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# Lewis River Hydroelectric Projects

*FERC Project Nos. 935, 2071, 2111, 2213*



## Lewis River Acclimation Pond Project

Final

August 8, 2011



**McMILLEN, LLC**

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## 1.0 Introduction

The Lewis River Settlement Agreement (SA) calls for PacifiCorp Energy and Cowlitz PUD to establish juvenile salmonid acclimation sites in the upper Lewis River watershed to aid in the reintroduction of anadromous fish. The language in the SA states:

### 8.8 *Juvenile Acclimation Sites.*

8.8.1 *Above Swift No. 1 Dam. Beginning upon completion of the Swift Downstream Facility, the Licensees shall place juvenile salmonid acclimation sites in areas reasonably accessible to fish hauling trucks and in practical areas in the upper watershed above Swift No. 1 Dam, as determined by the Licensees in Consultation with the Yakama Nation and the ACC. The acclimation sites shall consist of fish containment areas that allow juvenile fish to acclimate in natural or semi-natural waterways and allow necessary pre-release juvenile fish management; such sites will not consist of or include concrete-lined ponds or waterways, but may include other concrete structures necessary for facility functionality and structural integrity during the supplementation program.*

The SA (Section 8.4.3) also calls for the juvenile and adult supplementation of three species: spring Chinook, late winter wild steelhead and Type S coho. In 2006, discussions occurred at the monthly Aquatics Coordination Committee (ACC) meetings regarding location of the acclimation sites and whether or not juveniles of all three introduced species should be placed in the acclimation ponds.

During the June 8, 2006, ACC meeting at the Washington Department of Fish and Wildlife (WDFW) office in Vancouver, Washington, the Parties in attendance<sup>1</sup> agreed to use an initial target of 100,000 spring Chinook for the juvenile supplementation program and that, at the onset, it was not necessary to supplement juvenile coho and steelhead. The general agreement in the decision process was that coho and steelhead adults will likely successfully seed the watershed without additional juvenile supplementation but could be added to the acclimation program, if needed, at a later date. For coho this has been shown to be a valid assumption since the current Habitat Preparation Plan (HPP) fish have spawned and their offspring have occupied nearly every stream in the upper watershed and also occur in all three reservoirs. HPP activities have been in place for the past six years under SA article 7.4. The acclimation ponds sites have now been identified, designed, and will be operated at the onset for the juvenile spring Chinook supplementation program. Adult supplementation will include spring Chinook, late winter wild steelhead and Type S coho as stated in the Settlement Agreement. Hatchery Genetic

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<sup>1</sup> ACC Attendees: Craig Burley, WDFW; Jim Byrne, WDFW; Clifford Casseseka, Yakama Nation; Diana Gritten-MacDonald, Cowlitz PUD (via teleconference); Adam Haspiel, USDA Forest Service; Erik Lesko, PacifiCorp Energy; Kaitlin Lovell, Trout Unlimited (via teleconference); Tammy Mackey, American Rivers and Trout Unlimited; Jim Malinowski, Fish First; Kimberly McCune, PacifiCorp Energy; Todd Olson, PacifiCorp Energy; Frank Shrier, PacifiCorp Energy; Karen Thompson, USDA Forest Service (via teleconference); Richard Turner, NMFS; John Weinheimer, WDFW; Shannon Wills, Cowlitz Indian Tribe (via teleconference)

Management Plans (HGMPs) were developed by WDFW for all three species and approved by the Hatchery Supplementation Subgroup (HSS). The HGMP for spring Chinook specifically addresses the fish culture methods and protocols and anticipates an acclimation pond program. Steelhead and coho HGMPs have also been reviewed by the ACC.

Three sites have been approved by the ACC with one acclimation facility at each site (Figure 1). An alternative site was selected at Eagle Cliffs to be used if one of the other sites fails. Table 1 provides a description of attributes for each of those sites. An extensive search of the upper watershed did not yield any additional candidate sites that met the following criteria: absence of fish barriers downstream; suitable truck access; adequate distance up into the watershed; plus quality spawning and rearing adjacent to each site. The three primary sites selected were Muddy River, Clear Creek and Crab Creek. All three sites are located on U.S. Forest Service (USFS) lands and, as such, actions identified as part of this plan will require a National Environmental Policy Act (NEPA) analysis and USFS special-use permitting.

PacifiCorp staff met with USFS staff and management on November 16, 2009 to discuss the pond sites and the steps needed to obtain USFS approval. At that meeting the USFS staff expressed general support for the plan indicating there would be a number of steps that must be completed prior to issuance of special use permits.

The preferred sites were visited on December 1, 2009 by interested ACC members, and the design firm of McMillen, LLC for the benefit of the design team to gather further information for the final designs (see attendee list and trip report in Appendix). A Technical Memorandum/trip report from that visit and an earlier one, including attendee comments, is attached.

## 2.0 General Plan

The three pond facilities were initially designed to hold one-third or more of the 100,000 spring Chinook juveniles in approximately 2,100 cubic feet of water with a 1.2 cubic foot per second (cfs) water supply. During the initial comment period for Version 1 of the acclimation pond plan, WDFW recommended 5,500 ft<sup>3</sup> and about 2 cfs of water, but also attached the criteria used for the Cle Elem acclimation projects. McMillen prepared a comparison table of criteria for the different approaches including Cle Elem pond loading and fish size criteria (Table 2). Since side channels with mainstem intakes are proposed for Clear Creek and Muddy River, it is possible to achieve a larger rearing space with increased water supply if the ACC decides the 100,000 juvenile spring Chinook program does not provide adequate supplementation or if more fish need to be planted at those two sites and fewer at the Crab Creek site.

All supplementation fish will have their adipose fins intact and will be marked with a blank wire tag or other unique mark to identify each fish with its acclimation pond origin. In addition, a ten percent sample from each pond will have PIT-tags to aid with further evaluation of success of the supplementation program. Carcass recovery surveys along with other survey techniques implemented in the upper watershed, as described in the Final Lewis River Monitoring and Evaluation Plan (M&E Plan), will provide the mechanism to estimate total adult returns for each pond.

Draft 60% Design drawings were distributed to the ACC for comment on April 29, 2011 for 30-day review. The final approved plans were submitted to the ACC on June 24, 2011. The final site plans are included at the end of this document (see Attachment D). As originally drawn, each pond had the capacity to hold 33,333 fish with a 1.2 cfs water supply for conceptual purposes. Since early drawings were issued, it was determined that Clear Creek should be designed to hold additional fish if the need for more rearing space arose. Consequently, rearing space at the Clear Creek site has been expanded such that it can hold up to 90,000 Chinook which requires 6,800 cubic-ft. and an inflow of 1.2 cfs. This additional capacity design is included in the 60% and the final design drawing package.

The final drawings show actual pond designs and sizes that vary by site. Since space is limited at the Crab Creek site, the 60% and final pond design is sized to hold 33,000 Chinook but the design has changed completely to an instream structure that relies on mainstem Lewis River flow plus Crab Creek flow to provide adequate water for rearing. Final design capacity for Crab Creek is 33,000 Chinook with a holding volume of 2,500 cubic-ft. Capacity of the pond at Muddy River was increased to 125,000 Chinook with a holding capacity of 9,500 cubic-ft. and an inflow of 1.2 cfs. The acclimation program is scheduled to begin in the fall 2012 for Crab Creek site and spring 2013 for the Muddy River and Clear Creek sites. The acclimation program will continue for a minimum of 15 years unless the Licensees and the ACC elect to extend the program on a year-to-year basis.

