Montana Fish, Wildlife & Parks

1400 South 19th Avenue
Bozeman, MT 59718

July 19, 2012

To: Governor's Office, Mike Volesky, State Capitol, Room 204, P.O. Box 200801, Helena, MT 59620-0801
Environmental Quality Council, State Capitol, Room 106, P.O. Box 201704, Helena, MT 59620-1704
Dept. of Environmental Quality, Metcalf Building, P.O. Box 200901, Helena, MT 59620-0901
Dept. of Natural Resources & Conservation, P.O. Box 201601, Helena, MT 59620-1601
Montana Fish, Wildlife & Parks:

Director's Office	Parks Division	Lands Section	FWP Commissioners
Fisheries Division	Legal Unit	Wildlife Division	Design & Construction

MT Historical Society, State Historic Preservation Office, P.O. Box 201202, Helena, MT 59620-1202
MT State Parks Association, P.O. Box 699, Billings, MT 59103
MT State Library, 1515 E. Sixth Ave., P.O. Box 201800, Helena, MT 59620
James Jensen, Montana Environmental Information Center, P.O. Box 1184, Helena, MT 59624
Janet Ellis, Montana Audubon Council, P.O. Box 595, Helena, MT 59624
George Ochenski, P.O. Box 689, Helena, MT 59624
Jerry DiMarco, P.O. Box 1571, Bozeman, MT 59771
Montana Wildlife Federation, P.O. Box 1175, Helena, MT 59624
Wayne Hurst, P.O. Box 728, Libby, MT 59923
Jack Jones, 3014 Irene St., Butte, MT 59701

Ladies and Gentlemen:

The enclosed Environmental Assessment (EA) has been prepared for securing the Chadbourne Diversion. This proposed action combines the interests of native fish conservation and irrigated agriculture. By securing the Chadbourne Diversion, water users served by the Lower Shields River Ditch would continue to receive water according to their water rights. The fisheries component would promote the persistence and protect the genetic integrity of Yellowstone cutthroat trout occupying approximately 375 miles of mostly connected stream habitat.

The aging Chadbourne diversion suffers from several structural problems that threaten its long-term stability. Moreover, it has features that allow rainbow trout to breach the dam which threatens the genetic status of the Yellowstone cutthroat trout in the watershed above. Consequently, Montana Fish, Wildlife & Parks (FWP) is collaborating with the Lower Shields River Canal Company on a series of proposed repairs and retrofits. The repairs would include addressing erosion and wear on the face and abutments, and elimination of a large scour hole that threatens to undermine the structure. The fish passage elements would include installation of retrofits to prevent passage of fish through an existing notch and elsewhere along the face of the dam. In addition, construction of a selective fish passage channel would allow native Yellowstone cutthroat trout to access the river upstream of the diversion whereas nonnative fishes would be returned to the river below.

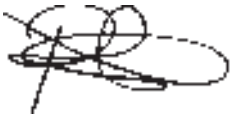
This document is an environmental assessment (EA) of the potential consequences of the various alternatives. EAs are a requirement of the Montana Environmental Policy Act (MEPA) which requires state agencies to consider the environmental, social, cultural, and economic effects of proposed actions. This EA considers 3 alternatives:

1. repairing the structure and installing retrofits and the selective fish passage channel
2. no action, and
3. repair of the structure without implementing the fisheries components.

Montana Fish, Wildlife & Parks invites you to comment on the attached proposal. The public comment period will be accepted until 5:00 p.m. August 10, 2012. Comments should be sent to the following:

Scott Opitz
Montana Fish, Wildlife & Parks
1354 Highway 10 West
Livingston, MT 59047
(406) 222-5105
sopitz@mt.gov

Sincerely,

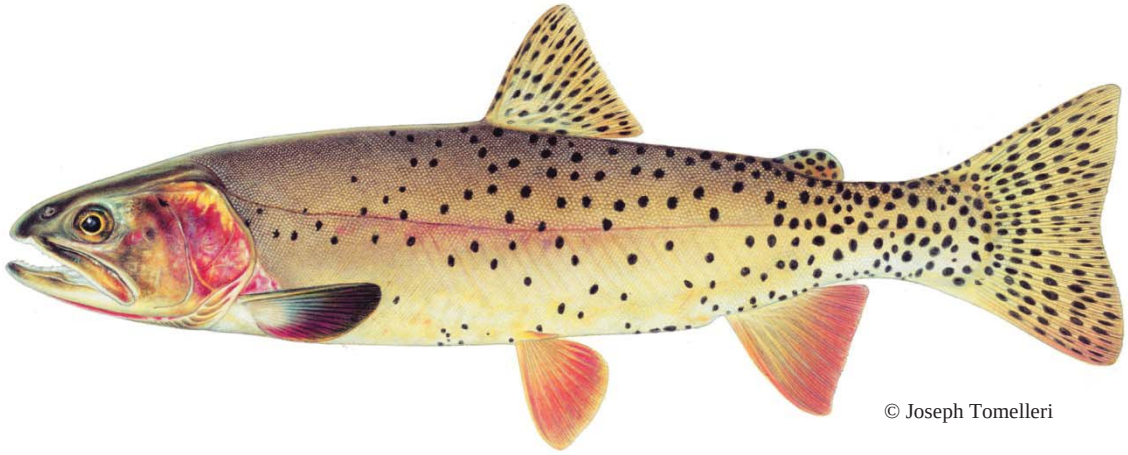


Patrick J. Flowers
Region Three Supervisor

Attachment

CHADBOURNE DIVERSION REPAIRS AND FISH PASSAGE RETROFITS

Draft Environmental Assessment



July 17, 2012

Montana Fish, Wildlife & Parks

Region 3 Office

1400 South 19th Street

Bozeman, Montana 59718-5496

Montana Fish, Wildlife & Parks

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List of Abbreviations

BMP	Best management practice
DEQ	Montana Department of Environmental Quality
DNRC	Department of Natural Resources and Conservation
EA	Environmental Assessment
EPA	US Environmental Protection Agency
FWP	Montana Fish, Wildlife & Parks
MCA	Montana Code Annotated
MEPA	Montana Environmental Policy Act
MNHP	Montana Natural Heritage Program
MOU	Memorandum of understanding
RBT	Rainbow trout
SPA	Stream Protection Act
USFWS	US Fish and Wildlife Service
YCT	Yellowstone cutthroat trout

Executive Summary

The Chadbourne Diversion is a structure spanning the Shields River about 14 river miles from its confluence with the Yellowstone River. In addition to delivering water to several farms and ranches served by the Lower Shields River Ditch, this structure has had the ancillary benefit of limiting invasion of nonnative rainbow trout (*Oncorhynchus mykiss*) into the watershed above. As a result, the Shields River watershed remains as a basin-level stronghold for Yellowstone cutthroat trout (*O. clarkii bouvieri*) with the majority of streams supporting core or conservation populations[1].

The aging diversion suffers from several structural problems that threaten its long-term stability. Moreover, it has features that allow rainbow trout to breach the dam which threatens the genetic status of the Yellowstone cutthroat trout in the watershed above. Consequently, Montana Fish, Wildlife & Parks (FWP) is collaborating with the Lower Shields River Canal Company on a series of proposed repairs and retrofits. The repairs would include addressing erosion and wear on the face and abutments, and elimination of a large scour hole that threatens to undermine the structure. The fish passage elements would include installation of retrofits to prevent passage of fish through an existing notch and elsewhere along the face of the dam. In addition, construction of a selective fish passage channel would allow native Yellowstone cutthroat trout to access the river upstream of the diversion whereas nonnative fishes would be returned to the river below.

This document is an environmental assessment (EA) of the potential consequences of the various alternatives. EAs are a requirement of the Montana Environmental Policy Act (MEPA) which requires state agencies to consider the environmental, social, cultural, and economic effects of proposed actions. This EA considers 3 alternatives:

1. repairing the structure and installing retrofits and the selective fish passage channel
2. no action, and
3. repair of the structure without implementing the fisheries components.

Alternative 1 is the preferred alternative. Evaluation of the potential effects of this alternative finds it will have short-term, minor effects on water and air quality. Otherwise, this project will be highly beneficial to native fishes and the local agricultural community.

MEPA also requires public involvement and opportunity for the public to comment on projects undertaken by state agencies. A 30-day public comment period will extend from July 19, 2012, to August 10, 2012. Interested parties should send comments to:

[1] Core populations have less than 1% rainbow trout genes. Conservation populations have less than 10% rainbow trout genes.

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1.0 PROPOSED ACTION DESCRIPTION

1.1 Type of Proposed Action

This proposed action combines the interests of native fish conservation and irrigated agriculture. By securing the Chadbourne Diversion, water users served by the Lower Shields River Ditch would continue to receive water according to their water rights. The fisheries component would promote the persistence and protect the genetic integrity of Yellowstone cutthroat trout occupying approximately 375 miles of mostly connected stream habitat.

1.2 Agency Authority for Proposed Action

Authority to conduct the proposed actions comes from the Montana Administrative Code (87-1-702). Specifically, this statute authorizes FWP "to perform such acts as may be necessary to the establishment and conduct of fish restoration and management projects".

1.3 Estimated Commencement Date and Schedule

The design components began in December of 2011 following selection of a contractor. Estimated dates for milestones are in Table 1-1.

Table 1-1: Estimated dates for milestones and construction.

Task	*Start*	*Finish*
35% design development	12/21/2011	3/13/2012
35% review	3/14/2012	3/27/2012
65% design development	3/28/2012	5/4/2012
65% review	5/7/2012	5/18/2012
95% design submittal	5/21/2012	6/8/2012
95% review	5/21/2012	6/22/2012
Bidding, award, & contracting	6/25/2012	8/31/2012
Construction	9/3/2012	12/14/2012

1.4 Name and Location of Project

The name of this project is "Chadbourne Diversion repairs and fish passage retrofits". The Chadbourne diversion lies about 14 river miles upstream from the Shields River's confluence with the Yellowstone River (Figure 1-1). Its legal description is Township 1N, Range 9E, Section 13. The diversion occupies the streambed and portions of private land along each bank.

