habitat have been field reviewed and determined to not be multi-storied mature or late successional winter snowshoe hare habitat. This determination is based on the lack of horizontal cover in the stands. Treatment of these units would be consistent with the standard in the NRLMD ROD that limits vegetation management that reduces snowshoe hare habitat in multistory forests.

The proposed action is consistent with the NRLMD and the LCAS.

Based on the limited impacts on primary vegetation, the limited potential for species occurrence, and compliance with standards and guidelines from the NRLMD ROD, the proposed action May Affect but is Not Likely to Adversely Affect lynx.

Cumulative Effects

There are no reasonably foreseeable State or private activities in the analysis area or surrounding landscape that would adversely affect any listed species or their habitat.

There are no cumulative effects which would cause the federal action to contribute to the loss of key populations or adversely affect proposed critical habitat. The proposed action would not

There are no cumulative effects which would cause the federal action to contribute to the loss of key populations or adversely affect proposed critical habitat. The proposed action would not result in any irreversible or irretrievable commitment of resources which would violate Section 7(a)(2) of the ESA.

DETERMINATION OF EFFECTS

Table 5 – Summary of Determinations

Species	No Effect	May Affect - Not Likely to Adversely Affect	May Affect - Likely To Adversely Affect	Beneficial Effect
Canada Lynx		X		
Grizzly Bear	X			
Woodland Caribou	X			

Recommendations: None

Conditions: None

Prepared by: Wildlife Biologist

Date: 5/16/08

REFERENCES

Anthony, R.M.; Lindsey, G.D.; Evans, J. 1984. Hazards to ground squirrels and associated secondary hazard potential from strychnine baiting for forest pocked gophers. In: Clark, D.O., ed. Proceedings, 11th vertebrate pest conference; 1984 March 6-8; Sacramento, Ca. Davis. CA: University of California: 52-31. IN: Black, Hugh C., tech. ed. 1994. Animal damage management handbook. Gen. Tech. Rep. PNW-GTR-332. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest research Station. 236 p.

Barnes, V.G., Jr., R.M. Anthony, K.A. Fagerstone, J. Evans. 1985. Hazards to grizzly bears of strychnine baiting for pocket gopher control. IN: Black, Hugh C., tech. ed. 1994. Animal damage management handbook. Gen. Tech. Rep. PNW-GTR-332. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest research Station. 236 p.

Black, Hugh C., tech. ed. 1994. Animal damage management handbook. Gen. Tech. Rep. PNW-GTR-332. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest research Station. 236 p.

Bonar, R.E. 1995. The Northern Pocket Gopher: Most of What You Thought You Might Want to Know, but Hesitated to Look Up. Missoula, MT: U.S. Dept. of Agriculture, Forest Service, Technology & Development Program.

Evans, J. 1987. Efficacy and hazards of strychnine baiting for forest pocket gophers. pages 81-83. IN: Black, Hugh C., tech. ed. 1994. Animal damage management handbook. Gen. Tech. Rep. PNW-GTR-332. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest research Station. 236 p.

Fagerstone, K.S., V.G. Barnes Jr., R.M. Anthony, and J. Evans. 1980. Hazards to small mammals associated with underground strychnine baiting for pocket gophers. pages 105-109 IN: Black, Hugh C., tech. ed. 1994. Animal damage management handbook. Gen. Tech. Rep. PNW-GTR-332. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest research Station. 236 p.

Hegdal, P.L. and T.A. Gatz. 1976. Hazards to wildlife associated with underground strychnine baiting for pocket gophers. pages 258-266 IN: Bonar, R.E. 1995. The Northern Pocket Gopher: Most of What You Thought You Might Want to Know, but Hesitated to Look Up. Missoula, MT: U.S. Dept. of Agriculture, Forest Service, Technology & Development Program.

IPNF. 1996. Draft - terrestrial ecosystem - vegetation and landscape ecology. Ecological concepts as applied to the St. Joe geographic area. Idaho Panhandle National Forests. USDA Forest Service, Coeur d'Alene, ID. 14 p.

Leonard, G. M. 1992. Memo dated May 15, 1992 from the Washington Office to Regional Foresters on Forest Health and Biological Evaluations, Washington Office Interpretation of FSM 2670. USDA Forest Service, Washington D.C.

MacCracken, James G; D. Goble; and J. O'Laughlin. 1994. Grizzly Bear Recovery in Idaho. Idaho Forest, Wildlife and Range Policy Analysis Group. Report No. 12.

Quigley, T.M., R.W. Haynes and R.T. Graham., tech. eds. 1996. Interegrated scientific assessment for ecosystem management in the interior Columbia Basin and portions of the Klamath and Great Basins. Gen. tech. Rep. PNW-GTR-082 Portland, OR: USDA Forest Service, Pacific Northwest Research Station. 303 p.