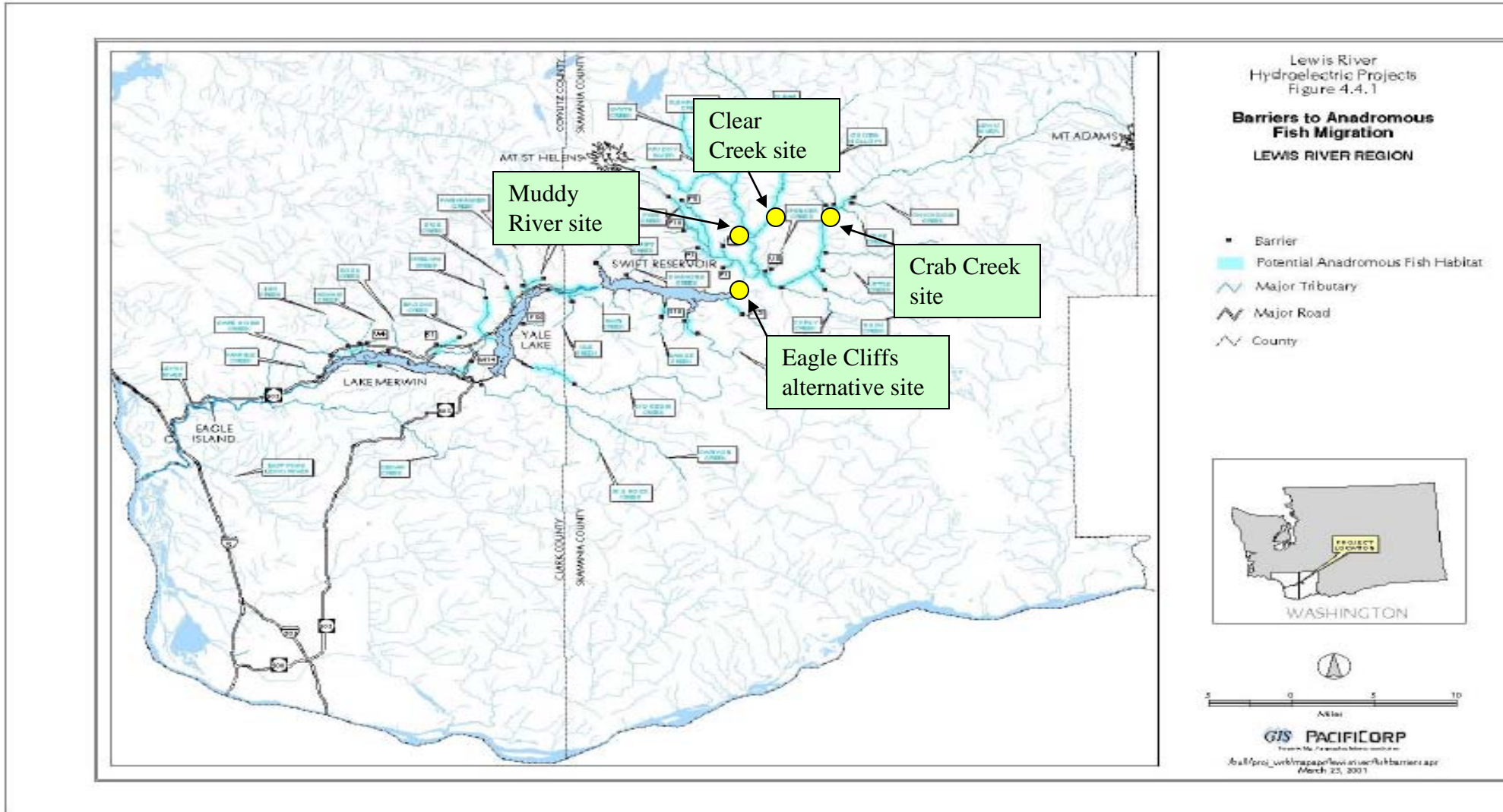


Figure 1: Map of the Lewis River basin showing all accessible habitat and anadromous fish barriers (small boxes) and the four possible acclimation site locations.

**Table 1: Comparison of potential acclimation sites in the upper Lewis River watershed and decision criteria.**

Site	Access to River?	High in the watershed?	Close proximity to quality habitat?	Water supply Quantity/Quality	Other Considerations
Muddy River	Y	Relatively	Marginal	Good/Good	Has side channel that could be modified – <b>Recommended for use</b>
Clear Creek	Y	Relatively	Y	Good/Good	Can use either side of the Creek – <b>Recommended for use</b>
Mainstem Lewis River at Crab Creek	Y	Y	Y	Good/Good	May have some esthetic/cultural concerns – <b>Recommended for use</b>
Mainstem Lewis River at Eagle Cliffs	Y	N	Y	Good/Good	Very low in the Upper watershed – <b>Recommended as an alternative</b>

**Table 2: Acclimation Criteria Comparison based on the draft pond design.**

Description	PacifiCorp Acclimation Pond Criteria	WDFW Yakima Pond Criteria
Total program numbers	100,000	810,000
Number of sites	3	3
Number released per site (per release)	33,333	45,000
Weight at release (fish/lb)	15	15
Length at release (in)	6	6
Total weight at release (lbs)	2,222	3,000
Water supply flow (cfs) (per site)	1.2	11.2
Acclimation pond volume minimum (cf)	2100	4545
Rearing density index (lb/cf/length of fish in inches)	0.18	0.11
Release density index (lb/cf)	1.06	0.66
Flow Index	0.69	0.10

During a pre-bid meeting and site visit with design consultants in April 2009 it became apparent that access to any of the three sites could be blocked by snow accumulation. The USFS roads are not maintained during the winter and the pre-bid group encountered a three-foot wall of snow at about two miles distance from the Muddy River site which is the lowest elevation of the three sites. An ensuing discussion with Yakama Nation fish biologists confirmed that they have experienced similar problems and have either not planted the acclimation fish at their pond sites in some years or have planted them late in the season and acclimated the fish for two weeks or less. This prompted a discussion over the possibility of acclimating juvenile fish in the fall instead of the early spring.

Alternatively, since fish in the mid-Columbia area leave their respective rearing areas at an earlier time of year than lower Columbia fish, it is possible to place Chinook in the Lewis River ponds later in the year (about mid- to late-April) and release them later in June. This seems to be a reasonable approach given that 1+ smolt spring Chinook outmigrants leave the Cowlitz River system in May and June (Mark LaRiviere, Tacoma Public Utilities). Also, spring Chinook smolts typically leave the Kalama River system in March and April (Cam Sharpe, WDFW). For both systems, however, it appears that the primary Chinook outmigration consists of subyearling fish. For the Lewis River Muddy River and Clear Creek acclimation program, the initial plan is to acclimate late spring 1+ Chinook smolts from mid-April to early-June until size and outmigration timing can be determined for the naturally produced fish. Once that information is realized, the acclimation pond program will be adjusted to mimic the natural spring Chinook outmigration. The Crab Creek program will start out as a fall program with the plan to adapt the timing and methods if needed. This is primarily due to the type of rearing facility and the concerns about flows and debris which would severely compromise a spring rearing strategy.



## 4.0 Site Descriptions

### 4.1 Muddy River Site

The Muddy River site is located on USFS land approximately five miles upstream of the confluence with Lewis River and just upstream of the Forest Road 25 crossing (Figure 1). There is a day-use park at this location which will provide for paved access to the site. This particular section of the Muddy River has a natural side-channel. The existing channel is lined with trees and has boulder, gravel and large woody debris (LWD) components already in place. This side channel is not hydraulically connected to the mainstem Muddy River on the upstream end but, during high flow periods, water can back up into the channel at the downstream end. Site construction would modify the channel on the upper end to provide some pass-through water from the main Muddy River using an infiltration gallery. The lower end will have a screened enclosure to allow for containment of the juvenile spring Chinook. Water will be conveyed from the upper intake to the rearing pond via an underground flowline. Otherwise the channel will remain as natural as possible (see attached drawings). The completed rearing area will have an approximate volume of 9,500 ft<sup>3</sup> with the capacity to rear up to 125,400 fish.

Once constructed the side channel gates would remain open and stored during the off-season so that, once access to the site is available in the early spring, the inlet/outlet gates will be placed and the channel watered-up and just prior to transfer of juvenile spring Chinook to the facility. A PacifiCorp biologist will monitor condition of the channel prior to fish transfer. In about mid-to-late-April of 2013, the ponds will be stocked with 45,000 spring Chinook at roughly 20 to 25 fish per pound (fpp). The number of fish ponded will likely change from year to year depending on success and condition of the other two ponds.

The spring Chinook will be checked daily at the onset of the program until the best visiting frequency is determined. Then, pond visits could taper off to about three times a week. The purpose of the pond visits is to verify proper flow through the ponds and to distribute some food supplementation. The fish will be allowed to emigrate from the ponds when they have achieved a size of 16 to 17 fpp (about 125 mm) or once they begin to exhibit smolt characteristics (e.g., silvery appearance, loose scales, etc.) including behavior such as circular swimming in schools. To allow for fish to leave the pond, the downstream screen will be removed and the fish will then be able to exit the facility volitionally. When natural production spring Chinook smolts begin to arrive at the Swift FSC, fish remaining in the acclimation pond will be forced to leave. The purpose of this strategy is an attempt to maintain acclimation fish release timing and migration that coincides with the wild run.

It is possible that, during the acclimation rearing period, flooding could occur that could allow these fish to inadvertently leave the facility. Flooding is a natural occurrence and is simply considered an acceptable 'early-release' mechanism. Any fish remaining in the acclimation pond after a flood will be tended to until the scheduled release time as long as the pond conditions are stable and suitable for further rearing. Otherwise the remaining fish will be taken from the pond and placed in the river by the simplest possible means.

Once acclimation rearing is complete and all fish have left the pond, any removable parts or equipment will be transferred to a storage facility and the area will be left to function as it normally would with only the inlet and outlet structures left in place.

## **4.2 Clear Creek Site**

The Clear Creek site is located on USFS land approximately 1.5 miles upstream of the confluence with the Muddy River. This site is located across the river from a dispersed camping site on Forest Road (FR) 9300. Discussions have centered around constructing a pond on the side of the creek opposite the dispersed camping area on the downstream side of the bridge where a natural side channel exists. Based on survey work McMillen engineers found this location to be suitable and developed plans to use the natural side-channel features (see attached drawings). It is anticipated that the site will be excavated to enhance the side-channel gradient much like the Muddy River site with concrete inlet and outlet structures. The intake structure will take surface water from Clear Creek rather than use an infiltration gallery. Operation, timing and size of fish and protocols would be similar to those at the Muddy River site. However, there is enough inherent flexibility at this site to rear more spring Chinook if needed. Since the Crab Creek site (next Section) has limited space and water supply, the Clear Creek site has been expanded to an approximate volume of 6,800 ft<sup>3</sup> with the capacity to rear up to 89,760 fish. In Spring 2013, the ponds will be stocked with 40,000 spring Chinook. The number of fish ponded will likely change from year to year depending on success and condition of the other two ponds.