1.5 Project Size (Acres Affected)

		Acres/miles			Acres
(a)	Developed	0	(d)	Floodplain	< 0.01
	Residential	0			
	Industrial	0	(e)	Productive	0
				Irrigated cropland	0
(b)	Open space/woodlands/recreation	0		Dry cropland	0
				Forestry	0
				Rangeland	0
(c)	Wetlands/riparian areas	54 feet		Other	0

1.6 Name and Address of Project Sponsor

Scott Opitz
Montana Fish, Wildlife & Parks
1354 Highway 10 West
Livingston, MT 59047
(406) 222-5105
sopitz@mt.gov

1.7 Project Map

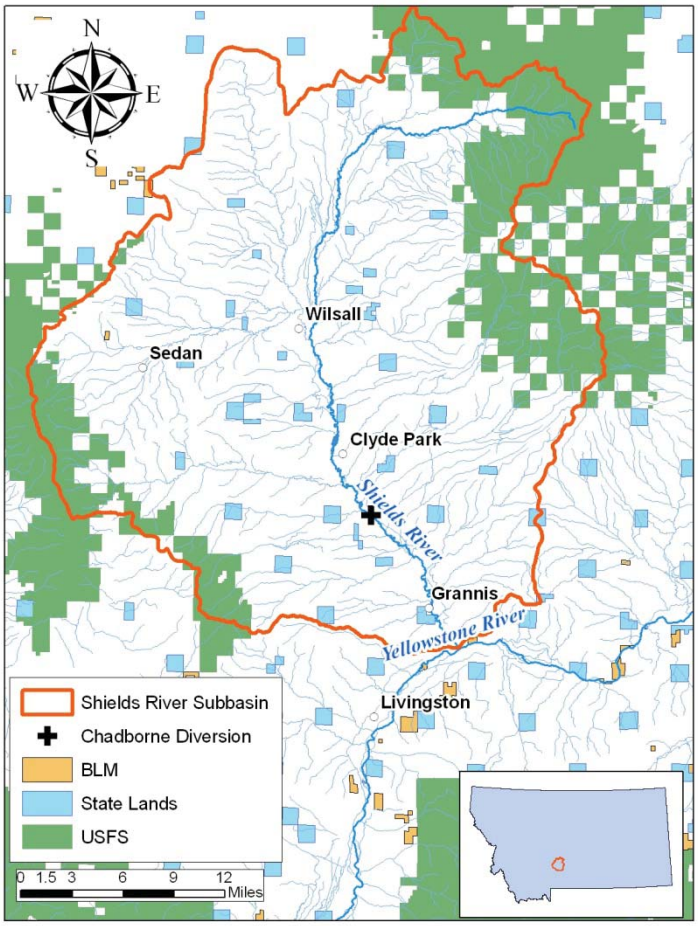

Figure 1-1: Overview of the Shields River watershed and location of the Chadbourne diversion.

1.8 Narrative Summary of the Proposed Action and Purpose of the Proposed Action

1.8.1 Status of Yellowstone Cutthroat Trout

Although assisting the agricultural community is among the goals of this project, a primary beneficiary will be the Yellowstone cutthroat trout. The Yellowstone cutthroat trout is native to Montana and several neighboring states: Wyoming, Idaho, Utah, and Nevada (Figure 1-2). In Montana, Yellowstone cutthroat trout historically occupied streams and lakes in the Yellowstone River watershed having suitable habitat, water quality, and thermal regime. Like many native cutthroat trout, Yellowstone cutthroat trout have experienced dramatic declines in abundance and range. Yellowstone cutthroat trout currently occupy an estimated 43% of their historic multi-

state range (Figure 1-2; May et al. 2007). In Montana, this subspecies occurs in only 34% of the historic range with pure Yellowstone cutthroat trout confirmed in 35% of the remaining occupied habitat (MFISH database[2]). Another 13% of its currently occupied habitat potentially supports unhybridized fish; however, genetic testing is necessary to verify the genetic status of these populations.

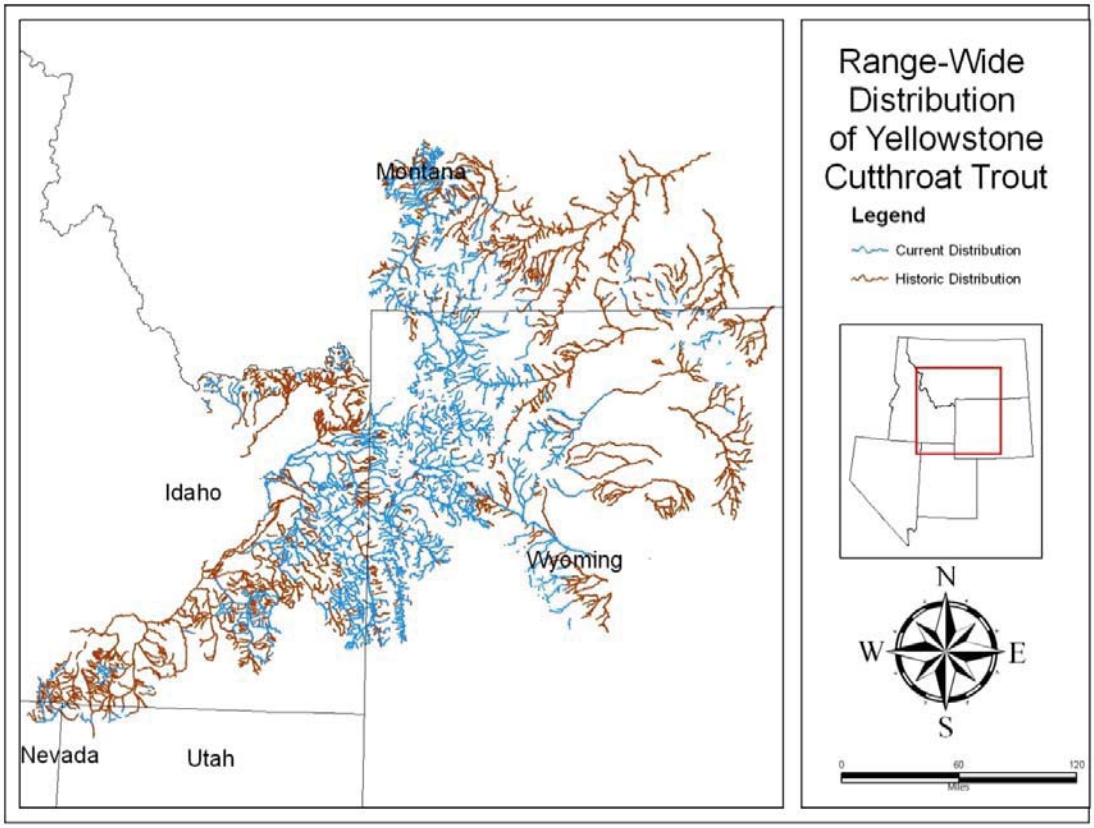

Figure 1-2: Historic and current distribution of Yellowstone cutthroat trout across its native range (MFISH database).

Among the 4th code hydrologic units or HUCs (hydrologic unit codes) lying mostly in Montana, the Shields River Subbasin supports the largest percentage of occupied habitat with 66% of streams still containing core or conservation populations (Table 1-2, Figure 1-3). In contrast, the Upper Yellowstone Subbasin supports Yellowstone cutthroat trout in 50% of its historically occupied habitat. Proceeding east in its native range, Yellowstone cutthroat trout populations become fewer and more isolated (Figure 1-4). These isolated and often small populations face considerable risk of extirpation. As a basin-level stronghold for Yellowstone cutthroat trout, the Shields River Subbasin has considerable conservation value, and protecting this substantial

[2] FWP's internal database on fish distribution.

extent of occupied habitat is a conservation priority. Factors contributing to the wide distribution of Yellowstone cutthroat trout in the Shields River Subbasin include extensive areas of intact and functioning habitat (Shepard 2004), an active watershed group that focuses on cutthroat conservation, and the Chadbourne Diversion which has slowed invasion of rainbow trout from the river below.

Table 1-2: Comparison of historically and currently occupied stream miles for subbasins (4th Code HUCs) with water in Montana (from May et al. 2007).

Name	*HUC*	*Historically Occupied Miles*	*Currently Occupied Miles*	*Percent of Historic Still Occupied*
Upper Yellowstone	10070002	1,116	560	50%
Shields	10070003	682	452	66%
Upper Yellowstone-Lake Basin	10070004	288	0	0%
Stillwater	10070005	416	103	25%
Clarks Fork Yellowstone	10070006	524	81	15%
Upper Yellowstone-Pompey's Pillar	10070007	273	0	0%
Pryor	10070008	225	26	12%
Bighorn Lake	10080010	277	65	23%
Shoshone	10080014	172	4	2%
Lower Bighorn	10080015	422	7	2%
Little Bighorn	10080016	224	20	9%

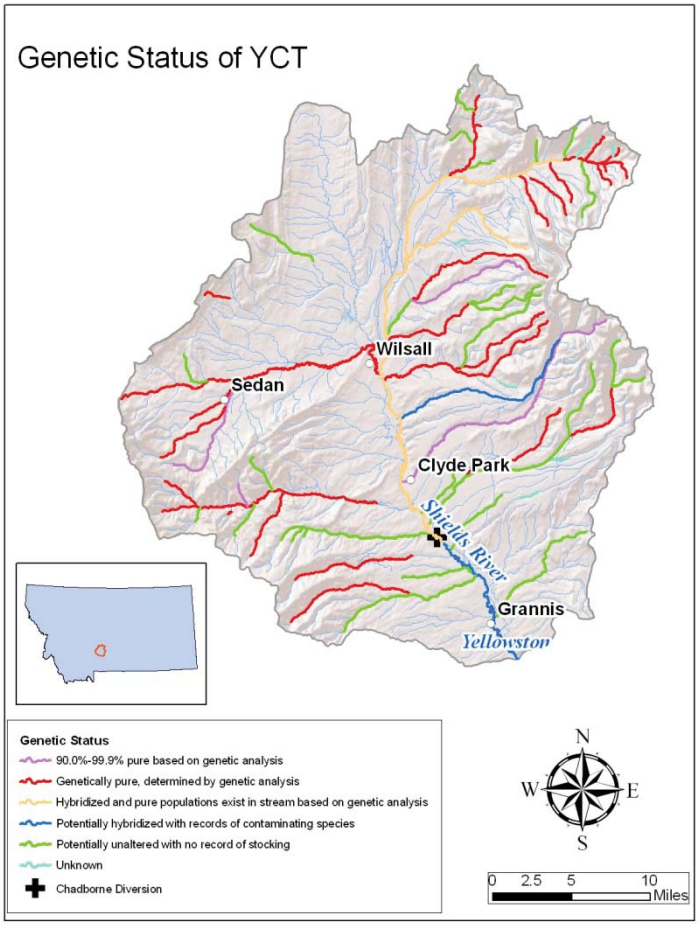

Figure 1-3: Genetic status of Yellowstone cutthroat trout (YCT) in the Shields River watershed (MFISH database, January 2012).