Rudiger, Bill, Jim Claar, Steve Gniadek, Bryon Holt, Lyle Lewis, Steve Mighton, Bob Naney, Gary Patton, Toney Rinaldi, Joel Trick, Anne Vandehey, Fred Wahl, Nancy Warren, Dick Wenger, and Al Williamson. 2000. Canada Lynx Conservation Assessment and Strategy. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication #R1-00-53, Missoula, MT. 142 pp.

Ruggiero, L.F., K. B. Aubrey, S.W. Buskirk, L.J. Lyon, and W.J. Zielinski, tech. eds. 1994. The Scientific Basis for Conserving Forest Carnivores: American Marten, Fisher, Lynx, and Wolverine in the Western United States. Gen. Tech. Rep. RM-254. Ft. Collins CO: USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station. 184 p.

Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey, and J.R. Squires. 1999. Ecology and Conservation of Lynx in the United States. USDA Forest Service, Rocky Mountain Research Station, General Technical Report RMRS-GTR-30WWW.

Servheen, C., J.S. Waller, and P. Sandstrom. 2003 (latest update). Identification and Management of Linkage Zones for Wildlife Between the Large Blocks of Public Land in the Northern Rocky Mountains. U.S. Fish and Wildlife Service. Missoula, Montana

St. Joe Ranger District 2008 Pocket Gopher Control Project BA and BE.

U.S. Environmental Protection Agency. 1996. Reregistration Eligibility Decision (RED) document for strychnine. Prevention, Pesticides, and Toxic Substances. EPA-738-F-96-033. Cincinnati, OH. 7p.

USDA Forest Service. 2007. Northern Rockies Lynx Management Direction ROD. USDA Forest Service, National Forests in Montana, and parts of Idaho, Wyoming, and Utah.

U.S. Fish and Wildlife Service 1993. Letter containing guidelines for species lists.

U.S. Fish and Wildlife Service. 1993. Recovery Plan for Woodland Caribou in the Selkirk Mountains. Portland, Oregon. 71 pp.

U.S. Fish and Wildlife Service. 1995 Draft-Bitterroot Ecosystem Grizzly Bear Recovery Chapter. Missoula, MT.

U.S. Fish and Wildlife Service. 1996. Bitterroot ecosystem recovery plan chapter – supplement to the Grizzly Bear Recovery Plan. U.S. Fish and Wildl. Serv., Missoula, Mont. 27pp.

U.S. Fish and Wildlife Service 1997. Grizzly Bear Recovery in the Bitterroot Ecosystem; DEIS. U.S. Fish and Wildlife Service, Missoula, Montana

USDI, Fish and Wildlife Service. 2000a. Grizzly Bear Recovery in the Bitterroot Ecosystem, Summary of the Final Environmental Impact Statement.

U.S. Fish and Wildlife Service. 2000b. Record of Decision and Statement of Findings for the Environmental Impact Statement on Grizzly Bear Recovery in the Bitterroot Ecosystem and Final Rule on Establishment of a Nonessential Experimental Population of Grizzly Bears in the Bitterroot Area of Idaho and Montana. U.S. Fish and Wildl. Serv., Missoula, Mont.

USDI Fish and Wildlife Service. 1993. Grizzly Bear Recovery Plan. Missoula, MT. 181 pp.

USDI Fish and Wildlife Service. 1996. Grizzly Bear Recovery Plan, Supplement: Bitterroot Ecosystem Recovery Plan Chapter. Missoula, MT. 27 pp.

