REVISED DRAFT

ENVIRONMENTAL ASSESSMENT

CLEARWATER FISH BARRIER MODIFICATION/REMOVAL

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REVISED DRAFT
ENVIRONMENTAL ASSESSMENT

CLEARWATER FISH BARRIER MODIFICATION/REMOVAL

Note: This *Revised* Draft Environmental Assessment (EA) on the modification of the Clearwater Fish Barrier has been revised as of September 2009, primarily to clarify a technical aspect of alternative 3A. The original Draft EA was issued in January 2009. This clarification indicates that the weir crest elevation of the preferred alternative full height rock step channel will be the same as the exiting log structure weir crest elevation. The changes are primarily editorial in nature and do not substantially affect the environmental impacts of alternative 3A or any of the other alternatives.

1.0 PURPOSE AND NEED FOR ACTION

The Montana Department of Fish Wildlife and Parks (FWP) and the Montana Department of Natural Resources and Conservation (DNRC) have identified several issues with the Lake Inez Fish Barrier that have resulted in this Environmental Assessment under the Montana Environmental Policy Act (MEPA). A previous engineering study (Hydrometrics, 1996) found that the existing timber weir structure was deteriorating and had an estimated remaining life of ten to twenty years. Recent fisheries studies have documented that the fish barrier restricts migration of bull trout (*Salvelinus confluentus*; a species classified as Threatened under the Endangered Species Act) and several other desirable fish species.

1.1 PROPOSED ACTION

Montana Fish, Wildlife and Parks (FWP) proposes to reconstruct or remove a fish barrier and earthen dike constructed along the Clearwater River in 1964. The integrity of the fish barrier has diminished over time.

1.2 LOCATION AND SETTING

The Clearwater Fish Barrier is located approximately two and one-half miles north of Seeley Lake and two miles south of Lake Inez in Missoula County, Montana (Figure 1-1) in the southwest ¼ of Section 8, Township 17 North, Range 15 West (P.M.M.). The fish barrier itself consists of two principal components, an earthen berm approximately 350 feet long constructed transversely across the floodplain that constricts flow to the left (east) side of the floodplain and a timber crib weir that serves as a spillway. The weir has a vertical drop and plunge pool to prevent unwanted fish species from migrating upstream. For purposes of this document, the terms "berm" and "weir" refer to these components and the term "fish barrier" refers to the entire facility. The fish barrier is situated on the main channel of the Clearwater river, and may be referred to as the lake Inez fish barrier. The coordinates of the project site are latitude 47° 14' 37" north, longitude -113° 32' 34" west (NAD83/WGS84). The timber and earth structure was built in 1964 by FWP to act as fish barrier on the Clearwater River between Seeley and Inez lakes. Surrounding land is privately owned and a large house/lodge structure is located immediately adjacent to the fish barrier site (Figure 1-2). Land use in the immediate vicinity includes the owner's residential/recreational building, forest land with some timber production and wildlife habitat. Montana highway 83 is located approximately one quarter mile east of the dam.

1.3 NEED FOR ACTION

Although the Clearwater Inez Fish Barrier was constructed to restrict upstream migration of some introduced fish species, its restriction of bull trout, westslope cutthroat trout and other native species is not desirable. Recent fisheries studies (Ladd Knotek, FWP, personal communication or FWP, unpublished data) have documented bull trout and westslope cutthroat trout congregations at the base of the fish barrier during migration periods. Restriction of fish, including bull trout, from their native spawning habitats has contributed to population decline. In the last two years FWP has been manually transporting migrating bull trout over the barrier in the fall of the year. This process is costly, risks injury to migrating

FIGURE 1-1. SITE LOCATION MAP

FIGURE 1-2. SITE OVERVIEW

fish and inefficient (not all spawning fish are likely to be captured and successfully transferred upstream).

Periodic inspections of the fish barrier have identified deterioration of the timber components as a problem that will eventually result in loss of structural integrity of the timber weir structure. In 2006 DNRC (Fullerton, 2006) indicated that: "The structure is approaching the end of its design life and further piecemeal repair is no longer an effective use of capital." In 2007 DNRC reported that: "The timber weir has deteriorated substantially." and "Although there is no reason to believe that wall failure is eminent decisions about repair or removal options need to be made soon." (Fullerton, 2007).

Following inspection in 2007, recommendation was made to remove or replace the Lake Inez fish barrier at some future date. It is not practical to fix the timber weir structure of the fish barrier as the condition has deteriorated leaving decayed support piles, decayed logs at the water line, and excessive wall deflection (Fullerton, 2007).

1.4 OBJECTIVES OF THE ACTION

1.4.1 Objective 1

A primary objective of the Clearwater Fish Barrier removal is to re-establish fish passage for bull trout, westslope cutthroat trout and other desirable species. Although the barrier was originally installed to restrict passage of certain undesirable, introduced species from Seeley Lake to Inez Lake (e.g., yellow perch), restriction of upstream passage for these species is no longer a concern because they have been introduced upstream of the fish barrier since construction. Northern pike (*Esox lucius*) were also introduced in the Clearwater drainage since construction of the fish barrier (~1990s). Inhibiting further expansion of this species is a primary management objective, but it is also found upstream of the structure in low densities. If restriction of pike can be accomplished while allowing upstream passage for bull trout and other desirable species, the project would meet the primary fisheries objectives established by FWP fisheries personnel.

1.4.2 Objective 2

Another major objective is to terminate FWP's easement for the fish barrier and eliminate or reduce future maintenance and potential liability. FWP and Montana Department of Natural Resources and Conservation (DNRC) have expended resources evaluating the structural stability of the fish barrier, studying the impacts to the fishery and actively transporting bull trout around the barrier during the migration season. DNRC performs an annual engineering inspection of the structure.

In addition to these indirect costs, maintenance of the fish barrier structure requires periodic engineering and contract costs to repair or replace. Any replacement structure, such as those described in the alternatives presented in Section 2 of this EA would also have periodic maintenance and replacement costs. Minimizing the long-term capital and maintenance costs is one of FWP's objectives.

Alternatives 1, 2, 3A and 3B would maintain a structure at the site. Under these alternatives, FWP would make an agreement with the landowner that would transfer liability and ownership for these structures to the landowner. In addition, the agreement would require that the structure built would continue to provide passage for fishes that the constructed structure originally intended. Any modification to the structure that would provide or hinder passage because of changes to FWP management objectives would be subject to other, future agreements with the landowner.

The current condition and ongoing deterioration of the timber weir structure increases the risk of some level of structural failure. A large number of failure modes are possible. Perhaps the most likely considering the condition of the timber structure is that seepage through the adjoining wing walls may produce piping of material (from the abutments or the stilling basin) that undermines the structural integrity of the timber weir structure. This ultimately could lead to its collapse with a resulting flood discharge wave downstream.

1.5 DECISION(S) TO BE MADE

Decisions to be made related to the Clearwater Fish Barrier and the alternatives described in this Environmental Assessment include what action is to be taken to attempt to meet FWP objectives. The alternatives analyzed offer a wide range in both the extent to which FWP objectives are addressed and in implementation costs and risks. Therefore the decisions to be made including which alternative should be selected and how to fund and implement the preferred alternative require a weighing of costs, risks, benefits and environmental impacts.

1.6 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT

This Environmental Assessment (EA) examines potential effects to the human and physical environment from removal or replacement of the fish barrier. The EA includes a comparison of engineering and environmental aspects of various alternatives for achieving the primary action objectives. This analysis will assist FWP in determining the appropriate action for repair or removal of the fish barrier.

1.6.1 Planning and Scoping Process

Scoping for this environmental Assessment included input from FWP personnel in Missoula and Helena, input from DNRC dam engineering staff, consultation with USDA Forest Service Seeley Ranger District and consultation with Seeley Lake Water District. The landowners (Bill and Patricia Cruz) provided input into the future nature of the fish barrier structure on their property.

FWP and DNRC have been evaluating options of what to do about the Clearwater Fish Barrier structure since the early 1990s. Hydrometrics (1996) reported that at the time of their engineering evaluation FWP had earmarked some funds for rehabilitation of the Clearwater structure. Apparently, following the detailed analysis of alternatives and estimation of costs in 1996, no further action was taken. Subsequent to 1996, DNRC has made annual inspections of the Clearwater barrier and recent inspection reports (see section 1.2; Fullerton, 2006; Fullerton, 2007) have indicated a growing need to rehabilitate or replace the current wooden structure. FWP has also identified the barrier's effects on eliminating upstream

migration of bull trout and other species as a major impact to the fishery in the Clearwater drainage.

1.6.2 Issues Identified for Analysis

The following issues have been identified through the scoping process as requiring analysis under the Montana Environmental Policy Act (MEPA) process.

1.6.2.1 Vegetation / Wetlands

Fish barrier modification or removal could lower water elevation upstream of the structure, resulting in transition from a broad riparian, wetland-dominated system to that of a drier upland vegetative community along a narrower riparian drainage. Construction operations related to modification or removal of the fish barrier could have impacts to riparian and wetland habitat and potentially affect any threatened, endangered or sensitive plant species in the affected area.

