# Kootenai River Ecosystems
# Preliminary Environmental Assessment

Bonneville Power Administration
April 2005

# Kootenai River Ecosystems

**Responsible Agencies:** U.S. Department of Energy, Bonneville Power Administration (BPA), Kootenai Tribe of Idaho (KTOI) and Idaho Department of Fish and Game (IDFG).

**Name of Proposed Project:** Kootenai River Ecosystems.

**State Involved:** Idaho.

**Abstract:** The Kootenai River is currently nutrient poor and has been so for about 25 years. Low nutrient levels are partly responsible for the low productivity found in the river and part of the reason that important fish populations are not doing well. BPA proposes to fund KTOI and IDFG to add liquid nitrogen and phosphorus to the Kootenai River from late June through September for up to five years to replace nutrients lost to the hydrosystem. The goal of this project is to help enhance native fish populations and river health. The nutrients are expected to stimulate production in the Kootenai River's depleted food web and reverse downward trends in fish populations such as trout, kokanee, mountain whitefish, burbot, and white sturgeon. Monitoring would determine the effects of nutrients on the ecosystem and water quality. This proposed project would be temporary and would be re-evaluated after 3-5 years.

The project would require a temporary gravity-fed nutrient delivery system near Leonia, Lincoln County, Montana. Temporary tanks on a bench above the river would release nutrients through pipes into the river. An existing access road would be improved to the tank site. The tanks would be located on private land. The pipe to the river would be on National Forest System Lands managed by the Kootenai National Forest.

Most impacts would be temporary. Some trees would be removed at the tank location. Impacts to land use, visual resources, recreation, soils, vegetation, wildlife, noise, public health and safety, cultural resources, floodplains and wetlands, and water resources would be minor. If successful, fish productivity would be improved as the nutrients stimulate the aquatic food chain.

BPA is also considering the No Action Alternative. In the No Action Alternative, BPA would not fund nutrient treatment. There would be no impacts.

For additional information, contact:
Colleen Spiering - KEC-4
Project Environmental Lead
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208
Telephone: (503) 230-5756
Email: caspiering@bpa.gov

To submit comments write:
Bonneville Power Administration
Communications - DM-7
P.O. Box 14428
Portland, OR 97293-4428
Email: www.bpa.gov/comment
Fax: 503-230-3285

For more copies of this document, call 1 (800) 622-4520 and ask for the document by name. The document is also at http://www.efw.bpa.gov/environmental_services/Document_Library/Kootenai/.

For additional information on DOE NEPA activities, please contact Carol Borgstrom, Director, Office of NEPA Oversight, EH-25, U.S. Department of Energy, 1000 Independence Avenue S.W., Washington D.C. 20585, phone: 1-800-472-2756.

# Table of Contents

## List of Figures and Tables

# 1.0 Purpose and Need for Action

## 1.1 Need for Action

The Bonneville Power Administration, under provisions of the **Pacific Northwest Electric Power Planning and Conservation Act of 1980 (Act)** [1], is obligated to protect, mitigate and enhance fish and wildlife and their habitats affected by the construction and operation of the federal hydroelectric system in the Columbia Basin, consistent with the Northwest Power and Conservation Council's (Council) Fish and Wildlife Program (2000). Libby Dam, on the Kootenai River near Libby, Montana is part of the federal hydroelectric system, and so BPA has a need to address impacts from Libby Dam on fish and wildlife.

The construction and operation of Libby Dam has changed the Kootenai's flow patterns and also captured nutrients, such as nitrogen (N) and phosphorus (P) that once enriched downstream areas, behind the dam in Lake Koocanusa. Low nutrient levels are believed to be partly responsible for the low productivity of important native fish populations found in the river such as sturgeon, burbot, kokanee, redband trout, whitefish, bull trout, and cutthroat trout. These populations are particularly important to the Kootenai Tribe of Idaho (KTOI), which historically derived about 50-70 percent of its subsistence from the Kootenai River fishery (Scholz, et al. 1985). The Tribe and the Idaho Department of Fish and Game (IDFG) have proposed this project—to add nutrients to the Kootenai River—to help improve productivity of the native species and are seeking funding from BPA for the project to help BPA meet its mitigation obligation for Libby Dam.

## 1.2 Background

The Kootenai River is currently nutrient poor and has been so for about 25 years. Although there are other factors influencing fish populations, low nutrient levels are partly responsible for the low productivity found in the river and part of the reason that important fish populations are not doing well. Nutrients that once flowed downriver from Canada are now being trapped in Lake Koocanusa behind Libby Dam. The separation of the Kootenai River from its historic floodplain (downstream of Bonners Ferry, Idaho) has also resulted in fewer available nutrients for river productivity. For example, the last viable white sturgeon year class to recruit to the Kootenai River population was produced in 1974. The burbot population in the Kootenai River has also declined sharply during recent decades; burbot sampling efforts by Idaho Department of Fish and Game (IDFG) in 1998-99 produced one fish during a 254-hour sampling effort (Paragamian, December 5, 2004).

Nutrient concentrations downstream from Libby Dam have dropped to very low levels. About 63 percent of the total phosphorus and 25 percent of the available nitrogen in the Kootenai River do not pass Libby Dam to enrich downstream reaches (Woods, 1982). Nutrients (especially P) are highly correlated with runoff events (P binds to

[1] Words in bold are defined in Chapter 6, Glossary.

suspended sediment) and thus the slower flows existing within Lake Koocanusa cause maybe as much as 95 percent of the sediment and its attached nutrients to settle behind the dam (Snyder, et al. 1996).

Nutrients in the river system stimulate algae growth, which aquatic insects feed on. Fish then feed on the aquatic insects and completes the aquatic food chain. Nutrient declines, therefore, can reduce the health and productivity of affected fish populations.

Through the Council's Fish and Wildlife Program (1994/2000) and with funding from BPA, the Tribe, IDFG, Montana Department of Fish, Wildlife, and Parks (MFWP), and others have been conducting Kootenai River fisheries research. This research has helped develop alternatives for meeting the need to enhance the river ecosystem, including the option of improving nutrient levels. BPA proposes to fund KTOI and IDFG to add liquid nitrogen and phosphorus to the Kootenai River from late June through September each year starting in 2005 to replace nutrients lost to the hydrosystem.

Adding nutrients to an ecosystem has been used successfully in other basins. Some examples:

- At Redfish Lake (Idaho), after nutrients in the form of sockeye salmon were all but eliminated in the early 1990s, the Shoshone-Bannock Tribes in partnership with Idaho Dept. of Fish and Game added nutrients from 1995-1998. As a result, zooplankton biomass increased 31%, sockeye density increased 26%, and Sockeye over-winter survival increased 192% (Griswold, et al. 2003).
- In the Adams River (British Columbia), the British Columbia Ministry of Environment implemented a nutrient restoration program in 1992-1997 to restore native rainbow and introduced brown trout populations. As a result of the nutrient restoration, algae increased up to 10 fold, bottom insects increased, trout densities doubled (not evident until the 3rd year of nutrient additions) (Wilson, et al. 1999a).
- In the Kuparuk River, Alaska, nutrients were added from 1983-1986 as a controlled test to determine a tundra river's response to human disturbance. The additions stimulated an increase in aquatic insect growth, as well as an increase in the growth rates of juvenile and adult grayling (Peterson, et al. 1993).

## 1.3 Purposes

The purposes are goals to be achieved while meeting the need for the project. These goals are used to evaluate alternatives proposed to meet the need. BPA will use the following purposes to select among the alternatives:

- Helps BPA fulfill its obligation to protect, mitigate, and enhance fish and wildlife affected by the development of Libby Dam in a manner consistent with the Council's Columbia Basin Fish and Wildlife Program.
- Enhances administrative efficiency and cost-effectiveness.
- Avoids or minimizes adverse environmental impacts.
- Provides the potential to achieve the following biological objectives:

- Rehabilitates the post-development Kootenai River ecosystem.
- Rehabilitates the ecosystem to reverse declining trends in native populations of kokanee, burbot, interior redband trout, and ESA listed populations of bull trout and white sturgeon.

- Helps improve a fishery important to the Kootenai Tribe of Idaho, consistent with BPA's general trust responsibility to the Tribe.

## 1.4 Other Planning or Projects in the Area

There are other efforts to improve the Kootenai River Basin that are being implemented or are planned for implementation in the future that could work in concert with this project. These include the following projects and their sponsors:

- Kootenai River White Sturgeon Studies and Conservation Aquaculture (Technical, Labor, and Data Interchange) (KTOI)
- Kootenai River Fisheries Recovery Investigations (Technical, Labor, and Data Interchange) (IDFG and KTOI)
- Reconnection of Floodplain Slough Habitat to the Kootenai River (KTOI) - project to evaluate potential slough sites for reconnection, estimate the ecological benefits, and implement reconnection.
- Implement Floodplain Operational Loss Assessment, Protection, Mitigation, and Rehabilitation on lower Kootenai River Ecosystem (KTOI)
- Mitigation for the Construction and Operation of Libby Dam (Montana Dept. of Fish Wildlife and Parks [MWFP]) - Implements watershed-based enhancement and fishery recovery actions to mitigate the losses caused by hydropower generation.
- Focus Watershed Coordination in the Kootenai River Watershed (Kootenai River Network and MWFP) - Fosters grass-roots public involvement and interagency cooperation for habitat restoration.
- Assess Feasibility of Enhancing White Sturgeon Spawning Habitat, Kootenai River, Idaho (KTOI; U.S. Geological Survey) - project to design scenarios and assess feasibility to enhance white sturgeon spawning substrate.

## 1.5 Public Involvement

In fall 2004, BPA opened a scoping period to the public for this proposal. Scoping refers to a time early in a project when the public indicates what issues to consider in the environmental assessment (EA). A public meeting was held in Bonners Ferry, Idaho on December 13, 2004 to present information about the project, answer questions from the public, and accept comments. About 30 people attended the meeting. Additional scoping comments were accepted through January 28, 2005.

Written comments were received from twenty-two individuals or families. Comments covered many issues. The following is a general list of those issues:

- Location, size and visibility of the nutrient storage tanks and how trucks would access them for filling and how frequently.
- Concerns about the potential contamination of well water from nutrient additions to the river.
- Quantities and types of nutrients proposed as well as scheduling of additions, mixing, and monitoring.
- Concerns about the potential for algae blooms and the wrong kinds of algae.
- Safety measures to prevent nutrient spills at the tanks, the pipe and at the nozzle in the river, as well as cleanup procedures in case of spills.
- Monitoring plans and reports and how it will be determined if the project is a success.
- Mixing zone depth, predicted flow levels and potential harmful effects in the river.
- Current dam operations and how they might affect this project.
- Potential contamination from impurities in the nutrients.
- Concerns about the nutrients causing negative impacts to other living things in the river.
- Consider adding nutrients to other parts of the river.
- Increases in nutrients may not be enough. Consider also floodplain restoration, water quality improvements and simulating historic stream flows.

These and other issues are addressed in this preliminary environmental assessment.

## 1.6 Related Documents

The following documents are related to this project and are available on request:

- Categorical Exclusion (CX), May 2004. Environmental review of a variety of research activities related to this project.
- CX, April 2005. Environmental review of activities related to pre-construction site preparation.

## 1.7 Decisions To Be Made

BPA is required under NEPA to examine the environmental effects of projects it proposes to fund and to determine whether effects are significant. If they are found not to be significant, a Finding of No Significant Impact (FONSI) would be issued and work may proceed. If they are found to be significant, an Environmental Impact Statement (EIS) must be prepared before making a decision.

The U.S. Forest Service will decide whether to grant a special use permit for the temporary facilities on the Kootenai National Forest.

# 2.0 Proposed Action and Alternatives

BPA is studying two alternatives to meet the need for this project, the Proposed Action and the No Action Alternative.

## 2.1 Proposed Action

BPA is proposing to fund the Kootenai Tribe of Idaho, in partnership with the Idaho Dept. of Fish and Game, to add nutrients (nitrogen and phosphorus) to the Kootenai River ecosystem for up to 5 years. The goal of this project is to enhance native fish populations and river health affected by the construction and operation of Libby Dam. The nutrients are expected to stimulate production in the Kootenai River's depleted food web and reverse downward trends in fish populations such as trout, kokanee, mountain whitefish, burbot, and white sturgeon. These agencies propose to add controlled amounts of nitrogen and phosphorus during the natural river-growing season (late June – through September). The nutrients would be added to the river through a system of gravity-fed tanks and outflow pipes near Leonia, Lincoln County, Montana (see Figures 1, 2, 3 and 7) and would disperse with river flow (Figure 4). The nutrients would be added to the river from the Montana side, across the Montana/Idaho state boundary, into Idaho state waters. Although supportive of the project goal, representatives of the State of Montana have requested that the nutrients not be discharged into their waters (Dunnigan, November 2003).

This proposed project would be temporary and would be re-evaluated after 3-5 years. If the project has positive results, the International Kootenai River Ecosystem Recovery Team (IKERT) would discuss whether to propose continuing the program. The IKERT includes the following organizations and individuals on the recovery team: the Kootenai Tribe of Idaho, IDFG; MFWP, British Columbia Ministry of Environment, Land, and Parks (BCMELP); Army Corps of Engineers (Corps); and the Universities of British Columbia (UBC), Idaho (UI), and Idaho State (ISU). Any continuation of the program would be subject to further environmental analysis and documentation.

### *2.1.1 Nutrients, Mixing Zone, and Affected Waters*

Liquid urea ammonium nitrate (28-0-0) and ammonium poly-phosphate (10-34-0) would be added to the river from a tank storage and delivery-pipe system. (The three numbers refer to the percentage of nitrogen, phosphorus, and potassium in the nutrient solution.) About 16 L/hr of phosphorous and 95 L/hr of nitrogen (depending on flow year) would be added over the treatment season. The ratio of nitrogen and phosphorus was derived based on the nutrient levels in an unaltered, healthy river, and reflect the standard ratios that would most likely be in the river without the influence of Libby Dam and other human activities, and a maximum amount that would render the additions ineffective. The turbulence caused by the jet of fluid exiting the pipe would do the initial mixing (dilution), and the turbulence from the moving water in the river would continue to mix the nutrients into the water. The effective distance of the treatment would be from about the Montana border (**river kilometer** [rkm] 276) downstream to Bonners Ferry (rkm 248; Ashley, July 21, 2004). The river contour in this area is a good location for treatment because it is shallow. Shallow stretches of river are better nutrient treatment locations than deep areas because adequate light can penetrate to the river bottom allowing algae growth to occur. Since the effective distance of the nutrients matches the distance of river that managers feel the nutrients would work best (i.e., the potential **autotrophic** reach), only one nutrient drip station would be needed to effectively treat the Idaho portion of the Kootenai River.