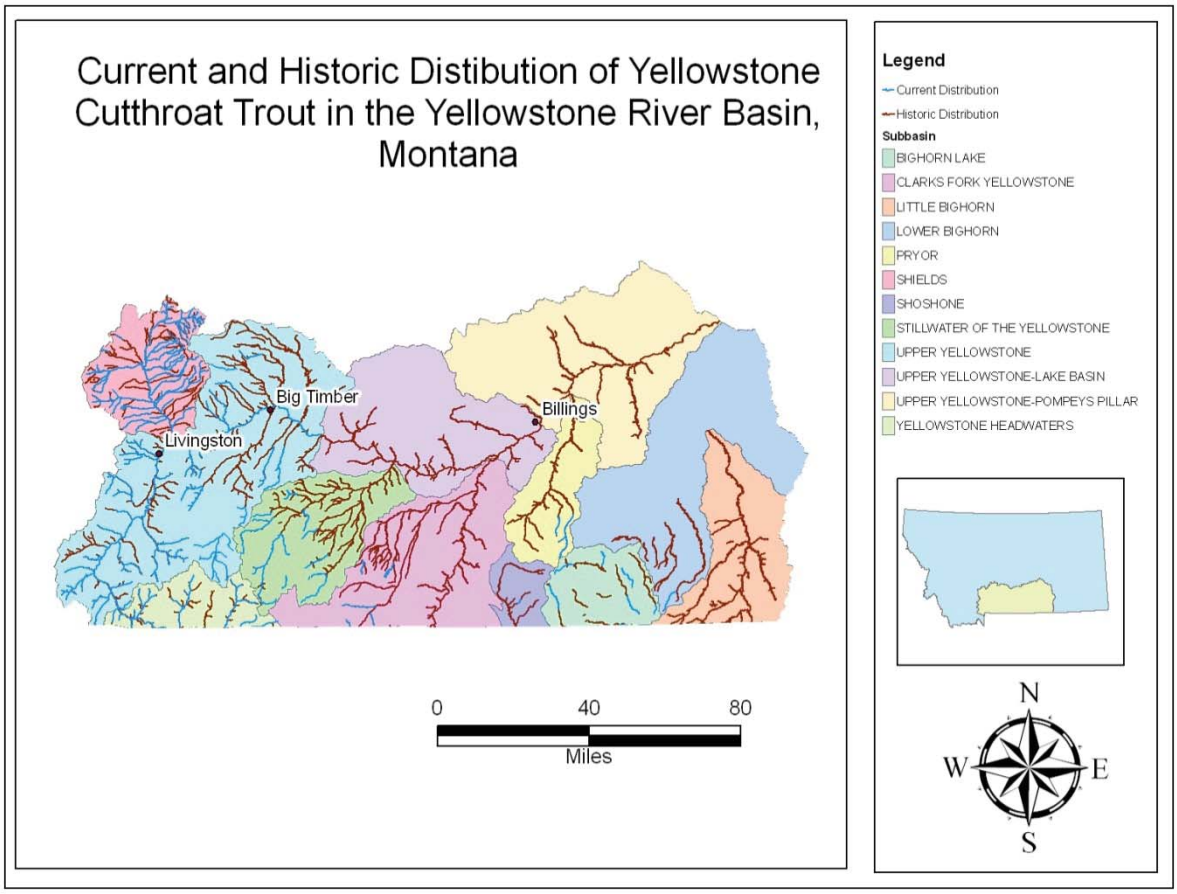

Figure 1-4: Current and historic distribution of Yellowstone cutthroat trout in its historic range in Montana.

The diminished and fragmented distribution of Yellowstone cutthroat trout is the result of a variety of disturbances across the landscape. Introduction of nonnative salmonids (rainbow trout, brown trout [*Salmo trutta*], and brook trout [*Salvelinus fontinalis*]) has been especially harmful (Gresswell 1995; Kruse et al. 2000). Hybridization with rainbow trout is a leading and irreversible cause of the decline (Kruse et al. 2000), and the resulting fertile offspring form hybrid swarms (Allendorf and Leary 1988). Brook trout and brown trout compete with Yellowstone cutthroat trout and can eventually displace this native species. Brown trout consume fish as a substantial component of their diet, making predation another threat to native cutthroat trout.

Habitat degradation and other alterations have also contributed to the decline in native cutthroat trout. Land use activities that degrade riparian health and function, contribute to stream bank erosion and channel instability, can limit the suitability of the habitat, and impair water quality. Features such as road crossings and irrigation diversions have potential to restrict movement of fish which can eliminate access to spawning, rearing, or overwintering habitat. Irrigation

withdrawals have had profound effect on some Yellowstone cutthroat trout populations as water demand coincides with sensitive incubation periods for Yellowstone cutthroat trout eggs and can result in significantly reduced habitat availability and warm water temperatures. The Shields Valley Watershed Group has embarked on a watershed restoration plan which will address impairments relating to sediment, habitat degradation, and thermal loading through streamside management and stream restoration. The combination of landowner-driven habitat improvement projects and this proposed project will bring cumulative conservation benefits to this critical conservation area.

Marked reductions in distribution and abundance of Yellowstone cutthroat trout in their historic range has resulted in their designation as a species of special concern (MNHP and FWP 2006). In response to these declines and designated status, a diverse group of state and federal agencies, agricultural and silvicultural interests, and environmental advocacy groups developed a memorandum of understanding (MOU) to guide conservation, protection, and restoration of cutthroat trout in Montana (Montana Cutthroat Trout Steering Committee [MCTSC] 2007). This MOU placed protection of pure populations of cutthroat trout and protection of migratory life-history strategies as highest priorities in cutthroat trout conservation in Montana. These priorities have specific relevance to this project as they will protect pure populations and restore opportunities for expression of the fluvial[3] life-history strategy.

Concerns over the status of Yellowstone cutthroat trout have prompted environmental advocacy groups to petition the US Fish and Wildlife Service (USFWS) to list this subspecies as a threatened or endangered species. In two decisions, the USFWS found listing Yellowstone cutthroat trout to be unwarranted citing the presence of stable, viable, and self-sustaining populations throughout its historic range as justification for this determination (USFWS 2001, 2006). Nonetheless, plaintiffs submitted a notice of intent to sue in 2006, indicating legal challenges are likely. In the interim, FWP and its conservation partners are implementing projects, such as this proposed action, to decrease the justification for including Yellowstone cutthroat trout on the endangered species list.

1.8.2 Background on the Chadbourne Diversion

The Chadbourne Diversion is a low-head dam spanning the Shields River (Figure 1-5) south of Clyde Park built in 1908. The canal delivers water to between 10 and 13 farms and ranches and provides irrigation and stock water which is critical for these agricultural operations. A notable feature of the diversion is a sediment and debris transport notch along the left, or east, side of the structure. This notch allows passage of bed load and woody debris, both of which are in considerable supply. Rainbow trout are likely able to swim through this notch during some flows.

[3] Fluvial Yellowstone cutthroat trout are those that reside mostly in larger streams or rivers, but migrate to smaller streams to spawn (Gresswell 1995).