Construction operations and lower water levels associated with fish barrier modification or removal could result in exposed soil and site conditions vulnerable to invasion by undesirable invasive plant species.

1.6.2.2 Water Quality

Construction, repair and fish barrier removal could have significant short-term water quality effects during and following construction due to release of sediments accumulated behind the fish barrier and the potential for significant increases in turbidity and sediment mobility. There is also the potential for construction activities to result in the release of cement, hydrocarbons or other construction related materials directly into the stream in the event of equipment malfunction or fuel spillage. The community of Seeley Lake takes its water supply from the Lake and a water quality impact that affected the public water supply would have a significant effect on the approximately 720 customers serviced by the water district.

1.6.2.3 Fisheries

Recovery of bull trout, preservation of westslope cutthroat and maintenance of a productive sport fishery are primary objectives of FWP's fisheries management in the Clearwater drainage. Removal or modification of the fish barrier would restore upstream fish passage to previously inaccessible habitat. Construction operations and removal of the fish barrier could have short-term impacts on local and downstream aquatic communities and potential long-term impacts on some species.

1.6.2.4 Wildlife

Fish barrier removal or lowering of the weir crest and subsequent lowering of the water table resulting in loss of wetland vegetation could affect species diversity and distribution in the immediate area. Construction operations and removal of the fish barrier could have short-term impacts to riparian habitat and transient populations of threatened species that travel through the study area. Bald eagles and other sensitive species utilize the Clearwater River riparian area.

1.6.2.5 Recreation

Removal of the fish barrier could affect recreation in the area in terms of fishing and boating by opening the river to greater floating access. Although the stream is narrow and may be blocked by downed trees, removal of the fish barrier would theoretically allow river access from Lake Inez to the USFS Canoe Trailhead (upstream of Seeley Lake) and down to Seeley Lake.

1.6.2.6 Land Use / Landowner Issues

The view from the landowner's residence would be changed by implementation of each of the action alternatives. Aesthetics, perceived values and actual land values may be changed if the open water and wetlands behind the barrier were converted back to the more common riparian zone vegetation that likely occurred prior to construction of the fish barrier. The landowner has indicated a preference for maintaining the water level behind the fish barrier at its present level and maintaining or increasing the amount of open water.

The U.S. Forest Service holds a conservation easement (established 1982) on approximately 158 acres including the fish barrier and upstream wetlands. Changing configuration of the fish barrier which could affect the area of wetlands and/or the wetland functions and values would potentially impact the conservation values intended by the easement, although the easement does not specifically address the wetland characteristics.

The site currently has no over-land public access and none is contemplated.

1.6.2.7 Engineering Considerations and Stability

The deteriorating condition of the current structure and the FWP objective of reducing potential long-term liabilities and maintaining desired fish passage focuses attention on design of a structure that is stable, has a long design life and will interact with natural forces in such a way that potential for environmental impacts and liability issues are minimized.

1.6.3 Issues Not Considered Potentially Significant and Eliminated from Further Study

1.6.3.1 Air Quality

The potential for air quality concern from dust generated by construction activities associated with removal or modification of the fish barrier and dust generated following construction originating from areas of exposed soil. However, most earth materials that would be disturbed by construction activities are expected to be moist and area not anticipated to create significant amounts of airborne particulate matter.

1.6.3.2 Soil / Land Resources

No significant effects to surrounding land use or productivity are anticipated. Some short-term effects may be encountered associated with construction activities, including haul roads, temporary storage, and materials disposal. However, these effects are relatively isolated and small scale. Erosion control measures and prompt reclamation of disturbed areas would mitigate potential harmful effects.

1.6.3.3 Cultural / Historical Resources

Construction activities associated with removal or modification of the fish barrier could potentially impact cultural resources, if any were present. In a letter to FWP dated January 7, 2008, the State Historic Preservation Office (SHPO) indicated that the fish barrier itself does not qualify as a historic structure and that the project has a low likelihood of impacting cultural properties and that a cultural resources inventory is not warranted. SHPO also notes that if cultural materials are discovered during this project, they should immediately be notified.

1.7 APPLICABLE PERMITS, LICENSES, AND OTHER CONSULTATION REQUIREMENTS

1.7.1 Permits

1.7.1.1 Section 404 of the Clean Water Act

The US Army Corps of Engineers (USACE) has the authority to regulate wetlands and other "Waters of the US" under Section 404 of the Clean Water Act (CWA). A permit is required for dredging and placement of fill or excavation in conjunction with placement of fill in jurisdictional Waters of the US. A 404 permit from the USACE would be required for work in the channel and wetlands at the Clearwater Fish Barrier.

1.7.1.2 Montana Stream Protection Act (SPA 124)

The Montana Division of Fish, Wildlife and Parks (FWP) administers permitting of federal, state or local government entities for projects that may affect the natural existing shape and form of any stream or its banks or tributaries. A 124 permit would be required from FWP for the construction activities associated with any of the action alternatives.

1.7.1.3 Montana Temporary Turbidity Waiver (318)

Montana's water quality laws (MCA 75-5-318) require specific authorization of activities that would result in temporary increase in turbidity above standards. Department of

Environmental Quality or FWP would need to authorize a temporary turbidity waiver for the construction activities associated with any of the action alternatives.

1.7.2 Coordination and Consultation

1.7.2.1 State Historic Preservation Office Consultation

State agencies in Montana are required to consult with the State Historical Preservation Office (SHPO) by rules developed under the *Montana State Antiquities Act* (MCA 22-3-421 to 442) and MEPA (MCA 75, Ch. 1, part 2), concerning the identification and preservation of Heritage Properties.

1.7.2.2 Conservation Easement – Held by USFS

The USFS holds a conservation easement on the property including the fish barrier structure and wetlands. FWP consulted with USFS Lolo National Forest Seeley Ranger District on the alternatives and issues related to the fish barrier repair, removal and potential impacts to the associated wetlands and fishery.

1.7.2.3 Landowner Consultation

FWP holds an easement that allowed the construction, maintenance and repair of the fish barrier. FWP consulted with the landowner regarding the landowner's concerns and preferences related to fish barrier repair, removal and associated impacts.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 INTRODUCTION

A previous study (Hydrometrics, 1996) and agency scoping identified four alternatives for detailed analysis. These include a no action alternative, a timber weir repair alternative, an outlet modification (rock drop structure) alternative and an alternative that would entirely remove the fish barrier and restore a channel to natural grade. Each alternative would result in a different degree of modification to the existing fish barrier structure. These alternatives address the Department's Objectives (Section 1.4) to different degrees; but provide a reasonable range of alternatives for the Montana Environmental Policy Act (MEPA) review. This section provides a description of the alternatives considered and estimated costs for implementation of alternatives considered in detail.

2.2 DESCRIPTION OF ALTERNATIVES

2.2.1 Alternative 1 (No Action) – Leave Existing Structure in Place

The no-action alternative would result in the existing earthen berm and timber weir structure staying in place without modification. The integrity of the wooden structure would continue to decline as the existing logs, timber and cable deteriorate. Fish including bull trout and cutthroat trout would continue to be barred from passing upstream without intervention. Sediment would continue to accumulate behind the fish barrier.

2.2.2 Alternative 2 - Replace Existing Timber Weir Structure with Concrete Weir Structure

Replacement of the existing structure would entail removal of the existing logs and cables. This alternative would be accomplished by first creating a temporary berm upstream of the existing fish barrier that would divert water around the construction (Figure 2-1). Some additional pumping to dewater the stilling basin and the local area immediately around the weir structure would also be necessary.

FIGURE 2-1. ALTERNATIVE 2 CONCRETE REPLACEMENT

The replacement weir structure would be an SCS type C concrete drop structure. This type of structure is well suited to this application due to its structural stability and ease of construction and similarity to the existing timber barrier in that it consists of a straight drop, a concrete lined stilling basin, baffle blocks, an end sill, sidewalls and wingwalls. This same type of structure was contemplated in previous investigations into fish barrier replacement alternatives (Hydrometrics, 1996).

Alternative 2 construction would require first creating a temporary berm upstream of the existing structure that would divert water into a CMP pipe (Figure 2-1). This would serve to temporarily dewater the area of the existing weir during its replacement. On completion of the construction, a fish passage bypass channel would be constructed to meet fish passage objectives and specifications.

The construction disturbance for this alternative would be significant. Access for concrete trucks and tracked equipment would need to be provided for both ends of the berm from the nearby Boy Scout Road.

Replacement with a concrete drop structure would result in a structure design life of 100 years. The upstream wetlands and stream channel would also remain essentially as they now exist. A fish-passage structure that allows passage of bull trout and other salmonids would be included in the project design to meet the Agency objective for fish passage.

Previous studies of wetlands upstream of the existing structure (PBS&J, 2007) concluded that impacts to wetlands could be minimized by maintaining the controlling elevation within one to two feet of the existing crest elevation. By iteratively examining designs with varying crest elevations and crest lengths, it was determined that a crest width of 45 feet (compared with 55 feet on the existing structure) and lowering the crest elevation by 1.5 feet would still be able to pass the expected flow of 1,500 cfs from the 100-year event (Kingery, 1994). This combination of lowering the crest elevation and slightly shortening the crest length minimizes both the impact to upstream wetlands and construction cost for the drop structure.