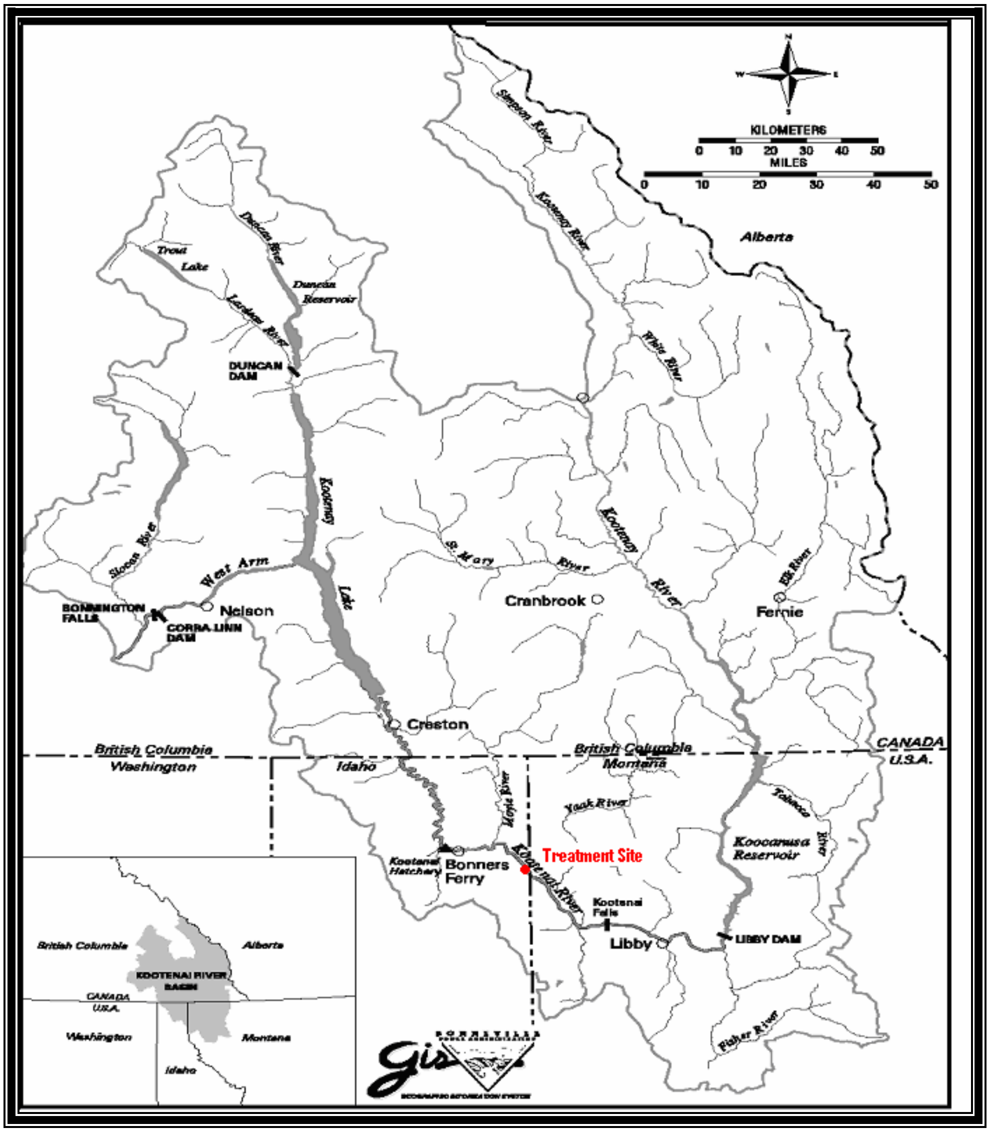



Figure 1 Kootenai River Basin and Treatment Location

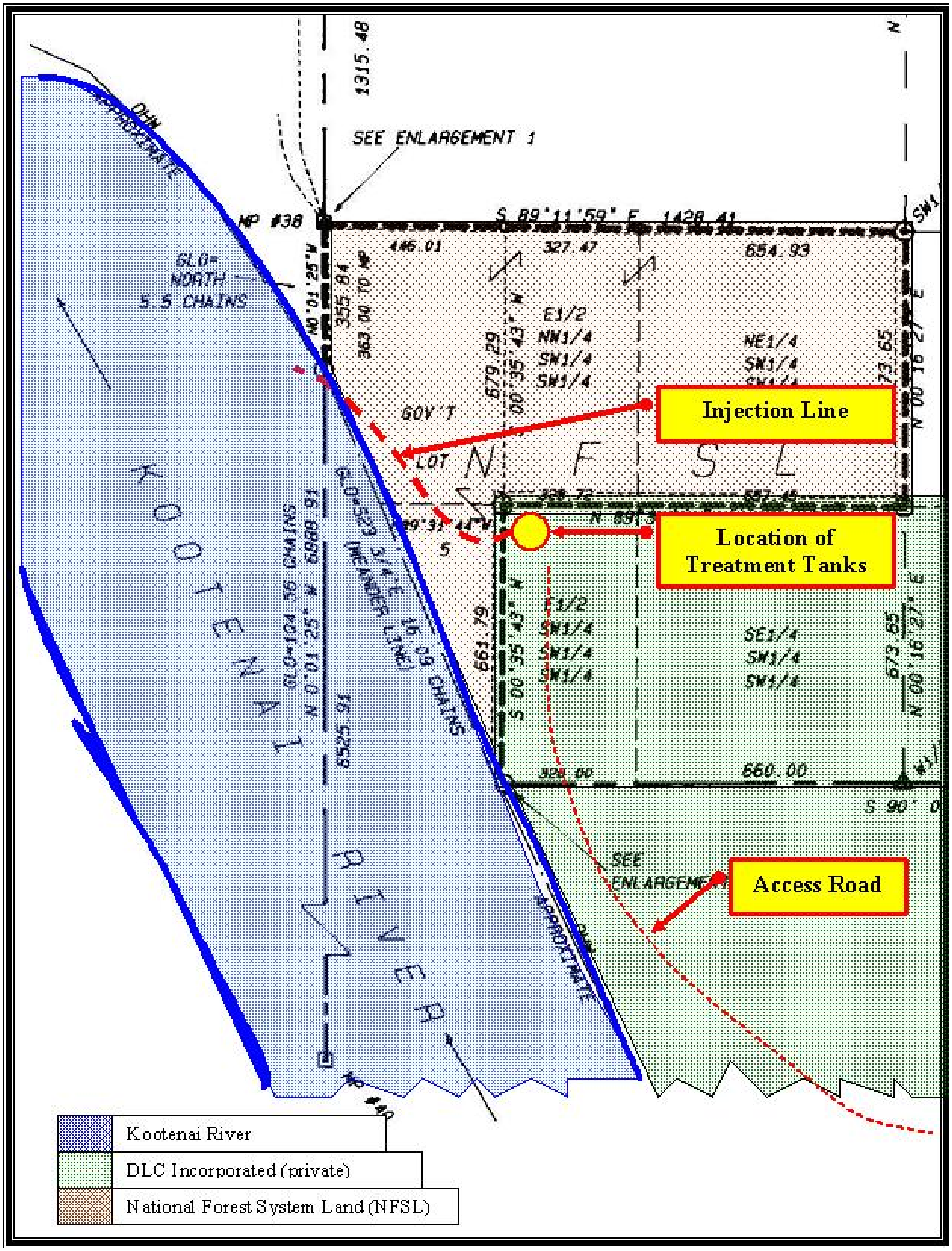



Figure 2 Proposed Action Site Map

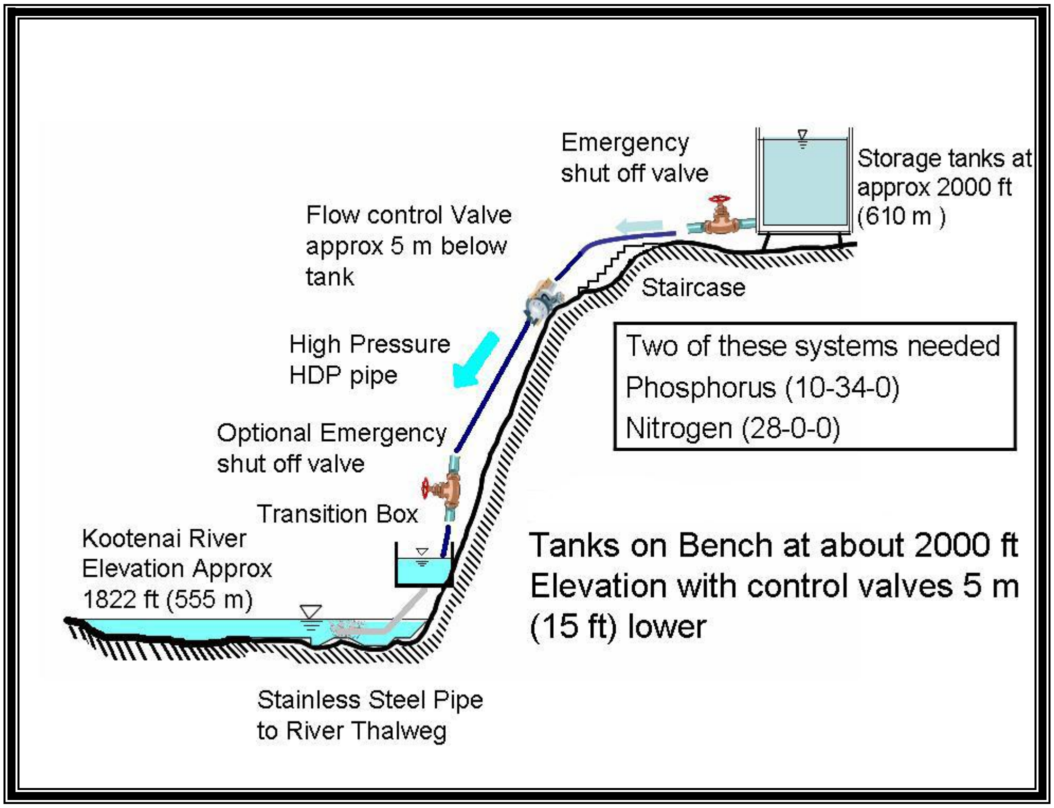



Figure 3 Schematic of the Proposed Nutrient Enrichment System

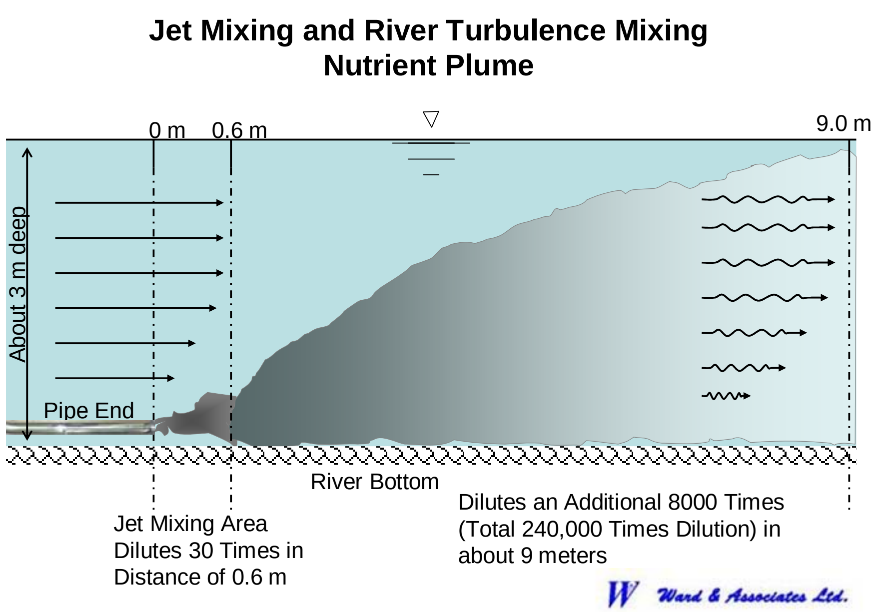



Figure 4 Schematic of the Mixing Zone

Benefits from indirect effects of the nutrients downstream of this area, such as increased insect and algal biomass, could help fisheries in the lower river reach from Bonners Ferry to Kootenay Lake, B.C.. See the Biological Assessment (available on request) for detailed information about mixing zone determinations.

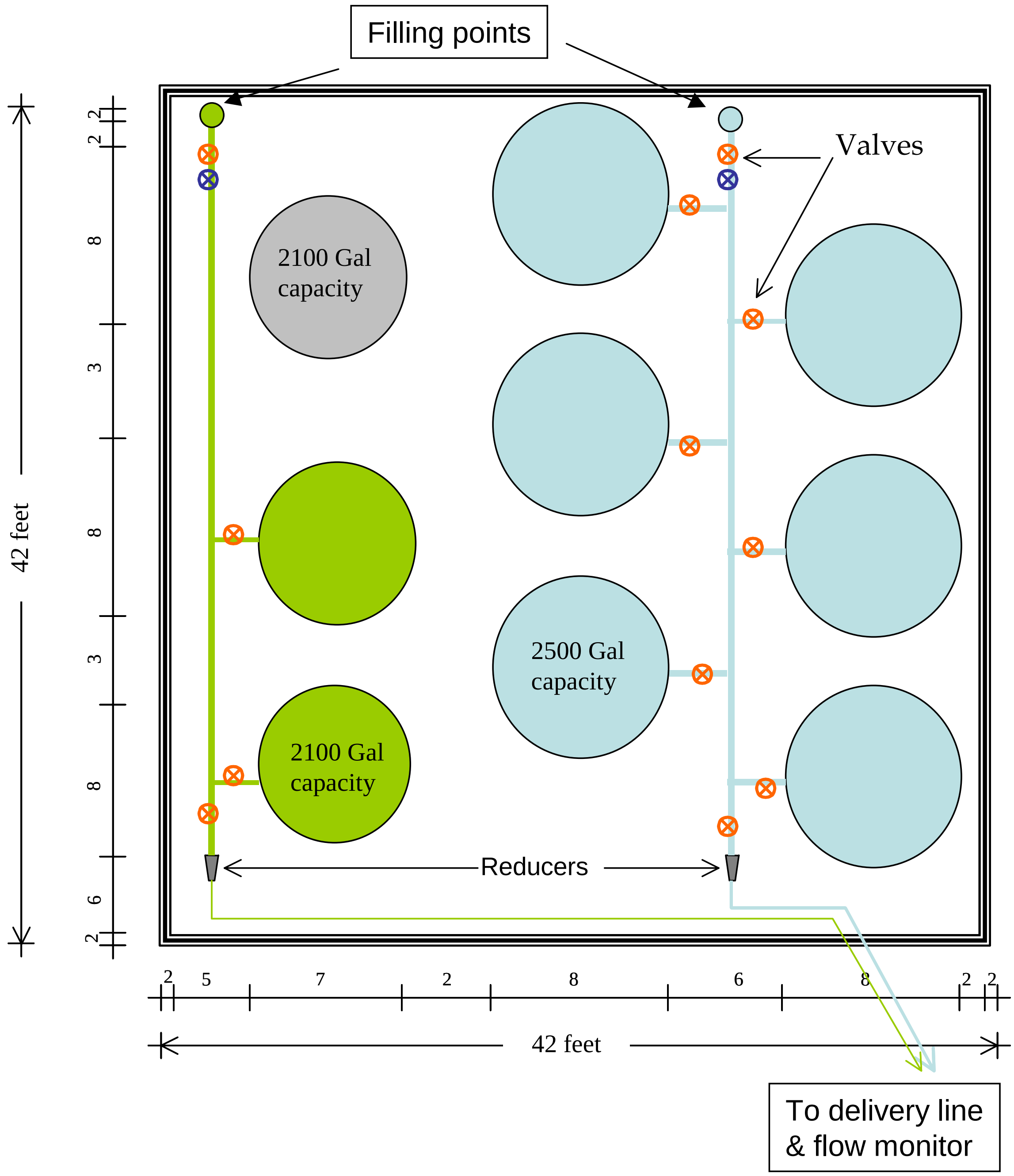
### *2.1.2 Access Road, Holding Tanks and Pipeline, Operations and Maintenance*

The proposed nutrient treatment site is near Leonia, Lincoln County, Montana (see Figures 1, 2, and 7). This site is just north of the Leonia Bridge and east of the Montana/Idaho state border. The access road to reach the site crosses Kootenai National Forest System Land and private property. Part of the access road, the Leonia Road, travels from Highway 2 and descends to the Kootenai River at a now impassable bridge. Before Leonia Road begins its descent from this bench above the river, an un-improved road forks to the north along the bench at approximately about 610 m of elevation on property owned by DLC, Inc. (a private landowner). This road continues to the proposed location for the treatment tanks, which is on private property.

An area about 100 x 60 m would be needed for the treatment equipment. Minimal construction would be needed. The access road would be improved from the fork at Leonia Road, approximately 1 km to the edge of the bench where the nutrient tanks would be. The access road would require gravel fill in low areas to allow truck access (see Section 1.6). A truck turn-around for refilling the tanks would be made near where the tanks would be placed. The truck turn-around site would require tree removal, leveling, and gravel fill.

A gravel pad would be constructed for the nine treatment tanks. Of these tanks, two slightly smaller tanks (7,947 L each) would be used for phosphate storage, and there would be seven additional tanks (9461 L each) (see Figure 5). One of these seven would be used for storing water for clean-up following the treatment season. The other six tanks would be used for nitrate storage. The pad would be about 12.8 x 12.8 m (3 tanks long x 3 tanks deep perpendicular to the river rim). The holding tanks would have a berm around them created with sandbags or concrete lock blocks (0.6 m x 0.6 m x 1.2 m) and then covered with a thick plastic liner to contain any leaks that might occur. The tanks would be filled at the beginning of the treatment season, then refilled 2-4 times while the project is underway (July – September), depending on need.

The tanks would be surrounded by a chain-link fence with neutral-colored blinds and the individual tanks would be a color that would blend into the surrounding area to lessen visual effects and decrease the risk of vandalism. To prevent wind damage and reduce the risk of fire, the area around the tanks would be cleared (1-2 average tree heights). At the end of each treatment season (September), the tanks would be emptied.




Source: Ward and Associates

Figure 5 Preliminary Tank Layout

About 70 m of High Molecular Weight (HMW) plastic (25-50 mm) pipe would extend from the tanks, following the slope of the land above ground down to the riverbank. An additional 250 m of pipe would run at an angle from the riverbank to the river bottom to deliver nutrients (see Figure 2). The pipe would be secured to the bottom of the river (about 2-5 m deep at the time of treatment) with concrete weights. The proposed pipe is relatively flexible and will conform to the contour of the riverbank. About 3/4 of the pipeline would be on national forest system land and the remaining amount of pipe would be below the high water mark (state of Idaho-managed land). After the treatment season, the pipe in the river would be removed using a boat and personnel on the riverbank and stored at the IDFG field station on the Kootenai National Wildlife Refuge. The remaining pipe on the slope would not be removed each year. After the treatment is delivered, the pipe on the slope would be emptied and left in place to reduce disturbance on the steep slope.