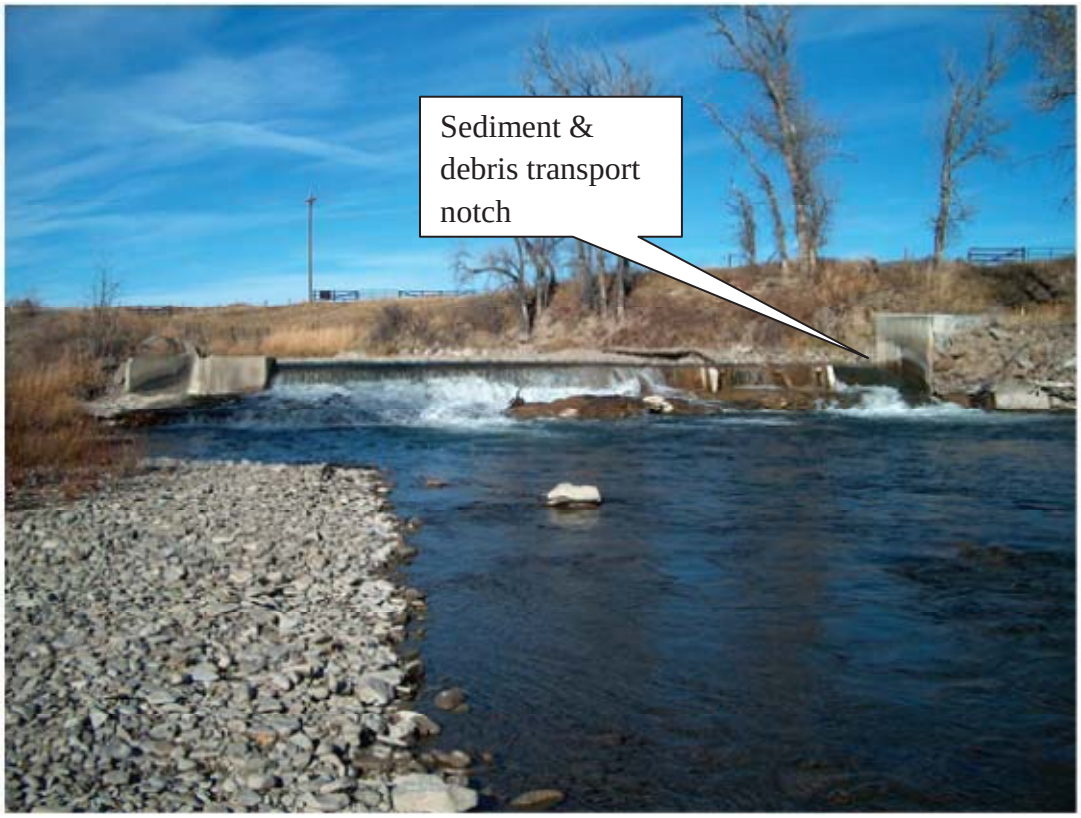

Figure 1-5: View of the Chadbourne Diversion looking upstream (Allied Engineering 2011).

This project has been a conservation priority for protecting Yellowstone cutthroat trout since 2004 with recognition that rainbow trout were likely passing over the structure and awareness of its state of disrepair and potential for failure. Annual fish surveys find large, apparently fluvial rainbow trout upstream of the diversion, and these fish likely originate from the lower Shields or Yellowstone rivers (S.T. Opitz, FWP, personal communication). Observable damage to the structure and a large scour hole downstream (Figure 1-6) resulted in concern for the long-term stability of the diversion.

Because the ability of the structure to be a permanent and total barrier to rainbow trout was in question, FWP commissioned several studies to evaluate its structural stability and the potential for rainbow trout to swim over the structure (Confluence 2006; OASIS 2006; Fullerton 2010; Allied Engineering 2011). A component of some of the studies was evaluation of the feasibility of establishing a barrier for all fish species while providing a means for selective passage of native fishes. The culmination of these studies indicated that structural problems were sufficient to cause concern for the longevity of the structure and that rainbow trout could breach the dam during certain flows.

Figure 1-6: Downstream of the diversion showing the scour hole and irregularly-formed splash pad (from Allied Engineering 2011).

The Lower Shields River Canal Company has been active in repairing the structure for years. The canal company periodically pours concrete downstream of the diversion to prevent the scour hole from migrating under the structure. Although this has been largely successful in moving the hole away from the dam, the irregularly-shaped pad potentially provides current refugia that may allow fish to pass the structure. The canal company recently rebuilt the left wing wall that forms the inlet to the irrigation canal. In 2011, a large chunk of the front wall of the dam fell off during spring flooding, and the canal company repaired this damage (Figure 1-7). This failure prevented installation of the check boards the canal company uses to ensure water delivery to the ditch. As a temporary measure, the canal company installed a berm constructed of bed material to divert water to the ditch.

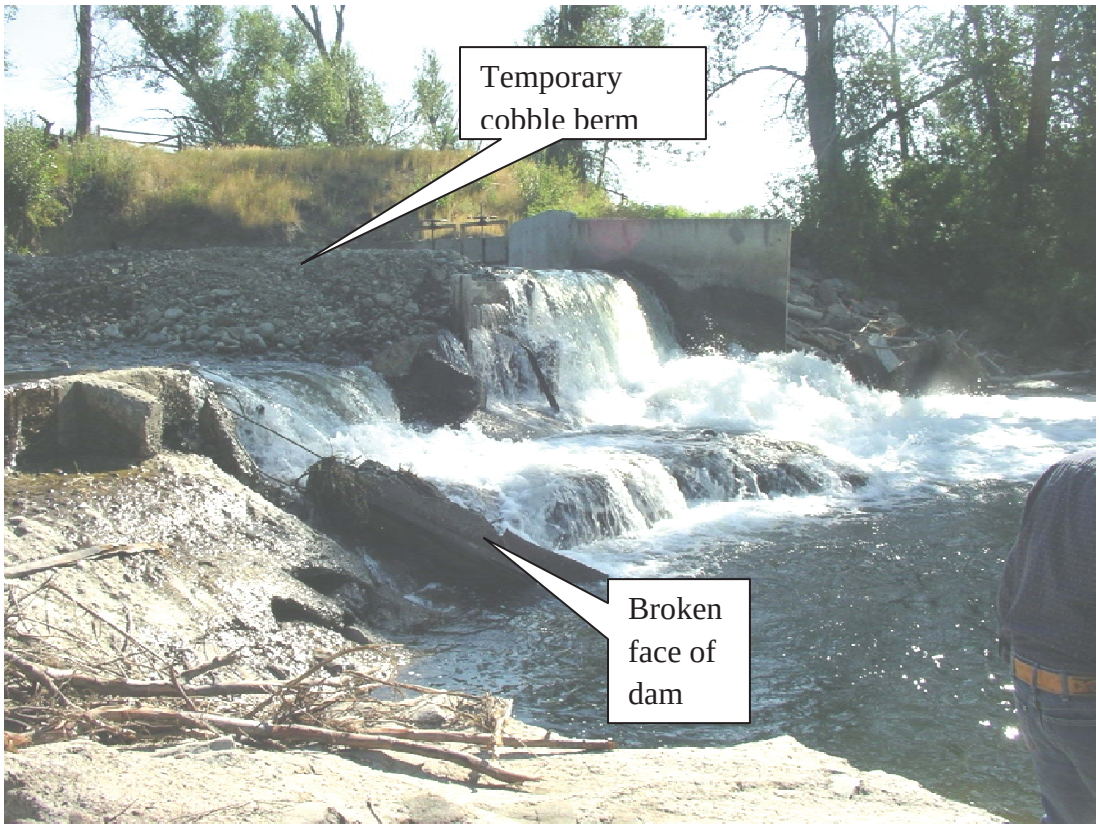

Figure 1-7: Chunk of the face of the dam that had fallen off during the spring flood of 2011. The canal company created a berm using upstream cobble deposits to divert water toward their head gate.

Although the canal company has been proactive in repairing and maintaining its diversion, given its age and proven vulnerability major repairs are necessary to ensure its longevity. Catastrophic dam failure would result in considerable financial hardship to the agricultural producers who rely on this water. Replacement costs would likely exceed 1 million dollars, about 4 times the estimated cost to repair the structure without the fish passage components. Many of these producers would need to switch to an alternative water source, convert to dry land, or go out of business. The consequence for native Yellowstone cutthroat trout in the Shields River watershed would be dire. Rainbow trout are highly abundant in the river system below the Chadbourne diversion, and these fish would have unfettered access to a watershed where they are currently rare, or absent, from most streams. The result would likely be eventual extirpation of pure Yellowstone cutthroat trout, and loss of this basin-level stronghold.

1.8.3 Proposed Design of Repairs and Retrofits

This project provides an opportunity to combine the interests of irrigated agriculture and native fish conservation. The proposed approach is in the design phase, but sufficient information exists to describe the various components. These components include repairs and retrofits to the front of the structure that would ensure its stability and installation of a selective fish-passage channel.

A major weakness in the Chadbourne diversion is the spalling, or erosion, of concrete from the face of the dam (Allied Engineering 2011). This relatively thin element receives the brunt of the energy of flood flows and, as seen in 2011, is vulnerable to breaking. The proposed repair and retrofit to address this thin element involves building a thickened, curved face to the dam (Figure 1-8). This curved, or ogee-shaped, face serves the dual purpose of increasing the thickness of the wall so it can be more resilient to high flows, and the shape presents an impassable component for fish. Observations made on sharp-crested weirs found that the jet of water over the edge often forms a standing wave behind the waterfall after hitting the splash pad. Rainbow trout that manage to jump through the water cascading over the weir can then breach the structure by leaping vertically from this upwelling (C. Kruse, Turner Enterprises, Inc., personal communication). The ogee face maintains a laminar flow and no room for formation of the standing wave thereby eliminating this potential route of unwanted fish passage.

The next component would involve removal of the irregular concrete pad and installation of a smooth, relatively steep splash pad (Figure 1-8). Similar to the ogee face, this component brings structural and fisheries benefits. The splash pad would prevent formation of the scour hole which can undermine the structure. Moreover, these scour holes provide upwellings where fish can leap toward the front of the structure and may gain sufficient height to clear the dam. In contrast, the proposed splash pad would maintain shallow, super-critical flows that exceed the swimming speed of rainbow trout. Combined with the fast, laminar flow over the ogee face, the splash pad would provide assurance that the structure is impassable.

Of course, water flowing off the splash pad has the potential to scour the bed downstream of the concrete. The preferred alternative would include armoring the bed below the splash pad with rock of sufficient size to prevent formation of another scour (Figure 1-8). This armoring would extend about 25 feet from the end of the splash pad.