## **4.3 Crab Creek Site**

The third site is located on the mainstem Lewis River on the south bank of the Lewis River upstream of the Crab Creek Bridge on USFS land which is approximately ten miles upstream of the confluence with Swift Creek Reservoir and one mile downstream of Lower Falls. An acclimation pond constructed in the Lewis River is proposed at the outlet of Crab Creek. This pond will receive flow from both Crab Creek and hyporheic flow from the Lewis River (see attached drawings). An existing pool at this location would be deepened and widened to allow for fish acclimation and a net structure with ½-inch mesh would be placed at the outlet to prevent escapement. Natural structures will be installed in and surrounding this pond to promote fish retention and provide cover for fish. The completed rearing area will have an approximate volume of 2,500 ft<sup>3</sup> with the capacity to rear up to 33,000 fish.

The pond would be activated in the fall just after Labor Day. An outflow structure will pass water from the pond into the Lewis River. Fish will be placed into the pond structure directly from a fish truck. Operation and protocols would be similar to those at the other two sites although fish will be released based on time-in-pond rather than size unless there are some outmigration behaviors exhibited. Because of the uncertainty with this type of rearing structure the ACC has elected to place fewer fish at Crab Creek until the reliability of this design can be verified. Approximately 15,000 fish will be stocked at this site in 2012.

We expect that one person will access the site daily in the beginning and approximately three times a week. Fish will be volitionally released beginning in about mid-October by removing the barrier net and allowing the fish free access to the mainstem Lewis River. After the majority of the fish have departed, the pond rock structure will be left in place and the outlet reassembled just prior to the next year's rearing time. This option allows for little to no further disturbance to the riparian area. It also allows for flexibility such that if this site does not seem to be effective, it could be easily obliterated and fish reared at an alternative location such as Muddy River, Clear Creek or Eagle Cliffs. There may be some fish that elect to stay in the pond area so there will not be any attempt to force them to exit.

For the above three sites, operational details are provided in the Technical memorandum included with the final design drawings (see [http://www.pacificorp.com/content/dam/pacificorp/doc/Energy\\_Sources/Hydro/Hydro\\_Licensing/Lewis\\_River/06242011\\_LR-AcclimationPondDesignSubmittal\\_FINAL.pdf](http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Lewis_River/06242011_LR-AcclimationPondDesignSubmittal_FINAL.pdf) ).

#### **4.4 Eagle Cliffs Alternative Site**

If, for any reason one of the above sites proves to be infeasible or is not producing good returns, then PacifiCorp will develop an alternative acclimation site at Eagle Cliffs. At this site, a small side channel exists in a relatively un-vegetated gravel bar. There is potential to develop a functioning side channel upstream of the FS-90 bridge but there is also potential to develop an instream pond much like Crab Creek on the downstream side of the bridge. If this alternative site is needed, it will be further assessed for an appropriate structure. Details will be developed for this site if and when the need arises.

## 5.0 Reporting

An annual report will be developed that describes the previous year's operation and plans for the following year. This report will be issued in draft form to the Aquatic Coordination Committee (ACC) in mid-summer following each year's release and after the spring fish outmigration period. The final report will become part of the annual ACC/TCC report.

## 6.0 Attachments

**ATTACHMENT A**  
**McMILLEN MEMORANDUM:**  
**LEWIS RIVER ACCLIMATION PONDS CONCEPTUAL DESIGN REVIEW –**  
**MEETING MINUTES**

# McMILLEN, LLC

To:	Frank Shrier	Project:	Lewis River Acclimation Ponds
From:	Mort McMillen	Cc:	Nathan Higa, Briana Weatherly, File
Date:	December 2, 2009	Job No:	1039.05
Subject:	Lewis River Acclimation Ponds Conceptual Design Review - Meeting Minutes		

## 1.0 PURPOSE

A site visit to each of the proposed Lewis River Acclimation Sites was conducted by PacifiCorp on December 1, 2009. The purpose of the meeting was to review the proposed conceptual design layouts at each facility, identify potential issues with the design and operation, discuss the overall implementation and operation of the proposed facilities and identify permitting steps needed to complete the projects. The following people were in attendance:

Name	Organization
Mort McMillen	McMillen, LLC (McMillen)
Jason Poulsen	McMillen
Derek Nelson	McMillen
Nathan Higa	PacifiCorp
Frank Shrier	PacifiCorp
Briana Weatherly	PacifiCorp
Phoebe Patterson	U.S. Forest Service (USFS) North Zone Planning Unit
Dave Hu	USFS
Eric Kinne	Washington Department of Fish and Wildlife (WDFW)
Aaron Roberts	Washington Department of Fish and Wildlife (WDFW)

## 2.0 DISCUSSION

The meeting attendees met at the PacifiCorp Merwin Hydro center at 9:00 am. From the Hydro center, the meeting attendees traveled to each of the acclimation sites. The major discussion points for each facility are presented in the following paragraphs.

## 3.0 CRAB CREEK

Mort McMillen presented the basic layout of the proposed facility. Mort pointed out that two locations were evaluated at this site. The first was located on the right abutment of the Lewis River upstream from the existing bridge. Mort indicated that this location was found to be infeasible due to the lack of hydraulic drop within this river reach. The intake would have to be

located a significant distance upstream to provide a gravity intake as well as an extensive excavation required to bury the water supply pipeline. The pipeline route would pass through a sensitive cultural area which was not acceptable to the USFS. For these reasons, the acclimation project site was focused on Crab Creek.

For this location, Mort pointed out that the acclimation ponds would be located on the downstream side of the bridge adjacent to the existing gabion wall abutment. An intake structure would be located up Crab Creek a sufficient distance to ensure gravity water supply to the acclimation ponds. The meeting attendees then walked up to the intake location and discussed the design, operation, and environmental issues associated with this location. The major points were as follows:

- (1) Mort pointed out that the intake would be located in one of the two existing pools on Crab Creek. The intake structure would consist of a concrete sill fitted with removable stoplogs. The stoplogs would be installed to provide adequate submergence on the water supply pipeline during operation. An intake box would be provided on the left abutment. A 12-inch water supply pipeline would be surface mounted along the left abutment then continue under the existing bridge to the acclimation tanks.
- (2) Eric asked if the intake would have an inclined wedge wire screen providing a self cleaning operation. Eric indicated that WDFW would be concerned that the intake can stay open when the facility is unmanned. Mort indicated that the intake would be designed to be self-cleaning as much as possible.
- (3) Frank and Briana suggested that the water supply pipeline be constructed from black pipe material. They have found that the black material tends to blend into the natural background more than green pipe. Briana also suggested that it might be more environmentally friendly if the pipeline was covered with woody debris in the upper reaches allowing the pipe to remain in service year round. Jason suggested wrapping portions of the pipe with coir fabric to aid in concealing the pipe. The fabric would allow vegetation to grow through providing additional cover (camouflage) and support for the pipe. The lower pipe reach could then be made removable.
- (4) The USFS indicated that their major issues were:
  - No blasting will be allowed.
  - Do not remove any large trees to facilitate the construction.
  - No excavation for burying the pipeline is preferred.
  - Maintain the existing woody debris as much as possible within the stream corridor. Placement of woody debris over the installed pipeline would be preferred.
  - Withdrawal of the majority of flow from Crab Creek during operation would be a major concern. Additional field studies to determine if fish species are present would be required.
  - Construction access and techniques will be important to minimize the impact to the environment.



- (5) Frank indicated that a fall release would be preferred for this site. Fish would be transported to the site in mid-October with release prior to December 1. The acclimation ponds would be erected in late September to support the effort. During low flow years, smaller fish numbers would be brought to the site. There may also be years when there is insufficient water available to acclimate fish. During these years, the fish would be acclimated at one of the other facilities that have more water available.
- (6) Frank indicated that additional baseline data could be gathered for Crab Creek including flows. Frank suggested that PacifiCorp could electroshock Crab Creek with USFS Staff to determine if any fish are present. Frank stated that the creek had been shocked in the past and there were not any fish found.
- (7) Derek indicated that the acclimation tanks would be similar to those manufactured by Husky tank. These would be a portable tank providing approximately 2,500 cubic feet of holding space. The maximum flow rate would be 1.25 cubic feet per second (cfs).
- (8) Eric indicated that WDFW's criteria are different than those used by the Cle Elem facility and also different than the criteria in the draft Acclimation Pond Plan. Frank indicated that McMillen is preparing a table comparing the Cle Elem criteria to the WDFW criteria.
- (9) Eric asked how we would volitionally release fish from the tanks. Mort indicated that they had developed a low level outlet from the tanks for the NEOH acclimation facilities located on the Lostine River, Catherine Creek and Upper Grande Ronde River. Mort agreed to send a photo of this system to Eric. A similar system would be used for the Crab Creek facilities.
- (10) Frank used a velocity meter to estimate the flow rate within Crab Creek. A cross-section was measured approximately 100 feet (ft) upstream from the confluence with the Lewis River. Mort will provide a flow calculation at a later time but the creek was flowing at somewhere between 5 and 6 cfs.