2.2.3 Alternative 3 - Replace Existing Structure with Rock Step Structure

Replacement of the existing timber weir structure with a rock lined channel would be a substantial design change from the existing condition, but would retain the existing berm. Rather than a weir with a vertical drop, the river would flow through a steep confined rock lined channel that includes several small steps consisting of rapids and resting pools that would allow migration of desirable fish species. This alternative is presented with two sub-alternatives that vary the length and amount of drop of the rock channel with corresponding effects on cost and impacts to existing wetlands.

This alternative would be accomplished by installing a temporary berm on the upstream face of the berm to isolate a portion of the berm. Next a channel would be excavated through a 'notch' in the isolated portion the existing earth berm to blend smoothly into the downstream channel. This elevation difference from the upstream pool to the downstream channel would be accommodated by a relatively steep rock lined channel with several short rock drops. The notch would also serve to make certain that natural channel processes did not cause river to migrate away from the rock-defined or reinforced channel onto unreinforced portions of the floodplain where it could cause extensive erosion. The notch in the middle of the earth berm would be designed so as to provide a seasonal constriction to high flows thereby seasonally inundating wetlands upstream of the berm.

Construction disturbance similar to Alternative 2 would be required. Replacement with a rock channel would result in a long design life. The upstream stream channel would also remain essentially as it now exists. The rock drops would be designed to control fish passage to allow passage of bull trout and other salmonids.

Two variations of this alternative have been considered – one (referred to as the Full Height Rock Step Channel) with a crest elevation the same as the existing structure and the other (referred to as the Low Rock Step Channel) that has a crest elevation approximately the same

as the reservoir floor just upstream of the existing berm. Both these alternatives are described in the following paragraphs.

2.2.3.1 Alternative 3A: Full Height Rock Step Channel

This alternative would consist of a rock step channel with a crest elevation essentially the same as the existing timber weir structure (**Figure 2-2**). This elevation maintains a water level that has a minimal impact on upgradient wetlands.

The rock step channel would consist of eight drops each with a drop of 1 foot (see **Figure 2-2**). Between the rock drops, a rock channel with a length of 20 feet and a slope of 0.0075 ft/ft would flow. Resting pools would be constructed at the base of each drop. The length of the rock drop structure is approximately 180 feet. For lower flows (up to about 200 cfs), this combination of length, slope and resting pools provides flow velocities of less than about 4 feet per second. This configuration allows for upstream trout migration (Powers and Osborne, 1985).

The rock channel would be constructed so as to be able to pass the predicted 100-year flow (1,530 cfs) safely. The channel would be constructed with a prominent thalweg in it. This would concentrate low flows in the thalweg area providing depth for migrating fish.

Following completion of the rock lined channel, the temporary upstream diversion berm would be removed and the berm replaced. The existing timber weir structure would also be demolished and removed to minimize any liability associated with leaving it in place. The gap in the left abutment caused by removal of the existing timber weir structure would also be backfilled and compacted to prevent possible channel migration to that area.

FIGURE 2-2. ALTERNATIVE 3A FULL HEIGHT ROCK CHANNEL

2.2.3.2 Alternative 3B: Low Height Rock Step Channel

This alternative (**Figure 2-3**) would consist of a rock drop whose crest is at the elevation of the reservoir pool floor just upstream of the existing berm. This essentially results in a rock drop structure with the least possible height without having to excavate the upstream reservoir pool area as well. This alternative would be smaller and consequently less costly to construct than alternative 3A, but would lower the upstream water level to a greater extent resulting in greater impacts on upstream wetlands.

The low height rock step channel would consist of four rock drops of approximately totaling about 3.4 feet connected by a 20-foot long channel with a grade of 0.75% (see **Figure 2-3**). The overall length of the channel would be approximately 100 feet. A resting/stilling pool would be created at the base of each drop and runs between resting/stilling pools would be no longer than 30 feet. For flows up to about 200 cfs, maximum water velocities in the rock channel would not exceed 4 feet per second. During flows of 200 cfs or more, water velocities in the rock channel may preclude upstream fish migration.

The length of the rock drop chute is such that it would not run all the way to the existing channel. Consequently a short (100 feet) section of natural channel would be constructed to convey water from the downstream end of the rock chute to the existing downstream channel.

The rock channel would be constructed so as to be able to pass the predicted 100-year flow (1,530 cfs) safely. The channel would be constructed with a prominent thalweg in it to provide adequate depth for migrating fish.

Following completion of the rock lined channel, the temporary upstream diversion berm would be removed and the berm replaced. The existing timber weir structure would also be demolished and removed to minimize any liability associated with leaving it in place. The gap in the left abutment caused by removal of the existing timber weir structure would also be backfilled and compacted to prevent possible channel migration to that area.

FIGURE 2-3. ALTERNATIVE 3B LOW HEIGHT ROCK CHANNEL

2.2.4 Alternative 4 - Remove Existing Structure, Breach the Berm and Reconstruct Channel at Natural Grade

This alternative would remove the existing timber weir and berm and reestablish a channel connecting the existing up and downstream channels at a similar grade to the preexisting channel (**Figure 2-4**). The new channel would be designed with a floodplain and hydrologic features (riffles, runs, glides and pools) to mimic the natural form and function of the stream prior to installation of the fish barrier. The existing weir structure would be removed, but a significant portion of the berm would remain in place.

Sediment control and control of stream turbidity would require a significant effort to limit impacts of the new channel construction and other disturbance to the accumulated fine grained sediment behind the existing fish barrier.

Alternative 4 construction would require a temporary CMP outlet and lowering the pool elevation. Then a diversion berm would be built at a location 700 to 1,000 feet upstream from the fish barrier to route inflows to the left abutment. This would dewater the right (west) portion of the impoundment area allowing a natural channel to be rebuilt in the vestiges of the old channel that survives there (see **Figure 2-4**). The new channel would have a grade of approximately 0.4% to 0.6%, similar to the natural channel grade upstream and downstream from the project site. The replacement channel plan would generally occupy what appears to be the location where the channel was located prior to the fish barrier being constructed. The channel would be lined with stream-size gravel and cobbles and that other habitat features such as root wads and large woody debris would also be incorporated. It is also possible to include one to three rock drop structures in the replacement channel to serve as impediments to upstream migration of some fish species (primarily northern pike). It is envisioned that the new channel would be somewhat narrow and incised particularly as it approaches the face of the existing berm; however, this is not inconsistent with the topography of the area. The alternative to this is to excavate a broad floodplain onto which overbank flows from large flood events would spill. This would entail excavation of a large volume of sediments from the reservoir basin and removal of wetlands. The costs and

FIGURE 2-4. ALTERNATIVE 4 NATURAL CHANNEL

impacts of constructing a somewhat narrow, incised channel are smaller than those of excavating a broad flat floodplain.

This alternative would result in a general lowering of the water surface in the impoundment area by approximately seven to nine feet. Construction disturbance and landscape changes would be significantly greater with channel replacement in comparison with the other alternatives. The upstream wetlands would be altered and replaced with a streamside riparian zone. Removal of the existing weir structure and berm would likely eliminate the State of Montana's long-term liability for the site. Risk of increased sediment production during construction or in the following several years would be greater than for the other alternatives.

There is a significant quantity of fill material (2,900 cubic yards) that would be brought to the site for this alternative to create temporary berms during construction. This material would be removed and would require disposal on project completion. There is also a significant quantity of material that would be excavated from the existing berm that would likely require off-site disposal. This material would be acceptable for construction fill, but a specific disposal location would have to be determined in conjunction with contracting and construction of alternative 4.

2.3 ALTERNATIVES CONSIDERED BUT DISMISSED FROM FURTHER EVALUATION

A number of alternatives were identified during scoping and earlier engineering evaluations, but were dismissed from further consideration in this analysis. Primary reasons for dismissing options or alternatives are that they did not address FWP objectives (Section 1.4), were technologically or economically infeasible, or did not provide any environmental or engineering benefit compared to the alternatives carried forward. The alternatives considered but dismissed from further consideration are summarized in this section.

2.3.1 Repair of Existing Structure

Repair of the existing timber weir structure was evaluated by a 1996 engineering report (Hydrometrics, 1996). Repairing the existing timber weir structure would require a temporary berm upstream and dewatering as in Alternative 2. Once the area in the vicinity of existing timber weir structure has been dewatered, excavation behind the wing walls and end walls would take place to approximately the existing water level. Most of the horizontal logs that have been identified as needing replacement to date are above the existing water level. All of the horizontal logs and sidewall decking above the existing weir would be removed. The extent of required timber replacement may expand as condition of the weir structure is uncovered during construction.

On the stilling basin floor, pumps would be used to dewater the area under the floor for a detailed inspection. Voids under the floor would be filled using a pumped concrete grout. Missing floor blocks and stilling basin floor boards and end sill boards would be replaced. Upstream of the weir crest, a flexible membrane liner would be placed against the exposed headwalls and sidewalls and possibly the approach ramp to limit seepage through these faces.

When all the replacement actions have been completed the excavations adjacent to the sidewalls and wingwalls would be backfilled and compacted. Deadmen and other anchor cables would be replaced as this occurs. However, it is probable that additional deteriorated structural components would be identified during construction and additional excavation and replacement beyond that identified by in 1996 engineering report would be required.