A 3 x 2 m wood platform 10-30 m downhill from the main tank location on Kootenai National Forest system land would house control valves and the main safety alarms for the application system. The battery, gate valves, and sea-metric meters would be housed in a locked, metal rectangular box (the transition box; see Figure 3). Two photovoltaic (PV) panels would be on the platform. These panels would provide power to the meters. The panels are about 0.5 m x 2 m.

An alarm system on this platform would alert the on-site technician when the flow exceeds or is considerably lower than the prescribed application amounts. The technician would check the valves for damage or constrictions. An additional safety feature is around the vacuum break area called the vacuum break box (see transition box in Figure 3). This box would be locked to reduce the risk of tampering with the flow application. A final safety fence (chain link) would also be added around the lower platform to reduce any attraction to the site from people recreating in the area.

#### *2.1.3 Housing*

During the 10-12 week treatment period, a field technician would live on site in a fully contained (own water and sewer) 24 ft. long mobile trailer. The technician would be responsible for the operation of the treatment system.

#### *2.1.4 Security and Safety*

The onsite technician would use a footpath (about 3 m wide and 30 m long) 2-4 times a day to inspect the pipes from the holding tanks, the flow meters and the transition box. The holding tanks would have a berm around them created with sandbags or concrete lock blocks and then covered with a thick plastic liner to contain any leaks that might occur. Should leaks occur, a submersible pump powered by a 5000-watt generator on site would pump the material into a non-damaged holding tank. If there are any nutrient leaks into the containment area, the liner would be properly cleaned and the waste disposed of. No major leaks should occur because an automated switch would shut off flow should nutrients stream faster than programmed (indicating a break in the line). The shutoff switch is above the transition box and the outlet nozzle. If the pipeline has any minor leaks and vegetation is reduced nearby (the opposite could occur), the forest botanist would be consulted for re-vegetation recommendations. Following the treatment season, the tanks would be emptied and the pipe in the river removed until the following season.

The tank area would be enclosed by a chain link fence with neutral colored blinds to reduce any attraction to the site from people recreating in or along the river or upland bench.

A new gate would be installed on the improved access road to limit access to only the landowner and authorized personnel.

During angler surveys performed during the treatment seasons, informational pamphlets about the project would be handed out. These pamphlets would also be available at boat launches and other areas used by recreationists and the general public. Signs would be placed near the outlet pipe to provide information and alert river users of elevated nitrate concentrations at the pipe nozzle prior to mixing (1-2 m; see Section 2.1.1 for more information on mixing zone concentrations).

### *2.1.5 Power Requirements*

Two medium-sized photovoltaic (PV) panels rated at about 100 watts would operate the application system. They would be on the wood platform where the transition box is located (see Figure 3). A deep discharge battery(s) rated at approximately 180 Ah would provide sufficient storage to supply the system during periods of cloudy weather. There would also be a 5,000-watt generator on-site for emergencies. The mobile trailer has two batteries on the front that can be recharged with the generator.

### *2.1.6 Research and Monitoring*

During the treatment season, meters would measure many types of data for project managers including the dosing rate for each nutrient, the water temperature and river surface level, and the sampling time. The data would be sent to KTOI and IDFG daily so that managers could maintain consistent nutrient concentrations in the river. Data would be transmitted by satellite to project managers by the equipment depicted in Figure 6.

In addition, the Tribe would monitor water chemistry and assess algal production. The Tribe has six bio-monitoring sites between the Yaak River confluence and Bonners Ferry. These sites are already comprehensively sampled for water chemistry, water-borne metals (from water samples), algae, and benthic macroinvertebrates. Monitoring for this project would supplement the monitoring already occurring (Hoyle, February 2005).

IDFG and KTOI personnel would monitor at 11 sites. The first site would be 1 km upstream of the dosing site, followed by a sample collected every 1 km starting at the dosing site. River km 277 through rkm 266 would be sampled weekly for water chemistry, algal taxonomic structure, and blue-green algae production (Hoyle, February 2005).

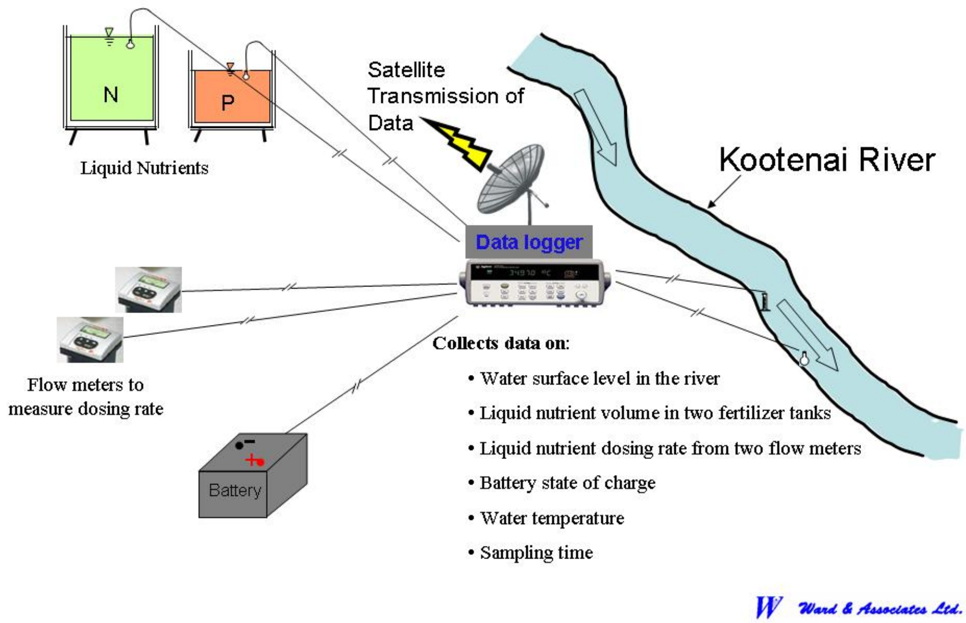



Figure 6 Schematic Layout of Data Logger and Measuring Devices

To evaluate the success of the nutrient additions, general criteria that focus on data trends at each **trophic** level over time would be used. More specifically, the post-treatment data would be evaluated against historical information available, current pre-treatment biomonitoring data collected since 2001, and the desired criteria that researchers from both agencies (KTOI and IDFG) would favor this experiment moving towards. The endpoint or goal of the nutrient restoration project is to enhance and help restore fish communities in the Idaho reach of the Kootenai River and improve angler fishing success. Although restoration of all the fisheries is not expected or required, the nutrient restoration of this proposal would be considered successful as long as the results demonstrate trends toward the desired criteria. Conversely, should trends be viewed as negative, the experiment may be discontinued and re-evaluated by the technical committee.

Weekly water quality testing would allow managers to determine potential cost: benefit factors to determine if the objectives are achievable. The KTOI and IDFG are working directly with nutrient restoration experts (e.g., Ken Ashley, British Columbia Ministry of Land Water and Air) and other ecologists on the International Kootenai River Ecosystem Recovery Team to determine the exact formulation of nutrients needed to achieve the set objectives.

Annual monitoring of the fish community (e.g., relative species abundance and catch-per-unit-effort [CPUE]) would allow the IKERT steering committee to either continue or halt the nutrient restoration program based on “negative threshold” values. Therefore, once these species increase to levels that may affect salmonid production (or other sensitive species such as Kootenai River white sturgeon), or the biomass proportion of salmonid:non-game fish becomes unacceptable (i.e., maximum negative target), the project would be re-evaluated. By the very nature of ecosystem complexity, however, it is difficult to predict such outcomes. In the likelihood of non-game fish species increasing, salmonid populations may also increase to a level that creates a top-down control on these non-game fish communities. Careful evaluation of the trophic interactions within the test period should reveal if species shifts revert back to populations dominated by salmonids (Partridge, 1983).

**Adaptive Management**

Management criteria of the nutrient additions have been set up to try and safeguard against any long-term deleterious effects of the treatments (see Table 1). In other words, should managers see nutrient additions resulting in potentially negative effects or no apparent benefit (especially within the fish community), the experiment would be discontinued and re-evaluated by the IKERT. Table 1 lists a simplified version of the adaptive management options that may be taken once certain effects are seen in the river. Should managers see nutrient additions resulting in potentially negative effects, the experiment would be discontinued and re-evaluated by the IKERT.

The detailed monitoring plan is available on request.

Table 1 Potential Outcomes and Possible Management Actions

| **Potential Outcomes** | **Trophic Level In Food Web** | | | |
|---|---|---|---|---|
| | **Primary Productivity (Algae)** | **Secondary Productivity (Aquatic Insects)** | **Tertiary Productivity (Fish)** | **Management Action** |
| Outcome a | No increase | No increase | No increase | Stop, re-evaluate experiment |
| Outcome b | Increases | No increase | No increase | Stop, re-evaluate experiment |
| Outcome c | Increases | Increases | No increase | Stop, re-evaluate experiment |
| Outcome d | Increases | Increases | Increases in non-target species only | Stop, re-evaluate experiment |
| Outcome e | Increases | Increases | Increases in target (and possibly non-target) species | Continue experiment after evaluation period |

### *2.1.7 Site Restoration*

If, through the adaptive management process, a decision is made to discontinue this project, the temporary equipment would be removed. The site on national forest system land would be restored to its original condition. The tanks, pipes and mobile trailer on private land would likely be removed and the area restored depending on the landowner’s wishes. If the landowner allows the tanks to remain on his property, the tanks would be emptied and cleaned so that all nutrients would be removed.

## 2.2 No Action Alternative

The No Action Alternative is the no funding alternative. BPA would not fund the research and temporary placement of nutrients into the Kootenai River.

## 2.3 Alternatives Considered but Eliminated from Detailed Consideration

### *2.3.1 Alternative Treatment Sites*

Four sites near the Montana-Idaho border area were considered for the treatment site (see Figure 7). Three sites are in Montana and one is on the Idaho side of the border; all sites are on the north side of the Kootenai River. A fifth site, located in Idaho and on the south side of the river, was briefly considered, but was eliminated early in the selection process because the pipeline would have to cross an active railway line.

Site 1A is the Proposed Action.

Site 1B was eliminated because road construction costs were much higher than site 1A and additional federal property had to be crossed.

Site 1C was eliminated because road construction costs were much higher than sites 1A and 1B, and additional federal property had to be crossed.

Site 2 was eliminated because nutrients would be added well within the boundary of the state of Montana, which does not want nutrients added to its waters during this project (Dunnigan, November 2003).

### *2.3.2 Nutrient Management Potential of Libby Dam Operation*

During the scoping period, some commenters suggested that Libby Dam be operated to increase the nutrients below the dam. Although this may be possible in the future, current dam design and operations preclude this as an option to increase nutrients in the Idaho reaches of the Kootenai River.

Creation of Koocanusa Reservoir by the construction of Libby Dam has altered river dynamics at multiple scales, and has created aquatic and terrestrial environments that have continually adapted to these altered dynamics since the reservoir initially began filling. Among these alterations has been the virtual cessation of nutrient loading from the upper Kootenai/ay watershed to the lower watershed. The downstream nutrient loading effects of dam construction were delayed for several years due to the initial loading of previously terrestrial nutrient sources into the newly created reservoir simply by the process of inundation of those environments; this effect is common when reservoirs are created.

There is an initial increase in available nutrients in newly inundated reservoirs, often expressed in increased fisheries biomass and growth. In addition to the initial increase in productivity in the reservoir, a portion is passed through the dam and is available downstream. As the reservoir ages and nutrient supplies are depleted, the reservoir environment becomes less productive, and thus the availability and passing of nutrients through the dam to the downstream river reaches declines. The nutrient depletion in the Kootenai River over time has been exacerbated by the gradual and steady decline of productivity in Koocanusa Reservoir over the last 30 years.

The dam is equipped with a "selective withdrawal" system, which allows operators to optimize the temperature river below the facility, within certain operational constraints. This system is governed by guidelines developed to enhance growth of trout, as well as other aquatic organisms. However, operation of this system cannot bypass large amounts of nutrients to aid in-river productivity, so the selective withdrawal system cannot be used to influence availability of P and N below the dam. This alternative was eliminated from further consideration.

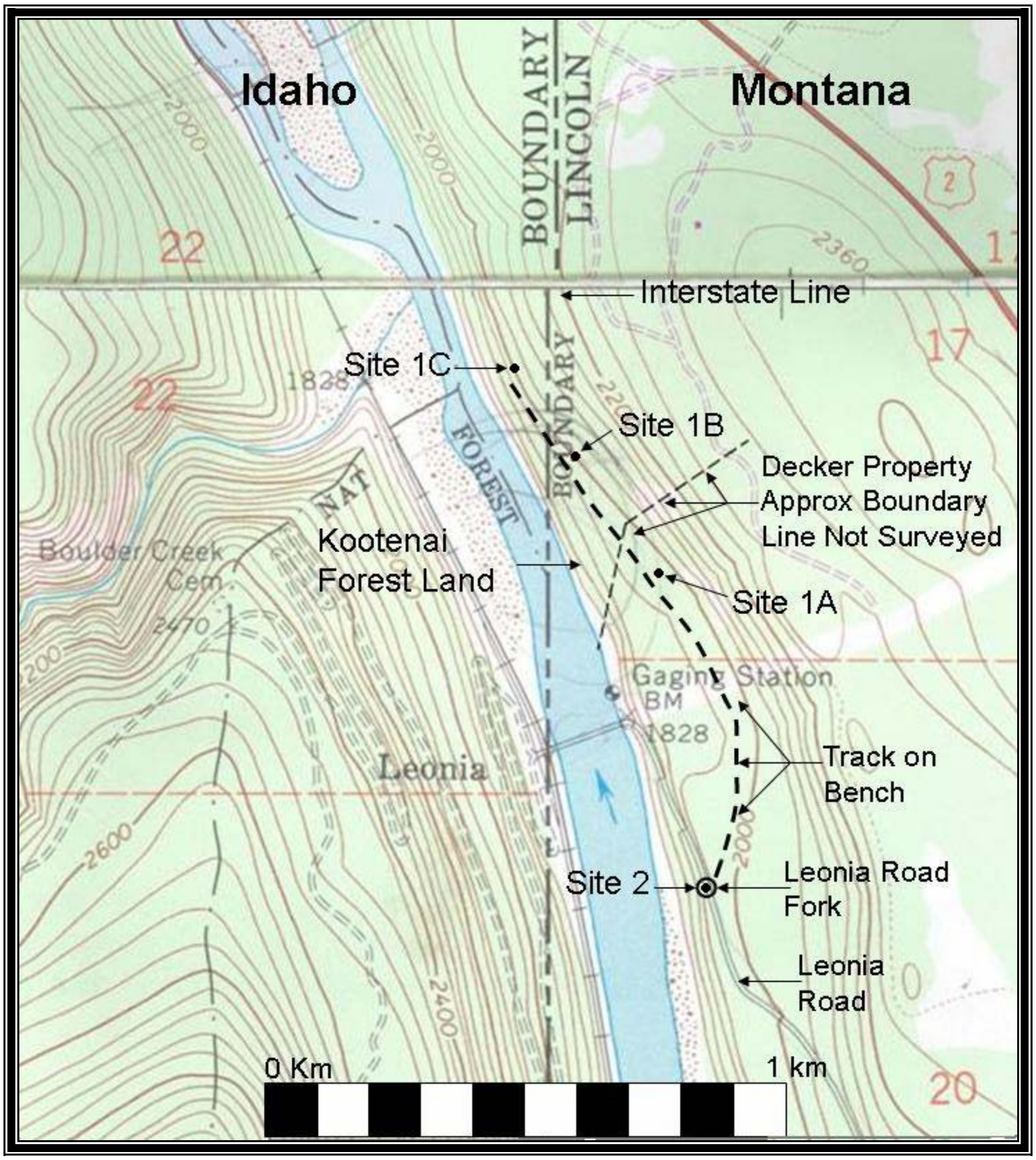



Figure 7 Alternate Treatment Sites. Site 1A is the Proposed Action.

## 2.4 Comparison of Alternatives

This section compares the alternatives described in this chapter using the project purposes and the predicted environmental impacts. Tables 2 and 3 summarize the environmental impacts and compare the alternatives.