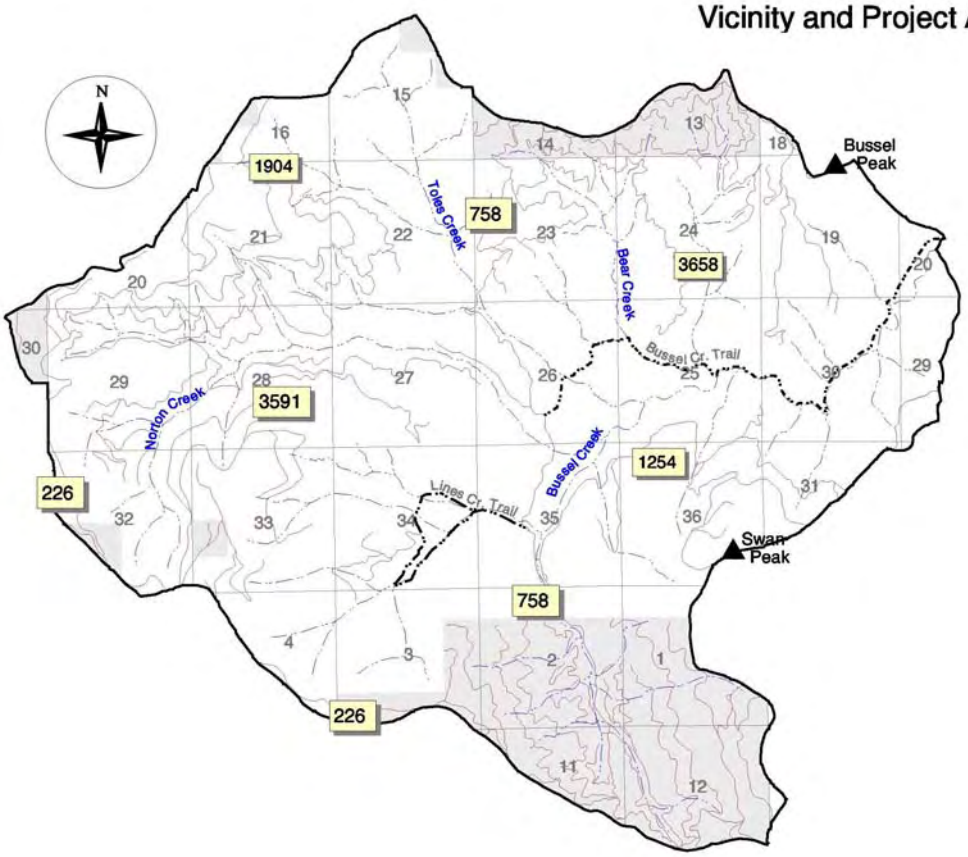
U.S. Forest Service 1987. Forest Plan Idaho Panhandle National Forests. USDA Forest Service, Coeur d' Alene, ID.

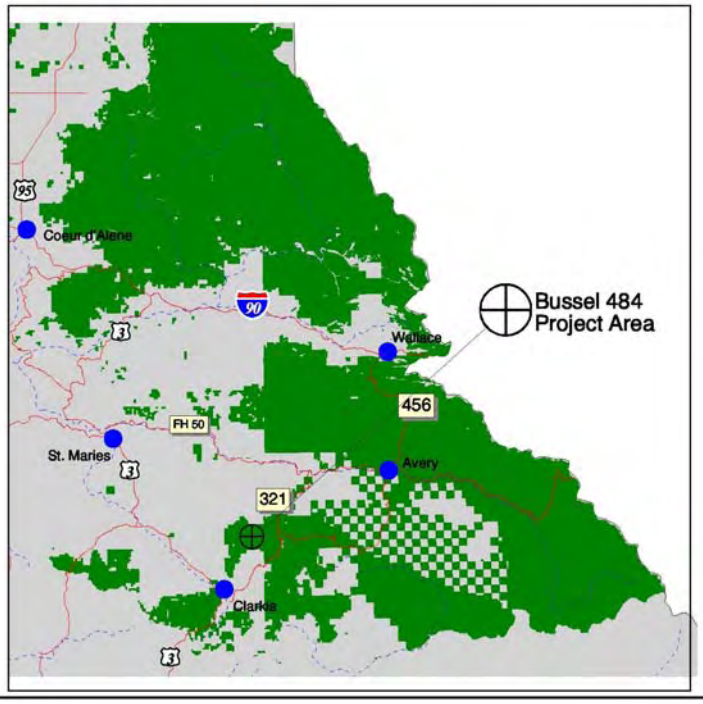
U.S. Forest Service. 1995. Letter: Streamlining Biological Evaluations and Conclusions for Determining Effects to Listed, Proposed and Sensitive Species.

U.S. Forest Service, 1997. Integration of Forest Planning into Ecosystem Management: Toward a Forest Ecosystem Approach: An Assessment for the St. Joe Area. Ecosystem Team Paper #3. Idaho Panhandle National Forests. USDA Forest Service, Coeur d' Alene, ID.

U.S. Forest Service. 1994-2002. Strychine, Pesticide Fact Sheet. Prepared for the U.S. Department of Agriculture, Forest Service by Information Ventures Inc. http://infoventures.com/e-hlth/peticide/strychni.html. 4/3/02. 12p.

Bussel 484
Vicinity and Project Area Map





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Appendix A

Potential effects from gopher control

A potential concern associated with the gopher control in the project is the possibility of non-target mortality from strychnine/zinc phosphide baiting. The main species that could be affected are mice and other small rodents that may consume treated bait in gopher burrows (Anthony et. al. 1984) and seed eating birds that may consume spilled bait (Bonar. 1995). Also, secondary poisoning could occur if predators ingest bait-killed gophers and consume a toxic level of poison (Black. 1994).