Repair would result in a longer structure life and reduced risk of short-term failure. The repair alternative would maintain the existing six-foot drop, which creates a fish barrier in the Clearwater River. The upstream wetlands and stream channel would also remain essentially as they now exist. The long-term liability for the site would remain unchanged. Since this alternative would not substantially address either of the FWP objectives, would have a shorter design life than a concrete replacement (alternative 2) and would not offer

significantly environmental or engineering improvements over Alternative 2 (replace with concrete) it was dropped from further consideration.

2.3.2 Replace Existing Structure with Sheet Pile Structure

Replacement of the existing timber weir structure with sheet piling was evaluated by Hydrometrics' 1996 engineering report (Hydrometrics, 1996). Replacement with sheet piling, although of lower cost than concrete, would have a shorter design life and would not offer significant environmental or engineering improvements over Alternative 2 (replace with concrete). Since a sheet pile replacement would not offer any substantial improvements over the concrete replacement structure and the trade off of lower cost would be counterbalanced with a shorter design life it was dropped from further consideration.

2.4 ESTIMATED COSTS FOR ALTERNATIVES

Table 2-1 lists estimated costs for each alternative. Alternative 3A is the lowest cost action alternative assuming no cost for wetlands replacement. If alternative 4 required construction of replacement wetlands, the costs for this alternative could be substantially greater than the other two alternatives depending on how much replacement wetland was required and the replacement cost (see section 2.4.1).

The estimated costs are based on the conceptual level designs developed by Hydrometrics (2008). Costs based on final design would reflect any significant design modifications. Cost estimates assumed that fill used for temporary berms, would be bought from a commercial source in Seeley Lake, trucked to the site, placed and any excess hauled off-site at completion of construction. It was assumed that the demolition debris from the timber structure would be hauled to a landfill in Missoula for disposal. If demolition debris is classified as hazardous waste, costs for hauling and disposing could be significantly higher. The cost of rip-rap is based on a quote from a local supplier.

TABLE 2-1. COMPARISON OF COSTS FOR CLEARWATER FISH BARRIER ALTERNATIVES

Alternative	Alternative Description	Estimated Cost (2008 Dollars)	Comments
Alternative 2	Replace with Concrete Structure	$560,000	
Alternative 3A	Replace with Full Height Rock Step Structure	$821,000	
Alternative 3B	Replace with Low Height Rock Step Structure	$477,000	Assumes no cost for 3 to 4 acres of wetland replacement
Alternative 4	Remove Existing Structure and Reconstruct Channel at Natural Grade	$751,000	Assumes no cost for approximately 9 acres of wetland replacement

Note: See Hydrometrics 2008 for additional detail on engineering design and costs

2.4.1 Replacement Wetlands

Alternative 3B would result in lowering the controlling hydrologic elevation upstream of the existing fish barrier by about 4 feet. This would eliminate the 3-acre open water pond and approximately three acres of primarily scrub-shrub wetland. Alternative 4 (removing the barrier and lowering the controlling hydrologic elevation upstream of the weir by seven to nine feet) would result in the loss of the 3-acre open water pond and approximately five acres of primarily scrub-shrub wetlands. Over time, drier site conditions under alternative 4 would result in the transition of approximately 9 acres of emergent wetlands to drier scrub-shrub wetland communities. Although these wetlands were artificially created as a result of the fish barrier construction, they have a variety of functions and values that would be modified or lost if the existing wetlands were replaced by riparian wetlands and upland scrub/shrub vegetation. If the lost wetlands were required to be replaced as a condition of a Corps of Engineers 404 permit there are a number of options that could be considered. Wetlands could be replaced on site by excavating a broad low elevation floodplain and maintaining scrub/shrub vegetation; other options include off-site replacement or obtaining credit from other FWP wetlands projects that have created a “wetland credit.” Since details of what, if

any, wetland mitigation are not known at the time of this analysis, costs for on-site replacement are estimated for consideration in weighing costs and benefits of the various alternatives.

2.5 PROPOSED ACTION/PREFERRED ALTERNATIVE

FWP has selected alternative 3A (the full height rock step channel) as the preferred alternative. Alternative 3A retains the initial intended function of the fish barrier of restricting upstream migration of introduced species such as pike, retains the existing wetland area and maintains the maximum area of open pond as requested by the landowner. In discussions with the landowner, FWP has indicated that they intend to negotiate an agreement defining maintenance responsibilities and liabilities between the two parties. FWP intends to pursue funding for alternative 3A and would initiate construction following funding approval.

3.0 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This section outlines existing conditions in the vicinity of the Clearwater fish barrier site. Documentation of existing conditions provides the basis for comparing potential impacts of the various alternatives. This discussion of existing conditions focuses on resources identified in scoping or potentially impacted by implementation of one of the alternatives.

3.2 DESCRIPTION OF RELEVANT AFFECTED RESOURCES

3.2.1 Vegetation / Wetlands

An evaluation of the Clearwater River Fish Barrier site conducted in 2006 (PBS&J, 2007) in the site area described wetlands occurring along both banks of the Clearwater River downstream of the fish barrier and earthen berm, wetlands associated with a remnant flood channel on the west side of the river, and wetland complex above the barrier.

Emergent wetland species are predominant in the wetland fringe downstream of the fish barrier along the banks of the Clearwater River where permanent or semi-permanent flooded zones exist. Species identified include red top (*Agrostis alba*), creeping spikerush (*Eleocharis palustris*), beaked sedge (*Carex utriculata*), tall manna grass (*Glyceria elata*), and three-stamen rush (*Juncus ensifolius*). The scrub/shrub habitat downstream of the dike is comprised of red-osier dogwood (*Cornus stolonifera*), Drummond willow (*Salix drummondiana*), and speckled alder (*Alnus incana*). These communities occur in seasonally flooded or saturated zones.

Permanently and semi-permanently flooded emergent marsh upstream of the barrier currently primarily supports broad-leaf cattail (*Typha latifolia*). Other herbaceous species observed in the marsh upstream of the barrier include small-fruit bulrush (*Scirpus microcarpus*), horsetail (*Equisetum arvense*), reed canary grass (*Phalaris arundinacea*), large leaf avens (*Geum macrophyllum*), and blue-joint reedgrass (*Calamagrostis canadensis*).

The scrub/shrub wetlands upstream of the barrier are comprised primarily of speckled alder, red-osier dogwood, Drummond willow, sandbar willow (*Salix exigua*), and Pacific willow (*Salix lasiandra*) (PBS&J, 2007).

The wetland complex identified above the fish barrier exceeds 20 acres. The complex is comprised of emergent marsh (9.0+ acres), scrub shrub (13.5 acres), and open water / aquatic bed habitats (3.0 acres). The overall wetland ranking based on the Montana Department of Transportation (MDT) Montana Wetland Field Evaluation for wetland functions of the existing wetland within the Clearwater River fish barrier study area was determined to be Category I, the highest overall ranking a wetland can receive. However, this wetland is artificially created and maintained by the fish barrier.

No Threatened or Endangered vegetative species have been identified within Township 17 N, Range 15 W (Montana Natural Heritage Program, 2008).

3.2.2 Water Resources

The Clearwater River originates about 10 miles north of the Fish Barrier at Clearwater Lake and flows in a generally southerly direction to where it meets the Blackfoot River about 20 miles to the south. The Inez Fish Barrier is located on the Clearwater River about 2 miles downstream of Lake Inez and 2.5 miles upstream of Seeley Lake.

3.2.2.1 Water Quality and Quantity

The Clearwater Drainage upstream of the fish barrier has received relatively low impacts from human activities and has generally high quality water. A study in the early 1970s indicated some impacts from logging and other activities (Streebin et. al., 1973). The USGS collected water quality data for the Clearwater near Clearwater Junction (station #12339450) from 1995 to 1997. This data indicates the Clearwater River to be soft to moderately hard, calcium bicarbonate type water with low levels of nutrients and metals. A limited amount of similar water quality data is available from monitoring sites near Sawyer Creek a half-mile downstream from the Fish Barrier and other sites in the drainage.

The USGS also collected flow data on the Clearwater at the "near Clearwater" station (#12339450) from 1975 to 1992 plus 1997; this data indicates monthly average high flows in May to be greater than 1000 cubic feet per second (cfs) and late summer, fall and winter low flows to be less than 100 cfs (<10 cfs in 2006-207). The drainage area at station #12339450 is 345 square miles while the drainage area at the Clearwater Inez Fish Barrier is about 97 square miles. The 100-year return period flood at the fish barrier site was estimated at 1530 cfs by DNRC (Kingery, 1994).

3.2.2.2 Sediment

The Clearwater River in the vicinity of the barrier is characterized by a cobble/gravel substrate. Fine sediment has accumulated upstream of the barrier. PBS&J (2007) reported that stream banks within the study area appear to be mostly stable and well vegetated with emergent herbaceous species as well as various shrub species.