Table 2 Environmental Impacts of Alternatives

| Environmental Resource | Existing Conditions | Proposed Action | No Action Alternative |
|---|---|---|---|
| Fish and Wildlife | Variety of animals and habitats. Threatened and endangered fish and mammals. | Animals likely to move during construction. If successful, treatment would benefit the river ecosystem, including threatened and endangered species. No threatened or endangered species would be adversely affected. | No impacts expected. |
| Land Use | Private timberland and national forest system land. | Access road improved. Some trees removed for gravel pad for tanks. Security measures proposed to prevent impacts from accidental leaks. Temporary equipment used, some removed each season. | No impacts expected. |
| Visual Resources | Rural, scenic area with river and mountain views. High visual quality should be maintained. | Tanks should not be visible from the river. Pipe would blend with rock and vegetation. Tanks would be colored to blend with local vegetation. A chain-link fence with neutral blinds would screen the area. | No impacts expected. |
| Recreation | Area has many recreation opportunities, but none on site. Fishing, boating, hiking in general area. | Viewshed of river users may be altered slightly. Pipe in the river would be submerged and would not pose a hazard and would be removed after treatment. If ecosystem improves, fish and other wildlife may increase for recreation. | No impacts expected. |
| Water Resources | River is nutrient deficient. The river is used for municipal and residential water. | Water quality would be monitored. No impacts to human health are expected. Nutrients may improve river productivity. | No impacts expected. |
| Wetlands | One riverine wetland along the shore at the treatment site. | No impacts expected. | No impacts expected. |

| Environmental Resource | Existing Conditions | Proposed Action | No Action Alternative |
|---|---|---|---|
| Floodplains | The tank site is outside the floodplain. The riverbank is bounded by steep slopes. | No floodplains would be affected. | No impacts expected. |
| Cultural Resources | Native American groups and bands frequently used the area. | No prehistoric resources found. A portion of an historic road would be improved with fill material, but would not be adversely impacted. | No impacts expected. |
| Vegetation | Vegetation includes mostly second growth timber. One listed plant. | Some trees would be removed at the tank site. Low-growing vegetation would be disturbed. Disturbance would be minor. No impact to the listed plant. | No impacts expected. |
| Soils | Existing soils have low fertility, and steep slopes. | Soils would be disturbed as vegetation is removed for construction. Erosion may increase temporarily. Erosion control measures would be used. | No impacts expected. |
| Noise, Public Health and Safety | Area of private property and national forest system lands. Traffic and railroad noise occur frequently. | Noise and human disturbance would increase temporarily. Tanks would be refilled using motorized vehicles 2-4 times per season. A berm would surround the tanks to control potential leaks. Onsite personnel would provide security, as would fencing, an alarm and a locked gate. Warnings would be posted for recreationists using the river during the treatment season. | No impacts expected. |

Table 3 Alternatives Compared to Project Purposes

| Project Purposes | Proposed Action | No Action Alternative |
|---|---|---|
| Helps BPA fulfill its obligation to protect, mitigate, and enhance fish and wildlife affected by the development of Libby Dam in a manner consistent with the Council's Columbia Basin Fish and Wildlife Program. | Provides a potential enhancement of the Kootenai River ecosystem, which was affected by Libby Dam. Is consistent with the Council's Program. | Does not help BPA fulfill its obligation. |
| Enhances administrative efficiency and cost-effectiveness. | Uses temporary facilities to lower overall costs. Equipment can be sold or used for other projects if treatment is unsuccessful. | No cost alternative. |
| Avoids or minimizes adverse environmental impacts. | Monitoring the success of the treatment is part of the project so treatment can be suspended if adverse impacts are created. Use of temporary equipment reduces land disturbance. Mitigation provided for security, safety and visual resources reduces impacts. | No environmental impacts. Current impacts to the Kootenai River ecosystem continue. |
| Provides the potential to achieve the following biological objectives: Rehabilitates the post-development Kootenai River ecosystem; rehabilitates the ecosystem to reverse declining trends in native populations of kokanee, burbot, interior redband trout, and ESA listed populations of bull trout and white sturgeon. | The treatment, if successful, would contribute to the rehabilitation of the ecosystem. | The biology of the Kootenai River system would remain as it is today, with reduced levels of nutrients. |
| Helps improve a fishery important to the Kootenai Tribe of Idaho, consistent with BPA's general trust responsibility to the Tribe. | Provides potential benefit to the Kootenai Tribe of Idaho if the fishery is improved. | The fishery would not improve without other projects or measures. |

# 3.0 Affected Environment and Environmental Consequences

## 3.1 Fish and Wildlife

### *3.1.1 Affected Environment*

Many species of birds, fish, and mammals are found in the project area, including large mammals such as elk, moose, mountain goats, whitetail and mule deer, black bear, and mountain lion. Many nongame species are also in the area and include a variety of songbirds, weasel, mink, beaver, otter, flying squirrel and porcupines (USFS, 1987). Varied habitats can be found for the diverse mix of animals. Some threatened and **endangered** animals may also exist in the vicinity of the proposed project (see Section 3.1.4).

The Kootenai River aquatic ecosystem has been degraded due to wetland loss and impoundment during the last century (see Section 1.2). Nutrients levels have decreased, and have adversely affected the populations of fish and invertebrates in the river. Lower nutrients causes a reduction in food production, which is thought to be a major contributor to poor fish production over the past two decades.

### *3.1.2 Impacts of the Proposed Action*

Adding nutrients in the river system is expected to stimulate algae growth, which aquatic insects feed on. Fish then feed on the aquatic insects and would, if successful, help rehabilitate the post-development Kootenai River ecosystem and reverse declining trends in native populations of kokanee, burbot, interior redband trout, and ESA-listed populations of bull trout and white sturgeon (see Section 3.1.4). Success of the project would be determined through extensive monitoring for all levels of the ecosystem including algae, aquatic insects and fish. There are other projects in the Kootenai River Subbasin whose purposes are to benefit fish populations. If these projects, in concert with this project, are successful, some fish populations that have declined would begin to return to previous levels.

Possible negative effects of the proposed action to the existing fish communities in the upper Kootenai could include a higher proportion of biomass in non-game fish (such as large-scale suckers). Nongame fish could increase to levels that may affect salmonid production (or other sensitive species such as Kootenai River white sturgeon). Management criteria for nutrient additions have been set up to try and safeguard against any long-term deleterious effects of the treatments (see Section 2.1.6 and Table 1). In other words, if negative effects are discovered during monitoring, then project managers would ask IKERT to re-evaluate and suspend the project if necessary.

Animals may be disturbed by temporary construction noise and human activity in the area. Animals would likely move to other areas during and after construction and treatment where similar habitat is available nearby.

### *3.1.3 Impacts of the No Action Alternative*

No impacts are expected.

### *3.1.4 Threatened and Endangered Species*

The U.S. Fish and Wildlife Service identified federally-listed species that may occur in the project area (USFWS, October 21, 2004). See Table 4.

Table 4 ESA-Listed Species in Project Area

| Species | Category | Expected Occurrence |
|---|---|---|
| Kootenai River White Sturgeon *(Acipenser transmontanus)* | Endangered | Transient |
| Bull trout (*Salvelinus confluentus*) | Threatened | Migratory/Resident |
| Bald eagle (*Haliaeetus leucocephalus*) | Threatened | Resident/Transient |
| Grizzly bear (*Ursus arctos horribilis*) | Threatened | Resident/Transient |
| Gray wolf (*Canis lupus*) | Endangered | Resident/Transient |
| Canada lynx (*Felis lynx canadensis*) | Threatened | Resident/ Transient |
| Ute ladies'-tresses (*Spiranthes diluvialis*) | Threatened | Resident |
| Critical habitat for Kootenai white sturgeon | Designated | |
| Source: US Fish and Wildlife Service, October 21, 2004. | | |

**Kootenai River White Sturgeon**

Kootenai River white sturgeon are a "distinct population segment" that can occupy the Kootenai River from Kootenai Falls, Montana (50 rkm downstream of Libby Dam) downstream to the outflow of Kootenay Lake at Corra Linn Dam, British Columbia. This distinct population is one of 18 landlocked populations in the Pacific Northwest (USFWS 1999).

Juvenile or adult white sturgeon sightings in the project area are rare and unsubstantiated. An angler reported catching a 50cm sturgeon somewhere between Bonners Ferry and the Yaak River in Montana in 1981 (Partridge 1983). Some additional historic sightings have been reported, but few are verifiable. No other white sturgeon have been documented near Leonia (Paragamian, January 2, 2005).

**<u>Effects of the Proposed Action on White Sturgeon</u>**

Kootenai River white sturgeon are uncommon within the habitat of the project area. Increases in river productivity may lead to increased food supplies which may then increase survival, growth rates, and body condition of larvae, juveniles, and adults in downstream reaches where they currently reside. The Proposed Action may greatly improve food resources and survival of early life stages as seen in other studies of nutrient restoration (Larkin et al., 1999; Wilson et al. 1999a).

It is difficult to speculate the pathway of nutrients and how specific fisheries would be affected in the long term and predict the outcome. However, several considerations should be taken into account as to possible indirect effects on early life history functions and survival to Kootenai River White Sturgeon. Although the Proposed Action would presumably increase larval survival through the critical transition from yolk sac to feeding in the open environment, consideration of predation on eggs should be taken into account if non-game, egg-preying species increase. One primary concern that has been considered is the direct increase of predators such as large-scale suckers and northern pikeminnow on Kootenai River White Sturgeon eggs. However, there is no conclusive evidence that egg predation is a limiting factor or that it could be. In addition, there is no information available to suggest that food production is a limiting factor for sucker recruitment and density. On the other hand, white sturgeon adults are a top predator and could use the increased biomass of the aforementioned non-sport fish as forage. In relation to sight feeding predation on eggs, increased food production may reduce water visibility in the reach below the study zone, which may in turn reduce sight feeding predation of all early life stages of sturgeon.

**Bull Trout**

Columbia River populations were listed as a threatened species on July 10, 1998. Although recently proposed, no critical habitat has been designated for bull trout in the Kootenai drainage.

The Kootenai River is known to have at least one migratory population of bull trout consisting of **fluvial** fish (Walters and Downs 2001; Walters 2002). In the Kootenai River in Idaho, bull trout usually start upstream migrations during June and July (IDFG unpublished data).

Bull trout densities in the Kootenai River mainstem appear low, based on electrofishing catch rates (<1 bull trout/h) and angler catch rates (< 0.05 fish/h), but appear distributed throughout the Kootenai River in Idaho (Walters 2002, 2003; Hardy 2003; IDFG unpublished data). In addition, adult fish are known to migrate through the treatment area enroute to O'Brien Creek. The Boulder Creek tributary, which enters the Kootenai River just downstream of the treatment site, historically served as a bull trout spawning area. Bull trout **redd** surveys have been conducted on Boulder Creek from 2000-2004, with two redds found both in 2001 and 2002 (Walters 2003, 2004).

**<u>Effects of the proposed action on bull trout</u>**

If an individual bull trout were in the immediate vicinity of the nutrient outflow pipe, it could be displaced slightly for the duration of the treatment. However, no adverse effects on spawning migrations are likely. In addition, treatment dilutions are well within safe water consumption standards (human) within 2m of the pipe (human standards are more conservative than for aquatic organisms). Because tanks are located on the rim away from the river's edge, and an emergency alarm and shut-off valves would be in place, no spills directly into the Kootenai River are anticipated.

Indirect effects on bull trout may include increased biomass, length at age, and fecundity as a result of increased nutrient levels. Other studies of nutrient restoration programs have clearly shown these anticipated benefits to fish populations (Peterson, et al. 1993; Wilson, et al. 1999b). No loss of habitat for bull trout would occur from this project. No potential take exists for bull trout.

**Bald Eagle**

Bald eagles are both yearlong residents and winter visitors in northern Idaho. Bald eagles nest almost exclusively in live trees usually within one mile in line of sight of a large river or lake. The most typical nesting trees include Ponderosa pine, Douglas fir, western larch, and cottonwood. Winter habitat is generally associated with areas of open water where fish and waterfowl congregate (Stalmaster, 1987). Bald eagles use perches during the day while hunting, feeding, or resting; roosts are used at night or for protection during bad weather and may be occupied by one to several hundred bad eagles; roost sites, like nest sites, are used year after year.

The bald eagle is an opportunistic predator and feeds primarily on fish, but also consumes a variety of birds and mammals (both dead and alive) when fish are scarce or these other species are readily available (USFWS 1997).

An active nest is present just upstream of the treatment site (approximately 2 km). Two adults have been seen in the area from the nesting site to below Boulder Creek. In addition, there are two alternate nesting sites downriver near Caboose Creek. One nest sits on the river's edge in a Ponderosa pine, while the other is located up on the rim at approximately 2000 ft elevation (Robinson, November 22, 2004).

**Effects of the proposed action on bald eagles**

Impacts to bald eagles would include temporary yet minor increases in noise and human disturbance associated with construction of treatment site and delivery of nutrients and personnel in the area. Nutrient holding tanks will only need to be replenished 2-4 times during the treatment period. The activity in the area is not likely to additionally displace bald eagles from the project area during the treatment process. Motorized vehicle use will be limited to personnel. The treatment site is on private property and lies between the highway and canyon rim so a great deal of traffic and human presence already exist. The only known nest is about 2 km upstream of the proposed location and it is unlikely that the planned roadwork would affect this nest. A survey of the surrounding area for any other nests will be done prior to any road improvements or any other activity that would create noise or other disturbance.

No impacts to bald eagles are anticipated as a result from consumption of fish and/or water near the treatment site and no loss of habitat or nesting sites is anticipated. Nitrate levels of treatment water fall within what is considered "safe" for consumption within 2 m of the pipe opening.

Bald Eagles lay eggs from February to April. Treatment would begin in late June after the breeding season. Fledglings should be nearly independent by this time. No nesting sites would be removed or tampered with. The nest site well upstream of the treatment location would not be adversely affected. The eagles may avoid the area on the canyon rim where the nutrient application station would be housed and the minor increase in traffic would occur.  This site is far enough away from the river that foraging should not be impacted.

### Grizzly Bears

On July 28, 1975, the grizzly bear was officially protected under the **Endangered Species Act** and was listed as threatened throughout its entire range in the lower 48 states (U.S. Department of the Interior, 1975).  Between 1800 and 1975, grizzly bear populations in the lower 48 states decreased from more than 50,000 to fewer than 1,000 bears.  The main causes for this decline are attributed to habitat loss (settling of the West), over-hunting and commercial trapping, livestock depredation controls, and human fear.  Today, the main threat to grizzly bears is from habitat degradation due to development and other human disturbances (U.S. Department of the Interior, 1995).

Grizzly bears maintain large home ranges that vary depending on gender and food abundance.  They are generalists when it comes to habitat.  They occupy low-elevation **riparian** areas, snow chutes, and meadows in the spring and late fall, and move up to higher sub-alpine forests in the summer, early fall, and winter.  Grizzlies usually den above 6,000 ft in natural or excavated caves after the first snowfall (U.S. Department of Agriculture, 2002).

There are no known credible sightings of grizzly bears within 5 km of the project area from 1960-2003, nor were there any reports of collared bears from 1980-2003.  On May 20, 2004 a credible sighting was reported near Boulder Creek on the opposite side of the river from the treatment site (Kasworm, December 3, 2004; Wakkinen, December 3, 2004).

The project area lies near the Cabinet/Yaak Grizzly Bear Recovery Zone.  The treatment site and tank location itself would not be in recovery zone, however the access road would be (Figure 8).

