Exhibit A

Wells Hatchery Modernization Master Plan
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  • Shane Bickford, Natural Resources Supervisor
  • Greg Mackey, Fisheries Biologist
  • Andrew Gingerich, Fisheries Biologist

Also, we’d like to acknowledge the coordination and participation from Grant County PUD and the Yakima Nation regarding components of their programs that were evaluated for potential incorporation into the modernization of this facility.

Jayson Wahls, the WDFW Wells Hatchery Complex Manager, along with the Washington Department of Fish and Wildlife staff associated with the mid-Columbia region have been extremely helpful in attending meetings, providing historical data and assisting with the interpretation of fisheries management policies as they relate to hatchery operations.

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Chapter 1  Introduction

1.1  Introduction
Public Utility District No. 1 of Douglas County (DCPUD or District) plans to complete a modernization of the Wells Hatchery to address aging infrastructure and to ensure the facility will reliably meet future fish culture needs. The modernization will repair, refurbish, or replace several major components of the facility. The groundwater and surface water system will be refurbished to optimize capacity and reliability. The existing volunteer channel adult trap and holding facility will be replaced with a modern trapping and holding facility that will improve handling of both target and non-target fish. Existing rearing infrastructure will be repaired. Biosecurity at the facility will be improved to meet modern standards through development of biosecure incubation and early rearing facilities, and replacement of rearing vessels for steelhead programs. The modernization of Wells Hatchery will allow the District to continue to reliably meet its mitigation requirements and agreement obligations in a dependable and cost effective manner.

1.2  History and General Information
Wells Dam and the Wells Fish Hatchery (Wells Hatchery) are located in North Central Washington State between Seattle and Spokane at river mile 515.6 on the Upper Columbia River (Figure 1-1). This location is approximately 30 river miles downstream from Chief Joseph Dam, owned and operated by the United States Army Corps of Engineers, and 42 miles upstream from Rocky Reach Dam, owned and operated by Chelan County PUD. The nearest town is Pateros, Washington, which is located approximately 8 miles upstream from Wells Dam. The Wells Hydroelectric Project (Wells Project) is the main generating resource for the District. It includes ten generating units with an installed nameplate capacity of 774,300 kW (774.3 MW) and a peaking capacity of approximately 840 MW. The design of the Wells Project is unique in that the generating units, spillways, switchyard, and fish passage facilities are combined into a single structure referred to as the hydrocombine. The dam produced its first commercial generation on August 22, 1967. Additionally, DCPUD owns and provides funding for the operation and maintenance of the Wells Hatchery. Located immediately adjacent to the dam, original construction of the Wells Hatchery was completed in 1967.

The DCPUD funds hatchery programs as mitigation for the construction and operation of the Wells Hydroelectric Project. Hatchery programs include the production of spring Chinook salmon (Oncorhynchus tshawytscha) and summer steelhead (Oncorhynchus mykiss) for conservation purposes, the production of steelhead and summer/fall Chinook salmon for harvest augmentation, and the production of two species of trout (Lahontan cutthroat trout [Oncorhynchus clarki henshawi] and rainbow trout [Oncorhynchus mykiss]), kokanee (Oncorhynchus nerka), sturgeon (Acipenser transmontanus), and resident Chinook to provide recreational fishing opportunities throughout North Central Washington.

Together, these hatchery programs collect, rear, and release fish in accordance with protocols identified within various plans and settlement agreements. All of the anadromous fish production activities are governed by the terms of the Anadromous Fish Agreement and Habitat Conservation Plan for the Wells Project (Wells HCP), the Aquatic Settlement Agreement (ASA) and the Off License Settlement Agreement.

Implemented to compensate for the loss of fish production resulting from construction and operation of the Wells Project, the hatchery has historically produced summer Chinook, summer steelhead, and rainbow trout. The existing site currently consists of a 6,100-foot-long spawning channel, portions of which have been modified to hold adults and juveniles, numerous above- and in-ground raceways, four large earthen rearing ponds, a centralized incubation facility with early rearing tanks, cold storage, administrative offices, a large vehicle storage building with workshop space, a volunteer channel with
adult trap, and steelhead and Chinook spawning structures. Three residences are located to the west across State Highway 97 for hatchery personnel.

This Master Plan is presented in two volumes. Volume 1 contains the overall water supply and site development and the production program associated with salmonid species. Volume 2 contains the elements of the Master Plan associated with the sturgeon program.

DCPUD initiated a contract with HDR Engineering, Inc. on February 1, 2012 to develop a Master Plan for the Wells Hatchery according to requirements that were identified in an RFP dated September 1, 2011. To initiate the Master Plan, several studies were required, including a Facility Assessment, Appendix A; Analysis of the Production Well Field, Appendix B; Bioprogramming and Rearing Requirements, Appendix C; and a Surface Water Supply Evaluation, Appendix F. These documents became the basis for developing the Master Plan as presented herein.

1.3 Condition of Wells Hatchery

Wells Hatchery conditions were first addressed as part of an overall Facility Assessment Report for Wells Hatchery. The general information and condition of each facility component was considered and documented by defined assessment criteria. Within each assessment area, minor and major deficiencies were listed. Major deficiencies or areas that could be renovated or fixed were listed in the Deficiencies category with the intent to utilize those lists for future development of the entire facility Master Plan. The majority of the problems at the hatchery are related to aging infrastructure, limited water availability or distribution capability, or lack of biosecurity features. The complete Facility Assessment report documents the current condition for all of the hatchery facility assets, including the current condition, use, and recommended action for each asset. This report is included in this document as Appendix A.

The report indicates that 80% of the existing infrastructure has an average of 5 years of useful life. The facility assessment reviewed 29 major component items, and only 6 of them indicated a useful life greater than 15 years taken as a whole, considering that some parts of a particular unit may have varying lengths of utility.

In summary, based on the information in the facility assessment the existing facilities are, for the most part, not in good condition, and in some cases are non-functional. This assessment provides justification for modernization of the Wells hatchery to reliably meet and maintain DCPUD fish rearing program goals.
1.4 Approach to Modernization

The modernization process, which has resulted in this Master Plan, utilized the Facility Assessment report, as well as a field report (Appendix B), Bioprogramming Summary (Appendix C), operator feedback (Washington Department of Fish and Wildlife [WDFW]), and direct communication with DCPUD staff to focus on priority areas for the modernization project.

1.5 FERC Licensing Requirements

The new Federal Energy Regulatory Commission (FERC) license for the Wells Project requires DCPUD to raise various groups of fish in order to comply with the terms of the Wells HCP and ASA. The production program for the Wells Hatchery modernization was prepared by DCPUD during the course of this Master Plan and is located in Appendix D.