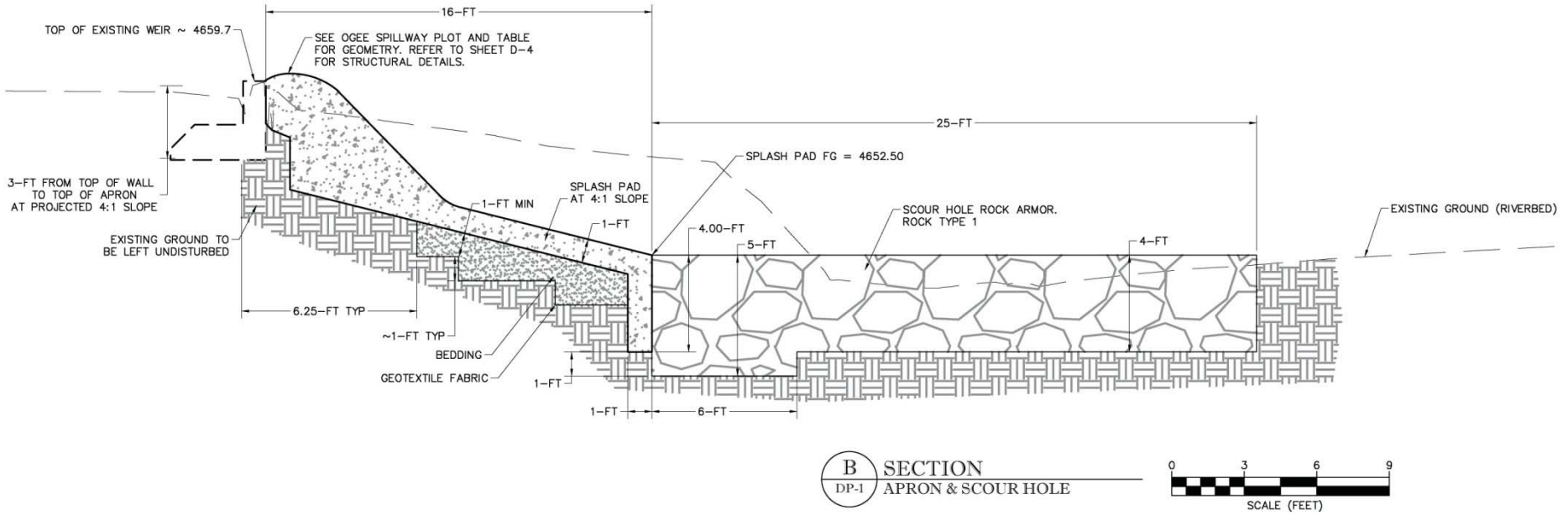

Figure 1-8: Proposed profile view of dam repair and retrofits from the (95% design plans) (Allied Engineering and OASIS 2012)

Another design consideration for the front of the dam involves the sediment notch or spillway. The canal company currently installs check boards at, and adjacent to, the spillway to backwater the Shields River during lower flows to ensure delivery of water to the ditch. The proposed design entails eliminating the notch and extending the ogee face across the entire length of the structure. Likewise, the check boards would be placed across the length of the structure to gain the water elevation needed to deliver water to the head gate. The boards would be removed at the end of the irrigation season.

Construction of a selective fish passageway is another feature of the fish-passage retrofits and entails several components. Fish encountering the Chadbourne Diversion would have the option of ascending a constructed channel composed of a series of step-pools (Figure 1-9 and Figure 1-10). The design flow for this channel is 1 to 10 cfs. Fish swimming up the step-pool feature would enter a V-trap structure which is a standard fish trap design (Figure 1-11). FWP fieldworkers would sort fish daily during the spring migration and transport Yellowstone cutthroat trout and other native fishes upstream of the structure. Rainbow trout and other nonnatives would be released downstream of the diversion. This feature would be in operation only during spring migration period with water controlled by screw gates at the intake pipes on the upstream side of the diversion. Other features include an energy dissipation box so the water within the trap would have little velocity. In addition, the fish trap would have lockable covers to prevent theft or other vandalism associated with the trapped fish.

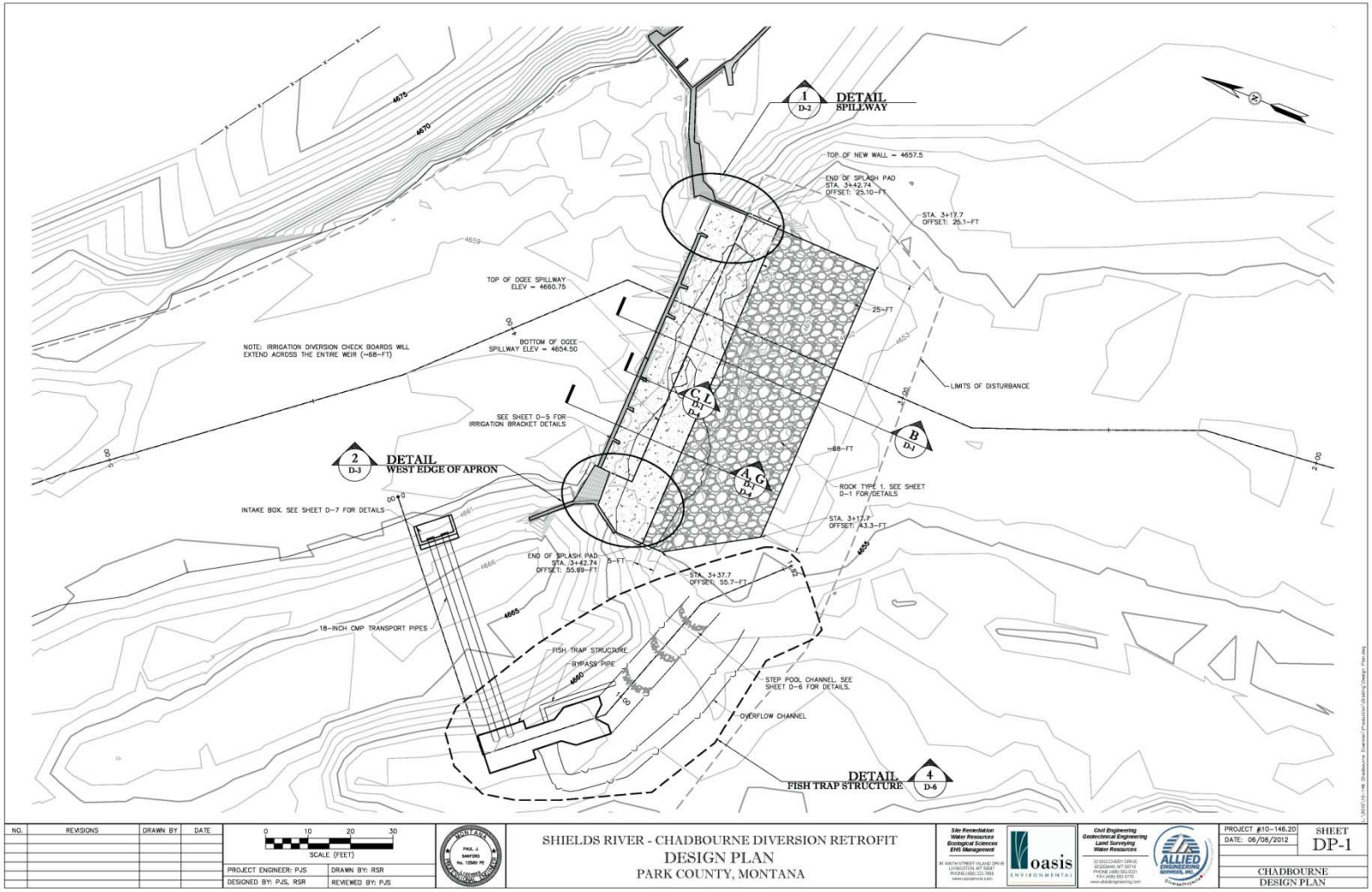

Figure 1-9: Plan view of the Chadbourne repairs and fish-passage retrofits (from the 95% design plans) (Allied Engineering and OASIS 2012)

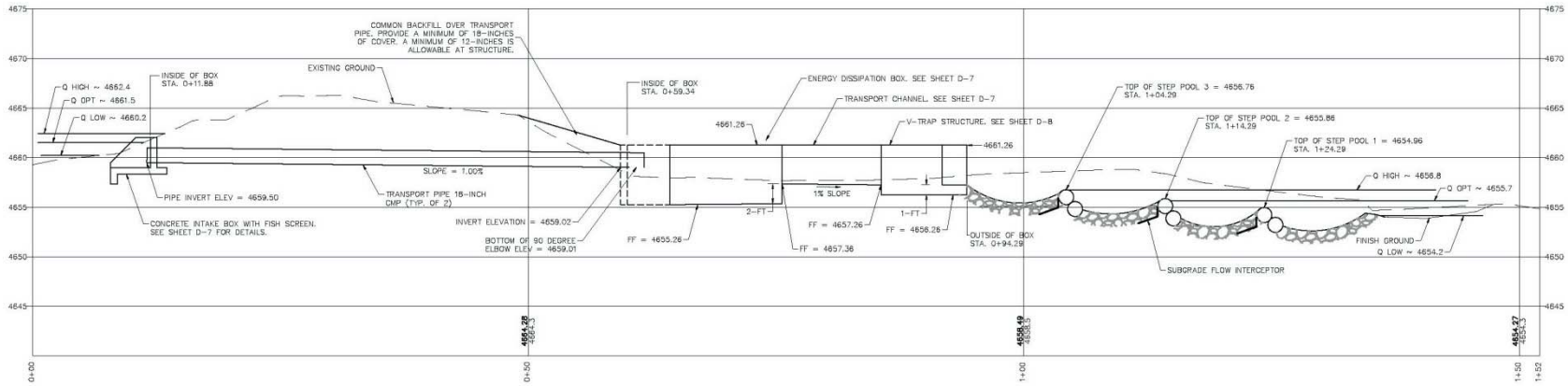

Figure 1-10: Profile view of fish passage structure (from the 95% design plans) (Allied Engineering and OASIS 2012).