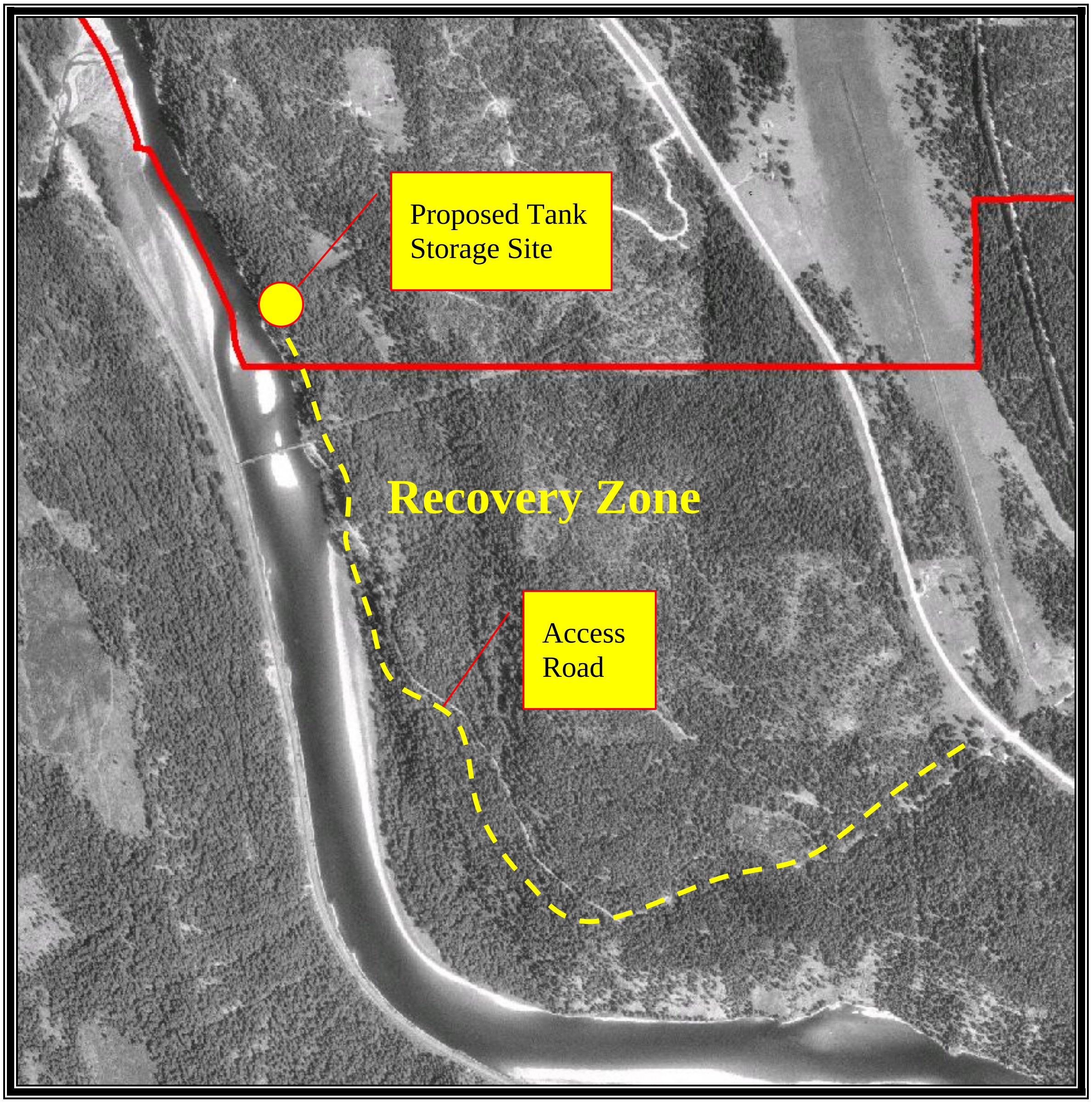



Figure 8 The Cabinet/Yaak Grizzly Bear Recovery Zone

**Effects of the proposed action on grizzly bears**

Impacts to grizzly bears would likely include temporary yet minor increases in noise and human disturbance associated with construction of treatment site and delivery of nutrients and personnel in the area. Nutrient holding tanks would only need to be replenished 2-4 times during the treatment period. Motorized vehicle use will be limited to personnel only. The treatment site is on private property and lies between the highway and canyon rim so traffic and human presence already exist.

No loss of habitat for food, denning, or migration is anticipated. In addition, no impacts to grizzly bears are anticipated as a result from consumption of fish and/or water near the treatment site. Nitrate levels of treatment water fall within what is considered safe for consumption within 2 m of the pipe opening on the river bottom.

**Gray Wolf**

Gray wolves were protected under the Endangered Species Act in 1978. Having been extirpated from the western United States by the 1930s, wolves were listed as endangered throughout the lower 48 United States, except Minnesota where they were listed as threatened (U.S. Department of the Interior, 1978). In a recent decision, specific distinct population segments (DPS) of gray wolves have been down-listed to threatened, including the Western Gray Wolf DPS (U.S. Department of the Interior, 2003). Gray wolves have also been listed as experimental in other areas, including Idaho and Montana. This designation has not been changed.

Wolves can live in many types of habitats including forested areas, rangelands, agricultural areas, deserts, and tundra. They are territorial in most areas, defending territories that range from 48 to 190 square miles (Mech, 1970; Peterson, 1977). Two factors identified as crucial for establishing good wolf habitat include a large prey base and minimal human disturbance.

The gray wolf remains listed as a threatened species north of Interstate 90 in Idaho. Key components of gray wolf conservation include prey availability and reducing human-caused mortalities.

The treatment area lies within the boundaries of the Northwest Montana Wolf Recovery Area which includes northwestern Montana and the Idaho Panhandle. There are currently no known wolf packs within a 20-mile radius of the treatment site. The nearest known pack location is the Candy Mountain pack in the Yaak Valley, just over 20 miles to the north (Figure 9). While there could be loners in the immediate project area, no sightings have been reported (Bangs and Laudon, December 13, 2004). Sightings have been reported in Boulder Meadows, approximately 10 miles to the west of the treatment site and on the opposite side of the Kootenai River (Laudon, December 13, 2004).

**Effects of the proposed action on gray wolf**

Impacts to gray wolves would likely include temporary yet minor increases in noise and human disturbance associated with construction of the treatment site and delivery of nutrients and personnel in the area. Nutrient holding tanks will only need to be replenished 2-4 times during the treatment period. Motorized vehicle use will be limited to personnel only. The treatment site is on private property and lies between the highway and canyon rim so traffic and human presence already exist.

No loss of habitat for food, denning, or migration is anticipated. In addition, no impacts to wolves are anticipated as a result from consumption of fish and/or water near the treatment site. Nitrate levels of treatment water fall within what is considered safe for consumption within 2 m of the pipe opening on the river bottom.

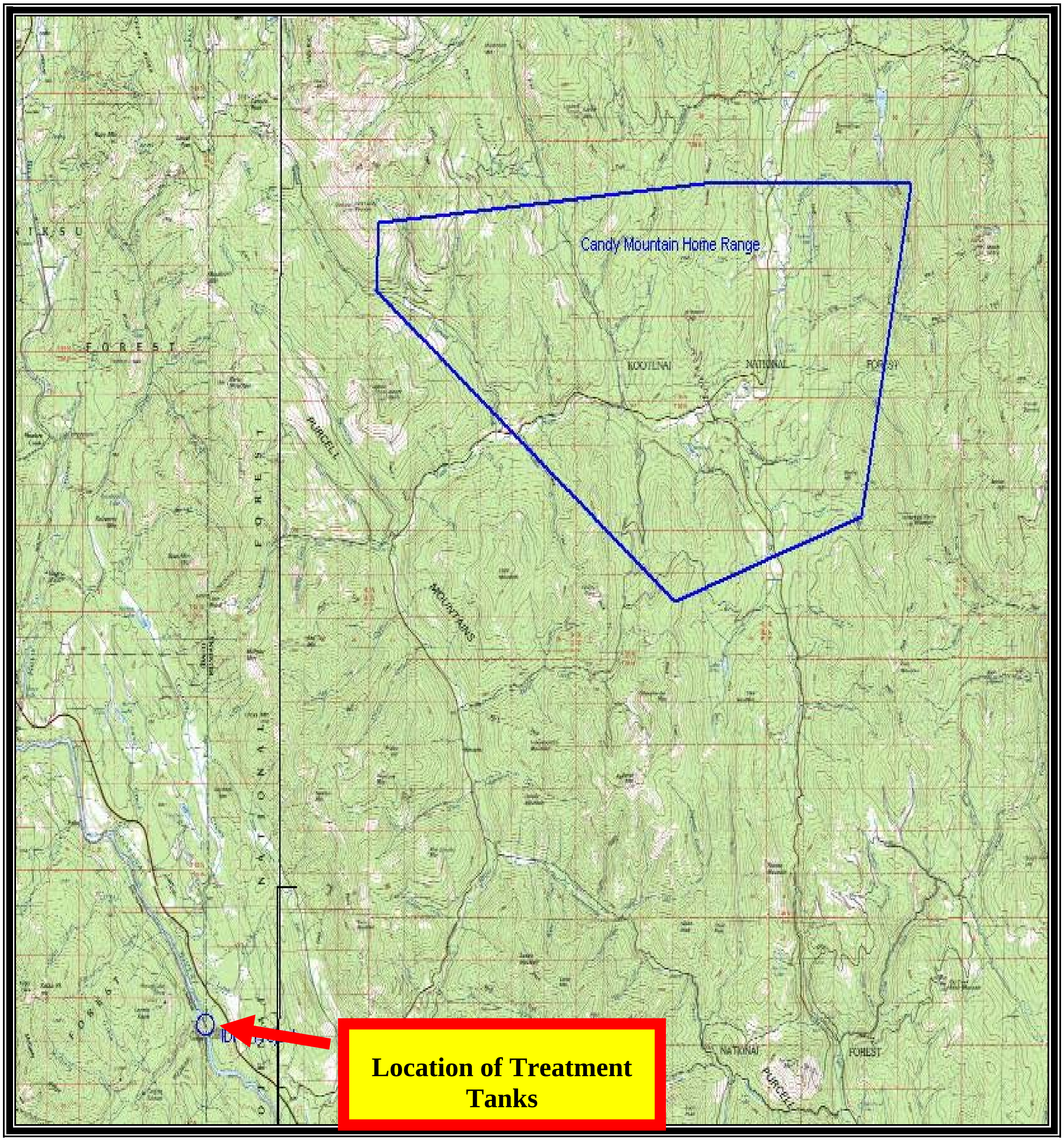



Figure 9  The Candy Mountain Wolf Pack Home Range

### Canada Lynx

Lynx were listed as threatened, effective April 24, 2000.

Lynx habitat has been identified in the vicinity of the project area, though not at the treatment site itself.  A linkage zone exists in the vicinity project area (Figure 10).

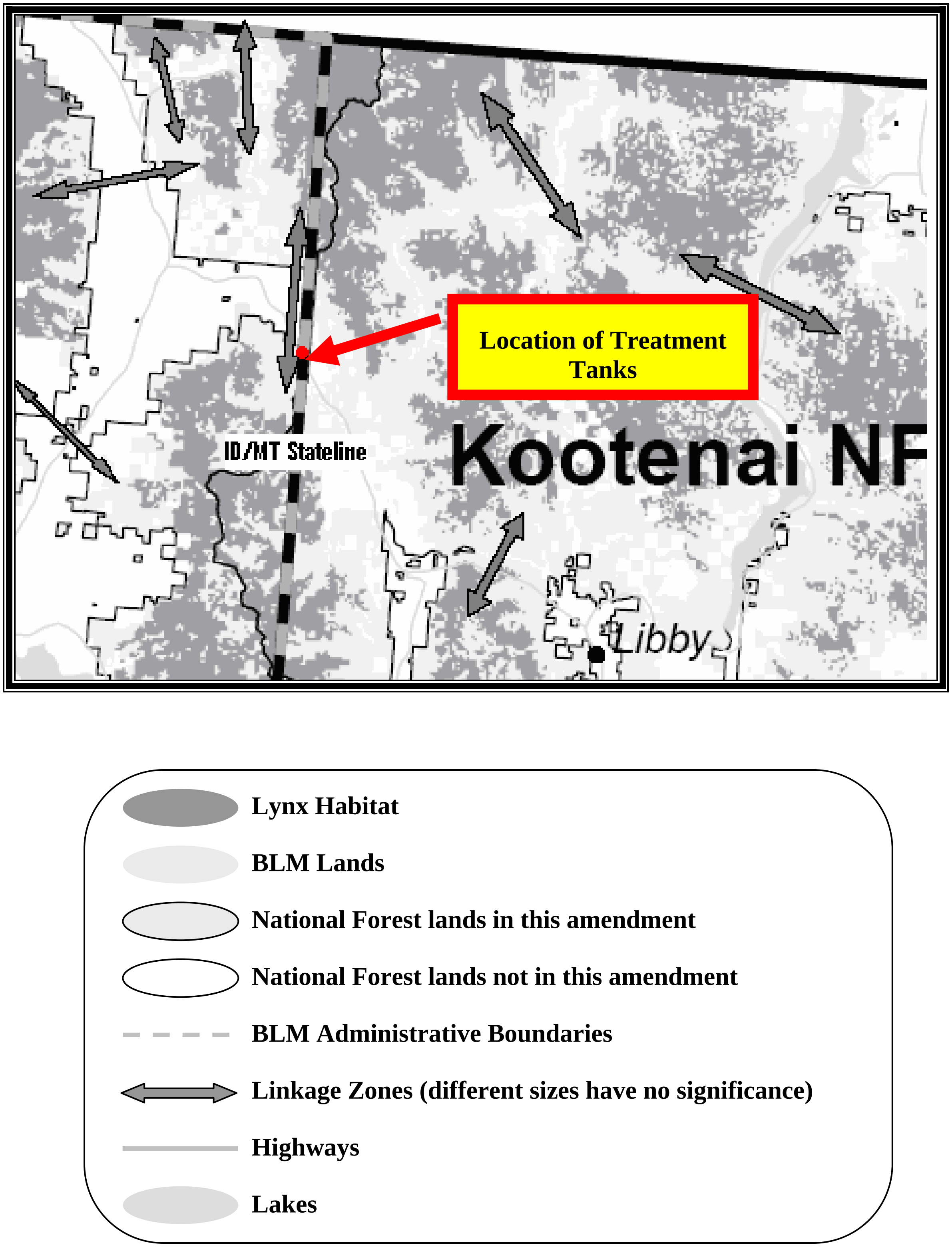



Figure 10  Canada Lynx Habitat and Linkage Zones

**Effects of the proposed action on Canada lynx**

Impacts to Canada lynx would likely include temporary yet minor increases in noise and human disturbance associated with construction of the treatment site and delivery of nutrients and personnel in the area. Nutrient holding tanks will only need to be replenished 2-4 times during the treatment period. Motorized vehicle use will be limited to personnel only. The treatment site is on private property and lies between the highway and canyon rim so traffic and human presence already exist.

No loss of habitat for food, denning, or migration is anticipated. In addition, no impacts to lynx are anticipated as a result from consumption of fish and/or water near the treatment site. Nitrate levels of treatment water fall within what is considered safe for consumption within 2 m of the pipe opening on the river bottom.

### *3.1.5 Species of Special Concern*

Table 5 shows the Idaho species of concern in the vicinity of the project.

Table 5 Idaho Species of Concern

| **Species** | **Expected Occurrence** |
|---|---|
| Burbot (*lota lota*) | Resident |
| Redband rainbow trout (*Oncorhynchus mykiss gairdneri*) | Migratory/Resident |
| Westslope cutthroat trout (*Oncorhynchus clarki lewisi)* | Resident |
| Source: Idaho Conservation Data Center, March 18, 2005. | |

**Burbot**

In Idaho, burbot are endemic only to the Kootenai River and are a species of special concern. They are imperiled because of large-scale hydro and habitat changes in the Kootenai River and the ecosystem including nutrient losses. Because of these factors it is very vulnerable to extinction within its very limited location.

There is only one instance of a burbot near the state border with Montana but none as far upstream as the state border. While burbot prefer slower moving water with sandy to small gravel substrate and lake environments, the river at the treatment site has a high gradient and large gravel substrate. Most sampling for burbot (Paragamian et al. 2000) was concentrated below rkm 244.5 due to a higher concentration of burbot but in 1993; some sampling was done up to the Montana border.

### Effects of the proposed action on burbot

The proposed action will take place prior to any spawning migrations for burbot in the lower river.

The Kootenai River is low in zooplankton density and any improvements to the primary and secondary productivity of the river below Bonners Ferry are likely to benefit burbot early life history, recruitment, and survival. This type of response was recently recorded in trout and mountain whitefish populations in Big Silver Creek, B.C. (Wilson et al 1999b). It is not known if nutrient restoration well above Bonners Ferry will show indirect benefits to burbot or other fish species in the lower river, however, it is very unlikely that there would be any associated negative effects.

**Redband Rainbow Trout** (Columbia River Redband Trout *Oncorhynchus mykiss gairdneri*)

A non-anadromous form of the Columbia River redband trout is native to the Kootenai (spelled Kootenay in Canada) River drainage upstream to at least Kootenai Falls in Montana (Allendorf, et al. 1980; Behnke, 1992). Columbia River redband trout (redband trout) spawn in Kootenai River tributaries from April to June, and include adfluvial runs from Kootenay Lake, British Columbia, and fluvial fish from the Kootenai River (Downs 1999; IDFG unpublished data). The juveniles rear in the tributary streams for up to three years before outmigrating to the Kootenai River, but some will outmigrate during their first summer (Downs, 1999, 2000; Walters and Downs, 2001; Walters, 2002, 2003). Redband trout in the Kootenai River are mainly insectivores, dependent on both aquatic and terrestrial insects.

### Effects of the proposed action on Redband trout

Redband trout are one of the species targeted to benefit from this nutrient restoration project. Redband trout could benefit if aquatic insect production increases after nutrient additions. The increased food supply could result in higher survival of juvenile redband trout that rear in the mainstem Kootenai River. An increased food supply could also support faster growth rates leading to an earlier age at maturity, and improved condition (e.g., relative weight), resulting in higher fecundities.

**Westslope Cutthroat Trout (*O. clarki lewisi*)**

Westslope cutthroat trout occur throughout the Kootenai River drainage, but are most common in tributary streams that are separated from the river by upstream migration barriers. Because redband trout are native to the Kootenai River, westslope cutthroat trout were likely never common in the mainstem or in tributaries downstream of migration barriers. Columbia River redband trout evidently replaced interior cutthroat trout in most areas where they came into contact (Behnke, 1992). During September electrofishing in 2000 and 2001, catch per unit effort for Westslope cutthroat trout was only 1.1 fish/hr. An estimated 235 westslope cutthroat trout were harvested from the Kootenai River in 2001, with a catch per unit effort of 0.03 fish/angler h (Walters, 2003).