1.6 Approach to Biosecurity

Biosecurity has profound effects on the design and operation of fish hatcheries. The term ‘biosecurity’ is used to address design and operational strategies to minimize the likelihood that pathogens will be introduced to, or transferred among or within, a hatchery population(s) through the water supply, other
Biosecurity was considered extensively in the development of this plan, and influenced the facility assessment, development of the bioprogram, site layout, and specific facility design concepts. The goal of implementing biosecurity is to raise healthy fish toward maintaining compliance with the FERC license, Wells HCP, ASA and Off-License Settlement Agreement. The following biosecurity concerns will guide the framework of the Master Plan and be addressed in detail during the design phase:

- Prevention of eggs and/or fish from unintentional access or exposure to rearing units outside of their biosecure zone.
- Contamination of the facility through the delivery of off-station water supplies will be addressed by disinfection prior to use within the facility and precautions made to contain incoming water from contamination with other programs.
- For outdoor rearing facilities, predation from birds and small mammals can have major impacts to production and can stress the fish. This added stress can result in poor feed conversion and can increase the risk of disease. Functional yet cost effective protection for minimizing predation will be employed.
- Vehicle restrictions, disinfection stations for vehicles, a visitor containment area, fencing, and site drainage will be used to minimize fish pathogens or invasive species from entering or leaving the site.
- A disinfection station to separate and potentially treat eggs brought on-site from outside the facility is necessary. Consideration will be given to its location within the hatchery facilities.
- The effluent from disinfection requires control of any pathogens, therapeutants, and escapement of eggs.
- Handling of mortalities will require a disposal plan to prevent any fish pathogens from reaching other portions of the site or the Columbia River.
- Prevention of Aquatic Nuisance Species (ANS) and invasive species will be part of the treatment of any water entering or leaving the site.
- Disinfection stations for personnel, equipment, and gear will be strategically located throughout the site.
- Management of personnel and visitors will be addressed during design to minimize inadvertent transmission of fish pathogens to fish rearing units.
Chapter 2  Existing Site

2.1 Site Overview

The existing site layout has a large decommissioned spawning channel that is currently used only for water conveyance, an extensive surface and ground water supply system, fourteen concrete raceways, four rearing ponds that are segmented portions of the channel, four vinyl-lined raceways, two adult collection areas, a pollution abatement pond, two outbuildings, a hatchery building, an adult collection fishway/juvenile release channel, and four large earthen ponds - two with outflow catch basins (Figure 2-1).

Access to the site is off the main road leading to the dam from State Route 97, approximately 5 miles south of Pateros. There is a visitor and staff parking area at the base of this road near the existing hatchery building.

Plant power is provided to the site directly by service from the DCPUD hydroelectric facility and to the Carpenter Island wells in part by Chelan PUD.

The surface and well water systems for rearing and fishway operation are described in Sections 5.1 and 5.2 of this document. The potable water system that supplies the hatchery, dam, residences, and nearby support facilities comes from a tap off the upper well system distribution piping, with Well 1A being the primary supply source.

Figure 2-1.  Aerial view of the existing Wells Hatchery.
Chapter 3  Program Requirements

3.1  Initial Production (2002 -2012)

Wells Hatchery produces summer Chinook salmon, summer steelhead, coho salmon (*Oncorhynchus kisutch*), rainbow trout, and Lahontan cutthroat trout (Table 3-1). In addition, the hatchery annual production includes culturing eggs for Chinook, steelhead, kokanee, and cutthroat trout (Table 3-1). Cutthroat eggs and fry, kokanee, and Lake Chelan Chinook are produced for off-station transfer to other fisheries enhancement programs in the region. Chinook salmon and steelhead adults are trapped, held and spawned on site. Adult steelhead are also trapped in the Methow and Okanogan basins for Wells Hatchery programs, with either adult broodstock or eyed eggs transferred to Wells Hatchery. The eggs are incubated, hatched, and grown to release size on site for summer Chinook and steelhead.

Chinook salmon are released directly from the hatchery at two different age classes, subyearling at approximately 50 fish per pound (fpp) and yearling at 10 fpp. DCPUD’s steelhead production is out-planted as yearlings to the Methow and Okanogan basins above the Wells Dam, and release directly into the Columbia from Wells Hatchery has recently begun (6 fpp). Grant PUD’s steelhead production is moved to acclimation locates in the Okanogan River Basin above Wells Dam as yearlings (8 fpp) and released by GCPUD at 6 fpp.

Rainbow trout are transferred to the facility as eyed eggs from the WDFW-operated Spokane Hatchery. After a short incubation period and subsequent outdoor rearing at Wells Hatchery, the trout are stocked to enhance sport harvest opportunities in North Central Washington lakes. The trout are released at three different sizes: Fingerling (30 fpp), Catchable (2.2 fpp) and Jumbo Catchable (1 fpp).

Adult coho salmon for a Yakama Nation reintroduction program are collected for broodstock and juvenile coho and transferred to the facility for short-term acclimation and release. Coho spawning, incubation, and rearing occurs off-station.

### Table 3-1. Historical production - Wells Hatchery

<table>
<thead>
<tr>
<th>Program Type</th>
<th>Target Number</th>
<th>Size (fpp)</th>
<th>Release Goal (lbs)</th>
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</thead>
<tbody>
<tr>
<td>Chinook Subyearling</td>
<td>484,000</td>
<td>50</td>
<td>9,650</td>
</tr>
<tr>
<td>Chinook Yearling</td>
<td>320,000</td>
<td>10</td>
<td>32,000</td>
</tr>
<tr>
<td>DCPUD Steelhead - Inundation</td>
<td>300,000</td>
<td>6</td>
<td>50,000</td>
</tr>
<tr>
<td>DCPUD Steelhead – NNI</td>
<td>48,000</td>
<td>6</td>
<td>8,000</td>
</tr>
<tr>
<td>GCPUD Steelhead</td>
<td>100,000</td>
<td>8</td>
<td>12,500</td>
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<tr>
<td>WDFW Steelhead</td>
<td>150,000</td>
<td>Eyed Eggs</td>
<td>Transfer Out</td>
</tr>
<tr>
<td>USFWS Steelhead</td>
<td>60,000</td>
<td>Eyed Eggs</td>
<td>Transfer Out</td>
</tr>
<tr>
<td>YN Coho Salmon</td>
<td>125,000</td>
<td>15</td>
<td>5,200</td>
</tr>
<tr>
<td>USFWS Chinook</td>
<td>248</td>
<td>Adults</td>
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<tr>
<td>CCPUD Chinook Eggs</td>
<td>869,230</td>
<td>Eyed Eggs</td>
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<td>YN Chinook Eggs</td>
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<td>30</td>
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<tr>
<td>Rainbow Catchable</td>
<td>32,000</td>
<td>2.2</td>
<td>14,545</td>
</tr>
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<td>Rainbow Jumbo</td>
<td>2,000</td>
<td>1</td>
<td>2,000</td>
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<tr>
<td>Lake Chelan Chinook</td>
<td>100,000</td>
<td>Eyed Eggs</td>
<td>500</td>
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<td>Cutthroat Trout</td>
<td>75,000</td>
<td>fry</td>
<td>100</td>
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<td>Cutthroat Trout</td>
<td>160,000</td>
<td>Eyed Eggs</td>
<td>160</td>
</tr>
<tr>
<td>Kokanee</td>
<td>300,000</td>
<td>Eyed Eggs</td>
<td>300</td>
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</table>

Sourced from the WDFW 2011 Brood Document Final and DCPUD Off-License Settlement Agreement production data.
### 3.2 2013-2022 Program Goals

The Wells Hatchery program descriptions (Appendix D) contain comprehensive information on the planned target production levels, fish culture, and biological attributes of the programs. Appendix D contains detailed design considerations incorporated within the Master Plan, including incubation and rearing space, bioprogramming analyses for space and water requirements, and design of an adult collection facility. However, deviations from the information in Appendix D were used at times in the Master Plan to address various rearing contingencies, such as the potential for programs to split or merge in the future, and the potential for new programs to come on-station. The Master Plan was created to efficiently address all of the fish culture needs identified within the programs presented in Appendix D.