Strychnine

Existing labeling does not restrict use of strychnine treated oats in other than residential sites. Strychnine does not bioaccumulate in bodily tissue (Bonar. 1995); and it may be consumed at very low dosages over prolonged periods with little or no ill effect (Black. 1994). However, residues in the gastrointestinal tract of animals poisoned with lethal doses are known to be potentially hazardous if the gastrointestinal tract is consumed (Bonar. 1995); and secondary poisoning may occur from ingestion of material stored in the gopher's cheek pouches (Black. 1994).

Strychnine-treated bait placed below ground is effective only for a limited time - from 1 week to 1-1/2 months (Black. 1994). The half-life in aerobic conditions ranges from 24 to 27 days in sandy loam or sandy clay loam soils, with 90% loss by 33 to 40 days (U.S. Forest Service. 2002).

Zinc Phosphide

The EPA registers zinc phosphide for mice, gophers, and other vertebrate pests. Zinc phosphide is highly to extremely toxic to mammals and birds but is several times more toxic to rodents than to carnivores (Johnson, 1992 in Bonar, 1995). It does not accumulate in muscle tissue of poisoned animals and breaks down relatively rapidly in the intestinal tract.

The following are based on the EPA Reregistration Eligibility Decision.

- When applied to dry soil environments, zinc phosphide may be moderately persistent with ≈40% of the applied ingredient remaining after 30 days.
- In moist soils, zinc phosphide was reported to dissipate with half-lives of less than 1 week.
- Data indicate that the application rate would generally be low enough that residues would not be detectable in plant or soil after ≈1-2 weeks.

Non-target and secondary mortality

Studies by the EPA and the US Fish and Wildlife Service of strychnine baiting for gopher control found very minor losses to other than the target species when bait was correctly placed (Black. 1994). Most of these losses were to burrowing animals (Black 1994). Some predators may be able to detect animals poisoned by zinc phosphide by smell or taste and reject them as food (Bell and Dimmick, 1975 in Bonar, 1995). In a literature review (Johnson, 1992 in Bonar, 1995) no cases of secondary exposure were documented because scavengers avoided the GI tract of poisoned animals. Small mammal populations are not adversely affected by baiting (Fagerstone et al. In Bonar. 1995).

Fagerstone and others (1982) found no evidence of secondary poisoning. There is very little potential for secondary poisoning of predator or scavenger species that may consume dead rodents (Marsh, 1985 in Bonar, 1995).

A single gopher generally occupies its own burrow system. Burrow/territory size varies dependent on such variables as the quality and quantity of available food, altitude, weather, etc. (Bonar. 1995). Pocket gophers almost always die underground (Lindsey and Evans. 1983 and Barnes et. al. 1985) in their own burrow system over a period of days and are therefore separated from each other (Bonar. 1995).

Each dead gopher contains only a small amount of strychnine (Barnes et. al. 1985). Because gopher predators have a greater body mass, they must consume many strychnine-killed prey for them to accumulate a lethal dose. It is unlikely that a gopher predator would find and consume enough gopher carcasses to accumulate a lethal dose of strychnine (Bonar. 1995). Secondary hazards to predators appear to be greatly lessened by the tendency of gophers to die underground (Barnes et al. 1985).

Research on whether grizzly bears would be affected by strychnine baiting for pocked gopher control (Barnes et. al. 1985) concluded that strychnine-poisoned gophers are a negligible hazard to grizzly bears. This conclusion was based on a number of factors, including: pocket gophers do not constitute a major component of the grizzly bear diet, degradation of bait quickly lessens the hazards to grizzly bears, grizzly bear use of young 1-5 year old treated stands is low, and the few bears that may forage in baited areas are not likely to consume lethal quantities (ibid).

Grizzly bears are omnivores, but feed primarily on vegetation. Studies indicate that a grizzly bear diet consists of about 90% vegetable and insect matter (USFWS 1997). They do scavenge and occasionally prey on game animals and ground dwelling rodents (ibid).

An analysis of the potential for non-target and secondary poisoning from treated bait reveals that poisoned gophers pose a negligible hazard to grizzly bears. The implementation of the proposed project – including resource protection measures – minimizes the potential for grizzly bears to consume poisoned rodents or bait, consistent with the *Grizzly Bear Recovery Plan Supplement: Bitterroot Ecosystem Recovery Plan Chapter* (USFWS 1996).

There is very little potential for secondary poisoning of predator or scavenger species that may consume dead rodents poisoned by zinc phosphide (Marsh, 1985 in Bonar, 1995). Some predators may be able to detect animals poisoned by zinc phosphide by smell or taste and reject them as food (Bell and Dimmick, 1975 in Bonar, 1995). In a literature review (Johnson, 1992 in Bonar, 1995) no cases of secondary exposure were documented because scavengers avoided the GI tract of poisoned animals.