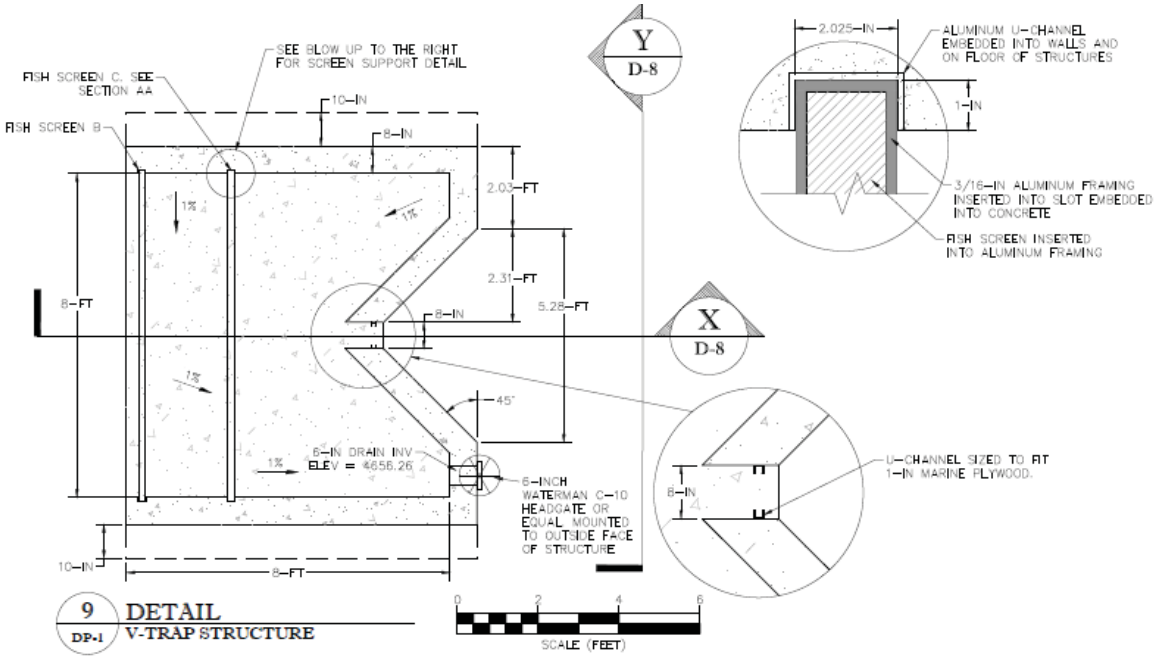

Figure 1-11: Plan view of the V-trap structure that would capture and hold fish from 95% design plans (Allied Engineering and OASIS 2012).

1.8.4 Funding

Funding for this project comes from a variety of sources. Contributions from the Montana Department of Natural Resources (DNRC), the FWP Future Fisheries Improvement Program, the US Fish and Wildlife Service, and the Gallatin National Forest account for the majority of the funding. The Lower Shields River Canal Company has made ongoing contributions through its regular repairs and maintenance.

1.9 Agencies Consulted During Preparation of the Draft EA

Agency consultation included communications with project partners, permitting agencies, and entities with information relevant to potential consequences of this project. These included the Gallatin National Forest, Montana Department of Environmental Quality, the Park County Environmental Health Department, the State Historic Preservation Office (SHPO), the Army Corps of Engineers, and the Montana Natural Heritage Program.

2.0 ENVIRONMENTAL REVIEW

2.1 Physical Environment

This chapter details the effects of the preferred alternative, which is repair of the diversion and installation of retrofits to allow and prevent fish passage. See 3.0 ALTERNATIVES for descriptions of the alternatives.

2.1.1 Land Resources

1. Land Resources	Impact				Can Impact be Mitigated?	Comment Index
Would the proposed action result in:	Unknown	None	Minor	Potentially Significant		
a. Soil instability or changes in geologic substructure?			X		Yes	1a
b. Disruption, displacement, erosion, compaction, moisture loss, or over-covering of soil, which would reduce productivity or fertility?			X		Yes	1b
c. Destruction, covering, or modification of any unique geologic or physical features?		X				
d. Changes in siltation, deposition, or erosion patterns that may modify the channel of a river or stream, or the bed or shore of a lake?			X		Yes	1c
e. Exposure of people or property to earthquakes, landslides, ground failure, or other natural hazard?		X				

Comments on 1a, 1b, and 1c: Effects on Soil Productivity, Erosion and Deposition

Construction of repairs and retrofits would result in several alterations in land resources. Installation of large rock under and downstream of the splash pad would alter the geologic substructure of the stream. This alteration would be beneficial to the diversion as it would contribute to its stability, a goal of the project.

The use of heavy equipment in the project area would result in the displacement, erosion, and compaction of soil. These would be short-term and minor disturbances. Heavy equipment would be limited to established staging and construction areas, and these areas would be reclaimed after project completion. All disturbed ground would be re-graded and seeded with a native seed mix.

Installation of the splash pad and rock armor will alter erosion patterns downstream of the diversion. Specifically, these features would prevent formation of a scour hole. As this hole is among the threats to the stability of the diversion, this alteration is beneficial to the structure.

2.1.2 Water

2. Water	Impact				Can Impact be Mitigated?	Comment Index
Would the proposed action result in:	Unknown	None	Minor	Potentially Significant		
a. Discharge into surface water or any alteration of surface water quality, including but not limited to temperature, dissolved oxygen, or turbidity?			X		Yes	2a
b. Changes in drainage patterns or the rate and amount of surface runoff?		X				
c. Alteration of the course or magnitude of flood water or other flows		X				
d. Changes in the amount of surface water in any body of water, or creation of a new body of water?		X				
e. Exposure of people or property to water-related hazards such as flooding?		X				
f. Changes in the quality of groundwater?		X				
g. changes in the quantity of groundwater?		X				
h. Increase in risk of contamination of surface water or groundwater?		X				
i. Effects on any existing water right or reservation?		X				2i
j. Effects on other water users as a result of any alteration in surface or groundwater quality?		X				
k. Effects on other users as a result of any alteration in surface or groundwater quantity?		X				
l. Would the project affect a designated floodplain?			X			2l
m. Would the project result in any discharge that would affect federal or state water quality regulations?			X			2m

Comment 2a: Alterations in Water Quality

Construction of repairs and retrofits would result in short-term increases in turbidity or sediment loading. Reclamation of the disturbed areas would limit sediment delivery after the project is completed. In addition, construction activities would follow conditions of all relevant permits

required to work in and around the Shields River including the Montana Stream Protection Act (SPA 124), Short-Term Water Quality Standard for Turbidity (318 authorization), and federal Clean Water Act (404) permits. Each permit requires implementation of best management practices (BMPs) or mitigative actions, such as site reclamation, to limit negative effects on water quality.

Comment 2i: Effects on Water Rights

This project would protect water users with existing rights from the Lower Shields River Ditch. Should the diversion fail, the canal company and its members would unlikely be able to raise the projected $1 million it would take to replace the structure.

Comment 2l: Floodplain Designation

This project occurs within the mapped floodplain of the Shields River. FWP will submit a floodplain permit to Park County.

Comment 2m: Discharge Affecting Water Quality Regulations

Construction of repairs and retrofits would result in temporary increases in sediment loading or turbidity. FWP would apply for 318-authorization from DEQ and would implement all required BMPs to reduce sediment loading from construction activities.

2.1.3 Air

3. Air	Impact				Can Impact be Mitigated?	Comment Index
Would the proposed action result in:	Unknown	None	Minor	Potentially Significant		
a. Emission of air pollutants or deterioration of ambient air quality?			X		yes	3a
b. Creation of objectionable odors?		X				
c. Alteration of air movement, moisture, or temperature patterns, or any change in climate, either locally, or regionally?		X				
d. Adverse effects on vegetation, including crops, due to increased emissions of pollutants?		X				

Comments 3a: Emission of Air Pollutants or Deterioration of Ambient Water Quality

Construction of repairs and retrofits would entail use of heavy equipment which emits diesel exhaust. This alteration would be minor and temporary as these fumes dissipate rapidly. Likewise, mixing concrete could result in creation of dust. Particulates would disperse and settle quickly resulting in short-term and minor alterations in air quality.

2.1.4 Vegetation

4. Vegetation	Impact				Can Impact be Mitigated?	Comment Index
Would the proposed action result in:	Unknown	None	Minor	Potentially Significant		
a. Changes in the diversity, productivity, or abundance of plant species (including trees, shrubs, grass, crops, and aquatic plants)?			X		Yes	4a
b. Alteration of a plant community?			X		Yes	4b
c. Adverse effects on any unique, rare, threatened, or endangered species?		X				4c
d. Reduction in acreage or productivity of any agricultural land?		X				
e. Establishment or spread of noxious weeds?			X			4e
f. Would the project affect wetlands, or prime and unique farmland?		X				See 4b

Comment 4a: Changes in the Diversity, Productivity, or Abundance of Plants

Most of the work would occur within the channel of the Shields River with the exception of the fish passage channel which would extend onto the right bank of the river. Vegetation would be removed from the footprint of the fish passage channel; however, adjacent disturbed areas would be seeded using a native seed mix. These alterations would be minor, and revegetation efforts would restore a healthy riparian plant community

Comment 4b: Alteration of a Plant Community

The primary alteration of the existing plant community would be a reduction in noxious weeds. Currently, spotted knapweed (*Centaurea maculosa*), leafy spurge (*Euphorbia esula*), and other weeds are abundant along the diversion structure. Following completion of the project, FWP would implement an aggressive weed control effort extending up to three years which would include spraying and pulling. A licensed applicator would conduct all weed spraying. The result of this weed control effort would be greatly diminished weed cover compared to the current condition, and native, desirable species would be able to re-establish in weed-infested areas.

Comment 4c: Effects on Unique, Rare, Threatened or Endangered Species

The MNHP does not list any plant species of concern within the township and range in which this project occurs so no negative effects on rare or special plant species are expected.

Comment 4e: Establishment or Spread of Noxious Weeds

The construction phase has potential to spread noxious weeds through ground disturbance which promotes establishment of invasive plants, and import of seeds on machinery. Several actions would mitigate for spread of noxious weeds. All machinery and vehicles would be power-

washed before traveling to the site including an undercarriage wash. Disturbed areas would be seeded with a native seed mix.