**Table 3-2** provides the 2013-2022 Wells Hatchery program by target number of fish, size or life stage, and annual poundage produced for each species.

### Table 3-2. 2013-2022 production goals - Wells Hatchery.

<table>
<thead>
<tr>
<th>Program Type</th>
<th>Target Number</th>
<th>Size (fpp)</th>
<th>Release Goal (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinook Yearling</td>
<td>320,000</td>
<td>10</td>
<td>32,000</td>
</tr>
<tr>
<td>Chinook Subyearling</td>
<td>484,000</td>
<td>50</td>
<td>9,650</td>
</tr>
<tr>
<td>DCPUD Steelhead - Inundation</td>
<td>300,000</td>
<td>6</td>
<td>50,000</td>
</tr>
<tr>
<td>DCPUD Steelhead – NNI</td>
<td>8,000</td>
<td>6</td>
<td>1,333</td>
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<tr>
<td>GCPUD Steelhead</td>
<td>100,000</td>
<td>8</td>
<td>12,500</td>
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<tr>
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<td>2,000</td>
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<tr>
<td>Rainbow Catchable</td>
<td>32,000</td>
<td>2.2</td>
<td>14,545</td>
</tr>
<tr>
<td>Rainbow Fingerling</td>
<td>60,000</td>
<td>30</td>
<td>2,000</td>
</tr>
<tr>
<td>Cutthroat Trout</td>
<td>160,000</td>
<td>Eyed Eggs</td>
<td>160</td>
</tr>
<tr>
<td>Cutthroat Trout</td>
<td>75,000</td>
<td>fry</td>
<td>100</td>
</tr>
<tr>
<td>Lake Chelan Chinook</td>
<td>100,000</td>
<td>Eyed Eggs</td>
<td>500</td>
</tr>
<tr>
<td>Kokanee</td>
<td>300,000</td>
<td>Eyed Eggs</td>
<td>300</td>
</tr>
<tr>
<td>White Sturgeon</td>
<td>5,000</td>
<td>Juvenile</td>
<td>2,500</td>
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### 3.3 Program and Capacity Goals

The program and capacity design goals are intended to demonstrate that the facility has sufficient access to critical resources to allow the programs to expand in the future should new or modified rearing programs be required starting in 2023 or beyond. The program and capacity goals (Table 3-3), in some cases, are different than the post-modernization production goals (Table 3-2). The design capacity numbers include flexibility that allows the programs to be changed in the future when program goals are revisited, when fish culture practices change and/or program revisions are necessary.
### Table 3-3. Program and capacity goals - Wells Hatchery (2013-2022).

<table>
<thead>
<tr>
<th>Program Type</th>
<th>Release Goal (no.)</th>
<th>Program Design Capacity (no.)</th>
<th>Future Design Contingency (no.)</th>
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<tbody>
<tr>
<td>Chinook Yearling</td>
<td>320,000</td>
<td>320,000</td>
<td>465,000</td>
</tr>
<tr>
<td>Chinook Subyearling</td>
<td>484,000</td>
<td>484,000</td>
<td>-</td>
</tr>
<tr>
<td>Steelhead – Columbia Inundation</td>
<td>160,000</td>
<td>200,000</td>
<td>-</td>
</tr>
<tr>
<td>Steelhead – Methow Inundation</td>
<td>100,000</td>
<td>100,000</td>
<td>-</td>
</tr>
<tr>
<td>Steelhead – Twisp NNI</td>
<td>8,000</td>
<td>48,000</td>
<td>-</td>
</tr>
<tr>
<td>Steelhead – Omak</td>
<td>50,000</td>
<td>55,000</td>
<td>-</td>
</tr>
<tr>
<td>Steelhead Okanogan Basin</td>
<td>50,000</td>
<td>55,000</td>
<td>-</td>
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<tr>
<td>Rainbow Jumbo</td>
<td>2,000</td>
<td>2,000</td>
<td>-</td>
</tr>
<tr>
<td>Rainbow Catchable</td>
<td>32,000</td>
<td>32,000</td>
<td>-</td>
</tr>
<tr>
<td>Rainbow Fingerling</td>
<td>60,000</td>
<td>60,000</td>
<td>-</td>
</tr>
<tr>
<td>Cutthroat Trout</td>
<td>160,000</td>
<td>160,000</td>
<td>-</td>
</tr>
<tr>
<td>Cutthroat Trout</td>
<td>75,000</td>
<td>75,000</td>
<td>-</td>
</tr>
<tr>
<td>Lake Chelan Chinook</td>
<td>100,000</td>
<td>100,000</td>
<td>-</td>
</tr>
<tr>
<td>Kokanee</td>
<td>300,000</td>
<td>300,000</td>
<td>-</td>
</tr>
<tr>
<td>Sturgeon</td>
<td>5,000</td>
<td>6,500</td>
<td>-</td>
</tr>
</tbody>
</table>

#### 3.3.1 Planned Chinook Production

A bioprogram for Wells stock summer Chinook subyearling and yearling releases was developed and evaluated (Appendix C). The process assessed the rearing parameters for a brood year production target combined total of 56,000 pounds. Post-modernization plans included additional yearling fish rearing capacity of 14,500 pounds as a contingency for future programmatic needs. This does not mean that the facility can raise these extra yearling Chinook without major modifications and upgrades to the facility during the post modernization era. What it does mean is that adequate water supplies and reserve rearing vessel space (open land) will be available in the future to provide the program some flexibility to adjust to changing fish rearing requirements. The biological program found in Appendix C uses program-specific data and assumptions. Situational growth models were created to calculate the required rearing space and identify the flow required at every stage of the rearing cycle.

- The strategies considered different pathways to achieving the release targets considering water temperatures and feeding rates.
- The initial populations of fry (first feeding) required to meet program goals for the subyearling and yearling Chinook programs was determined.
- First pass only water (no reuse) will be used for rearing. Other water use strategies were considered in the bioprogramming process, but flow-through was determined to be optimal.
- The bioprogram identified the space and flow requirements throughout the rearing cycle from adult collection to final release of target number of progeny.
- Probable rearing water sources and comparison to historical pond flows were used in the growth models.
- In addition to modeling flow and space requirements for the on-site juvenile release programs, the required adult holding and incubation requirements were developed during the bioprogramming process.
Specification and assumption references used to model holding and rearing requirements are included within the bioprogram. These specifications and assumptions are part of the growth model for summer Chinook, which is contained in Appendix C.