Little is known about westslope cutthroat trout in the Kootenai River, Idaho. All three life history forms are possible in the Kootenai River drainage, though resident forms in tributary streams appear most common. One westslope cutthroat trout was radiotagged on May 2, 2002 in the mainstem Kootenai River. This fish was located in Boulder Creek, a Kootenai River tributary, on June 4, 2002, where it presumably spawned (Walters, 2004). Westslope cutthroat trout likely use similar habitat as the redband trout in the mainstem, and their food habits are likely similar as well.

**Effects of the proposed action on Westslope cutthroat trout**

Westslope cutthroat trout could benefit if aquatic insect production increases after nutrient additions. The increased food supply could result in higher survival of juvenile westslope cutthroat trout that rear in the mainstem Kootenai River. An increased food supply could also support faster growth rates leading to an earlier age at maturity, and improved condition (e.g., relative weight), resulting in higher fecundities.

### 3.1.6 Cumulative Impacts

The equipment proposed is temporary and can be removed during the treatment season or later if treatment is discontinued. Treatment of the river could have positive cumulative effects if treatment increases all production up the food chain and more fish are available not only for humans but also for animals. Treatment would be monitored so as to limit negative effects and if negative effects are created, treatment would be suspended. The land used for the equipment could revert to its previous condition when all equipment is removed.

## 3.2 Land Use

### 3.2.1 Affected Environment

The proposed location for the treatment tanks is on private timber land. The private land is in young second growth timber, with scattered old growth. Lincoln County has no zoning in this area and there are no restrictions on land use on the private property (French, March 10, 2005).

The above ground, HMW pipes from the tanks would cross National Forest System Land that borders the private land. This area is in the Kootenai National Forest Plan as Management Area 13 (MA-13). This management area includes scattered parcels of timber stands. The area proposed to be crossed by the treatment pipe is in second growth timber. The goal of this management area is "to provide special habitat necessary for old-growth dependent wildlife (usually other than big game) on a minimum of 10% of each major drainage on the Forest, and in units that represent the major habitat types and tree species of each drainage." Special uses are authorized on a case-by-case basis (USFS, 1987).

### 3.2.2 Potential Impacts of the Proposed Action

The treatment equipment proposed would be temporary. Some of the equipment would be removed after the end of the treatment season; others such as the tanks would be left on the site for the next treatment season. The land use would not be permanently changed except where trees are cut to make room for a gravel pad for the tanks and trailer. If treatment is suspended, the land could be recovered and planted with trees.

### *3.2.3 Potential Impacts of the No Action Alternative*

No land use impacts are expected to occur.

### *3.2.4 Cumulative Impacts*

All equipment proposed for the treatment site is temporary. Some would be removed after each treatment season; others are temporary facilities that could be removed at the end of the project. The land could revert to its former condition.

## 3.3 Visual Resources

### *3.3.1 Affected Environment*

Visual quality objectives for this management area (MA-13) vary depending on the visual significance of the area. Because the area is next to the Kootenai River, and may be seen from the river, riverbanks and other vantage points, the visual quality objective (VQO) for the area where the pipes would cross has high visual quality and so should be managed to retain the visual quality.

The area is situated between mountains and attracts tourists and residents because of its scenic visual resources. From the valley floor the area provides vistas of snow-capped mountains. The nearby area is rural, with farmland and scattered houses on the valley floor and along the river, and forestland and rural residential sites in the foothills. The non-operational Leonia Bridge crosses the river just south of the treatment site. Along the west side of the river railroad tracks add an industrial element to the area. Trees, other vegetation, or topography screen most views of the treatment location.

The proposed tank site is not visible from Highway 2 or any existing homes. Tanks would be visible from the private property. The tanks would be designed to minimize visibility from the river or from the steep slope. The pipe, small control valve platform and PV panels down the slope may be visible from the river, but would likely be screened by trees or brush.

The view of the treatment location and surrounding area from nearby hills and mountains is from a long distance and higher elevation.

### *3.3.2 Potential Impacts of the Proposed Action*

Originally the tanks were proposed to be about 3.3 m high. After concerns expressed about whether the tanks could be seen from the river, the tanks were redesigned to be shorter (about 1.8 m). They should not be visible from the river. The pipe would be semi-transparent and would blend into the native rock and vegetation on the riverbank. The treatment equipment proposed would be temporary. Some of the equipment such as the pipe in the river would be removed after the end of the treatment season; the tanks and the pipe on the steep slope would remain for the next treatment season. The tanks would be covered or colored in a way to blend with the local vegetation. A chain-link fence with neutral-colored blinds would be placed around the tanks to reduce any attraction to the site from people recreating in or along the river. The control valve platform down the hillside toward the water would also have a fence around the equipment and would be mitigated and blended in by trees and smaller vegetation. The

PV panels may be visible intermittently by visitors to the river. The visual resource of the area would not be permanently changed except where trees are cut to make room for a gravel pad for the tanks (on DLC Inc. property). If treatment is suspended, equipment would be removed and the land could be recovered and planted with trees.

### *3.3.3 Potential Impacts of the No Action Alternative*

No visual impacts are expected to occur.

### *3.3.4 Cumulative Impacts*

The area is regarded for its scenic qualities. All equipment proposed for the treatment site is temporary. Some would be removed after each treatment season; others are temporary facilities that could be removed at the end of the project. The land could revert to its former condition.

## 3.4 Recreation

### *3.4.1 Affected Environment*

Northern Idaho and western Montana have many natural and manmade resources that provide residents and visitors with a choice of recreation opportunities. The landscape is varied and scenic. Rugged mountains, rivers and lakes draw visitors to this area. Activities include skiing, hunting, fishing, boating, hiking, golfing, and other outdoor sports. Deer, elk, bear and various birds and small animals are common in the area. The public land near the proposed treatment site is not fenced and may be used for informal, dispersed recreation including hunting, wildlife viewing, birdwatching, and walking. Boaters use the river for floating and fishing. No recreation facilities exist on the property.

### *3.4.2 Potential Impacts of the Proposed Action*

The area of the river to be treated is used by boaters, hikers, birdwatchers, fishers and other recreationists. The pipe used for treatment would be submerged and would not provide a hazard to boaters.

If the treatment is successful and fish populations increase, there would be a benefit to fishers because there would be the opportunity for harvest. Hikers, birdwatchers and others could also benefit if birds and other predators increase.

### *3.4.3 Potential Impacts of the No Action Alternative*

No impacts to recreation are expected.

### *3.4.4 Cumulative Impacts*

There are varied and abundant recreation resources in the area and no formal recreation on the existing property. If the project is successful, additional recreation opportunities such as increased fishing could be available.

## 3.5 Water Resources

### *3.5.1 Affected Environment*

No historical data (prior to 1950s) are available for baseline or "natural" ambient nutrient concentrations (P or N) in the Kootenai River. A phosphate fertilizer plant (Cominco, Ltd.) located on the Saint Mary River, a major tributary to the upper Kootenai River, (BC) was in operation from 1953 to 1987. The plant discharged more than 8,000 metric tons of phosphate annually into the river in the 1960s (Knudson 1993). This greatly increased measures of ambient total phosphorus (TP). By the time the plant was closed, Libby Dam had been on-line for over a decade, which reversed the problem from a nutrient surplus to nutrient deficiency, especially in the Idaho reaches of the Kootenai River (Hardy and Holderman, 2004).

The City of Bonners Ferry has an intake for its municipal water near rkm 247. The Kootenai River is a secondary source of drinking water for the City of Bonners Ferry, the primary source being Myrtle Creek. Other private properties draw water from the river for drinking or irrigation purposes.

### *3.5.2 Potential Impacts of the Proposed Action*

The effective distance of the treatment would be from about the Montana border (rkm 276) downstream to Bonners Ferry (rkm 248; Ashley, July 21, 2004).

Water samples would be obtained weekly at pre-determined locations to monitor the desired nutrient concentrations. Comparisons of background water quality samples would be performed to determine the change in nutrient concentrations. As stated in Section 2.1.6, annual monitoring of the fish community (e.g., relative species abundance and CPUE) would allow the IKERT steering committee to either continue or halt the nutrient restoration program based on "negative threshold" values. Therefore, once these species increase to levels that may affect salmonid production (or other sensitive species such as Kootenai River white sturgeon), or the biomass proportion of salmonid:non-game fish becomes unacceptable (i.e., maximum negative target), the project would be re-evaluated. By the very nature of ecosystem complexity, however, it is difficult to predict such outcomes. In the same likelihood of non-game fish species increasing, salmonid populations may increase to a level that creates a top-down control on these non-game fish communities. Careful evaluation of the trophic interactions within the 5-year experimental period should reveal if species shifts back to populations dominated by salmonids (Partridge 1983).

Management criteria of the nutrient additions have been set up to try and safeguard against any long-term deleterious effects of the treatments (see Section 2.1.6). In other words, should managers see nutrient additions resulting in potentially negative effects, the experiment would be discontinued and re-evaluated by the IKERT.

The City of Bonners Ferry has requested that total organic carbon (TOC), in addition to the six water quality parameters sampled at other sites, be measured weekly at the city water intake. Temperature (ºC), conductivity (mS·cm), salinity (ppt), total dissolved solids, dissolved oxygen (mg·L and % saturation), standard pH, barometric pressure (mm·Hg), nitrate (mg·L N), and ammonia (mg·L N), and blue-green algae (V or cells·mL) would be measured at the city water intake, and reported to the appropriate agencies (Hoyle, 2005). Treatment dilutions are well within safe water consumption standards (human) within 2m of the pipe (human standards are more conservative than for aquatic organisms). During angler surveys performed during the treatment seasons, informational pamphlets about the project would be handed out. These pamphlets would also be available at boat launches and other areas used by recreationists and the general public. Signs would be placed near the outlet pipe to provide information and alert river users of elevated nitrate concentrations at the pipe nozzle prior to mixing (1-2 m; see Section 2.1.1 for more information on mixing zone concentrations).

**Total organic carbon (TOC)**

The City of Bonners Ferry is currently near the maximum level of TOC that they can safely chlorinate (2-2.5 mg/L). There should not be a measurable increase in TOC given the small amount of nutrients that would be added (Ashley, February 3, 2005). At most, the river would experience a slight increase in particulate organic carbon as some of the periphyton, such as algae, is scoured downstream in a flood event (for example) or in the fall when the periphyton dies off. If the nutrients are added in the proper ratios, the river should experience little periphyton on the rocks, as it would be grazed and transferred into the invertebrate community (Ashley, February 3, 2005).

Northern rivers experienced a lag of 1 year for the invertebrates to increase in density and biomass following the first treatment dates. Considering this, and the need for TOC increases to be minimal, managers on the Kootenai River are proposing to add the lower P load for 2005 (1.5 ug/L), which would likely be increased to 3.0 ug/L in 2006. This should allow the invertebrate community enough time to increase and to take advantage of the additional periphyton accrual.

**Chlorophyll (CHL)**

Department of Environmental Quality (DEQ) guidelines indicate that "surface waters of the state shall be free from floating, suspended, or submerged matter of any kind in concentrations causing nuisance or objectionable conditions or that may impair designated beneficial uses…" (IDAPA 58.01.02-Water Quality Standards and Wastewater Treatment Requirements). Adding to this, Title 10-06 of DEQ surface water quality criteria states that "surface waters of the state shall be free from excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses" (IDAPA 58.01.02-Water Quality Standards and Wastewater Treatment Requirements). British Columbia (BC) has similar standards for surface water quality. For example, maximum chlorophyll *a* (CHL) concentration for aesthetic concerns are set at 50 $mg/m^2$, and the maximum without deleterious effects on stream life is set at 100 $mg/m^2$ CHL (Ashley and Stockner, 2003). In the upper Kootenai River (above Bonners Ferry) chlorophyll *a* concentrations in 1994 ranged from 46 $mg/m^2$ in July to 27 $mg/m^2$ in August (Snyder and Minshall, 1996). The same study showed that levels in 1995 were similar at 24 $mg/m^2$ in June and 39 $mg/m^2$ in July. Holderman and Hardy (2004), however, reported lower chlorophyll *a* concentrations (1-5 $mg/m^2$) upstream of Bonners Ferry during the summers of 2001 and 2002. Although there are no specific CHL *a* criteria defined by Idaho DEQ for the Kootenai River, the objective is to stay within guidelines deemed acceptable in neighboring Canada. Objectives for CHL are to maintain Chlorophyll *a* concentrations below a maximum standard of 50-100 $mg/m^2$. Nutrient application to the Kootenai River would carefully follow water quality standards laid out by the Idaho DEQ and Environmental Protection Agency (EPA).

**Metals**

The objective is to maintain heavy metals additions at or below 1% of current background levels in the upper Kootenai River.

Since the phosphorus in the 10-34-0 nutrient solution is originally obtained through the mining of phosphate deposits around the earth, each ore body has its own unique amounts of heavy metals (Ashley and Stockner, 2003). Special attention would be paid to the origin of the phosphate in order to reduce heavy metal concentrations at the nutrient application site (only two major locations of mining of phosphorous exist in North America: Idaho and Florida). As a general rule, new metal additions should be maintained at or near 1% of current ambient metal concentrations to avoid harming aquatic organisms (Ashley, July 22, 2004).

Two 250 ml samples of the 10-34-0, the proposed form of nutrient additions, were sent to ALS Environmental (BC) for a full metals analysis in July 2004. Calculations performed by IDFG and KTOI in 2004 showed that following river mixing, the relative additions of metals to the river from the 10-34-0 are miniscule (< 0.1 ug/l). Fish samples collected near the proposed treatment site were additionally sampled and analyzed in 2003 for background metals concentration. None of the fish tested (eight mountain whitefish and six large-scale suckers) were considerably high in metals concentrations. The amount of metals that is to be added to the river is so small (< 0.1 ug/l) bioaccumulation of these metals in fish tissue would not likely be a factor (Ashley, July 22, 2004). Samples would be taken from approximately 25 fish annually to determine if the project is within the set guidelines. Substrate and water column samples would be taken weekly during the treatment application period.

There is likely only a minor, if any, hydrologic connection between the river water and some private wells in the Kootenai River Valley. Little or no impacts to local wells are expected because the treated river water should be filtered while traveling through the aquifer, and the river's organisms would use up the nutrients far in advance of the water being added to the local groundwater (Ashley, July 21, 2004). However, at the request of residents, some local wells would be sampled to see if any changes are detected after nutrients are added.

### *3.5.3 Potential Impacts of the No Action Alternative*

No impact to water resources would occur.

### *3.5.4 Cumulative Impacts*

If treatment is successful in meeting the goals of the project and does not create negative impacts, the cumulative impacts would be beneficial to the ecosystem's animal communities and also to the human communities of tribes, fishers, and recreationists. If the treatment does not meet the goals, it would be suspended and there would be no cumulative impacts. The water quality of the river would be monitored to ensure that it is not degraded from the treatment and that it meets the requirements for municipal water withdrawals.

## 3.6 Wetlands

### *3.6.1 Affected Environment*

Wetlands are areas of transition between aquatic and terrestrial systems, where water is the dominant factor determining the development of soil characteristics and associated biological communities. They are important communities that have declined over the years due to an increase in agriculture practices and urban development. Because of these losses, federal, state, and local laws protect wetlands. Jurisdictional wetlands, or wetlands that are regulated, are defined as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (U.S. Army Corp of Engineers, 1987). Wetlands in the project area were identified using USFWS National Wetland Inventory Maps and aerial photos.

There is one riverine wetland along the eastern riverbank where the pipe would run into the river. This wetland is bounded by the riverbank. Riverine wetlands are those that occur within the river channel and are dominated by emergent vegetation that remains only through the growing season (American Wetlands Campaign, 2005).

### *3.6.2 Potential Impacts of the Proposed Action*

No construction would occur in the wetland. The wetland mapped is along the river. The only action that would take place would be laying the pipe along the riverbank to the river. No soil or plants would be disturbed. No impacts are expected.

### *3.6.3 Potential Impacts of the No Action Alternative*

No impacts to wetland resources would occur.

### *3.6.4 Cumulative Impacts*

No cumulative impacts would occur.

## 3.7 Floodplains

### *3.7.1 Affected Environment and Potential Impacts*

The floodplain of the river ends at the edge of the riverbank where the topography quickly gains elevation. The tank site is on a bench high above the river and is outside the floodplain of the river.

The pipe that crosses the riverbank then descends into the river would be in the floodplain for about 12 weeks. The schedule for treatment is during typical low flow times of the year (June-September) and the pipe would be removed from the river and riverbank at the end of the treatment. The pipe would be on the top of the ground, and the ground would not be disturbed.

No impacts to floodplains are expected.