3.2.2.3 Seeley Lake Water District

The community of Seeley Lake public water supply is obtained from an intake located in Seeley Lake approximately one-third mile from the mouth of the river. The Seeley Lake Water District provides water to approximately 720 users in and around the community of Seeley Lake. Although this is a surface water intake, the Water District reports that there is rarely a problem with turbidity or color in the water, even during high flows (Vincent Chappell, personal communication, 2008).

3.2.3 Fisheries

The Clearwater drainage, including the chain of lakes, interspersed main stem river sections, and numerous tributaries, support a mixed fish community comprised of native and introduced species. Introduced species include historical introductions, (e.g., brown trout, brook trout, rainbow trout, largemouth bass), currently stocked sport species (e.g., Kokanee salmon) and illegally introduced fish such as northern pike, pumpkinseed sunfish, yellow perch and brook stickleback. Native fish species include bull trout, westslope cutthroat trout,

mountain whitefish, northern pikeminnow, longnose dace, peamouth, sculpin spp., longnose sucker, largescale sucker and redside shiner.

Fish distribution and primary sport species vary among lakes, rivers, and streams. Primary sport species in lakes include westslope cutthroat trout, kokanee, brown trout, northern pike, largemouth bass and yellow perch. The Clearwater River offers seasonal fishing opportunities, primarily for brown trout, rainbow trout, northern pike and spawning kokanee. Tributaries primarily support westslope cutthroat trout and brook trout fisheries.

Life history diversity is high among wild populations, particularly for native salmonids. Bull trout and westslope cutthroat trout stream-resident and migratory (adfluvial) populations exist throughout the drainage. Migratory forms are the most suppressed, in part because of fish passage obstructions. Most introduced fish species are concentrated in lake environments, but may use stream and river sections seasonally.

3.2.3.1 Existing Fish Populations

Fish community composition and fish species distribution are variable in the Clearwater watershed. This is due to past and current stocking practices, patterns of unauthorized introductions and geographic distribution of fish passage obstructions. In the fish barrier area, fish species composition is roughly the same upstream and downstream of the structure as confirmed by recent FWP sampling surveys (FWP, unpublished data 2007; L. Knotek personal communication, 2007; Berg 2003). The two exceptions appear to be northern pikeminnow and peamouth, which both occur only downstream of the fish barrier. However, the impact of the barrier is more pronounced for certain migratory species (particularly native salmonids), which rely on a migratory life history involving tributary streams and lakes. The fish barrier currently blocks the upstream spawning migration of these fish. Recent fisheries investigations have highlighted impacts of the fish barrier to adult migratory bull trout from Seeley Lake, which are attempting to return to the West Fork Clearwater River to spawn.

The fish barrier is also relevant for the distribution and relative abundance of northern pike. Seeley and Salmon Lakes (downstream of the structure) support high densities of unwanted northern pike, while densities in Lakes Alva and Inez (upstream of the structure) are relatively low. It is not known why northern pike populations have not thrived in Lakes Alva and Inez. However, the barrier may currently act as an impediment to continual movement from the abundant lower lake populations to Lakes Inez and Alva.

3.2.3.2 Sensitive, T&E Species

Threatened, endangered and sensitive fisheries species that may occur in the Clearwater River fish barrier study area include the bull trout (*Salvelinus confluentus*) and westslope cutthroat trout (*Oncorhynchus clarki lewisi*). Bull trout, listed as threatened by the USFWS (2008) under the ESA of 1973, occur both up and downstream of the fish barrier.

As mentioned above, adfluvial forms of this species are significantly impacted by the structure.

Westslope cutthroat trout have also been documented both up and downstream of the fish barrier. These populations include both wild (from tributaries) and stocked (lakes) fish that are found throughout the watershed. Again, the migratory (adfluvial) form is most affected by the fish barrier as they attempt to move upstream to access natal spawning tributaries. A 1960's reclamation effort including the construction of the fish barrier and chemical rehabilitation eliminated northern pikeminnows and peamouth in lakes upstream from the barrier. The westslope cutthroat trout population was enhanced by hatchery supplementation and lack of predation by or food competition with northern pikeminnows and peamouth (Berg, 1995 – 2002).

3.2.4 Wildlife

3.2.4.1 Wildlife Use

The Clearwater River valley in the vicinity of the fish barrier provides habitat for a variety of northern Rocky Mountain wildlife species. White-tail deer (*Odocoileus virginianus*), elk

(*Cervus canadensis*), moose (*Alces alces*), black bear (*Ursus americanus*), coyote (*Canis latrans*), beaver (*Castor canadensis*), mink (*Mustela vison*), otter (*Lontra canadensis*) and a variety of other smaller animals would utilize the riparian zone along the river. A variety of ducks, raptors and passerine birds would find foraging and nesting habitat in the channel, slack water and riparian habitats.

3.2.4.2 Sensitive, T&E Species

Threatened and endangered animal species that may occur in the Clearwater River fish barrier study area include: Grizzly Bear (*Ursus arctos*) and Canada Lynx (*Felis lynx*). Potential occurrence of Grizzly Bear and Canada Lynx would be transient in nature with use along the riparian zone or across the valley bottom (Montana Natural Heritage Program, 2008; USFWS, 2008).

Species of Concern that may occur in the study area include: Olive-sided Flycatcher (*Contopus cooperi*), Common Loon (*Gavia immer*), Bald Eagle (*Haliaeetus leucocephalus*; delisted as Threatened August 8, 2007), common at the site, and Gray Wolf (*Canis lupus*; initially delisted as Endangered March 28, 2008 and currently under review). Wildlife habitat changes would be minimal as a result of fish barrier removal or modification. Short-term interruption may occur during construction activities.

3.2.5 Recreation

The Clearwater drainage is intensively used for recreation. Seeley and Inez Lakes have numerous residential and cabin sites and are used for boating, fishing and site-seeing. The surrounding area has numerous roads and trails and is used for hiking, camping, hunting and other recreational activities. The Clearwater River between Seeley and Inez Lakes is used for fishing, floating and wildlife viewing. The Forest Service has established a “canoe trail” on the lower several miles of the Clearwater above Seeley Lake that includes a boat launch and a trail along the river. This facility receives significant use, particularly during the summer months as recreationists travel from the trailhead downstream to Seeley Lake. The reach of

river through the fish barrier site is mostly private land with limited public access and receives little boating/fishing/floating use.

3.2.6 Land Use / Landowner Issues

The land surrounding the fish barrier is privately owned and used for residential/recreational purposes. A private dwelling is located to the east of the fish barrier and overlooks the stream, pond and wetlands. There is also limited occasional timber harvest from the private land. The current fish barrier backs up water and creates a pond and supports the surrounding wetlands. These features are a focus of the immediate viewshed of the adjacent residence and along with the associated wildlife, a significant component of the connection with the "natural" environment that is associated with this private property.

The berm is also visible as a distinctly man-made feature in the landscape. Water falling over the weir is clearly audible from the west side of the house and the adjacent grounds. The landowner is concerned that changes to the fish barrier could affect their view, the aquatic habitat that they enjoy and their property values.

3.2.6.1 Conservation Easement

The fish barrier and wetlands upstream of the weir are included within a protective conservation easement that covers 158 acres. The stated purpose of the easement is "to protect the scenic, recreational, geological, wildlife, historic, cultural, and other similar values of Clearwater River and its immediate environments, and to prevent any developments that will tend to mar or detract from said values, . . ." The conservation easement is held by the Forest Service and restricts development on the parcel of land but allows some grazing and timber management activities.

3.2.6.2 Fish Barrier Easement

Montana Fish Wildlife and Parks also holds an easement covering about 17.6 acres that allows for construction, operation, maintenance, inspection and repair of the fish barrier and the flooded area. This easement was established in 1963 to allow construction of the fish barrier.

4.0 ENVIRONMENTAL CONSEQUENCES

Chapter 4 provides information to evaluate alternatives in relation to project objectives, effects on relevant resources, and unavoidable adverse effects.

4.1 INTRODUCTION

All of the action alternatives would include restoration of upstream fish passage. The fish passageways contemplated for alternatives 2 and 3 would be designed to allow passage of bull trout and other salmonids that are capable of jumping a foot or more in their upstream migration. The drops in the fish passageway structures would be designed to discourage upstream migration by northern pike. Weir and berm removal and replacement of an at-grade channel would provide access to upstream fish habitat for all aquatic species. Construction operations and removal of the fish barrier could have short-term impacts on the aquatic communities downstream of the fish barrier and on the wetland vegetation upstream of the fish barrier.

4.2 PREDICTED EFFECTS ON RELEVANT AFFECTED RESOURCES OF ALL ALTERNATIVES

4.2.1 Alternative 1 No Action – Leave Existing Structure in Place

Evaluation of impacts the No Action alternative of leaving the existing fish barrier in place assume that the structure continues to function as it currently does. Since the logs are significantly deteriorated and would eventually deteriorate to the point that the structure fails, a realistic evaluation of the No Action alternative is not complete without including the impacts of failure. A separate section (4.2.1.7) contains the discussion of continued deterioration and ultimate failure for this alternative. The other subsections for this alternative assume that the fish barrier remains in place.