#### 4.0 CLEAR CREEK

Mort walked the group through the proposed layout and operation of the acclimation facility at Clear Creek. A new combined surface water intake and infiltration gallery would be constructed immediately downstream from the existing bridge. The intake would discharge into a natural side channel that extends downstream approximately 400 ft. The side channel splits into a near and far channel. Initially, it was thought that the near channel would be fitted with an inlet and outlet screen structure with the fish acclimated in a natural channel between the structures. The far channel could also be used for fish acclimation. The existing channel would have to be excavated to provide a minimum of 3 ft of acclimation water depth within the channel. The major discussion points included:

- (1) The right bank area upstream from the bridge has experienced heavy erosion. A large tree has fallen into this area and extensive erosion is visible. The USFS indicated that they had discussed the stability of the existing bridge with their in-house engineers who confirmed

that the bridge is stable in its current configuration. The USFS intends to complete a riparian planting project in the area upstream from the bridge which could provide some stability to the channel section. Mort indicated that a significant amount of bank erosion would have to occur for the creek to bypass the bridge and cut a new channel around the right abutment of the bridge.

- (2) Eric asked if drum screens or vertical screens would be used for the outlet structures. Eric prefers drum screens to handle the leaf debris which would be expected with the new channel. Mort pointed out that drum screens handle floating debris very well, but do not handle icing well. Frank indicated that a fall release at this location would also be preferred due to access and icing issues associated with a spring release. The merits of a fall release versus spring release are yet to be resolved.
- (3) Frank and Eric indicated that they would like to see the design have the flexibility to use the upper channel, middle channel, and lower channel for acclimation. The intake structure would have to be designed to provide sufficient flow to maintain the channels. Mort indicated that this would probably be around 5 cfs. Frank and Briana agreed that it may be prudent to increase the water right application from the current 3 cfs to 5 cfs to provide the flexibility for future expansion at this site.
- (4) Mort indicated that additional flow control structures would have to be provided to allow the flow to be split between multiple channels. The vertical drop from the existing access road to the acclimation channels is sufficient to easily transport fish via gravity to any of the three locations.
- (5) Frank indicated that they would like to see structure provided within the channel (preferably large cobble) for fish escape from potential predators. Large rocks would be preferred in conjunction with larger diameter trees spanning the channel.
- (6) USFS asked if the intake structure would have any components sticking up that would be aesthetically unappealing or create an attraction for potential vandalism. McMillen intends to design the structures with low profile/visibility.

## 5.0 MUDDY RIVER

Mort walked the group through the proposed conceptual layout from the intake to the outfall. An intake structure would be located approximately 1,200 ft upstream from the existing parking area. The intake would be a combined infiltration and surface intake providing the flexibility to divert water into a water control manhole which would be buried on the left abutment of the river. A control valve would be located within the control manhole. A 12-inch diameter water supply pipeline would extend downstream approximately 1,200 ft to an existing natural drainage side channel. The pipeline terminus could be located in several locations along the natural channel alignment. The existing channel downstream from the parking area would be enhanced through excavation and channel shaping to maintain a 3-foot water depth and install inlet and outlet screens. The major discussion points with this acclimation site were as follows:

- (1) Mort pointed out that the intake site was located significantly upstream to provide adequate head for the water supply pipeline as well as provide a semi-stable river channel section. Derek pointed out review of past aerials of the project site showed that the river had moved completely across the floodplain. We would expect the river to continue channel changing activities over time, particularly after large flow events. The intake structure will be a long term maintenance issue. A second intake location was identified approximately 200 ft upstream. The group agreed that this location appeared to be a better spot from a channel stability standpoint. McMillen will provide additional evaluation of the intake location.
- (2) Frank indicated that he was surprised by the height of the existing river bank at this location as well as the lack of a connected side channel. The required intake structure and pipeline makes more sense upon viewing the existing site conditions.
- (3) Several discharge locations are available for the new water supply pipeline. Discharging at the upstream end of the site channel would minimize the pipeline size, but require excavation to provide adequate flow area through the existing channel. Eric liked this location from the standpoint that no fish stranding in non-flow areas of the channel could occur. Discharging immediately downstream from the existing beaver dam would maintain the existing channel and potential wetlands, but would require an inlet and outlet screen to confine the fish to the acclimation channel. McMillen will provide additional evaluation of the pipeline discharge location and screen locations to prevent stranding of fish.
- (4) The existing channel downstream from the parking area will have to be excavated to provide adequate holding volume for acclimation. The downstream end of the channel will be fitted with an outlet screen and stoplogs which can be pulled to allow volitional release of the fish.
- (5) The group observed the existing sedimentation problem at the side channel outlet. The existing bridge has created a rock bar which has shut off flow adjacent to the left bank of the river. Flow from the acclimation channel will continue to a discharge location downstream from the bridge. The group agreed that there is a potential for the outfall to be filled in with sediment during a large flood event. There could be a significant amount of annual maintenance required to maintain the outlet channel to support a volitional fish release.

## 6.0 SUMMARY

Upon completing the site walk through at the Muddy Creek site, the group discussed the general observations and follow-up action items. These items were as follows:

- (1) USFS indicated that they would like to see more natural systems incorporated at the sites. They would like to see the design elements clearly defined and operational approach outlined for each site including normal and emergency requirements. Required long term maintenance requirements will also have to be identified.

- (2) Phoebe would like to see the environment and permitting effort started early rather than later. Phoebe pointed out that sometimes advancing the design without considering the environmental analysis results in the design being modified to incorporate a resource concern late in the design process. Phoebe advocated advancing the environmental work in concert with the design.
- (3) Briana indicated that she would like to see all potential operating scenarios clearly defined such as fall and spring operation, access by road or helicopter, moving fish between the facilities depending on river operating conditions and flows, and other related operation items. These potential operating parameters will have to be clarified in the Acclimation Pond Plan to support the environmental analysis and provide PacifiCorp with the flexibility for future operation without having to return to the permitting process. It is understood that a fish, wildlife, vegetation and cultural survey will need to be completed along with an ordinary high water mark delineation on all of the sites. The Muddy River site will also need a wetlands delineation. Briana further stated that we have approximately 9 months to complete the permitting process.
- (4) Frank indicated that the proposed schedule is to complete the design process by September 2010. Construction is currently scheduled for summer of 2012 during the in stream period of July 1 through August 31. The permitting would occur throughout this time period.
- (5) Mort indicated that McMillen would provide an operational summary to PacifiCorp for review and incorporation into the permitting process.
- (6) Mort indicated McMillen will prepare draft meeting minutes for PacifiCorp.

**ATTACHMENT B**  
**McMILLEN MEMORANDUM:**  
**TRIP REPORT FROM SITE VISITS TO THE LEWIS RIVER ACCLIMATION POND PROPOSED**  
**SITES**

# McMILLEN, LLC

To:	Nathan Higa PacifiCorp	Project:	Lewis River Acclimation Ponds
From:	Mort McMillen	Cc:	Frank Shrier, PacifiCorp Derek Nelson, McMillen LLC
Date:	June 5, 2009	Job No:	1039.06
Subject:	Trip Report from Site Visits to the Lewis River Acclimation Pond Proposed Sites		

## 1.0 INTRODUCTION

### 1.01 Purpose

The memorandum summarizes the discussions and observations from the site visit to four proposed acclimation pond sites for Spring Chinook Salmon on June 3, 2009. The site visit commenced at the Merwin Facility Offices with representatives from PacifiCorp, Yakima Nation Tribe, United States Department of Agriculture Forest Service (USFS), Washington Department of Fish and Wildlife (WDFW), and McMillen LLC., in attendance. The four sites are located in the upper Lewis River Basin, three of which are located in the Gifford Pinchot National Forest. The forth, alternate site, is located on PacifiCorp property near the head of Swift Reservoir.

The purpose of the site visit was to gather information, pictures, and discuss possible alternatives at each site for placement of acclimation tanks or natural acclimation channels. The objective is to prepare a conceptual design for each site to present to the Federal Energy Relicensing Commission as part of PacifiCorp's Lewis River Settlement Agreement.

### 2.0 Background

The Lewis River Settlement Agreement (SA) calls for PacifiCorp Energy and Cowlitz PUD to establish a juvenile salmonid acclimation sites in the upper Lewis River watershed to aid in the reintroduction of anadromous fish in the upper Lewis River watershed. Details regarding the actual SA language and directions taken from the Aquatics Coordination Committee (ACC) are included in the Lewis River Acclimation Pond site plan. Completion of the final plan is dependent on an engineering evaluation and conceptual design of the individual pond facilities.