3.3.2 Planned Steelhead Production (Columbia, Methow, and Twisp Rivers)

A summer steelhead bioprogram for each program (Columbia, Methow and Twisp Rivers) was prepared to develop programming alternatives.

- Models of programming alternatives were developed to compare density index specifications, identify potential inflow blending strategies, and model each individual program’s release targets.
- The goals for size at release and the potential to temper the rearing water temperature prior to transfer to remote acclimation sites was incorporated in the bioprograms.
- The growth projections for summer steelhead at Wells Hatchery were divided into individual profiles based on the various release sites and program purpose.
- Each steelhead program was modeled individually for bioprogramming due to the variety of hatching intervals caused by winter verses spring spawn timing for different programs and fish types, required rearing segregation of the different programs, density index criteria, and multiple final rearing locations.
- The modernized hatchery will accommodate the steelhead adult collection and rearing program requirements in order to receive adult fish or eyed eggs, as appropriate, from the various brood source locations and timings, and rear each program separately.
- The probable water source and historical inflow source information for rearing steelhead specification and assumption references are contained in the bioprogram (Appendix C).
- First pass only water (no reuse) will be used for rearing. Other water use strategies were considered in the bioprogramming process, but flow-through was determined to be optimal.
- Incubation will use stack trays for all programs.
- Initial ponding and feeding of steelhead will use 13 foot long rectangular vessels for all programs.
- The bioprogram determined that approximately 4800 cf of space is needed for the Twisp program. This results in four circular tanks (20ft x 5ft-4ft water depth) that would be used for final rearing.
- The Columbia and Methow programs will use dirt ponds three and four for final rearing.

3.3.3 Planned Steelhead Production (Okanogan Basin and Omak Creek)

- Adult holding, incubation, and juvenile rearing space were identified for steelhead with release locations in the Omak Creek and Okanogan basin. In response to an Interlocal Agreement (ILA 430-12173561) with Grant County PUD, a combined total of 110,000 summer run steelhead will be produced at Wells for intended transfer to final rearing acclimation sites with release into the respective tributary from which the parents were trapped, or as determined by the co-managers and other interested parties. Design specification to rear 110,000 was used in the bioprogram to accommodate a 10% over-production maximum. The Omak and Okanogan basin release groups were each modeled in the bioprogramming to represent 55,000 fish per stock as an approximation of typical program needs. However, additional flexibility was designed into the program to accommodate a range of other proportional allocations of fish to the two programs while maintaining programmatically separate rearing units. Temperature of rearing water was modeled to meet specified growth rates.
• The bioprogram model incorporated the size at transfer target with descending water temperatures in preparation for transfer to a colder-water off-station acclimation site(s).

• The growth models for the Okanogan Basin and Omak programs produced at Wells Hatchery were developed using flow index specifications, incubation segregation, outdoor rearing vessels, and rearing densities that were specified by Grant County PUD staff.

• Criteria used to customize the fish growth model applied to the conservation program include hatching intervals, individual program rearing segregation, density, flow, and water temperature control.

• The probable water source throughout the entire rearing cycle for rearing steelhead destined for the Omak Creek and Okanogan basin was also noted in the bioprogram.

• First pass only water (no reuse) will be used for rearing. Other water use strategies were considered in the bioprogramming process, but flow-through was determined to be optimal.

• Incubation will use stack trays for all programs.

• Initial ponding and feeding of steelhead will use 13 foot long rectangular vessels for all programs.

• The bioprogram determined that approximately 4800 cf of space is needed for each of the Grant County programs. Through discussions with GCPUD, it was determined that circular tanks (20ft x 5ft-4ft water depth) would be used for final rearing resulting in four tanks for each of the two programs, for a combined total of eight tanks.

3.3.4 Planned Off License Settlement Trout, Triploid Chinook, and Kokanee Production

The Off License Settlement Agreement rainbow trout segment of the bioprogram was prepared with the target of producing of 20,000 total pounds of rainbow trout equivalents annually, as determined through agreement between DCPUD and WDFW (May 11, 2012 memorandum from G. Mackey to J. Wahls et al. confirming the WDFW 2012/2013 Off-License Settlement Agreement Production Plan).

• The various stocking sizes and anticipated rainbow trout poundage to be produced at the Wells Hatchery was provided by WDFW and DCPUD. The bioprogram identified the space and flow required to produce fingerlings (30 fpp), catchable (2.2 fpp), and jumbo (1.0 fpp) rainbow trout, all reared from the eyed egg life stage.

• Incubation will use stack trays for all programs.

• Initial ponding and feeding of rainbow trout will use 13 foot long rectangular vessels for all programs.

• The flow comparison quantified the reduction in well water pumped to the rainbow ponds if the final rearing used inflow from the Columbia River surface water or reused well water from simultaneously reared biosecure programs.

• The surface water provision was limited by the time of year when the Columbia River temperature was favorable for resident salmonid rearing (predominantly in winter).

• Additionally, historic information regarding the established sources of inflow used for final rearing at Wells Hatchery was documented in the growth profiles to determine growth rates based upon mixed water (surface and/or ground) temperature profiles.

• First pass only water (no reuse) will be used for rearing. Other water use strategies were considered in the bioprogramming process, but first pass only water was determined to be optimal.
The Lahontan cutthroat production requirement was modeled to identify both incubation and short-term fry rearing at Wells Hatchery (Appendix C).

- Sourced from ancestral Lake Lenore strain broodstock collected in central Washington lakes, green eggs and milt will be obtained at an off-site spawning location(s) and transported to Wells Hatchery for incubation.
- Shallow troughs were identified for hatching and first feeding.
- After development to the eyed egg life stage, a portion of the eyed eggs will be transferred to other trout stocking programs operated by Idaho Department of Fish and Game (IDFG), Oregon Department of Fish and Wildlife (ODFW), and WDFW.
- The remaining population segment will be hatched at the Wells Hatchery and then transferred as fed fry to the WDFW Columbia Basin Hatchery in Moses Lake, Washington.

The kokanee production at Wells Hatchery was modeled to initial incubation (eyed egg stage) only.

- The goal for number of eggs and the life stage at transfer, as identified by DCPUD, were illustrated within the bioprogram (Appendix C).
- Sourced from Palmer Lake broodstock, eggs will be obtained at an offsite spawning location and transported to Wells Hatchery for incubation.
- Upon development to the eyed egg life stage, the entire kokanee egg production will be transferred to the WDFW Omak Hatchery in Omak, Washington.