4.2.1.1 <u>Vegetation / Wetlands</u>

Leaving the existing barrier structure in place with regular maintenance would result in gradual changes to the vegetation and wetlands upstream of the fish barrier. Over time, if the

structure were to remain in place, aggradation of sediment and plant debris behind the barrier would raise the surface elevation, with most of the impoundment area and adjacent wetland community becoming drier, ultimately forming an upland vegetative community with a narrower riparian fringe along the active stream channel.

4.2.1.2 Water Resources

Alternative 1 would have no impact on the current hydrologic regime. While the fish barrier remained in place there would be no significant water quality or flow impacts. The impoundment raises the stream elevation for a distance of about 1,500 feet above the weir, creating a pool and lower velocities. This affect to the surface water also results in a localized area of elevated groundwater that contributes to the support of the wetlands vegetation.

The impoundment currently results in a small amount of sediment removal from the stream, primarily during high flow events when it is essentially unnoticeable, which is deposited in the wetlands area behind the fish barrier.

4.2.1.3 Fisheries

The No Action alternative would continue to maintain a barrier to upstream fish migration. Migratory bull trout and other species would not have access from the lower river and Seeley Lake to headwaters spawning areas.

4.2.1.4 Wildlife

The No Action alternative would maintain existing habitat conditions and have no impact on wildlife.

4.2.1.5 Recreation

Alternative 1, No Action, would not change recreation access or opportunities. There would be no overland public access, but floaters could use the river and continue to have portage access around the fish barrier in accordance with the existing conservation easement.

4.2.1.6 Land Use / Landowner Issues

Under alternative 1 there would be no change in land use or significant effects to the landowner. The landowner would have the right, within the constraints of the existing conservation easement and laws governing this type of activity, to maintain or expand the open water area behind the fish barrier.

4.2.1.7 Engineering and Geotechnical Long-Term Disposition of Timber Structure

The existing timber weir structure has a number of deficiencies and its condition may be deteriorating at an accelerating rate (Fullerton, 2007). If left as is, the existing timber weir is subject to a higher risk of failure than would be the case for the other alternatives. Failure could occur as a result of a high runoff event but could also occur under more typical lower flow conditions. The failure could be a massive failure in which all or most of the structure is destroyed in a relatively short time (more likely in a high flow event failure) or it might amount to a failure of a major component (for example a sidewall) that does not lead immediately to a failure of the remainder of the structure. In this latter case, emergency measures to drain the reservoir and prevent failure of the remainder of the structure may be required.

If the existing weir structure did fail catastrophically, the initial effects would likely be short term flooding between the existing fish barrier and Seeley Lake. The crest of the existing weir is approximately ten feet higher than the channel just downstream. The volume of water that is stored in the existing impoundment is not known, but is small in relation to average stream flow. The bridge that is located just downstream would potentially be damaged or destroyed and other downstream structures within the floodplain could also be damaged.

Following an initial breach, additional impacts would also occur over time. As the stream cuts a new channel accumulated sediments above the fish barrier would likely be eroded by the increased energy of flows. Sediment would be deposited in and adjacent to the Clearwater River and in Seeley Lake. The extent of water quality impacts from failure or

partial failure of the fish barrier are difficult to predict, but increased turbidity reaching into Seeley Lake with possible impacts to the Seeley Lake water supply could occur.

4.2.2 Alternative 2 - Replace Existing Structure with Concrete Structure

4.2.2.1 Vegetation / Wetlands

As with alternative 1, alternative 2 would result in gradual changes to wetlands upstream of the barrier as the impoundment naturally fills with sediment and the adjacent wetland community becomes drier. This long-term trend would result in development of an upland vegetative community with a narrower riparian fringe on the active stream channel. During construction wetlands would be temporarily dewatered and there would likely be some consolidation of sediments and some short term impacts to wetland vegetation.

4.2.2.2 Water Resources

As under the No Action alternative, alternative 2 would result in little change to the existing hydrologic conditions. The existing fish barrier has essentially no storage in the short section of slack water and a small pond.

During removal of the timbers and construction, short term increases in sediment and turbidity would occur. Following placement of the concrete and completion of construction, water quality would return to pre-construction conditions.

4.2.2.3 Fisheries

The concrete structure and fish-passage proposed in alternative 2 would continue to prevent upstream movement of northern pike, but would allow westslope cutthroat trout and bull trout to migrate upstream of the barrier. Hatchery supplementation of lakes in the drainage would likely continue to supplement populations of desired fisheries in upstream lakes. Construction activities would need to be timed to avoid bull trout spawning to minimize impacts to bull trout.

4.2.2.4 Wildlife

Wildlife habitat changes would be minimal under alternative 2. Construction activities would temporarily disrupt wildlife usage.

4.2.2.5 Recreation

Alternative 2 would not change recreation access or opportunities. There would continue to be no overland public access, but floaters could use the river and continue to have portage access around the fish barrier in accordance with the existing conservation easement except during the construction activities.

4.2.2.6 Land Use / Landowner Issues

Alternative 2 would have no impacts on land use. The concrete replacement alternative would result in significant construction activity and potential short-term impacts to the landowner during construction (noise, equipment activity, interruption of solitude and wildlife viewing). Following replacement of the weir structure, there would be little difference between the concrete structure and the existing timber one. Visually the concrete structure would provide more color and form contrast and may be less aesthetically desirable than the existing timber structure.

4.2.2.7 Engineering and Geotechnical Considerations

This alternative would be designed to safely pass the 100-year flood event through the spillway while maintaining freeboard on the adjacent berm. The entire structure would be designed to be stable and not subject to failure due to flows from the 100-year event. This alternative will likely require some engineering inspection and maintenance over its lifetime to monitor seepage, concrete condition and other stability issues for the weir and the adjacent berm. If, for some reason the concrete weir structure were to fail, the consequences are likely to be similar to failure of the existing timber structure. That is, short term flooding and potential damage to structures near the stream and increased sediment load to Seeley Lake would potentially result from failure.

4.2.3 Alternative 3A - Replace Existing Structure with Full Height Rock Step Channel

4.2.3.1 Vegetation / Wetlands

A rock step channel designed to maintain the existing hydraulic conditions (Full Height) above the barrier would have little impact on vegetation or wetlands above or below the site. As for alternatives 1 and 2, the wetland community above the fish barrier would gradually change as sediment accumulates and raises the land elevation.

4.2.3.2 Water Resources

There would be little change to the hydraulic conditions above the fish barrier. The upstream channel and pool elevation would be maintained within at approximately the existing pool elevation. The 180-foot long rock channel would have a steep gradient of .044 ft/ft or about 4½ percent and would resemble a short rapid. The downstream plunge pool would no longer exist.

During removal of the timbers and construction, short term increases in sediment and turbidity would occur. Following placement of the rock channel section and completion of construction, water quality would return to pre-construction conditions.

4.2.3.3 Fisheries

Positive impacts to native fisheries may be realized with a rock step channel designed to allow passage of native species such as bull trout while restricting non-native species such as northern pike. Construction activities would need to be timed to avoid bull trout spawning to minimize impacts to bull trout.

4.2.3.4 Wildlife

Wildlife habitat changes would be minimal under alternative 3. Construction activities would temporarily disrupt wildlife usage of habitat in the immediate vicinity.

4.2.3.5 Recreation

As under alternatives 1 and 2, alternative 3A would not change recreation access or opportunities. There would continue to be no overland public access, but floaters could still use the river and would still continue to have to portage around the fish barrier. For a short period during the construction activities, floaters would be denied access.

4.2.3.6 Land Use / Landowner Issues

Alternative 3A would result in no significant changes to land use. The rock channel would occupy slightly more area than the existing weir drop structure. As for alternative 2 the rock channel alternative would result in significant construction activity and potential short-term impacts to the landowner during construction. The rock drop channel would be visually different than the existing timber weir with its vertical drop into the plunge pool. However, the pool above the fish barrier and wetlands would remain essentially unchanged.

4.2.3.7 Engineering and Geotechnical Considerations

This alternative would be designed to safely pass the 100-year flood event through the rock channel while maintaining freeboard on the adjacent berm. The entire channel and its components (rocks) would also be designed to be stable and not subject to failure due to flows from the 100-year event. This alternative will likely require some engineering inspection and maintenance over its lifetime to monitor berm seepage and other stability issues on the rock chute and on the adjacent berm. If, for some reason the channel or berm were to fail, the consequences are likely to be similar to failure of the existing timber weir. That is, short-term flooding and potential damage to structures near the stream and increased sediment load to Seeley Lake.

4.2.4 Alternative 3B - Replace Existing Structure with Low Height Rock Step Channel

4.2.4.1 Vegetation / Wetlands

The existing spillway crest elevation controls the water elevation for the immediate upstream wetland system. The Low Height Rock Step Structure would alter the controlling hydraulic elevation above the structure, reducing the extent of wetlands above the existing barrier. This

structure would lower the controlling hydrologic elevation by approximately four feet, converting the 3-acre open water pond to other wetland types and an estimated three acres of wetlands, primarily drier scrub-shrub wetland areas. Loss of wetlands is estimated at three to four acres. The reduction in wetland area would become evident as higher fringe areas of the existing wetlands contract with the lowered water levels. However, the upstream channel would remain in a similar configuration to the present thalweg and would develop a riparian wetland fringe similar to the natural condition. Project design would emphasize the return of riverine habitat conditions found in nearby undisturbed Clearwater River locations.