The following SA Section details the Acclimation Ponds:

#### 8.8 Juvenile Acclimation Sites.

*8.8.1 Above Swift No. 1 Dam. Beginning upon completion of the Swift Downstream Facility, the Licensees shall place juvenile salmonid acclimation sites in areas reasonably accessible to fish hauling trucks and in practical areas in the upper watershed above Swift No. 1 Dam, as determined by the Licensees in Consultation with the Yakama Nation and the ACC. The acclimation sites shall consist of fish containment areas that allow juvenile fish to acclimate in natural or semi-natural waterways and allow necessary pre-release juvenile fish management;*

*such sites will not consist of or include concrete-lined ponds or waterways, but may include other concrete structures necessary for facility functionality and structural integrity during the supplementation program.*

The SA (Section 8.4.3) also calls for the juvenile and adult supplementation of three species: spring Chinook, winter steelhead and Type S Coho. In 2006, discussions occurred during the monthly Aquatics Coordination Committee (ACC) meetings regarding location of the acclimation sites and whether or not juveniles of all three introduced species should be placed in the acclimation ponds. During the June 8, 2006, ACC meeting at the Washington Department of Fish and Wildlife (WDFW) office in Vancouver, Washington, the attending parties agreed to use a target of 100,000 spring Chinook for the juvenile supplementation program as a starting point and that it was not necessary to supplement juvenile Coho and steelhead (see attached final meeting notes). The general agreement in the decision process was that Coho and steelhead adults will be able to seed the watershed without additional juveniles although the option remains open to supplement with juveniles if needed. Therefore, the acclimation ponds will be sited, designed and managed solely for the juvenile spring Chinook supplementation program. Supplementation numbers may increase or decrease from the initial 100,000 Chinook depending on the success of the program. A Hatchery Genetic Management Plan (HGMP) has been developed by WDFW that specifically addresses the fish culture methods and protocols for the spring Chinook supplementation program.

The ACC selected three sites for this project with one acclimation facility at each site. The sites selected are Muddy River, Clear Creek and Crab Creek. The Eagle Cliffs site was selected as an alternative site if one or more of the initial sites do not work.

It is expected that each of the three pond structures will be designed to hold one-third or more of the 100,000 spring Chinook juveniles in approximately 2,100 cubic feet of water with a 1.2 cubic foot per second (cfs) water supply. Acclimation facility design will vary to accommodate the terrain and access at each site. All supplementation fish will have their adipose fins intact and will be marked with a coded wire tag (CWT) that will identify them with their acclimation location.

### 3.0 Observations

#### 3.01 Crab Creek

The basic observations discussed by the meeting attendees for the Crab Creek site are presented in Table 1.

**Table 1. Summary of Field Assessment Observations**

Facility Element	Observation	Reference Photo (See Appendix A)
Acclimation Type	The ponds would be removable and could be located near the Gabion wall on either side of the bridge or in the undeveloped camp site upstream of the bridge on the left bank. Aluminum, Vinyl, or other type of tank would be used to acclimate the fish.	3, 4
Operation Period	Operation of the acclimation ponds would either be in the fall from October to November or in the spring from late February to early April. Access during the spring is limited due to 4-7 feet of snow. Due to high public use during the fall season the equipment would be visible to the public and open to vandalism. The road to the site is normally open from about Memorial Day to Mid November.	N/A
Water Supply	Crab Creek could be utilized as the water supply for the acclimation ponds. Water quality and flow data on the creek is limited and further data collection will be required. For a fall operation period, the Crab Creek flows may not be adequate to supply the required 1.2 cfs. Spring operation concerns would be ice formation on the intake and access to the site and intake structure. Water supply is available from the Lewis River however it may require placing the intake a significant distance upstream to provide an adequate head differential to deliver the water.	2, 5
Pipe	For a Lewis River water supply a significant length of pipe would be required. Crab creek would require that the pipe be routed through steep topography through a heavily wooded area.	5
Staffing	One visit per day would occur at the site	N/A
Site Constraints	Lower Falls is approximately 1 mile upstream from the site and is a complete barrier to fish.	N/A
	Any modifications to the bridge would need to go through USFS Engineering. Possible cultural site on left bank looking upstream from bridge. Forest Service to provide cultural information.	6
USFS Concerns	Cultural site protection, aesthetics, ground disturbance, bridge modifications, water quality/quantity, access, no public restrictions	N/A

### 3.02 Muddy River

The basic observations discussed by the meeting attendees for the Muddy River Site are presented in Table 2.



**Table 2. Summary of Field Assessment Observations**

Facility Element	Observation	Reference Photo (See Appendix A)
Acclimation Type	The muddy location provides a natural side channel that would be used for an acclimation pond. The channel is approximately 1,300 feet long and well vegetated. An intake structure, an outfall structure, and a mid channel structure would be incorporated to provide a section of the natural side channel for rearing. The outlet structure would allow for ponding of the acclimation area for the acclimation period. The mid channel structure would isolate the fish to the lower section. A gate/screen at the outlet structure would be removed for volitional release. The channel would require a constant grade and well defined channel to the Muddy River to avoid stranding fish during low flows or release. Manual crowding may be needed if fish don't leave volitionally. Removable portions of the structures could be stored for the off season.	7, 8, 9
Operation Period	Operation of the acclimation ponds would either be in the fall from October to November or in the spring from late February to early April. Access during the spring is limited due to snow.	
Water Supply	An intake structure would be located on the Muddy River near the head of the side channel. The main issues are icing of the channel in shallow sections and predation. Increasing the depth of the channel with the outlet structure may be an option. Good water quality and flow data for the Muddy River.	N/A
Pipe	A pipeline will not be required. Three small intake structures will be required. Structures need to be removable at the end of the reintroduction period of 15 years or more.	N/A
Staffing	One visit per day would occur at the site	N/A
Site Constraints	Structures should be aesthetically pleasing	N/A
	Flooding of the channel would provide a natural release to the system. Not seen as a constraint but could deposit excess sediment into the channel causing maintenance issues for the acclimation portion of the channel. May require an annual USFS permit for maintenance work.	7, 8, 9
	Will need to model the channel to insure that proper flow can be maintained in the channel.	N/A
USFS Concerns	Ground disturbance to a minimum, no public restriction. USFS prefers the natural channel system.	N/A

### 3.03 Clear Creek

The basic observations discussed by the meeting attendees for the Clear Creek site are presented in Table 3.

**Table 3. Summary of Field Assessment Observations**

<b>Facility Element</b>	<b>Observation</b>	<b>Reference Photo (See Appendix A)</b>
Acclimation Type	Potential for removable aluminum or vinyl type tanks. Available space on both banks below the bridge that would provide access. Also potential for a side channel similar to the Muddy River site. The side channel is located on the right bank looking downstream from the bridge. Year round connectivity would be an issue. Could supplement flow with an intake structure. USFS like the idea of a side channel that could also be used by resident species. Potential beaver issues.	12 - 15
Operation Period	Operation of the acclimation ponds would be in the spring from late February to early April. Access during the spring is limited due to snow. Plowing may be required.	N/A
Water Supply	For the tank option, an intake structure would be located on Clear Creek above the new cut bank. Concerns of the erosion occurring upstream of the bridge would necessitate an anchored intake structure. Icing and pipe routing could be issues. For the channel, the main issues are icing of the channel in shallow sections and predation. Increasing the depth of the channel with the outlet structure may be an option. Good water quality and flow data for Clear Creek.	10, 12, 15
Pipe	A pipeline will be required for the tank option. Routing the pipe down along the road to the bridge and crossing under the bridge could be an option. USFS engineers would need to examine if pipe were attached or hung from the bridge. A smaller intake structure may be used with a short section of pipe to supplement flows for the channel option.	10
Staffing	One visit per day would occur at the site	N/A
Site Constraints	Eroding banks could produce issues for intakes and pipelines.	10, 11
	Flooding would be an issue for the tank option. Flooding of the channel would provide a natural release to the system. Not seen as a constraint but could deposit excess sediment into the channel causing maintenance issues for the acclimation portion of the channel. May require an annual USFS permit for maintenance work.	12 - 14
	Will need to model the channel to insure that proper flow can be maintained in the channel.	N/A
USFS Concerns	Aesthetics, ground disturbance, bridge modifications, access, no public restrictions. USFS prefers the natural channel system.	N/A

### 3.04 Eagle Cliffs Site

The basic observations discussed by the meeting attendees for the Eagle Cliffs site are presented in Table 4.

**Table 4. Summary of Field Assessment Observations**

Facility Element	Observation	Reference Photo (See Appendix A)
Acclimation Type	Potential for removable aluminum or vinyl type tanks. Available space on left bank looking upstream from the bridge. High public use site. Small potential for a side channel. Not well vegetated.	16
Operation Period	Operation of the acclimation ponds would be in the spring from late February to early April. Access year round.	
Water Supply	For the tank option, an intake structure would be located on the Lewis River above the gravel bar. Concern would be providing an intake with a sufficient head differential to supply the required flows. For the channel, the main issues are icing of the side channel in shallow sections and predation. Increasing the depth of the channel with the outlet structure may be an option. Channel substrate may be too porous to provide sufficient flows. Site would be affected by high water flows however this may be natural release for the system.	17, 18
Pipe	A pipeline will be required for the tank option. Routing of the pipe would be down along the left bank looking upstream. A smaller intake structure may be used with a short section of pipe to supplement flows for the channel option.	17, 18
Staffing	One visit per day would occur at the site	N/A
Site Constraints	High public visibility. Highly used year round site.	16
	Flooding could be an issue for the tank option. To elevate the tanks would require a longer pipeline to achieve proper head differential. Flooding of the channel would provide a natural release to the system. Not seen as a constraint but could deposit excess sediment into the channel causing maintenance issues for the acclimation portion of the channel. Substrate porosity would need evaluation.	17, 18
	Will need to model the channel to insure that proper flow can be maintained in the channel.	N/A
USFS Concerns	Aesthetics, ground disturbance, suggestions. PacifiCorp Property.	N/A

#### 4.0 CONCLUSIONS

For each preferred site, a conceptual design will be addressed. The potential concepts are discussed in the following sections. The conceptual design will be based on an engineering analysis of each site.