### 3.4 Adult Trapping and Holding

The timing and number of adults projected to be captured via the volunteer channel and the West Fish Ladder trap and held as broodstock, trapped for monitoring and evaluation purposes, and/or captured and held for surplus, was estimated. The adult holding requirements incorporated species- and stock-specific programmatic and operational requirements. Design parameters for adult holding were developed based on these estimates and requirements, including number of separate holding vessels required, and required volume and potential dimensions of the holding vessels. Based on this, potential layouts of the adult trapping, handling, sorting, and processing, and holding facility were developed. Adult holding requirement specifications were referenced from standard holding pond inflow and density values derived by the operating agency. A monthly inflow model was created based on species and expected holding timelines, as derived from past practices and planned program operations. Comprehensive spatiotemporal summary charts identified the space requirements for each individual program (Appendix C). The adult trapping and holding facility will incorporate the ability to collect and hold broodstock for each separate program, and to hold surplus fish and fish trapped at the West Ladder. Fish held for broodstock will be able to be crowded and moved to a spawning facility using water-to-water transfer. The spawning facility will be integrated with the trapping and holding facility, thus minimizing the need to crowd or move adult fish, reducing handling and stress. Facilities for holding surplus fish will allow efficient removal of fish for release of surplus disposition. Fish trapped at the West Ladder will be utilized in the facility for sorting and monitoring and evaluation purposes.
Chapter 4  Water and Space Requirements

4.1  Flow Summary
A Wells Hatchery inflow summary was produced by evaluating each program’s flow requirements by rearing stage and month in the bioprogram (Appendix C). The bioprogram growth models identify the probable source of inflow for each program. Where fish rearing temperature adjustments are necessary, a percentage of well water and surface water is indicated. These percentages are estimates only, as seasonal water temperature variations will affect the amount of each water source utilized. The planned Wells Hatchery inflow requirements by month are illustrated in Table 4-1. The bioprogram flow requirements (Appendix C) are exclusive of the sturgeon program (Volume 2) but are included in Table 4-1 which represents the total flow required for adult holding, incubation, and rearing at Wells Hatchery in gallons per minute (gpm) and cubic feet per second (cfs). These flow requirements represent the design capacity as presented in Table 3-3 which include the future design contingency. It does not include attraction flows for the volunteer channel fish trap. The bioprogram determined that there was sufficient water supply to provide first pass water to all rearing programs and circumvent the need for reuse.

Table 4-1. Planned Wells Hatchery inflow requirements.

<table>
<thead>
<tr>
<th>Month</th>
<th>Well (gpm)</th>
<th>Well (cfs)</th>
<th>Surface (gpm)</th>
<th>Surface (cfs)</th>
<th>Facility Total (gpm)</th>
<th>Facility Total (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>December</td>
<td>12,390</td>
<td>27.59</td>
<td>363</td>
<td>0.81</td>
<td>12,753</td>
<td>28.40</td>
</tr>
<tr>
<td>January</td>
<td>6,567</td>
<td>14.63</td>
<td>6,152</td>
<td>13.70</td>
<td>12,719</td>
<td>28.33</td>
</tr>
<tr>
<td>February</td>
<td>6,677</td>
<td>14.87</td>
<td>6,251</td>
<td>13.92</td>
<td>12,928</td>
<td>28.79</td>
</tr>
<tr>
<td>March</td>
<td>7,133</td>
<td>15.89</td>
<td>5,793</td>
<td>12.90</td>
<td>12,926</td>
<td>28.79</td>
</tr>
<tr>
<td>April</td>
<td>6,833</td>
<td>15.22</td>
<td>4,899</td>
<td>10.91</td>
<td>11,732</td>
<td>26.13</td>
</tr>
<tr>
<td>May</td>
<td>6,778</td>
<td>15.10</td>
<td>2,527</td>
<td>5.63</td>
<td>9,305</td>
<td>20.72</td>
</tr>
<tr>
<td>June</td>
<td>3,176</td>
<td>7.07</td>
<td>334</td>
<td>0.74</td>
<td>3,510</td>
<td>7.82</td>
</tr>
<tr>
<td>July</td>
<td>3,550</td>
<td>7.91</td>
<td>334</td>
<td>0.74</td>
<td>3,884</td>
<td>8.65</td>
</tr>
<tr>
<td>August</td>
<td>4,361</td>
<td>9.71</td>
<td>434</td>
<td>0.97</td>
<td>4,795</td>
<td>10.68</td>
</tr>
<tr>
<td>September</td>
<td>5,597</td>
<td>12.47</td>
<td>434</td>
<td>0.97</td>
<td>6,031</td>
<td>13.43</td>
</tr>
<tr>
<td>October</td>
<td>8,106</td>
<td>18.05</td>
<td>434</td>
<td>0.97</td>
<td>8,540</td>
<td>19.02</td>
</tr>
<tr>
<td>November</td>
<td>10,999</td>
<td>22.49</td>
<td>363</td>
<td>0.81</td>
<td>10,462</td>
<td>23.30</td>
</tr>
</tbody>
</table>
4.2 Space Allocation

A rearing unit allocation model that integrates space and time was developed for outdoor rearing at Wells Hatchery to identify the availability of rearing space relative to transition of each program through the entire rearing cycle (Appendix E). The model used specific color codes to plot the rearing vessel usage of each program for each calendar month. The exercise was used to optimize the use of hatchery space and infrastructure by identifying vacant rearing vessels, to identify the rearing space reduction due to decommission of any existing raceways, and to earmark the programs anticipated to rear in new and/or rehabilitated existing vessels after the facility modernization.
Chapter 5  Water Supply Assessment

5.1  Groundwater Supply

A groundwater assessment was undertaken that incorporated extensive data and information mining, site evaluations, hydrogeological assessment, site visits and video of wells, and flow testing of all currently operable wells (Appendix B). The groundwater supply for the hatchery and potable use is derived from 15 wells. For this Master Plan, the wells are identified as Upstream Wells 1A, 10C, 11C, 12C, and 13C and Downstream Wells 6B, 7B, 8B and 15. See Appendix B, Figure 2, Well Location Map, for location of all 15 wells currently associated with the Wells Hatchery.

The amount of geologic and well construction information related to the 15 wells associated with the Wells Hatchery varied from almost nothing (well 9B) to fairly detailed well construction information and well driller reports (wells 12C, 13C and 14C). Overall, the available information was generally incomplete. Well information was copied from a binder provided by Kristy Oules of DCPUD (personal communication, 2012). This information includes drawings of the wells based on borehole television surveys, plus pump installation, repair and placement data, and pump curves in some instances. Recordings of the borehole television surveys were not in the files. Thus, the only data obtained from the surveys are the drawings of each well. In addition, plan maps showing locations and geologic logs of test boreholes prior to dam construction were obtained from DCPUD.

A limited number of well driller reports were obtained from the website of the Washington Department of Ecology. Additional information on wells 12C, 13C and 14C was obtained from the files of the U.S. Bureau of Reclamation (USBR) office in Boise, ID.

Borehole video surveys of wells 11C and 13C were run on September 4, 2012. These well videos were completed to allow better assessment of current conditions while these two wells were out of commission due to pump problems.