Implementation of an aggressive weed control program would further mitigate for the potential for establishment of weeds following construction. Moreover, as weeds are already abundant at this site, this weed control program would reduce the existing weed infestation. FWP has secured funds for up to 3 years of spraying in disturbed and adjacent areas within the project site.

2.1.5 Fish and Wildlife

5. Fish and Wildlife	Impact				Can Impact be Mitigated?	Comment Index
Would the proposed action result in:	Unknown	None	Minor	Potentially Significant		
a. Deterioration of critical fish or wildlife habitat?		X				
b. Changes in the diversity or abundance of game animals or bird species?			X		Yes	5b
c. Changes in the diversity or abundance of nongame species?			X		Yes	5c
d. Introduction of a new species into an area?		X				
e. Creation of a barrier to the migration or movement of animals?			X		Yes	5e
f. Adverse effects on any unique, rare, threatened, or endangered species?		X				5f
g. Increase in conditions that stress wildlife populations or limit abundance (including harassment, legal or illegal harvest, or other human activity)?			X			5g
h. Would the project be performed in any area in which T&E species are present, and would the project affect any T&E species or their habitat? (Also see 5f)			X			5f
i. Would the project introduce or export any species not presently or historically occurring in the receiving location? (Also see 5d)		X				

Comment 5b: Changes in the Diversity or Abundance of Game Animals or Bird Species

The proposed action would prevent passage of rainbow trout and other nonnative fishes over the Chadbourne Diversion which would slow establishment of self-sustaining rainbow trout population in the watershed above. The consequence of this action would be protection of the existing core and conservation populations of Yellowstone cutthroat trout occupying about 375

miles of stream habitat. Protection of core and conservation populations is the highest priority in the MOU developed to conserve cutthroat trout in Montana. Moreover, the selective fish passageway would reconnect the Shields River upstream of the Chadbourne diversion to migratory or fluvial fish. Preserving migratory life-history patterns is also a high priority for cutthroat trout conservation in Montana and the project would also be beneficial to other native species with migratory life history strategies.

Game species such as white-tailed deer (*Odocoileus virginianus*), moose (*Alces alces*), black bear (*Ursus americanus*), and mountain lion (*Felis concolor*) are likely present within the project area. White-tailed deer are highly abundant within and adjacent to the Shields River corridor. Construction activities would have short-term and minor effects by temporarily displacing these species.

Comment 5c: Changes in the Diversity or Abundance of Nongame Species

The use of heavy equipment would have a temporary and minor effect on nongame species, such as birds, reptiles, amphibians, and small mammals, and may result in temporary displacement of some species. Breeding and early life stages are most sensitive to this type of temporary disturbance. As the project would occur in late summer through early fall, most nongame species would be mature enough to have fledged or otherwise have decreased reliance on parental care and be capable of dispersing.

Comment 5e: Creation of a Barrier to the Movement or Migration of Animals

This project would include construction of a barrier to prevent upstream movement of fish into the project area in order to secure a pure population of Yellowstone cutthroat trout. The selective fish passageway would mitigate the effect on native fishes, which would restore migratory life-history patterns for other native species. Blocking nonnative species, especially rainbow trout, is the intent of the project.

Comment 5f: Effects on Unique, Rare, Threatened, or Endangered Animals

The MNHP database lists 3 animal species of special concern as occurring in or near the project area (Table 2-1). Field guide information provided by the MNHP website allows inference on potential effects of the project on these species. Evaluation of their habitat needs, forage base, and migration timing suggests effects on these species would be negligible or beneficial.

Great blue herons forage and nest along rivers, although no nesting colonies occur close to the project site. This project may result in displacement of individual birds from the project area during the construction period, which constitutes a short-term and minor effect.

Sage grouse occur throughout the Shields River valley; however, this project is unlikely to have an effect on this species. The construction project would be limited to the river corridor, and sage grouse are upland birds preferring sagebrush steppe. Therefore, effects on sage grouse would be negligible.

Yellowstone cutthroat trout is the other species of special concern occurring within the project area and an intended beneficiary of the proposed actions. Stopping passage of rainbow trout over the Chadbourne Diversion would protect the existing core and conservation populations from hybridization. Likewise, installation and operation of the selective fish passageway would result in restoration of migratory or fluvial life-history strategies for native fish which is a conservation priority.

Table 2-1: Animal species of special concern known to occur in the township and range in which the Chadbourne diversion lies (MNHP database).

Group	Scientific Name	Common Name	Global Rank	State Rank	USFS
Birds	*Ardea Herodias*	Great blue heron	G5	S3	
Birds	*Centrocercus urophasianus*	Greater sage grouse	G4	S3	Sensitive
Fish	*Oncorhynchus clarkii bouvieri*	Yellowstone cutthroat trout	G4T[8]2	S2	Sensitive

G4 or S4: uncommon but not rare (although it may be rare in parts of its range), and usually widespread
G3 or S3: Potentially at risk because of very limited and/or declining numbers, range, and/or habitat, making it vulnerable to global extinction or extirpation in the state.
G5 or S5 Common, widespread, and abundant (although it may be rare in parts of its range). Not vulnerable in most of its range.
portion of its range (16 U.S.C 1532[20]).
G2 or S2: At risk because of very limited and/or declining numbers, range, and/or habitat, making it vulnerable to global extinction or extirpation in the state
T: Infraspecific taxon (trinomial) – the status of infraspecific taxa (subspecies or variety) are indicated by a "T-rank" followed by the species' global rank

Comment 5g: Increase in Conditions That Would Stress Wildlife

See Comment 5b: Changes in the Diversity or Abundance of Game Animals or Bird Species and Comment 5c: Changes in the Diversity or Abundance of Nongame Species.

2.2 Human Environment

2.2.1 Noise and Electric Effects

6. Noise and Electric Effects	Impact				Can Impact be Mitigated?	Comment Index
Would the proposed action result in:	Unknown	None	Minor	Potentially Significant		
a. Increases in existing noise levels?			X			6a
b. Exposure of people to nuisance noise levels?		X				
c. Creation of electrostatic or electromagnetic effects that could be detrimental to human health or property?		X				
d. Interference with radio or television reception?		X				

Comment 6a: Increases in Existing Noise Levels

Repairs and retrofits would require the use of heavy equipment which would increase noise levels during the construction period. The loudest component would be demolition of the existing splash pad which would likely be accomplished through use of an excavator and some use of a jackhammer. A thick stand of cottonwoods would buffer noise to the nearest neighbor. Noise would be short term and limited to daylight hours.

2.2.2 Land Use

7. Land Use	Impact				Can Impact be Mitigated?	Comment Index
Would the proposed action result in:	Unknown	None	Minor	Potentially Significant		
a. Alteration of or interference with the productivity or profitability of existing land use of an area?		X				
b. Conflict with a designated natural area or area with unusual or scientific importance?		X				
c. Conflict with any existing land use whose presence would constrain or potentially prohibit the proposed action?			X		Yes	7c
d. Adverse effects on, or relocation of, residences?						

Comment 7c: Conflicts with Existing Land Uses

The proposed project could result in short-term alterations in recreational uses of the river. The presence of heavy equipment and short-term increases in turbidity may have a negative effect on anglers fishing this portion of the Shields River. As anglers can access the Shields River at several bridges and a fishing access site nearby, this presents a minor and temporary inconvenience. Elimination of the scour pool may also be perceived as a loss of fishable habitat; however, the river has an abundance of other pools providing habitat for catchable fish.

The project would likely coincide with hunting season which begins September 1 for most species. Nonetheless, the footprint of the project is relatively small, so this would present a minor, short-term limitation for hunters.

2.2.3 Risks/Health Hazards

8. Risks/ Health Hazards	Impact				Can Impact be Mitigated?	Comment Index
Would the proposed action result in:	Unknown	None	Minor	Potentially Significant		
a. Risk of an explosion or release of hazardous substances (including, but not limited to oil, pesticides, chemicals, or radiation) in the event of an accident of other forms of disruption?		X				
b. Affect an existing emergency response or emergency evacuation plan or create a need for a new plan?		X				
c. Creation of any human health hazard or potential hazard?		X				
d. Would any chemical piscicides be used?		X				

2.2.4 Community Impact

9. Land Use	Impact				Can Impact be Mitigated?	Comment Index
Would the proposed action result in:	Unknown	None	Minor	Potentially Significant		
a. Alteration of or interference with the productivity or profitability of existing land use of an area?		X				9a
b. Conflict with a designated natural area or area with unusual or scientific importance?		X				
c. Conflict with any existing land use whose presence would constrain or potentially prohibit the proposed action?		X				
d. Adverse effects on, or relocation of, residences?		X				

Comment 9a: Alteration in productivity or profitability of an existing land use.
This project would secure the Chadbourne Diversion which supplies water to numerous agricultural operations. Loss of the structure would present economic hardship to these producers, so this project would protect the profitability with respect to a continued supply of water for agricultural purposes.

2.2.5 Public Services/Taxes/Utilities

10. Public Services/Taxes/Utilities	Impact				Can Impact be Mitigated?	Comment Index
Would the proposed action result in:	Unknown	None	Minor	Potentially Significant		
a. Will the proposed action have an effect upon or result in a need for new or altered governmental services in any of the following areas: fire or police protection, schools, parks/recreational facilities, roads or other public maintenance, water supply, sewer or septic systems, solid waste disposal, health, or other governmental services? If any, specify: _____		X				
b. Will the proposed action have an effect upon the local or state tax base and revenues?		X				
c. Will the proposed action result in a need for new facilities or substantial alterations of any of the following utilities: electric power, natural gas, other fuel supply or distribution systems, or communications?		X				
d. Will the proposed action result in increased used of any energy source?		X				
e. Define projected revenue sources		X				
f. Define projected maintenance costs		X				10f

Comment 10f: The canal company would still be responsible for maintenance and repairs of the diversion structure.