4.2.4.2 Water Resources

The upstream channel and pool elevation would be lowered by approximately four feet below the existing pool elevation. The 100-foot long rock channel would have a steep gradient of about 3.4 percent and would resemble a short rapid. Although there would be pools at the bottom of each drop structure, the large downstream plunge pool would on longer exist.

During removal of the timbers and construction, short term increases in sediment and turbidity would occur. Following placement of the rock channel section and completion of construction, water quality would return to pre-construction conditions.

4.2.4.3 Fisheries

Positive impacts to desirable fisheries may be realized with a rock step channel designed to allow passage of native species such as bull trout while restricting northern pike. Construction activities would need to be timed to avoid bull trout spawning to minimize impacts to bull trout.

4.2.4.4 Wildlife

Wildlife habitat changes would be minimal under alternative 3B. The reduction in wetland vegetation and reduced open water area above the weir would decrease availability and use of these habitats.

4.2.4.5 Recreation

As under alternatives 1 and 2, alternative 3B would not change recreation access or opportunities. There would continue to be no overland public access, but floaters could still use the river and would have to portage around the fish barrier location except for a short period during the construction activities when floating would be restricted.

4.2.4.6 Land Use / Landowner Issues

Alternative 3B would result in no significant changes to land use. The rock channel would occupy slightly more area than the existing weir drop structure. As for alternative 2, the rock channel alternative would result in significant construction activity and potential short-term impacts to the landowner during construction. The rock drop channel would be visually different than the existing timber weir and vertical drop into the plunge pool. Additionally, the pool above the fish barrier and emergent wetlands would no longer exist and the remaining wetlands would be reduced in size.

4.2.4.7 Alternative 3B Engineering and Geotechnical Considerations

This alternative would be designed to safely pass the 100-year flood event through the rock lined channel while maintaining freeboard on the adjacent berm. The entire channel and its components (rocks) would also be designed to be stable and not subject to failure due to flows from the 100-year event. If, for some reason the fish barrier were to fail, the consequences are likely to be minor in comparison to either of the full height alternatives (2 and 3A). Since the pool of stored water would be almost entirely eliminated with this alternative, there would be no initial flood wave and resulting damage to streamside structures or erosion of the bed and banks. Further, this alternative would allow the fine-grained sediments that have accumulated in the existing reservoir pool to be revegetated and thereby stabilized against erosion. If the rock chute were to fail for some reason, it is likely that less of the accumulated sediments would be eroded and carried downstream to the bed and banks of the Clearwater River or to Seeley Lake.

4.2.5 Alternative 4 - Remove Existing Structure, Breach the Berm and Reconstruct Channel at Natural Grade

4.2.5.1 Vegetation / Wetlands

The existing weir crest elevation controls the water elevation for the immediate upstream wetland system. Removing the existing fish barrier would lower the controlling hydrologic elevation by approximately 7 to 9 feet, approximating the historic channel elevation. This would impact the hydrology of wetlands upstream of the barrier. The impacts anticipated above the barrier would primarily be the loss of the three acre open water aquatic bed and nine acre emergent wetland communities. With lowered hydrologic elevation, the overall system would be expected to shift to a greater dominance of scrub-shrub communities adapted to saturation and occasional flooding, with patches of emergent and upland communities and little to no open water/aquatic bed communities outside of the river channel itself (PBS&J, 2007). Existing scrub-shrub communities that remained wetlands would likely remain scrub-shrub communities, although dominance may shift from obligate wetland shrubs to more facultative wetland shrubs (PBS&J, 2007). Consequently, the overall system may shift to a greater dominance of scrub-shrub communities adapted to saturation and occasional flooding. Following reestablishment of the floodplain and associated riparian vegetation the total loss of wetland would be up to approximately nine acres.

Few, if any, effects are anticipated on downstream vegetation, except in the area where re-routing of a new channel results in direct “footprint” impacts. Primary functions of the riparian/riverine wetland, such as production export, flood attenuation, sediment stabilization, and groundwater discharge would likely be maintained at substantial levels (PBS&J, 2007).

Swale/seep areas and the fen area discharging into the wetlands surrounding the barrier were likely present prior to barrier construction. Removal of the barrier would likely not alter these hydrologic sources to these adjacent wetlands (PBS&J, 2007).

4.2.5.2 Water Resources

Returning the channel to natural grade would significantly alter the hydraulic conditions compared to the existing impoundment pool, weir drop and plunge pool situation. The channel would have a gradient of approximately 0.3 percent and would simulate stream conditions prior to installation of the fish barrier. The upstream pool and slack channel would be eliminated, as would the drop and plunge pool. A series of meanders, riffles and shallow pools similar to the stream morphology both upstream and downstream would be constructed. The reconstructed channel would have to be armored where it is adjacent to the fine-grained sediments deposited behind the fish barrier.

Construction disturbance would be more extensive for alternative 4 than for the other action alternatives and construction related sediment release and turbidity would likely be greater and continue for a longer period. Particularly during the first few years following channel reconstruction and before establishment of riparian vegetation, the risk for more extensive erosion in the area of fine sediments upstream of the present fish barrier during a high flow event would be greater than for the other alternatives. Over the longer term, natural processes and channel migration would be expected to continually modify the reconstructed channel.

In the long-term following revegetation of the riparian zone with shrubs and trees, the natural grade channel would most closely simulate natural conditions. Shade provided by the riparian vegetation would help moderate water temperature. Water quality would be similar to existing conditions.

4.2.5.3 Fisheries

Fisheries habitat functions associated with the Clearwater River would be significantly improved with the restoration of up and downstream system connectivity upon removal of the fish barrier and return to natural grade. Disturbance of the stream channel during construction would likely create greater short-term sediment release and turbidity than with other alternatives. Fisheries would be at higher risk during the short-term from the release. Over the longer term, natural processes and channel migration would provide improved

habitat for native species through the stream reach now affected by the impoundment. Construction activities would need to be timed to avoid bull trout spawning to minimize impacts to bull trout.

4.2.5.4 Wildlife

Due to the conversion of wetland vegetation communities to drier and upland vegetation after removal of the fish barrier structure, the wetland system would be smaller, would not provide the slack-water pond habitat and would include fewer habitat niches for wetland-dependent species. Alternative 3B would reduce the area of open water and use by species utilizing the pond such as ducks. Return of the stream channel and riparian zone to more natural conditions would favor species that utilize those habitats.

4.2.5.5 Recreation

As under the other alternatives, there would be little change to recreation access or opportunities. There would continue to be no overland public access, but floaters could use the river without having to portage around the fish barrier. During the construction period floating access would have to be controlled.

4.2.5.6 Land Use / Landowner Issues

The natural channel reconstruction alternative would result in a small impact on land use by removing the weir and berm and replacing the pond/marsh wetlands with a stream channel and riparian zone. Alternative 4 would result in the greatest amount construction disturbance and a longer period of construction impacts to the landowner. Following replacement of the pond with a channel, the view from the owner's home and grounds would be substantially changed. Over a substantially shorter time than would have occurred if the fish barrier were left in place, natural forest regeneration would change the habitat to more closely resemble the native riparian zone. Wildlife viewing opportunities would change as the habitat changes.

4.2.5.7 Engineering and Geotechnical Considerations

The natural channel would be designed to convey a bank-full flow approximately equal to the 2-year peak flow. Additionally, an adjacent floodplain will be constructed so that the combined capacity of the channel and floodplain would transmit a much larger flow of at least the 100-year flood event. This alternative does not result in any pooled water behind a structure (as does alternatives 2 and 3A) so failure of this alternative would not produce an initial flood wave. Further, this alternative does not have any extra grade that, upon failure, might progressively headcut upstream and cause erosion of accumulated sediments (as does alternative 3B), so failure of this alternative is likely to result in less impact than other alternatives. "Failure" of this alternative would most likely take the form of lateral channel migration across the floodplain. Lateral channel migration is not unusual for natural channels. If the floodplain has sufficiently revegetated before lateral migration occurs, resulting erosion and downstream impacts to water quality are likely to be minimal. However, if an overbank flood event were to occur before the floodplain was sufficiently stabilized by revegetation, there could be significant quantities of accumulated sediments that are eroded and transported downstream.

4.3 PREDICTED ATTAINMENT OF PROJECT OBJECTIVES OF ALL ALTERNATIVES

4.3.1 Predicted Attainment of Fish Barrier Removal

4.3.1.1 Alternative 1 – No Action

The No Action alternative would not achieve the objective of removing the fish barrier and returning natural fish migration for native species. Leaving the fish barrier in place would not meet FWP's main objectives of allowing upstream passage of native fishes. Due to the continuing deterioration of the timber structure this alternative would result in increasing risk of failure.

4.3.1.2 Alternative 2 – Replace Existing Timber Weir with Concrete Weir

Alternative 2, by replacing the existing timber weir structure with a concrete structure, would partially achieve the objective of returning natural fish migration for native species. Under

this alternative a fish passageway would allow partial salmonid migration, but the ability of other native and desirable species such as mountain whitefish, sucker, redside shiner, peamouth, northern pikeminnow and kokanee may be inhibited.