##### 4.01 Crab Creek

The Crab Creek site has two possible intake sites with three sites for the acclimation tanks. The preferred intake would be on Crab Creek at a sufficient elevation to provide a gravity fed water supply. Water quality and quantity will need to be evaluated for this option. The second site would be significantly upstream of the bridge on the Lewis River to achieve the required head differential. The tanks could be placed on either bank downstream of the river or on the left bank looking upstream of the bridge. There are cultural concerns that will be addressed and those areas protected.

##### 4.02 Muddy Creek

The Muddy Creek site has great potential as a side channel acclimation site. This will be the primary alternative for this site with two options for each intake, mid-channel, and outlet structure locations and slight modifications to the channel. A third alternative for a tank arrangement will be assessed.

#### **4.03 Clear Creek**

The Clear Creek site provides opportunity for both tank and a natural channel option. The channel option will be preferred and an intake structure will be evaluated to insure adequate flow to the channel during acclimation periods. The channel would be constructed to provide possible year round rearing areas for resident species as well. The tank alternative has two options for sites on either bank downstream of the bridge. The water supply intake structure would be located upstream of the newly eroded right bank looking upstream from the bridge. A pipeline would be routed downstream and under the bridge to service the tanks.

#### **4.04 Eagle Cliffs (Alternate Site)**

The Eagle Cliffs site is an alternate site if any of the preferred sites are determined to be unfeasible. A small side channel exists in a relatively un-vegetated gravel bar. There is potential to develop this into a functioning side channel and will be assessed for feasibility. The tank alternative will assess two potential tank locations and an intake structure for the water supply to both locations.

**ATTACHMENT C**  
**McMILLEN MEMORANDUM:**  
**ACCLIMATION POND CONCEPTUAL DESIGN**

**TECHNICAL MEMORANDUM NO. 002**

**McMILLEN, LLC**

**Memo**

To: Nathan Higa, PacifiCorp	Project: Lewis River Acclimation Ponds
From: Mort McMillen	Cc: Frank Shrier, PacifiCorp Derek Nelson, McMillen LLC File
Date: August 19, 2009	Job No: 1039.06
Subject: Acclimation Pond Conceptual Design	

**1.0 INTRODUCTION**

McMillen, LLC (McMillen) visited the four acclimation sites on June 16<sup>th</sup> and 17<sup>th</sup> 2009, to conduct a preliminary assessment, verify the available hydraulic drop across each site, and complete the general conceptual layout at each location. The staff members participating in the site engineering survey and analysis were Mort McMillen, Colin Turbert, and Derek Nelson.

Finley Engineering provided the survey services for the acclimation pond sites. Topographic maps were provided to McMillen for use in the conceptual design of each site. The survey and maps were completed and delivered on July 15, 2009.

**2.0 PURPOSE**

The purpose of the concept design is to confirm the site layout and feasibility for each site. The design includes:

- Confirm feasibility of a gravity water supply.
- Determine intake location accessibility and protection from erosion, ice, debris, and sedimentation.
- Determine utilization of tank acclimation ponds or natural side channel acclimation.
- Select outlet location for juvenile release.
- Confirm truck access for unloading of juvenile fish.

Each site is analyzed for a gravity water supply system. The water supply system will provide a continuous 1.2 cubic feet per second (cfs) flow to the site. PacifiCorp and the participating agencies prefer the side channel rearing option over the tank rearing option as discussed on the June 3, 2009 site visit.

**3.0 ANALYSIS**

**3.1 Crab Creek Site**

The Crab Creek Site is located on USFS Road 90 near the bridge located approximately one mile downstream from Lower Falls Recreation Site. The original scope for the site included an intake along the Lewis River upstream from the bridge with an alternate intake location on Crab Creek.

The scope proposed to utilize portable ponds for acclimation and could be at a location easily accessible near the bridge.

The Lewis River upstream of the bridge has a cultural site on the right bank and bedrock on the left bank. The engineering survey provided a hydraulic grade line with a drop of 3.5 feet (ft) in approximately 800 ft. The ground surface rose from 6 ft to 25 ft above the water surface traveling upstream. The site topography and river gradient do not provide for an efficient intake and pipeline on the Lewis River.

The alternate site is located on Crab Creek which enters the Lewis River approximately 100 ft upstream of the bridge. An intake structure will be placed in Crab Creek approximately 250 ft upstream from the confluence with the Lewis River in a large pool at an elevation to provide gravity flow to the portable acclimation tanks as illustrated in Figure 1. A valve box will be positioned to be unobtrusive and provide a quick coupling for the pipeline. The pipeline will be approximately 430 ft long and be portable, field routed, and connected to the valve box prior to the acclimation period. The pipe will be field routed on the ground, under the bridge, and then to the portable acclimation tanks. The acclimation tanks will be located near the gabion wall along the left bank downstream of the bridge and be covered with netting to prevent predation. The tanks will drain into one discharge pipe that is routed to the Lewis River. The drains will also serve as fish release conduit at the end of the acclimation period.



**Photograph 1. Crab Creek Intake Location.**



**Photograph 2. Crab Creek Channel.**



**Photograph 3. Crab Creek Acclimation Tank Location.**

### 3.2 Clear Creek Site

The Clear Creek Site is located on USFS Road 9303 near the bridge approximately 1.5 miles upstream of the confluence with Muddy River. There is a dispersed campsite located on the left bank looking downstream from the bridge. The original scope for the site included an intake

McMillen, LLC  
August 19, 2009



along Clear Creek upstream of the bridge. The scope included a pipeline to be routed downstream to a portable tank location near the bridge.

The Clear Creek site provides an opportunity for an acclimation channel. The acclimation channel will be located on the right bank looking downstream from the bridge as illustrated in Figure 2. The acclimation channel will be constructed in an existing side channel and provide a constant grade to an outfall into Clear Creek. The channel will be approximately 365 ft in length and approximately 6 ft in width. A screened surface intake structure will be placed at the head of the acclimation channel. In addition, an infiltration gallery will be installed just downstream of the bridge to provide additional flow for the acclimation channel. A short pipeline with an inline valve for water control will be routed from the infiltration gallery to the head of the acclimation channel. An outlet structure will be placed near the downstream end of the channel to provide water level control and prevent juvenile escapement. At the end of the acclimation period the control in the outlet structure will be removed and the fish released into Clear Creek.



**Photograph 4. Clear Creek Intake Location.**



**Photograph 5. Clear Creek Acclimation Channel.**



**Photograph 6. Clear Creek Acclimation Channel Outlet.**

### **3.3 Muddy River Site**

The Muddy River Site is located on USFS Road 25 near the bridge located approximately 5 miles upstream from the confluence with the Lewis River. The site is located next to a day use recreation area just north of the bridge providing paved access to the site. The original scope for

the site included an intake that would feed an existing side channel that runs between the Muddy River and the day use recreation area. The site would include an outlet structure for water level control and to prevent juvenile escapement.

The Muddy River has changed course in recent years that could cause issues with the acclimation site. This movement and high bed load will cause problems for an intake structure and the outlet location. If the channel converts back to the channel location from 2006, then the proposed intake site will not function. The current proposed intake location is adjacent to a highly unstable bank potentially leaving the pipeline and intake structure exposed to damage. The outlet location for the acclimation channel is located on the left bank looking downstream and just upstream of the bridge. The possibility of a runoff event depositing gravel and sediment that will block off the outfall is high. Fish release would need to be timed to insure connectivity between the acclimation channel and the Muddy River.

The proposed design will place an infiltration gallery approximately 1,700 ft upstream from the bridge as illustrated in Figures 3 and 4. A pipeline will extend into the 7-foot high left bank to a valve box. The valve box will provide flow control for the pipeline down to the acclimation channel. The pipeline is approximately 1,020 ft long with a water surface elevation difference of approximately 5 ft. The acclimation channel is approximately 700 ft long with an elevation difference of about 7 ft. The channel will be approximately 6 ft wide and graded to provide a continuous flow to the outlet. The outlet structure will be used for level control and juvenile escapement control. Existing beaver activity could cause a maintenance issue for the acclimation channel.



**Photograph 7. Muddy River Intake Site.**



**Photograph 8. Muddy River Acclimation Channel.**



**Photograph 9. Muddy River Channel Outlet.**

### **3.4 Eagle Cliffs Site (Alternate)**

The Eagle Cliffs Site is an alternate site located on USFS Road 90 at the bridge located at the Eagle Cliffs day use site near the point where the Lewis River flows into Swift Creek Reservoir.