Results of the well field assessment completed by Dr. Dale Ralston are located in Appendix B.

The current recommended development process is outlined as follows, with more detail provided in Appendix B:

- **Step #1 – Wells 11C and 13C**
  - Aquifer (pump) test wells 11C and 13C prior to rehabilitation.
  - The first step includes wells 11C and 13C because the pumps have been removed from these wells. Rehabilitation of these wells using the “Aqua Freed” process was performed during the week of December 10, 2012.
  - Follow-up aquifer (pump) test will be performed after rehabilitation. Existing pumps cannot be used because one is not repairable and the other requires extensive repair.
  - The results from wells 11C and 13C would be used to judge whether the “Aqua Freed” process should be used for other project wells or whether an alternative approach should be identified and used for future well rehabilitation.

- **Step #2 – Well 12C**
  - The pump would be pulled from well 12C.
  - Well 12C would be rehabilitated using the “Aqua Freed” process or an identified alternative process.
• A program of aquifer testing would be needed prior to putting well 12C back into service.

• Step #3 – New well 16
  • Alternative well site locations
    ▪ The only logical place to construct a new well upstream of the dam is in the parking lot close to wells 2A and 3A.
    ▪ The alternative location for a new well is below the dam, probably within the footprint of the hatchery.
  • The first new well should be located in the parking lot close to wells 2A and 3A.
    ▪ Problems with well construction on the dam and near the reservoir will need to be addressed. These include: dam stability issues, dam operational issues during drilling, disposal of water and cuttings generated during drilling and long-term well access.
    ▪ The new well should be constructed with 16-inch diameter pump chamber casing and 16-inch diameter telescope, stainless steel, wire-wrapped well screen. The screen should be placed in the bottom half to the bottom one-third of the aquifer and the slot size should be selected based on grain-size analysis.

• Step #4 – Assessment of well field yield
  • The combined yield of the upstream wells (1A, 10C, 11C, 12C, 13C and 16) should be determined both with and without the operation of well 1A.
  • The combined yield of the downstream wells (6B, 7B, 8B and 15H) should be determined under both low and high water-level conditions.
  • The combined yield of the upstream and downstream wells should be assessed and compared to anticipated hatchery needs during both low and high water-level conditions.
  • The above assessments would result in the identification of need for additional water supply sources from ground water for the hatchery.

• Step #5 – Well 7B (if additional water supply is needed)
  • The pump should be removed from well 7B and a borehole video log should be obtained and assessed relative to the need for well rehabilitation.
    ▪ If needed, well 7B would be rehabilitated using the “Aqua Freed” process or an identified alternative process.

• Step #6 – Well 1A (if additional water supply is needed)
  • The existing pump should be removed from well 1A.
  • A new pump should be installed in well 1A that will yield 4,000 to 4,500 gpm.

• Step #7 – New well 17 (if additional water supply is needed)
  • Unless new information indicates otherwise, well 17 should be constructed below the dam within the footprint of the hatchery.
    ▪ Consideration should be given to conducting a surface geophysical study to detect the topography on the top of the granite. The new well should be drilled at a
location where sand and gravel backfilled channels are present in the granite surface and the aquifer is thickest.

Additional water steps, if needed, would involve rehabilitating wells 2A and 10C. It appears now that wells 3A and 14C could be put out of service.

5.2 Surface Water Supply

In 2008, an existing traveling screen system was taken off line and replaced with a permitted NOAA-compliant T-Screen with 1.75 mm screen openings providing 100 cfs withdrawal at 0.2 fps approach velocity and up to 150 cfs with an approach velocity of 0.4 fps.

The T-screen is attached to four new piles and is mechanically connected to the existing 72-inch concrete pipe that extends approximately 300 feet into the Wells Dam forebay from the screen structure. The T-screen is equipped with a brush cleaning system where brushes are fixed to the screen superstructure inside and out of the screen face.

The water travels via a concrete conduit through the West Embankment of Wells Dam to the surface (river) water aerator and water supply channel at the upper pool. A constant and preset quantity of water is required at the downstream systems despite the fluctuations of the reservoir. Preceding an extreme flood, the reservoir can be drawn down to elevation 767 with the highest pool of 791.

The primary uses of surface water at the fish facilities is to supply the four earthen rearing ponds during the winter months (November through May), supply Rearing Ponds 16 & 17, and provide attraction flow for returning adult Chinook broodstock and steelhead. The surface water also supplies the volunteer channel (fish ladder and channel leading into the hatchery) with past documentation indicating a total ladder water supply ranging from 48 cfs to 100 cfs.

Surface water from the supply channel at the Upper Pool is also used to supply up to 10 cfs of irrigation water for Wells & Wade Orchards during the growing season designated by agreement from November to May. Two pumps located at the Upper Pool convey the surface water via a 15-inch steel line to the orchards.

The surface water also supplies the Job Water distribution system with two pumps located at the upper pool, distributing water to various hydrants throughout the site.

A complete detailed assessment is included as Appendix F of this Master Plan.

5.3 Attraction Flow and Drain System

Attraction water through the existing volunteer channel is necessary for flow, temperature, and olfactory cues for returning adult anadromous fish to locate the volunteer channel entrance and swim up to the collection, holding, and handling facility. In the new facility design, the piping and water control systems will allow for all rearing water (ground and surface) from the new hatchery rearing complex to discharge through the volunteer channel with the ability to supplement or replace this flow with additional surface water. The volunteer channel will be able to flow to maximum capacity during adult return migration timing with operator preference on the mix of water. During the design phase of the project, an evaluation of the volunteer channel operational flow will be completed to assure appropriate passage and attraction flows considering all sources of water control at the head end of the volunteer channel. Provisions for direct diversion of overflow or discretionary control of water flowing through the volunteer channel versing the hatchery drain to the river will be included as well.

The Surface Water Report (Appendix F) and the information included in Section 2.0 (Existing Site) provide the specific information relative to the existing and proposed attraction water supply.
Chapter 6  Rearing Technologies and Functions Considered

A list of fish production technologies (incubation, early rearing and grow-out only) was developed based upon the current industry fish culture practices throughout North America. The Master Plan included analysis of fish culture practices which considered the application of existing hatchery components that will remain, along with any new design facilities constructed. The items below identify the technologies/procedures being considered for feasibility, efficiency, and implementation. An initial list of all technologies was developed in November 2012 and was refined, resulting in the list below.

6.1 Incubation

Incubation needs were derived from the individual program growth profiles. The egg goals provided the inputs used to determine the incubation space and flow requirements for each fish species by program to be incubated at the facility. Incubation options, along with the relevant technologies, were identified.

- Incubator types (vertical tray incubators, isolation buckets, bulk container and trough).
- Chemical treatment (formalin treatment system).
- Incubator water temperature regulation requiring inflow chilling and heating units.
- Egg processing (automated egg picking and counting).
- Biosecurity (stock segregation, specific egg lot isolation).
- Safety (staff ergonomics throughout the egg processing operations).