Because the proposed treatment requires nutrients to be mixed into the river, there is no alternative to putting the equipment temporarily across the floodplain.

### *3.7.2 Potential Impacts of the No Action Alternative*

No impacts to floodplain resources would occur.

### *3.7.3 Cumulative Impacts*

No cumulative impacts would occur.

## 3.8 Cultural Resources

### *3.8.1 Affected Environment*

This stretch of the Kootenai River is the traditional territory of the Bonners Ferry band of the Lower Kootenai, now the Kootenai Tribe of Idaho. It likely saw frequent use by other nearby Native American groups including other Kootenai bands and nearby groups such as the Kalispell (Ives 2005).

In September 1809, a North West Company exploratory party, led by David Thompson, descended the Kootenai River to present-day Bonners Ferry. However, Euro-American contact had been made earlier by a small number of explorers, missionaries and traders. Indirect influences such as trade goods, horses and diseases had already had a great impact on the traditional cultures of Native American groups within the region (Ives, 2005).

Interactions with Euro-Americans increased with the arrival of gold mining prospectors into the area in the 1890s. Wagon roads from Troy, Bonners Ferry and Leonia were constructed in the late 1890s in an attempt to control traffic to and from the mining claims. The town of Leonia, located just west of the project Area of Potential Effect (APE) on the Idaho side of the Kootenai River was a station supplying needs of local homesteaders and miners. Ferry service and later the Leonia Bridge, constructed in 1922, provided a way to connect travel across the river.

### *3.8.2 Potential Impacts of the Proposed Action and the No Action Alternative*

No cultural resources were identified during the field survey of the Area of Potential Effect conducted in March 2005. However, according to Montana State Historic Preservation Office site files, portions of the historic Moyie-Sylvanite and Leonia-Sylvanite wagon roads are located within the project APE. A portion of the historic Moyie-Sylvanite wagon road would be used to access the proposed storage tank location, and the outlet from the storage tanks would cross the path of the Leonia-Sylvanite wagon Road (Ives 2005).

Project plans call for the portion of the Moyie-Sylvanite road to be improved for use as an access road by adding fill material. The road within the project area is on private land and has been impacted as a result of logging activities. Further modification in the form of adding fill material would not adversely affect this culture resource.

The portion of the Leonia-Sylvanite wagon road within the APE was constructed in 1896 and abandoned the following year.  No evidence of this cultural resource was observed during the field survey.

In the unlikely event that archaeological material is encountered during the implementation of this project, an archaeologist would immediately be notified and work halted in the vicinity of the finds until the material can be inspected and assessed.  The Montana State Historic Preservation Office and the appropriate Tribes will be notified of any future findings.

### *3.8.3 Potential Impacts of the No Action Alternative*

No impacts to cultural resources would occur.

### *3.8.4 Cumulative Impacts*

No cumulative impacts would occur.

## 3.9 Vegetation

### *3.9.1 Affected Environment*

Most of the Kootenai National Forest is tree-covered.  Trees native to the area include western red cedar, western hemlock, western white pine, lodgepole pine, ponderosa pine, Douglas-fir, subalpine fir, grand fir, whitebark pine, alpine larch, western larch, mountain hemlock, Engelmann spruce, and juniper.  Of the over 2.2 million acres on the Kootenai National Forest, about 1.8 million acres are considered capable of producing commercial timber.  Habitat types are primarily in the Douglas fir, hemlock, and alpine fir series with clintonia and snowberry union as the dominant understory.  Ponderosa pine/bitterbrush is found in scattered areas.  There are also small areas of ponderosa pine habitat type in the Tobacco Plains, the West Kootenai Bench, and on the dry south slopes in the drier sites and exposures.  The Troy and Yaak Ranger Districts commonly support cedar/clintonia and hemlock/clintonia habitat types.  Hemlock/devil's club and cedar/lady fern are found in moist high water table bottoms on those Districts, and in the foothills of the Cabinet Mountains Wilderness.  Alpine fir/ beargrass and whortleberry on the drier high elevation sites (USFS 1987).

The proposed treatment site is on a bench above the Kootenai River in second growth timber next to Kootenai National Forest Plan Management Area 13.  The above ground, HWM pipe to the river from the tanks would be in MA-13.  This parcel is mostly second growth timber, with scatterings of old growth timber.  It is managed for wildlife habitat, not timber production.

**Noxious Weeds**

Spotted Knapweed, Orange hawkweed, rush skeleton weed, and toadflax are the noxious weed species of concern in western Lincoln County, Montana (Williams, February 28, 2005). A visual inspection for these species would be conducted prior to construction on the site and treatment of these species, if found, would occur at that time. After construction is finished at the tank site and the access road, monitoring and treatment of the above species needs to be performed. The County recommends inspecting the county road that accesses the site and treating and monitoring it if noxious weeds were present. The County recommends Tordon 22K as the best herbicide to treat the four species listed.

#### Threatened and Endangered Species

***<u>Ute Ladies' Tresses</u>***

Ute Ladies' Tresses is a perennial orchid with a flowering stem, 20-50 cm tall. The flowers are ivory-colored and arranged in a spike at the top of the stem. The plants generally bloom from late July through August. Plants occur largely along streams and rivers and their floodplains, wet meadows, and open seepy areas, between elevations of 1300-1600 m. Two other species of *Spiranthes* are known to occur in Idaho.

There exists no documentation of Ute Ladies Tresses in Boundary County, Idaho or Lincoln County, Montana (Arvidson, December 18, 2004; Mincemoyer, December 5, 2004). The only known plants in Idaho occur in Jefferson, Madison, Fremont and Bonneville counties in southeast Idaho, largely along the Snake River floodplain (Mosely, 2002). In Montana, plants exist mostly in the eastern part of the state, especially along the Yellowstone River. In addition, no suitable habitat is present at the treatment site.

### *3.9.2 Potential Impacts of the Proposed Action*

The potential impacts to vegetation would be from clearing of trees for the tanks and other equipment and improved access. Low-growing vegetation would also be disturbed. The amount of disturbance would be minor. There is a risk of spreading noxious weeds to these areas. A survey of noxious weeds would be done as suggested by the County. There would be no effects on Ute Ladies' Tresses because none occur in the area. If treatment is suspended, the land could be restored and planted with trees.

### *3.9.3 Potential Impacts of the No Action Alternative*

No impacts to vegetation are expected.

### *3.9.4 Cumulative Impacts*

Long-term effects to the area would be minor. Few trees and other vegetation would be removed. The equipment is temporary, and the area used for a gravel pad could be restored and replanted if treatment is suspended.

## 3.10 Soils

### *3.10.1 Affected Environment*

Soils in the area, for the most part, have been influenced by glaciation and typically have a low inherent fertility when compared, for example, to soils on the west coast. The land type of the proposed treatment site from the Soil Survey of the Kootenai National Forest Area, Montana and Idaho (1995), is described as containing very steep slopes with lots of rock outcrop. This is the soil type for the area on National Forest System Land where the small platform and pipes would be. Because of the steepness of the slope, there is a potential for soil erosion. The soil on the bench where the tanks and access road would be located is a mixture of glacial till, residual soil, and stream deposits, which is underlain by bedrock. The area where the tanks would be is stable (Kuennen, March 12, 2005.)

### *3.10.2 Potential Impacts of the Proposed Action*

The Proposed Action could create impacts from construction and use of the land. Site development would require an improved road to the tank site, a disturbed area for where the tanks and camp trailer would be located, and a turn-around area for the nutrient trucks to exit following the tank refill. The site would require some tree and shrub clearing, soil excavation, and other construction surface and subsurface disturbance. Potential impacts include soil erosion and dust. Erosion control measures would reduce potential impacts.

### *3.10.3 Potential Impacts of the No Action Alternative*

No impacts are expected.

### *3.10.4 Cumulative Impacts*

Potential development could create erosion on hill slopes, but adequate erosion control measures would prevent loss of topsoil. If treatment is suspended, the land could be restored and planted with trees.

## 3.11 Noise, Public Health and Safety

### *3.11.1 Affected Environment*

The treatment site is on private property and lies between the highway and canyon rim where traffic and human presence already exist. Ambient noise levels include noise from truck traffic on the highway during many hours of the day. A railroad line runs along the opposite of the river from the treatment site, and train noise is frequent. See Section 3.1 for impacts to wildlife.

Though the access road to the treatment site is gated and crosses private property, some informal visitors do use the area. The area along the river is accessible by boat and by foot. The Forest Service is concerned about potential vandalism on the site.

### *3.11.2 Potential Impacts of the Proposed Action*

The Proposed Action would create minor increases in noise and human disturbance associated with construction of the treatment site and delivery of nutrients and personnel in the area. Nutrient holding tanks would need to be replenished 2-4 times during the treatment period. Motorized vehicle use would be limited to project-authorized personnel only.

The tanks would be surrounded by a berm (concrete lock-blocks or sandbags) with a thick plastic membrane to contain any leaks from the tanks. This would prevent the nutrients from being released and affecting any other ground. No major leaks should occur because an automated switch would shut off flow should nutrients stream faster than programmed (indicating a break in the line) and an alarm system would alert the technician on site. Should any minor leaks in the line reduce vegetation in the immediate vicinity (the opposite should occur), the forest botanist would be consulted for re-vegetation recommendations. Following the treatment season, the tanks would be emptied and the pipe in the river removed until the following season.

Treatment dilutions are well within safe water consumption standards (human) within 2m of the pipe (human standards are more conservative than for aquatic organisms). Because tanks are located on the rim away from the river's edge, and an emergency alarm and shut-off valves would be in place, no spills directly into the Kootenai River are anticipated.

A fence would surround the tank area and the gate on the fence would be locked when the tanks are not in use to keep anyone from tampering with the injection system. A technician would be onsite during the treatment season and would provide security against vandalism.

The end of the pipe in the river would be submerged so that boaters could safely pass the pipe. During angler surveys performed during the treatment seasons, informational pamphlets about the project would be handed out. These pamphlets would also be available at boat launches and other areas used by recreationists and the general public. Signs would be placed near the outlet pipe to provide information and alert river users of elevated nitrate concentrations at the pipe nozzle prior to mixing (1-2 m; see Section 2.1.1 for more information on mixing zone concentrations).

As stated in other sections of the document, mitigation to reduce potential harm and/or an attraction for vandalism are included in the proposed action:

- Using a color for the tanks so that they blend into the surrounding environment;
- Onsite personnel to provide security and monitor the system and the nutrient application and equipment;
- An alarm system and automatic shutoff to prevent leaks;
- A concrete or sand berm around the tanks and a plastic liner underneath the tanks to capture any potential leaks;
- A locked gate on the access road to the site;
- Posting and handing out informational pamphlets in the area.

#### *3.11.3 Potential Impacts of the No Action Alternative*

No impacts are expected.

#### *3.11.4 Cumulative Impacts*

No cumulative impacts are expected. The equipment is temporary. Some would be removed at the end of each treatment season. If a leak or vandalism occurs, the containment of the nutrients would prevent any lasting impact to the surrounding area.

# 4.0 Consultation, Permit and Review Requirements

## 4.1 National Environmental Policy Act

This EA is being prepared pursuant to the National Environmental Policy Act (NEPA) (42 U.S.C. 4321 *et. seq*.) and the Council of Environmental Quality (CEQ) Implementing Regulations, which require federal agencies to assess the impacts that their proposed actions may have on the environment. Based on information in the EA, BPA would determine whether the proposal significantly affects the quality of the human environment. If it does, an Environmental Impact Statement is required. If it is determined that the proposal would not have significant impacts, a Finding of No Significant Impact (FONSI) would be prepared, or a Categorical Conclusion (CX) (10 C.F.R. Part 1021) could be applied to this action.

## 4.2 Threatened and Endangered Species and Critical Habitat

The Endangered Species Act (ESA) of 1973 (16 U.S.C. 1536) as amended in 1988, establishes a national program for the conservation of threatened and endangered (T&E) species of fish, wildlife, and plants and the preservation of the ecosystems on which they depend.

The ESA is administered by the U.S. Fish and Wildlife Service and, for salmon and other marine species, by the National Marine Fisheries Service. Section (7a) requires federal agencies to ensure that the actions they authorize, fund, and carry out do not jeopardize endangered or threatened species or their critical habitats.

See Sections 3.9, Vegetation and 3.1, Fish and Wildlife for a discussion of the federally-listed species and the potential impacts to these species. BPA has consulted with the USFWS.

## 4.3 Fish and Wildlife Conservation

The Fish and Wildlife Conservation Act of 1980 (16 USC 2901 et seq.) encourages federal agencies to conserve and promote conservation of non-game fish and wildlife species and their habitats. In addition, the Fish and Wildlife Coordination Act (16 USC 661 et seq.) requires federal agencies undertaking projects affecting water resources to consult with the U.S. Fish and Wildlife Service and the state agency responsible for fish and wildlife resources. The analysis in Section 3.1, Fish and Wildlife, indicates impacts to fish and wildlife the alternatives would have. Provisions of the Pacific Northwest Electric Power Planning and Conservation Act (16 U.S.C. et seq.) are intended to address system-wide fish and wildlife losses. This project is proposed to fulfill these obligations, as part of the Columbia River Basin Fish and Wildlife Program.

## 4.4 Permits for Discharges into Waters of the United States

The Tribe and IDFG have obtained a short-term activity exemption (STAE) from the Idaho Department of Environmental Quality for the 12-week period proposed. The Tribe and IDFG would comply with all EPA and IDEQ guidelines for discharges under the

Clean Water Act including obtaining a National Pollutant Discharge Elimination System (NPDES) permit, if required.

## 4.5 Safe Drinking Water Act

The Safe Drinking Water Act (42 U.S.C. sec 300f et. seq.) is designed to protect the quality of public drinking water and its sources. The City of Bonners Ferry has an intake for its municipal water near rkm 247. The Kootenai River is a secondary source of drinking water for the City of Bonners Ferry, the primary source being Myrtle Creek. Water samples would be obtained weekly at pre-determined locations to monitor the desired nutrient concentrations. Comparisons of background water quality samples would be performed to determine the change in nutrient concentrations. The City of Bonners Ferry has requested that total organic carbon (TOC), in addition to the six water quality parameters sampled at other sites, be measured weekly at the city water intake. Temperature (ºC), conductivity (mS/cm), salinity (ppt), total dissolved solids, dissolved oxygen (mg/L and % saturation), standard pH, barometric pressure (mm/Hg), nitrate (mg/L N), and ammonia (mg/L N), and blue-green algae (V or cells/mL) would be measured at the city water intake, and reported to the appropriate agencies (Hoyle, 2005). Treatment dilutions are well within safe water consumption standards (human) within 2m of the pipe (human standards are more conservative than for aquatic organisms). See Section 3.5.

## 4.6 Resource Conservation and Recovery Act

No hazardous materials would be used, discarded or produced by this project. Solid wastes would be disposed of at a landfill approved by the state of Idaho. If any leaks develop at the treatment site, the berm surrounding the treatment tanks would contain the liquid and it would be pumped to a non-leaking holding tank, then disposed of.

## 4.7 Permits for Discharges into Waters of the United States

The project proponents have obtained a 124 permit from the Montana Department of Fish, Wildlife and Parks. A Section 12 Permit for Navigable Waters (rather than a Section 404 permit) from the Army Corps of Engineers would also be obtained.

## 4.8 State, Areawide, and Local Plan and Program Consistency

Lincoln County, Montana does not have a comprehensive plan or zoning regulations for the treatment site. The treatment site is on unincorporated private rural timberland owned by DLC, Inc. (E 1/2 of the SW 1/4, of the SW 1/4, of the SW 1/4 of Section 17, Township 33N, Range 34W of survey 2800) and National Forest System Lands managed by the Kootenai National Forest (Government Lot #5 of Section 17, Township 33N, Range 34W of survey 2800). The use of the proposed equipment on the Kootenai National Forest would require a special use permit from the Forest Supervisor. The use is consistent with the current forest plan, no amendments to the forest plan are necessary. The Tribe and IDFG would work with the USFS while designing the facilities. A special use permit would be obtained.

## 4.9 Wetlands and Floodplains Protection

Discussion of wetland effects is provided in Section 3.6, Wetlands. Discussion of floodplain effects is provided in Section 3.7, Floodplains.

## 4.10 Recreation Resources

The proposed project would not affect Wild and Scenic Rivers, National Trails, Wilderness Areas, National Parks, or other specially designated recreational areas. Discussion of impacts to dispersed recreation is in Section 3.4.

## 4.11 Federal Insecticide, Fungicide and Rodenticide Act

Herbicides would not be used during project construction; however, herbicides may be used to prevent the spread of noxious weeds. The Tribe and IDFG would comply with all federal regulations regarding the use of herbicides, including application by trained applicators.