The original scope for the site included an intake along the Lewis River upstream from the bridge. The scope proposed to utilize portable ponds for acclimation and could be located anywhere easily accessible for the transport truck near the bridge and day use site. This site will be analyzed if any of the previous three sites are abandoned.

**4.0 CONCLUSION**

The proposed gravity water supply systems for the acclimation facilities for each site will function properly. Concerns for each site are listed in Table 1.

**Table 1. Design Concerns**

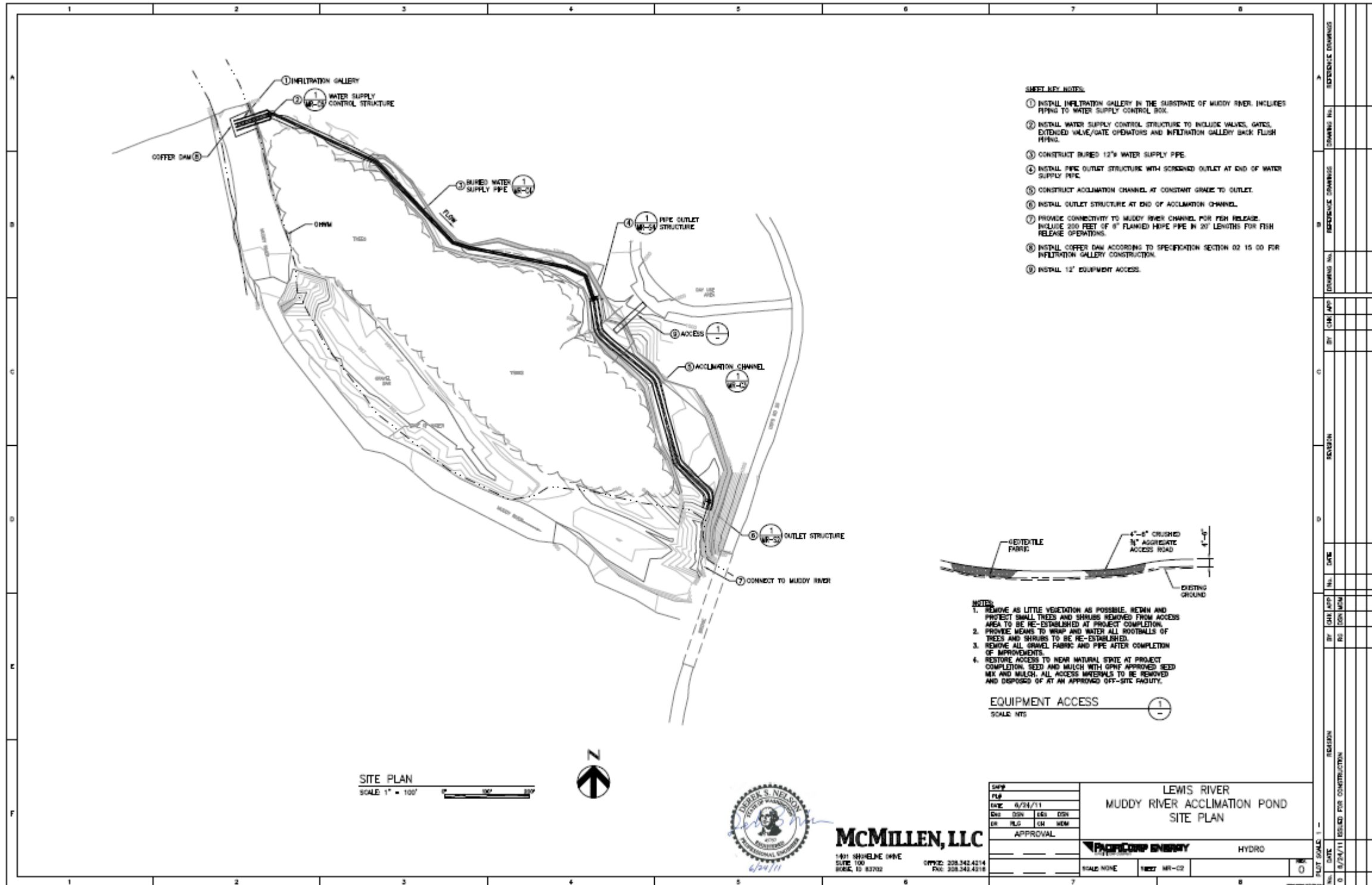
Location	Concerns
Crab Creek	Icing at intake structure and acclimation tanks.
	Access to intake during acclimation period.
	Sediment load affecting intake.
	Water quality and quantity during acclimation period are unknown.
Clear Creek	Beaver activity.
	Icing of intake structure and acclimation channel.
	Sediment load affecting infiltration intake.
	Predation.
Muddy River	Channel/bank stability <ul style="list-style-type: none"> <li>▪ Loss of water supply at intake.</li> <li>▪ Outlet connectivity to the Muddy River lost.</li> </ul>
	Icing of intake structure and acclimation channel.
	Beaver activity.
	Sediment load affecting infiltration intake.
	Access to intake during acclimation period.
	High public visibility.
	Predation.