6.2 Early Rearing

Early rearing takes place after egg yolk absorption and the fish begin swimming (alevin to fry stages). The environment required is used to introduce the fish to artificial feed and acclimate them to culture practices.

- Rearing containers (troughs, fiberglass tanks, combination [combi] units).
- Container water temperature regulation requiring inflow chilling and heating units.
- Lighting (photo period, stress reduction, energy saving, automation).
- Transfer (water-to-water process with minimal handling of small fish, degassing).
- Technology-based inflow systems supplying the rearing vessels.

6.3 Grow-Out

Grow-out period refers to the period when fish at Wells Hatchery are moved to larger outdoor containers or earthen ponds for rearing. Depending on species and target size, the rearing period varies from several weeks to over a year.

- Shape of rearing vessel (circulars, large diameter).
- Vessel drain type (circulars, center drain with additional side box for effluent).
- Pond improvements (existing earthen ponds with updated inflow manifolds).
- Circular tank construction material (fiberglass, concrete, or other modern poly composite materials).
- Linear raceways (sectional provisions, sustainability of material).
- Predation control (lighting, fencing, indoor rearing).
- Feed application devices (auto feeders, blower feeders, or demand feeders).
- Inflow device (upwell or subsurface distribution, multi-port manifold or degassing devices).
- Drain system (standpipe, sump, dam board material and design).
- Rearing operation efficiency (marking and tagging process).
- Automated release enumeration (fish counters).
- Alarms (integration into a main monitoring and control system).
- Rearing operations (crowders, tail screen systems and section screens).
- Non-mechanical pond cleaning (automated cleaning or circular flow sweeping velocity).
- Inflow blending (temperature regulation and de-icing/ice prevention).
- Mechanical cleaning, (vacuum systems, brooming and pollution abatement).
- Rearing operations efficiency (fish collection, fish transport and loading).
- Release structures (volitional release from the facility for some anadromous programs).
- Biosecurity (stock isolation and tool disinfection).
Chapter 7  Hatchery Facility Technologies and Functions Considered

7.1 Existing Hatchery Components

An important basis used in the development of this Master Plan is the information gathered and assessed from the Wells Fish Hatchery Modernization, Fish Hatchery Assessment/Useful Life Analysis report (see Appendix A).

This report developed a critical assessment of existing hatchery infrastructure that was used in evaluating necessary and most cost-effective improvements to maintain the required fish rearing program goals by determining what we can use, what can be rehabilitated or should be abandoned, and what new infrastructure is required. The following provides a brief summary of the full report (Appendix A):

Major components and criteria that were assessed are as follows:

1. Surface Intake Building and T-Screen Well
2. Site Water Supply Distribution
3. Headworks
   3.1 Surface Water Aerator
   3.2 Job Water Pump Pit
   3.3 North and South Bureau Aerator
   3.4 Upper Pool Well Water Aerator
   3.5 Aeration Tower
   3.6 Well House No. 4
4. Incubation and Administration Building
5. Green Spawning Building (near existing headworks)
6. Upper Pool
7. Spawning Channel
8. Salmon Rearing Ponds (16/17) (Rainbow Ponds)
9. Adult Salmon Holding Ponds (15U, 15L)
10. Adult Steelhead Holding Ponds (Section A – Section D)
11. Chinook Spawning House
12. Steelhead Spawning House
13. Volunteer Fish Ladder
14. Dirt Ponds (DP1-DP4) (trapping trucking)
15. Adult Trapping Facility
16. Raceways (Bureau) (1-10)
17. Vinyl Raceways (11-14)
18. Above Ground Raceways (18-21)
19. Storage Building (Shop, Feed, Chemical)
20. Facility Drain
21. Pollution Abatement
   21.1 Treatment Pond
   21.2 Vacuum System
22. Primary Power
23. Well Houses

Each component was evaluated and documented with respect to the following main criteria:

- **Descriptive Information**
  - Component Name
  - General Component Description
  - Size (if applicable)
  - Approximate Year of Construction

- **Assessment of Condition**
  - Architectural
  - Structural
  - Mechanical (HVAC, Plumbing)
  - Process Piping
  - Electrical
  - Useful Life
  - Deficiencies

The general information and condition of each component was assessed and documented by these main criteria. Information was gathered by site visits, photos, interviews with staff, and design plans. Within each assessment area, minor and major deficiencies were listed. The identified deficiencies, whether major or minor, taken in combination, allowed an analysis of existing infrastructure that informed decisions in this Master Plan as to what existing infrastructure would be retained, the extent of repairs required, and what new infrastructure was needed. The majority of the problems at the hatchery are related to aging infrastructure, limited water availability, and lack of biosecurity features. While the hatchery has been periodically updated, many of the facility components are at the end of their service life or will require renovation to continue operation.

### 7.2 Future Hatchery Components

In addition to the rearing technologies discussed in Chapter 6, the other facility components required to complete the post modernization effort are listed below. Some of these components are existing, but are in need of improvement/replacement, while others are completely new facilities.

#### 7.2.1 Adult Handling

Handling occurs after returning adult fish are trapped. At Wells Hatchery, adults may be obtained from several different locations, such as tributary trapping transfers, diversion or trucking from the fish ladders within the Wells Dam, and via an onsite swim-in fishway (i.e. volunteer channel). Trapping and sorting frequency occurs based on the abundance and timing of returning fish. Holding occurs for the spawners and those fish designated as program surplus. A percentage of the fish trapped and handled are retained and used for spawning, while others are retained for surplus, or returned to the river. It will be important to use technology to support a multi-species, multi-program sorting system suitable for the volume of the adult sorting and handling expected at Wells Hatchery. Technologies and functions that we considered during the design process are presented below:

#### 7.2.1.1 Trap & Sorting

- Trap component (finger weir, Fyke net system).
- Trap component (upwell, Denile, distribution flume).
- Transfer component (lift system, hopper dump, pescalator, braile loader).
• Sorting (integrate automation).
• Fish crowders (motorized crowders).
• Work up area (recovery tank).
• Anesthesia (AC and DC electro-anesthesia).
• Anesthesia (CO₂ control and MS 222 administration).
• Euthanization (electro-tank or air powered dispatch device).
• Integrate automation (tag detection, PIT tag reading and CWT sampling).
• Stress reduction (spray bar, sunburn mitigation).
• Predation control (covered and secure pond).

7.2.1.2 Adult Holding

• Integrate automation (tag detection, PIT tag reading and CWT sampling).
• Transfer component (lift system, hopper dump, pescalator, braile loader).
• Fish crowders (motorized crowding).
• Anesthesia (AC and DC electro-anesthesia).
• Anesthesia (CO₂ control and MS 222 administration).
• Euthanization (electro-tank or air powered dispatch device).
• Circular holding tank.
• Rectangular holding tank.
• Stress reduction (spray bar, sunburn mitigation).
• Predation control (covered and secure pond, predation and poaching prevention).
• Formalin system.