4.3.1.3 Alternative 3A – Replace Existing Timber Weir with Full Height Rock Step Channel

Replacing the existing structure with a rock step channel designed specifically for salmonid migration would substantially achieve the objective of removing the fish barrier and returning natural fish migration for native salmonid species. However, under this alternative some species would be restricted from upstream migration; including pike which FWP would like to control upstream. Most other non-salmonid species would likely also be inhibited from upstream movement to some extent (depending on jumping ability).

4.3.1.4 Alternative 3B – Replace Existing Timber Weir Structure with Low Height Rock Step Channel

Replacing the existing structure with a rock step channel designed specifically for salmonid migration would substantially achieve the objective of removing the fish barrier and returning natural fish migration for native salmonid species. However, under this alternative some species would be restricted from upstream migration; including pike which FWP would like to control upstream. Most other non-salmonid species would likely also be inhibited from upstream.

4.3.1.5 Alternative 4 – Remove Existing Timber Weir Structure, Breach the Berm and Reconstruct Channel at Natural Grade

Replacement of the fish barrier with a channel at natural grade would completely achieve the objective of removing the fish barrier and returning natural fish migration for native species. Under this alternative non-native species including pike may also be able to migrate upstream, but could be discouraged by incorporating a rock step structure into the design.

4.3.2 Predicted Attainment of Reducing Potential Liability

4.3.2.1 Alternative 1 – No Action

The No Action alternative would not achieve the objective of reducing potential liability related to the fish barrier. Ongoing deterioration of the timber structure would increase the likelihood of eventual structural failure, which could have greater environmental impacts than the other alternatives.

4.3.2.2 Alternative 2 – Replace Existing Timber Weir Structure with Concrete Channel

Alternative 2 would only partially achieve the objective of reducing potential liability related to the fish barrier. Although short-term concerns about deterioration of the timber structure would be eliminated, long-term maintenance would continue to be required and risk of failure of the weir or berm during a flood event and other potential liabilities would still remain.

4.3.2.3 Alternative 3 – Replace Existing Timber Weir Structure with Rock Step Channel

Alternatives 3A and 3B would only partially achieve the objective of reducing potential liability related to the fish barrier. Although short-term concerns about deterioration of the timber structure would be eliminated, long-term maintenance would continue to be required and risk of failure of the channel or berm during a flood event would still remain. Maintaining the berm and drop structure within the floodplain even with design of the rock step channel to pass a 100-year flow event would leave some potential for liability in the event of a large flood event.

4.3.2.4 Alternative 4 – Remove Existing Timber Weir Structure, Breach the Berm and Reconstruct Channel at Natural Grade

Alternative 4 would substantially achieve the objective of eliminating potential liability related to the fish barrier. Design of the replaced channel to withstand a 100 year flow event plus floodplain construction and removal of the earthen berm results in the least potential for liability for any of the alternatives. Following removal of the fish barrier and completion of the channel reclamation, the State should be able to eliminate the existing easement.

However, some risk of significant erosion remains associated with the accumulated sediment behind the fish barrier. With time, as those sediments consolidate and shrubs and trees add erosion resistance to the fine-grained soils, the risk of significant erosion for a given magnitude flow event would decrease.

4.4 UNAVOIDABLE ADVERSE IMPACTS

4.4.1 Vegetation/Wetlands

All modification or removal alternatives would create short-term minor impact to wetland vegetation immediately surrounding the site. The complete removal of the barrier would significantly alter the hydrologic elevation as discussed in section 4.2.4.2. An estimated five acres of scrub-shrub wetland areas (created post-barrier) would be lost upstream of the site. Existing wetland vegetation may adapt to drier conditions over time establishing the scrub-shrub communities as the dominant community.

4.4.2 Water Resources

Short term impacts to water quality including primarily sediment release and resulting turbidity would occur under all action alternatives. Under alternative 4 (Remove Existing Timber Weir Structure, Breach Berm and Reconstruct Channel at Natural Grade) the short-term water quality impacts are likely to be greater and to last for a longer period of time. However, even under alternative 4 the turbidity increase is not expected to noticeably affect the Seeley Lake public water supply intake.

4.4.3 Fisheries

Modification of the fish barrier and construction of a fish passage-way would continue to restrict natural migration of some native and desirable species. Removal of the structure and return to natural grade would allow non-native species including pike to migrate upstream, unless rock steps were incorporated.

4.4.4 Aesthetics /Landowner Concerns

During construction under any of the alternatives there would be noise and disruption that would likely affect the residents of the adjacent residence. Under alternative 4 the changes to the visual and aesthetic landscape as viewed from the adjacent residence would be significantly changed and would not meet the owner's indicated preference to maintain or increase the water pool behind the existing fish barrier. Reduction of the area of wetlands and change from aquatic bed and emergent marsh types to scrub-shrub type would also change and potentially detract from bird-watching/nature viewing opportunities from the adjacent residence.

4.5 CUMULATIVE IMPACTS

Other unrelated activities in the Clearwater River drainage would continue to impact fisheries and wetlands resources. Increased population and associated impacts upstream of Seeley Lake would incrementally increase sediment production and nutrient sources from septic systems and runoff. Development is also likely to reduce wetland areas. Logging and grazing activities are at the same time decreasing and over the long term (particularly if accompanied with road density reduction) have the opposite effect on sediment and water quality. Recreational use is also increasing in the Clearwater drainage as throughout western Montana. Fishing pressure on the lakes and streams is greater than supported by natural reproduction and several of the lakes are stocked. Bull trout populations have been suppressed and may not be sustainable in the long-term under current conditions. Other native species would continue to be affected by non-native introduced species, particularly northern pike.

4.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

No irreversible commitment of resources has been identified for any of the alternatives through this environmental Assessment. Alternative 4 would result in an irretrievable loss of the open water/aquatic bed and emergent marsh wetlands supported by the existing fish barrier. However, the functions and values of these artificially supported wetlands would in part be replaced by natural riparian zone wetlands that would develop along the restored

channel. If further mitigation for this wetland loss was required, it could be achieved by creating additional on-site or off-site wetlands.

4.7 SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

All of the action alternatives have short-term impacts to water quality as the result of construction activities and sediment release. These short-term impacts are not significant to the overall water quality of the Clearwater River and are outweighed by the long-term potential productivity increase to the bull trout and other native fisheries by re-establishing up and downstream migration.

Alternative 4 would result in both short and long-term decrease in wetland area and change the character of some of the remaining wetland vegetation type. The return of wetland area, functions and values to conditions similar to those occurring prior to the fish barrier construction are not considered a significant impact to the hydrologic, soils or vegetation resources of the Clearwater Drainage.

5.0 PUBLIC PARTICIPATION

Scoping issues related to the Inez Fish Barrier involved consultation with the affected landowner, the Seeley Lake Ranger District of the US Forest Service Lolo National Forest, and the Seeley Lake Water District. No general public meetings were held as part of the preparation of the Draft Environmental Assessment; however, FWP personnel met with the landowner to discuss the alternatives and the landowner's concerns.

Public notice of availability of the Revised Draft Environmental Assessment has been provided by submitting legal notices for publication in the *Independent Record* (Helena), *Missoulian* and *Seeley Swan Pathfinder* (Seeley Lake) newspapers and posting the EA on the FWP website at http://fwp.mt.gov/publicnotices/. The EA or notice of its availability was mailed or emailed to adjacent landowners and interested parties. Copies may be obtained from or viewed at the Region 2 FWP office (address below).

The public comment period will begin September 11, 2009 and extend for 21 days following publication of the legal notice. Comments will be accepted until 5: p.m. on October 1, 2009, and should be mailed:

Ladd Knotek
Montana Fish, Wildlife & Parks
Region 2 Headquarters
3201 Spurgin Road
Missoula, MT 59804-3101

Or emailed to lknotek@mt.gov
Or phoned to Ladd Knotek at 406-542-5506.

6.0 PEOPLE ASSOCIATED WITH THE PROJECT

This environmental Assessment has been prepared under the direction of Montana Fish Wildlife and Parks. Paul Valle served as the FWP project manager. Other State agency personnel involved with scoping, analysis and review are listed in the following table. Hydrometrics, Inc., a Helena based consulting firm, was contracted to prepare the EA. The following table also lists Hydrometrics personnel responsible for EA preparation.

Name	Association	Project Responsibility
Paul Valle	FWP	FWP project manager
Brian Holling	FWP	Scoping and review
Ladd Knotek	FWP	Fisheries, scoping and review
Pat Saffel	FWP	Scoping and fisheries review
Kristi DuBois	FWP	Wildlife review
Bill Fullerton	DNRC	Scoping and engineering review
Rob Kingery	DNRC	Scoping and engineering review
Juliann Clum	Hydrometrics	Editing, vegetation, wildlife
Larry Cawlfield	Hydrometrics	Engineering design, cost estimates
Larry Johnson	Hydrometrics	Drafting
Mike Oelrich	Hydrometrics	Engineering review
Doug Parker	Hydrometrics	Coordination, editing, hydrology, various disciplines
Jamie Poell	Hydrometrics	Vegetation, wildlife
Wendy Williams	Hydrometrics	Report production

7.0 REFERENCES

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