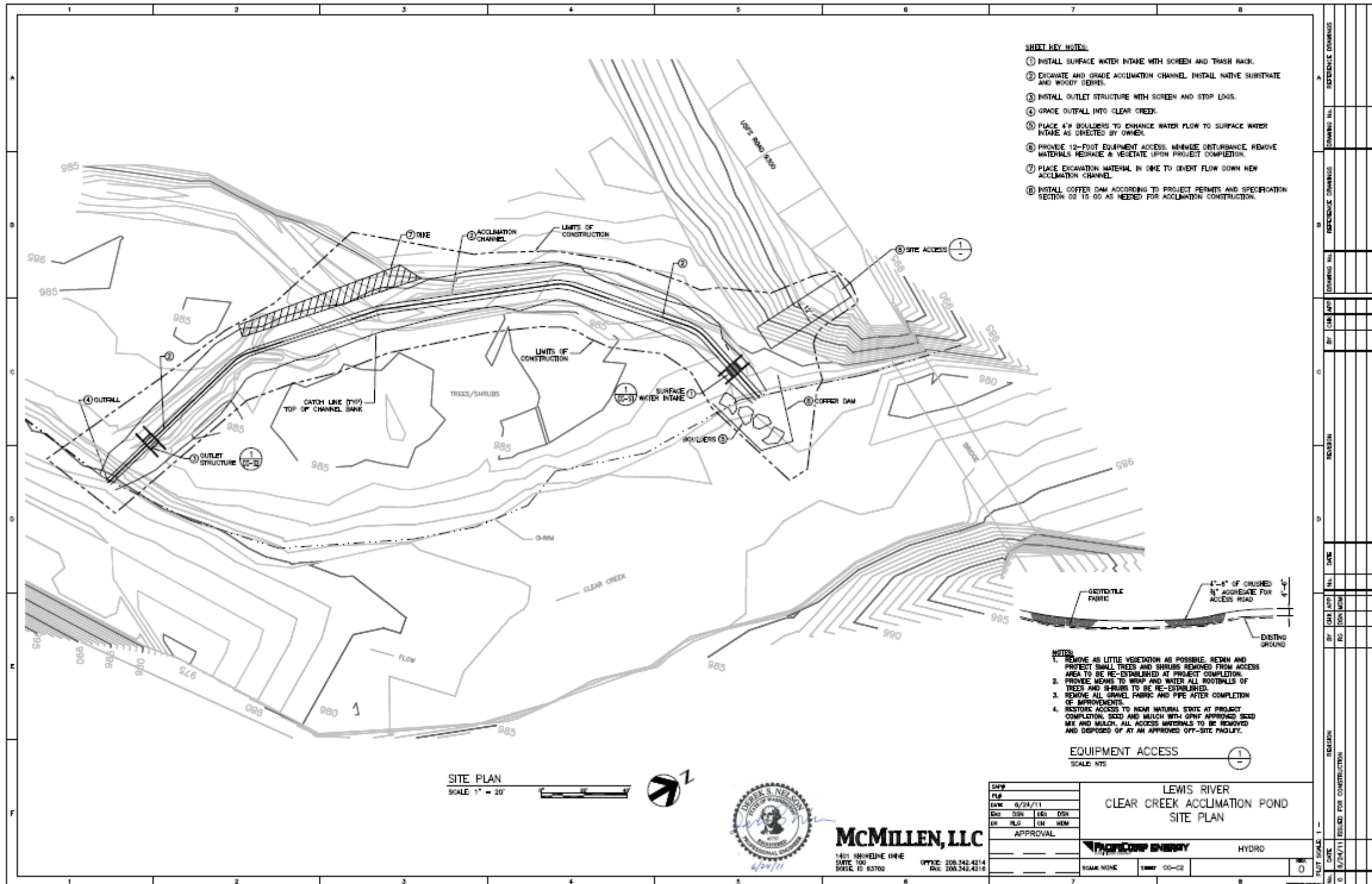
**ATTACHMENT D:**

ACCLIMATION POND FINAL SITE PLANS

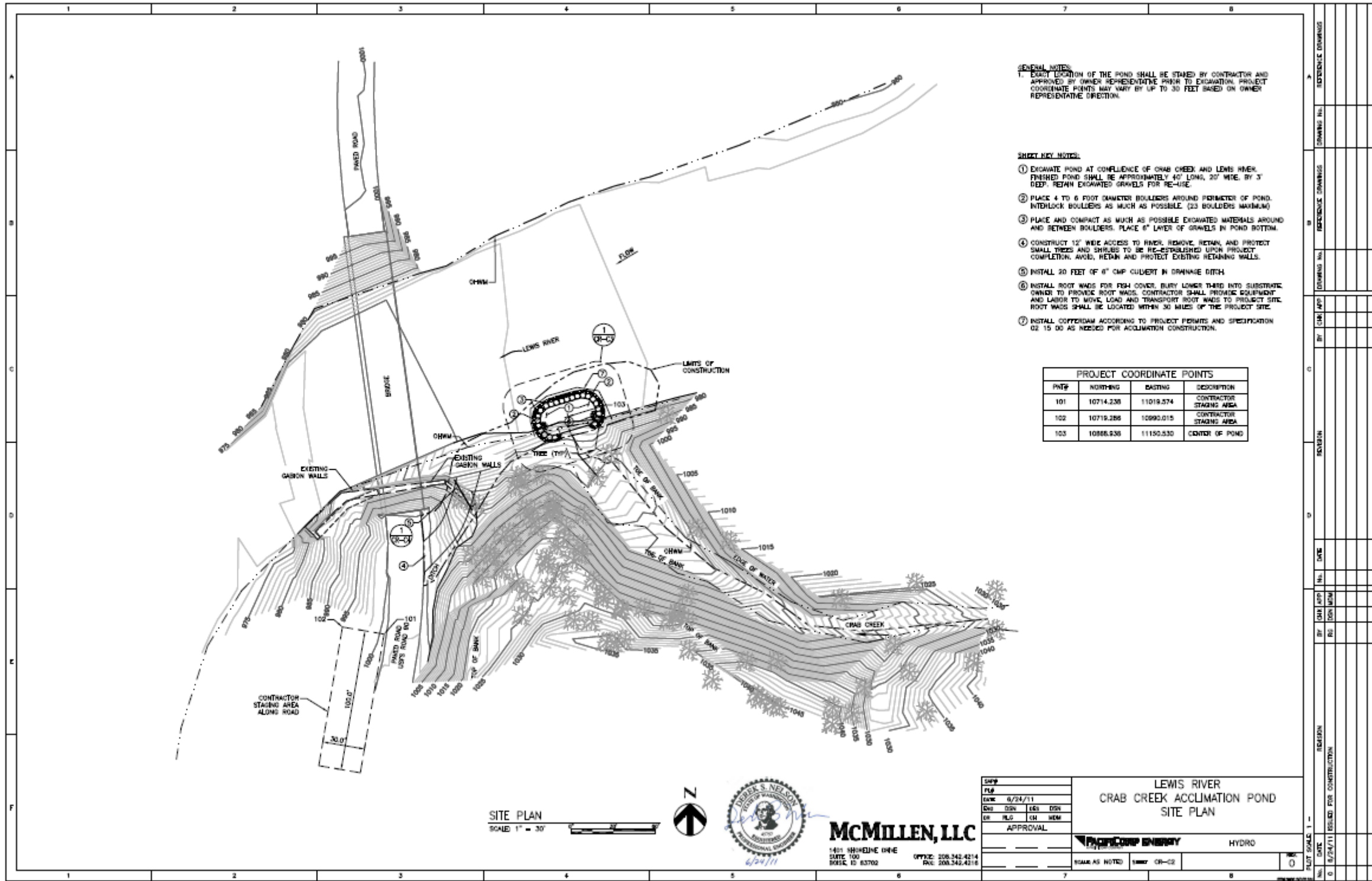
A COMPLETE SET OF DRAWINGS IS LOCATED ON PACIFICORP'S WEBSITE AT:

[http://www.pacificorp.com/content/dam/pacificorp/doc/Energy\\_Sources/Hydro/Hydro\\_Licensing/Lewis\\_River/06242011\\_LR-AcclimationPondDesignSubmittal\\_FINAL.pdf](http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Lewis_River/06242011_LR-AcclimationPondDesignSubmittal_FINAL.pdf)









**GENERAL NOTES:**  
 1. EXACT LOCATION OF THE POND SHALL BE STAKED BY CONTRACTOR AND APPROVED BY OWNER REPRESENTATIVE PRIOR TO EXCAVATION. PROJECT COORDINATE POINTS MAY VARY BY UP TO 30 FEET BASED ON OWNER REPRESENTATIVE DIRECTION.

- SHEET KEY NOTES:**
- EXCAVATE POND AT CONFLUENCE OF CRAB CREEK AND LEWIS RIVER. FINISHED POND SHALL BE APPROXIMATELY 40' LONG, 20' WIDE, BY 3' DEEP. RETAIN EXCAVATED GRAVELS FOR RE-USE.
  - PLACE 4 TO 6 FOOT DIAMETER BOULDERS AROUND PERIMETER OF POND. INTERLOCK BOULDERS AS MUCH AS POSSIBLE (23 BOULDERS MAXIMUM)
  - PLACE AND COMPACT AS MUCH AS POSSIBLE EXCAVATED MATERIALS AROUND AND BETWEEN BOULDERS. PLACE 6" LAYER OF GRAVELS IN POND BOTTOM.
  - CONSTRUCT 12' WIDE ACCESS TO RIVER, REMOVE, RETAIN, AND PROTECT SMALL TREES AND SHRUBS TO BE RE-ESTABLISHED UPON PROJECT COMPLETION. AVOID, RETAIN AND PROTECT EXISTING RETAINING WALLS.
  - INSTALL 20 FEET OF 6" CMP CULVERT IN DRAINAGE DITCH
  - INSTALL ROOT WADES FOR FISH COVER. BURY LOWER THIRD INTO SUBSTRATE OWNED TO PROVIDE ROOT WADES. CONTRACTOR SHALL PROVIDE EQUIPMENT AND LABOR TO MOVE, LOAD AND TRANSPORT ROOT WADES TO PROJECT SITE. ROOT WADES SHALL BE LOCATED WITHIN 30 MILES OF THE PROJECT SITE.
  - INSTALL COFFERDAM ACCORDING TO PROJECT PERMITS AND SPECIFICATION 02 15 00 AS NEEDED FOR ACCLIMATION CONSTRUCTION.

PROJECT COORDINATE POINTS			
POINT	NORTHING	EASTING	DESCRIPTION
101	10714.238	11019.574	CONTRACTOR STAGING AREA
102	10719.288	10990.015	CONTRACTOR STAGING AREA
103	10888.838	11150.530	CENTER OF POND

SITE PLAN  
 SCALE 1" = 30'



**McMILLEN, LLC**  
 1401 SHIMMELINE DRIVE  
 SUITE 100  
 BOSTE, ID 83702  
 OFFICE: 208.342.4214  
 FAX: 208.342.4216

DATE	FILE	LEWIS RIVER CRAB CREEK ACCLIMATION POND SITE PLAN	
DATE	DATE	DESIGN	DATE
BY	BY	CHK	CHK
APPROVAL			
		HYDRO	
SCALE AS NOTED	NO. OF SHEETS	0	

DATE	FILE	DESIGN	DATE
BY	BY	CHK	CHK
APPROVAL			
		HYDRO	
SCALE AS NOTED	NO. OF SHEETS	0	

**ATTACHMENT E**  
**COMMENTS ON THE INITIAL DRAFT PLAN**  
**FROM THE YAKAMA NATION**

## **Yakama Nation Comments to Lewis River Implementation Draft Acclimation Pond Plan-V2**

### **3.0-**

C1- I would suggest that during this study, you make sure that the fall groups are held as long as possible; if 8 weeks, 10 weeks, or more, utilize that. Also, fish size will be important...I would try to have fish released in the fall to be comparable to expected arrival of springtime fish.

C2- When mentioning survival, are you just looking at return rates (SARs) or smolt-to-smolt rates?

George Lee – does not want to use part of the 100,000 for the fall release. Would prefer that we use an additional 15,000 for the experiment.

### **4.0-**

C1- for the Muddy Creek site, you may not need to bring the fish into the acc. site so large. Typically, during spring acc. in the Wenatchee and Methow, we bring fish in at 20-25 FPP and release them at 15 FPP six-weeks later. Although these are coho, which tend to initiate feeding at a cooler temperature, I would think you could bring fish in to the sites a bit smaller than 12-15 FPP. What we have experienced is that the larger the size coming in, the more likelihood that imprinting has occurred at the original rearing location.

C2- Crab Creek site- I would suggest conducting your release strategy study at this site, not Muddy.

Where you can conduct the traditional acclimation, I would do that (i.e.-Clear and Muddy). I thought of this experiment for sites such as Crab where you are trying to develop an alternative to sites where access is a real issue and would only allow for very minimal acc. in the spring.