## 4.12 Heritage Conservation

Federal historic and cultural preservation acts include the National Historic Preservation Act (16 USC 470-470w-6), the Archeological Resources Protection Act (16 YSC 470aa-470ll), the Archeological and Historic Preservation Act (16 USE 469-469c), the American Antiquities Act (16 USC 431-433), and the American Indian Religious Freedom Act (42 USC 1996). BPA has consulted with the Montana State Historic Preservation Office. See Section 3.8 for information about cultural resources. No impacts are expected from the alternatives.

## 4.13 Noise Control Act

See Section 3.11.

## 4.14 Clean Air Act

During the fire season (March 1 - October 31), burning permits are required in Lincoln County (Lincoln County, March 18, 2005). If cleared slash or trees are burned by the landowner, a county permit would be obtained.

## 4.15 Review, Consultation and Permit Requirements not Applicable to this Project

### *4.15.1 Stormwater Permit*

A stormwater permit is required if the proposed ground disturbance is greater than 1 acre. Less than 1 acre of disturbance is proposed, so no stormwater permit is required (Ryan, January 2004).

### *4.15.2 Toxic Substances Control Act*

No toxic substances would be manufactured or used on this project.

### *4.15.3 Energy Conservation at Federal Facilities.*

Energy conservation practices are not relevant to the facilities proposed.

### *4.15.4 Farmland Protection Policy Act*

The project would not affect any prime, unique or other important farmland as defined in the Farmland Protection Policy Act (U.S.C. 4201 et seq.).

### *4.15.5 The Executive Order on Environmental Justice*

The project would not adversely affect minority or disadvantaged groups. No adverse effects on any human groups or individuals are expected. This project would have a positive impact for minority/disadvantaged tribal populations.

# 5.0 List of Agencies, Organizations, and Persons Sent the EA

The project mailing list contains about 350 potentially interested or affected landowners; tribes; local, state and federal agencies; utilities; public officials; interest groups; businesses; special districts; libraries and the media. They have directly received or have been given instructions on how to receive all project information made available so far, and they will have an opportunity to review.

## Federal Agencies

US Army Corps of Engineers (Libby, MT)

US Army Corps of Engineers (Seattle, WA)

US Environmental Protection Agency (Idaho)

USDA Forest Service (Kootenai National Forest)

USDA Forest Service (Libby Ranger District)

USDA Forest Service (Panhandle National Forest)

USDA Forest Service (Troy Ranger Station)

USDA Forest Service (Bonners Ferry Ranger District)

USDA Natural Resources Conservation Service

USDOC NOAA National Marine Fisheries Service

USDOE Bonneville Power Administration (Libby Station)

USDOI Bureau of Land Management

USDOI Fish & Wildlife Service (Spokane)

USDOI Fish & Wildlife Service (Kootenai National Wildlife Refuge)

USDOI Geological Survey

## Tribes Or Tribal Groups

Blackfeet Nation

Confederated Salish and Kootenai Tribes

Kootenai Tribe of Idaho

## State And Local Agencies

Idaho Department of Fish and Game

Idaho Department of Environmental Quality

Montana Department of Transportation

Montana Fish Wildlife and Parks

Boundary County, Idaho

Lincoln County, Montana

City of Bonners Ferry

City of Troy

## Canada

British Columbia Ministry of Environment, Land, and Parks (BCMELP)

East Kootenay Environmental Society

## Public Officials

### *Federal*

US Congressman, C L (Butch) Otter, Idaho

US Senator Larry Craig, Idaho

US Senator Mike Crapo, Idaho

US Congressman Denny Rehberg, Montana

US Senator Max Baucus, Montana

US Senator Conrad Burns, Montana

### *State*

Representative Eric Anderson, Priest Lake, Idaho

Senator Shawn Keough, Sandpoint, Idaho

Representative Rick Maedje, Fortine, Montana

Representative Ralph Heinert, Libby, Montana

Senator Aubyn Curtiss Fortine, Montana

## Special Districts

Boundary Soil Conservation District

South Baldy Water District

## Libraries

County of Boundary Public Library

East Bonner County Library District

Lincoln County Free Library

Troy Branch Library

## Universities

University of British Columbia

University of Eastern Washington

University of Idaho

## Interest Groups

Historical Research Associates

Idaho Conservation League

Kootenai River Network

Kootenai Valley Trout Club

Montana River Action

Montana State Parks Foundation

Montana Trout Unlimited

Montana Wilderness Association

Montana Wildlife Federation

National Wildlife Federation

Rock Creek Alliance

Sierra Club (In-Land Northwest Office)

Trout Unlimited (Sandpoint and Hope)

Yaak Valley Forest Council

## Media

Bonners Ferry Herald

Boundary News, Rural Northwest

Coeur d' Alene Press

Kootenai Valley Press

KLCB AM

## 6.0 Glossary

Autotrophic: plants capable of making their own food by synthesis of inorganic materials.

Endangered: Under the Endangered Species Act, those species officially designated by the National Marine Fisheries Service or U.S. Fish and Wildlife Service as in danger of extinction through all or a significant portion of their range. Endangered species are protected by law. See also *Threatened.*

Endangered Species Act (ESA): The Endangered Species Act of 1873, as amended, requires that Federal agencies ensure that their actions do not jeopardize Threatened or Endangered species.

Fluvial: is generally used to describe a type of spawning strategy of a fish. For example, a fluvial fish will reside in the mainstem of a river and migrate to upper tributaries to complete their spawning. Adfluvial fish reside in a lake and travel up adjacent tributaries to spawn. A fish that is considered "resident" spend their entire lives in headwater streams.

Pacific Northwest Power Planning and Conservation Act: The Pacific Northwest Power Planning and Conservation Act of 1980 (16 U.S.C. 839 et. seq.), which authorized the creation of the Northwest Power Planning Council and directed it to develop this program to protect, mitigate and enhance fish and wildlife, including related spawning grounds and habitat on the Columbia River and its tributaries.

Redd: the specific location in a river where a female fish lays her eggs and buries them in gravel for incubation.

Riparian: Growing or living on the banks of a stream.

River kilometers (rkm): The distance the river travels between two given points, measured in kilometers.

Threatened: Under the Endangered Species Act, those species officially designated by the U.S. Fish and Wildlife Service as likely to become endangered within the foreseeable future through all or a significant portion of their range. Threatened species are protected by law. See *Endangered.*

Trophic Level: The position of a species in the food web or chain, i.e., its feeding level. It represents a step in the movement of biomass or energy through an ecosystem.

# 7.0 References

Allendorf, F. W., D. M. Espeland, D. T. Scow, and S. Phelps. 1980. Coexistence of native and introduced rainbow trout in the Kootenai River drainage. Proceedings of the Montana Academy of Sciences 39:28-36.

American Wetlands Campaign Web site. Accessed March 11, 2005. Wetland definitions. (http://www.iwla.org/sos/awm/kit_defn.html).

Arvidson, Mike. December 18, 2004. Idaho Conservation Data Center, personal communication.

Ashley, Ken. July 21, 2004. BCMLWAP, personal communication, IKERT Conference.

Ashley, Ken. February 3, 2005. BCMLWAP, personal communication.

Ashley, K. I., and J. G. Stockner. 2003. Protocol for applying limiting nutrients to inland waters. Pages 245-258 *in* J.G. Stockner, editor. Nutrients in salmonid ecosystems: sustaining production and biodiversity. American Fisheries Society, Symposium 34, Bethesda, Maryland.

Bangs, Ed and Kent Laudon. December 13, 2004. USFWS, personal communication.

Behnke, R. J. 1992. Native trout of western North America. American Fisheries Society, Monograph 6.

Downs, C. C. 1999. Kootenai River fisheries investigations: Rainbow trout recruitment. 1997 Annual report to Bonneville Power Administration. Project 88-65. Idaho Department of Fish and Game, Boise, Idaho.

Downs, C. C. 2000. Kootenai River fisheries investigations: Rainbow trout recruitment. 1998 Annual report to Bonneville Power Administration. Project 88-65. Idaho Department of Fish and Game, Boise, Idaho.

Dunnigan, James. October 2003. MFWP. Personal communication.

Dunnigan, James. November 2003. MFWP. Personal communication.

French, Vicki. March 10, 2005. Lincoln County Courthouse. Personal communication.

Griswold, R.G., D. Taki, J.G. Stockner. 2003. Redfish Lake Sockeye Salmon: Nutrient Supplementation as a means of restoration. *In:* J. Stockner (ed). Nutrients in Salmonid Ecosystems: Sustaining Production and Biodiversity. American Fisheries Society Symposium 34:197-211.

Hardy, R.S. 2003. Kootenai River fisheries recovery investigations: ecosystem rehabilitation. Annual progress report to Bonneville Power Administration, April 1, 2002-March 31, 2003. Project 1988-06500. Report Number 04-01. Idaho Department of Fish and Game, Boise, Idaho.

Hardy, R.S., and C. Holderman. 2004. Kootenai River Fisheries Investigations: Ecosystem Rehabilitation Project; Nutrient Restoration Work Plan.

Hardy, R.S., C. Holderman, and J.P. Walters. 2005. Biological assessment for proposed nutrient restoration of the Kootenai River, Idaho. Prepared and submitted in compliance with NEPA documentation for the Bonneville Power Administration.

Holderman, Charles. February 4, 2005. KTOI, personal communication.

Holderman, Charles E., and Ryan Hardy, Editors. June 2004. Kootenai River Ecosystem Project: An Ecosystem Approach To Evaluate And Rehabilitate A Degraded, Large Riverine Ecosystem. Final Report to BPA. Portland, Oregon. Project Number 1994-049-00.

Hoyle, Genevieve. February 2005. Kootenai River Fertilization Water Quality Monitoring Proposal for 2005. Prepared for the KTOI Ecosystem Project.

Idaho Conservation Data Center. Accessed March 18, 2005. Available at: http://fishandgame.idaho.gov/wildlife/nongame/specialspecies.cfm#fish.

Ives, Ryan. March 2005. Cultural Resources Survey of the Bonneville Power Administration's Kootenai River Nutrient Dosing Project, Lincoln County, Montana.

Kasworm, Wayne. December 3, 2004. USFWS, personal communication.

Knudson, K. 1993. Water Quality Status Report, Kootenay River Basin, British Columbia, Montana and Idaho. The Kootenai River Network.

Kuennen, Lou. March 12, 2005. E-mail to Ryan Hardy regarding soil types. Personal Communication.

Larkin, G.A., G. Wilson, K.I. Ashley, P.A. Slaney, R.W. Land, and S. Biancolin. 1999. Development of a premier northern river fishery: Mesilinka River, the fourth year of fertilization Fisheries Project Report No. RD 70. Province of British Columbia Ministry of Fisheries.

Laudon, Kent. December 13, 2004. USFWS, personal communication.

Lincoln County Web Site. Accessed March 18, 2005. Burning Permits. Available at: http://www.lincolncountymt.us/fire_co-op.htm.

Mech, L.D. 1970. The Wolf: the ecology and behavior of an endangered species. Doubleday, New York, N.Y. 389 pp.

Mincemoyer, Scott. December 5, 2004. USFS, personal communication.

Mosely, R and C Murphy. 2002. Ute Ladies Tresses in Idaho: 1999 and 2000 Status Report. BLM Technical Bulletin no. 02-1.

Paragamian, V.L. December 5, 2004. IDFG, personal communication.

Paragamian, V.L. January 2, 2005. Personal communication.

Paragamian, V. L., V. Whitman, J. Hammond, and H. Andrusak. 2000. Collapse of the burbot fisheries in Kootenay Lake, British Columbia, Canada, and the Kootenai River, Idaho, USA, post-Libby Dam. Pages 155-164 *in* V. L. Paragamian and D. W. Willis, editors. Burbot: biology, ecology, and management. American

Fisheries Society, Fisheries Management Section, Publication Number 1, Bethesda, Maryland.

Partridge, F. 1983. Kootenai River Fisheries Investigations. Idaho Department of Fish and Game. Completion Report. Boise, ID.

Petersen, R.O. 1977. Wolf ecology and prey relationships on Isle Royale. United States National Park Service Fauna Service 11, Washington, D.C. 210 pp.

Peterson, J.P., L. Deegan, J. Helfrish, J.E. Hobbie, M. Hullar, B. Moller, and others. 1993. Biological responses of a tundra river to fertilization. Ecology. 74: 653-672.

Robinson, Scott. November 22, 2004. Bureau of Land Management, personal communication.

Ryan, Jeff. January 2004. MDEQ, personal communication.

Scholz, Allen and 9 co-authors. 1985. Compilation of information on salmon and steelhead total run size, catch and hydropower related to losses on the Upper Columbia River Basin, above Coulee Dam. Fisheries Tech. Report No. 2. UCUT fish. Centre. Eastern Washington Univ., Cheney, WA.

Snyder, E.B., and G.W. Minshall. 1996. Ecosystem metabolism and nutrient dynamics in the Kootenai River in relation to impoundment and flow enhancement for fisheries management. Final Report. Stream Ecology Center, Idaho State University, Pocatello, Idaho.

Stalmaster, M V. 1987. The bald eagle. Universe Books, New York; 238p.

U.S. Army Corps of Engineers. 1987. Corps of Engineers Wetlands Delineation Manual.

U. S. Department of Agriculture, Forest Service. 1987. Kootenai National Forest Plan Final Environmental Impact Statement.

U. S. Department of Agriculture, Forest Service. 1995. Soil Survey of the Kootenai National Forest Area, Montana and Idaho.

U. S. Department of Agriculture, Forest Service. 2002. Final Environmental Impact Statement: Forest Plan Amendments for Motorized Access Management within the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones.

U.S. Department of the Interior, Fish and Wildlife Service. 1975. Endangered and Threatened Wildlife and Plants; Amendment Listing the Grizzly Bear of the 48 Conterminous States as a Threatened Species; 40 FR 31734, 31736 (July 28, 1975).

U.S. Department of the Interior, Fish and Wildlife Service. 1978. Endangered and Threatened Wildlife and Plants; Reclassification of the Gray Wolf in the U.S. and Mexico with Determination of Critical Habitat in Michigan and Minnesota, 43 Fed. Reg. 9607, 9615 (March 9, 1978).

U.S. Department of the Interior, Fish and Wildlife Service. 1995. Grizzly Bear, Wildlife Species Information: U.S. Fish and Wildlife Service, available at http://species.fws.gov.bio_griz.html.

U.S. Department of the Interior, Fish and Wildlife Service, Snake River Basin Office. 1997. Threatened, Endangered, Candidate, and Species of Concern: Biological Information and Guidance.

U. S. Department of the Interior, Fish and Wildlife Service. 1999. Recovery Plan for White Sturgeon (Acipenser transmontanus): Kootenai River Population. U. S. Fish and Wildlife Service, Portland Oregon. 96 pp. plus appendices.

U.S. Department of the Interior, Fish and Wildlife Service. 2003. Endangered and Threatened Wildlife and Plants; Final Rule to Reclassify and Remove the Gray Wolf From the List of Endangered and Threatened Wildlife in Portions of the Conterminous United States; Establishment of Two Special Regulations for Threatened Gray Wolves, 50 C.F.R. pt. 17 (2003).

U.S. Department of the Interior, Fish and Wildlife Service. October 21, 2004. Letter to BPA-Species List.

Wakkinen, Wayne. December 3, 2004. IDFG, personal communication.

Walters, J. P. 2002. Kootenai River fisheries investigations: rainbow and bull trout recruitment. Annual progress report to Bonneville Power Administration, April 1, 2000-March 31, 2001. Project 1988-06500. Idaho Department of Fish and Game, Boise, Idaho.

Walters, J. P. 2003. Kootenai River fisheries investigations: rainbow and bull trout recruitment. Annual progress report to Bonneville Power Administration, April 1, 2001-March 31, 2002. Project 1988-06500. Idaho Department of Fish and Game, Boise, Idaho.

Walters, J. P. 2004. Kootenai River fisheries investigations: rainbow and bull trout recruitment. Annual progress report to Bonneville Power Administration, April 1, 2002-March 31, 2003. Project 1988-06500. Idaho Department of Fish and Game, Boise, Idaho.

Walters, J. P., and C. C. Downs. 2001. Kootenai River fisheries investigations: rainbow and bull trout recruitment. 1999 Annual report to Bonneville Power Administration. Project 1988-06500. Idaho Department of Fish and Game, Boise, Idaho.

Williams, Dan. February 28, 2005. Lincoln County Weed Department. Personal communication.

Wilson, G., K. Ashley, E. Standen, S. Mouldey Ewing, P. Slaney and R. Land. 1999a. Development of a Resident Trout Fishery on the Adam River Through Increased Habitat Productivity: Final Report of the 1992-97 Project. Fisheries Project Report No. RD 68. Province of British Columbia, Ministry of Fisheries.

Wilson, G., K. Ashley, S. M. Ewing, P. Slaney, R.W. Land. 1999b. Development of a premier river fishery: the Big Silver Creek Fertilization Experiment, 1993-1997.

Final project report. Fishery Project Report No. RD 69. Province of British Columbia Ministry of Fisheries Research and Development Section.