2.2.6 Aesthetics and Recreation

11. Aesthetics and Recreation	Impact				Can Impact be Mitigated?	Comment Index
Would the proposed action result in:	Unknown	None	Minor	Potentially Significant		
a. Alteration of any scenic vista or creation of an aesthetically offensive site or effect that is open to public view?		X				
b. Alteration of the aesthetic character of a community or neighborhood?		X				
c. Alteration of the quality or quantity of recreational/tourism opportunities and settings? (Attach Tourism Report)			X		Yes	11c
d. Will any designated or proposed wild or scenic rivers, trails or wilderness areas be impacted? (Also see 11a, 11c)		X				

Comment 11c: Alteration of the Quality or Quantity of Recreational/Tourism Opportunities and Settings.

As stated in ***Comment 7c: Conflicts with Existing Land Uses***, this project would have short-term and minor disturbances to angling and hunting. The designs provide for portaging of watercraft around the diversion.

2.2.7 Cultural/Historical Resources

12. Cultural and Historical Resources	Impact				Can Impact be Mitigated?	Comment Index
Would the proposed action result in:	Unknown	None	Minor	Potentially Significant		
a. Destruction or alteration of any site, structure or object of prehistoric historic, or paleontological importance?			X		Yes	12a
b. Physical change that would affect unique cultural values?		X				
c. Effects on existing religious or sacred uses of a site or area?	X					12c
d. Will the project affect historic or cultural resources?	X				Yes	12d

Comment 12a: Effects on Features with Prehistoric, Historic, or Paleontological Importance.

See Comment 12d: Effects on Historic or Cultural Resources.

Comment 12c: Effects on Existing Religious or Sacred Uses of a Site or Area.

Through the MEPA process, FWP's protocols require consultation with tribal governments when proposed projects occur within their historic range. The intent is to determine if the potential actions coincide with areas of cultural or religious significance, and if the proposed actions

would interfere with these important uses and values. Before European settlement, the Shields River valley was contested territory (L. Lahren, Anthro Research, personal communication). Owing to an abundance of bison (*Bison bison*) and other game, many tribes vied for occupancy and the ability to exploit the rich resources. The Confederated Salish and Kootenai Tribes retain hunting rights in the Shields River valley, so on May 16, 2012, the EA preparer sent a letter to the Tribal Preservation Department inquiring about potential cultural or religious significance within the project area. The Notice of Decision issued following the public comment period will include any input from the Confederated Salish and Kootenai Tribes, and incorporate their concerns as indicated.

Comment 12d: Effects on Historic or Cultural Resources.

Given the potential age of the diversion, it may have cultural resource values. FWP has arranged for an archeologist to conduct a survey and recommend mitigation measures. An initial consultation with the State Historic Preservation Office (SHPO) indicates the agency believes the proposed project would have an effect on eligibility, although they recognize the need for the project to continue and would be willing to discuss mitigation options (B. Mangum, FWP, personal communication). The Notice of Decision will include a discussion of the archeologist's findings and any recommended mitigative actions.

Note that the "no action" alternative would also have potential to have adverse effect on this potentially culturally significant resource. Without substantial repair, the diversion would remain susceptible to total failure during flooding. The result would be loss of a cultural resource, disruption of water supply to farms and ranches, and no barrier preventing invasion of rainbow trout into a critical Yellowstone cutthroat trout stronghold.

13. Summary Evaluation of Significance	Impact				Can Impact be Mitigated?	Comment Index
Will the proposed action, considered as a whole:	Unknown	None	Minor	Potentially Significant		
a. Have impacts that are individually limited, but cumulatively considerable? (A project or program may result in impacts on two or more separate resources which create a significant effect when considered together or in total.)		X				
b. Involve potential risks or adverse effects which are uncertain but extremely hazardous if they were to occur?		X				
c. Potentially conflict with the substantive requirements of any local, state, or federal law, regulation, standard or formal plan?		X				
d. Establish a precedent or likelihood that future actions with significant environmental impacts will be proposed?		X				
e. Generate substantial debate or controversy about the nature of the impacts that would be created?		X				
f. Is the project expected to have organized opposition or generate substantial public controversy? (Also see 13e)		X				
g. List any federal or state permits required.						13g

Comment 13g: Necessary Federal or State Permits

This project would require several permits which are as follows:

- DEQ 318 authorization – authorization for short-term exemption of surface water quality standards to address short-term increases in turbidity associated with construction.
- Montana Stream Protection Act (SPA 124 Permit) – permit for any agency or subdivision of state, county, or city government proposing a project that may affect the bed or banks of any stream in Montana.
- Montana Floodplain and Floodway Management Act – permits new construction within a designated floodplain.
- Federal Clean Water Act (404 permit) – permits activities that would result in the discharge or placement of dredged or fill material into waters of the United States.

3.0 ALTERNATIVES

Three alternatives received consideration during preparation of the environmental assessment. The proposed alternative (Alternative 1) was evaluated in detail. The others received less consideration as they would not meet the fisheries conservation or agricultural preservation goals.

3.1 Alternatives Given Detailed Study

3.1.1 Alternative 1 (Preferred Alternative): Construction of Repairs and Fish Passage Retrofits

The proposed action involves several components. Repair and fortification of the existing structure would prevent catastrophic failure during future floods and would decrease maintenance costs and effort for several decades. Installing an ogee face to the structure would thicken the front wall, which is the thinnest element yet receives the brunt of the force. The ogee face would also serve as an impassable feature by blocking rainbow trout from leaping or swimming over the structure. Replacement of the existing irregular splash pad with a steep, smooth concrete splash pad would provide structural and fisheries benefits by preventing formation of a scour hole and presenting a second impassable element. Eliminating the sediment notch, which does little to convey bed load or large woody debris, would also eliminate a route of fish passage. Finally, installation of the selective fish passageway would restore seasonal connectivity to migratory Yellowstone cutthroat trout which is a high priority in conservation planning.

The consequences of not implementing the entire project as described would result in not meeting agricultural or fisheries goals. The Chadbourne Diversion is due for a major repair, and postponing this action would put the structure at risk of major failure during the next flood event. This failure would have dire consequences for Yellowstone cutthroat trout as the diversion is the primary feature preventing further spread of rainbow trout into the Shields River watershed. Moreover, the water users served by the diversion would need to find an alternative source of water, convert to dryland agriculture, or go out of business. Omitting the retrofits that make the diversion impassable to rainbow trout would allow for the continued passage of fluvial rainbow trout over the barrier which puts the core and conservation populations of Yellowstone cutthroat trout at risk. Not installing the selective fish passage way would not allow for restoration of migratory life history patterns which is among the highest conservation priorities.

3.2 Alternatives Considered but not Given Detailed Study

3.2.1 Alternative 2: No Action

Under the no action alternative, no measures would be taken to repair the Chadbourne Diversion other than the stopgap measures employed by the canal company. Likewise, none of the features

designed to block passage of rainbow trout would be constructed nor would the selective fish passageway be installed.

Among the consequences of the no action alternative is that the Chadbourne Diversion could eventually fail despite the best efforts at temporary repairs implemented by the Lower Shields River Canal Company. Low numbers of rainbow trout would manage to swim over the structure until the ultimate failure when the basin would be open to invasion by the abundant rainbow trout occupying the Shields and Yellowstone rivers below. This could result in eventual loss of this basin-level stronghold of Yellowstone cutthroat trout and increase the loss of historically occupied range. The remaining fluvial Yellowstone cutthroat trout would be reconnected to the Shields River but would continue to face risks of hybridization with the abundant rainbow trout.

The consequences of diversion failure would be substantial to water users served by the diversion. The cost of diversion replacement is prohibitive at an estimated $1 million. Producers would need to find and alternative water supply, switch to dry land agriculture, or go out of business.

3.2.2 Alternative 3: Repair of the Structure without Implementing the Fisheries Components

Under this alternative, the structural problems of wear on the front of the diversion, damage to the abutments, and the presence of the scour hole would be fixed. The Lower Shields River Canal Company would be ensured continued delivery of water; however, none of the fisheries benefits would be met. The sediment notch would remain a potential route of rainbow trout invasion. Designs for repair would not necessarily account for the swimming and leaping abilities of rainbow trout, so fish passage over the structure would be possible. Restoration of the migratory life-history strategy for Yellowstone cutthroat trout would not occur without construction of the selective fish passageway.

4.0 ENVIRONMENTAL ASSESSMENT CONCLUSION SECTION

4.1 Evaluation of Significance Criteria and Identification of the Need for an EIS

Evaluation of the potential effects on the physical and human environment in 2.0 ENVIRONMENTAL REVIEW provides the basis for determining the need for an environmental impact statement (EIS) which is a more rigorous evaluation of the potential impacts to human health and the environment from the proposed action. If evaluation of these significance criteria suggests the proposed action may result in significant impacts, an EIS would be required.

This environmental review demonstrates the impacts of the proposed project are limited and can be mitigated. The proposed actions would benefit native Yellowstone cutthroat trout in the

Shields River watershed. In addition, agricultural producers served by the Lower Shields River Ditch would benefit from a continued supply of water. Therefore, the EA is the appropriate level of environmental review and an environmental impact statement (EIS) is not required.

4.2 Level of Public Involvement

Several factors influence the appropriate level of public involvement for a given proposed action. Risks to human health, the environment, and local economics as well as the seriousness of the environmental issues are key considerations. This project will include a 23-day public comment period. The public will be informed of the potential project through press releases in local newspapers and through a notice on FWP's website (http://fwp.mt.gov/news/default.aspx). Should sufficient public interest arise, FWP will plan a public meeting and will advertise through the same venues as described above.

4.3 Public Comments

The public comment period will extend from July 19, 2012 to August 10, 2012.

Send comments to:

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4.4 Parties Responsible for Preparation of the EA

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5.0 LITERATURE CITED

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