7.2.1.3 Spawning

• Biosecurity (containment of spawning runoff and post spawn deleterious materials).
• Electro-anesthesia (gravid female sorting aid, reduce chemical sorting baths).
• Euthanization (electro-tank or air powered dispatch device).
• Fish handling (conveyance alternatives, automated transfers).
• Safety (improve spawning operation and area safety).
• Ergonomics (efficiency and equipment implementation).
• New covered spawning facility.

7.2.2 Water Supply

The water supply at Wells Hatchery includes surface and groundwater sources. Groundwater is pumped to the facility, and the surface water is gravity fed to the hatchery from the adjacent Columbia River. The following bullets identify the aspects of the water supply modernization with the potential of technological solutions overview. The overview considered the system by each source of hatchery intake flow, the river intake, and the available well field water supply.

7.2.2.1 Groundwater

• New distribution control system (“Smart” screen for well system display).
• Emergency incubation water supply.
• Head tank (blending, level monitoring and control).
• Pressure system treatment (gas balancing, oxygen supplementation).
• Well field improvements and equipment updates (VFD installation, refurbish pumps).
• Flow meters (electronically controlled, monitored in alarm system).
• Monitoring devices (temperature and flow meters on every vessel).
• Central control and alarm reporting.
- Valve refurbishing or replacements in the existing system (technology updates where applicable).
- Mass balance of flow monitoring system.

7.2.2.2 Surface Water

- Head tank (integrate existing automated river intake system).
- Treatment (filtration, oxygen induction, pressurization).
- Biosecurity and disease treatment (UV, ozone).
- Emergency early rearing water supply.
- Isolation/treatment for invasive species.
- New distribution system monitoring and controls.

7.2.3 New Hatchery Building

The hatchery building will house fish rearing operations (incubations and early rearing) and facility administration activities. Storage for fish food and chemicals, and a shop area will also be included in the hatchery building design.

- Incubation water temperature (water chiller or heater control).
- Multiuse layout (fish culture, administration, storage and shop).
- Restroom with shower facility.
- Use profile (break room, conference room, offices, lockers).
- Communication system (designated area system support devices).
- Electrical room (HVAC, copier, fax, media storage).
- Kitchen (break room, fridge, microwave, oven, coffee maker).
- Early rearing and incubation area.
- Sturgeon facility (new facility built in the existing incubation building).
- M&E office and fish health exam lab area.
- Building monitoring (integrated fire, power, and temperature alarming).

7.2.3.1 Incubation Area

Segregation for each stock and species was a key factor for incubation area design at Wells Hatchery. The incubation period has required criteria for biosecure stock segregation.

- Biosecurity (segregated species and stocks).
- Isolation rooms (isolated effluent, water transfer barrier).
- Gear and tool isolation.
- Dedicated egg mixing and disinfection area.
- Start tanks/early rearing.
- Gravity feed fish transfer.
- Equipment room.
- Diurnal lighting.
- Chiller.
- Picking and sampling room.
- Biosecure fertilization room.

7.2.4 Existing Hatchery Incubation and Administrative Building Improvements

The existing hatchery building rearing function will be changed to accommodate the OLSA trout program and the sturgeon program. All anadromous fish incubation and rearing will be completed in the new hatchery building. At the time of the Master Plan development, new modifications are ongoing to accommodate the sturgeon program. Details of this program are covered in Volume 2.
It is anticipated that the electrical room will require a level of rehabilitation which will be further determined during the course of design due to meeting current electrical codes. General maintenance of the building envelope will also be determined during the course of design. The current shop area, personnel equipment area, office space, kitchen, freezer, and trough room will remain as currently functioning.

### 7.2.5 New Garage/Shop

The design process identified the need for improved infrastructure for hatchery support operations and weather controlled equipment storage areas.

- Heating and ventilation control.
- Equipment storage (vehicles, pumps, boats, etc.).
- Shop provisions (welding, vehicle repair and wood working).
- Feed storage (additional if required with mechanized loading/unloading, temperature/pest control).

### 7.2.6 Existing Utility Building

The existing utility and storage building structure has five bays which house chemical and equipment storage areas. The chemical storage area has a concrete floor and the equipment parking area is unpaved. Improvements to this structure include:

- Enclosing the open bays.
- Providing a concrete slab in the equipment storage area.
- General site access improvements.
- Chemical storage area enhancement.

#### 7.2.6.1 Chemical Storage

The chemical storage area in the existing utility building will be improved as required with the focus on safety and efficient functional aspects.

- Loading, processing and storage.
- Temperature control (exhaust and ventilation).
- Safety (alarm monitoring for air quality, fire and temperature).

### 7.2.7 Power

Auxiliary power was considered for use during emergencies or periodic service interruptions from the main dam direct feed (generator, automated start, alarm monitoring).

### 7.2.8 Drain System

The design technology to facilitate water flow from the rearing vessels to the volunteer channel for use as returning adult attraction flows (ability to drain water to volunteer channel or drain pipe).

### 7.2.9 Juvenile Collection/Release/Transfer

The use of current technology and advanced fisheries engineering design to reduce fish stress during typical hatchery operations was given consideration for this renovation. The need for research and monitoring activities are also key factors in the configuration of these systems (gravity transfer of fish, pit tag readers, fish counters, crowding/collection systems).

One significant improvement in this area is the centralized juvenile collection structure, which will allow for gravity transfer of juvenile fish from rearing vessels to a central location with easy access for subsequent fish handling by hatchery personnel and for marking or vehicle loading.
The structure will include provisions for transferring fish for tagging, marking, enumeration, and transfer, both by gravity from above to lower ponds below and by pumping/brailing to tanker trucks.

Segregation of fish transferred from fish rearing vessels within this structure will be provided for control of the numbers of the fish arriving for handling, holding through the period of marking/transfer and separation of different arriving fish that may be required.

7.2.10 Pollution Abatement

Modern pollution abatement technologies were considered for an integrated system that worked conjunctively with the remaining existing components and the modernized facility (clarifier, culture tank cleaning systems, microfiltration, settling ponds, polishing ponds).

7.2.11 Landscaping

Technology relative to low maintenance, improved scenic value, and seasonal climates were considered for landscaping the modernized facility (outdoor lighting, security system and monitoring, designated parking areas, plantings of grass, trees, landscape features, roadways and access - paved vs. dirt areas around ponds and channel, large delivery truck access - lighting, backing, turnaround safety, tourist/interpretive center with public restrooms).

7.2.12 Volunteer Channel

Operational and safety improvements for the existing volunteer channel (returning adult fishway), which also serves as a juvenile release channel, included removal of decommissioned structures (bat wing modifications, improve ergonomics, safety, use automation, structural repairs, decommissioned and relic apparatus, demolish/improve fish passage).

7.2.13 Truck Fill

Safety and function with technology to insure fill system is integrated into the flow profile (tanker fill spout and adjacent drain).

7.2.14 Transport Vehicle Disinfection Station

Incoming fish transport tank vehicles and on-site fish transport vehicles should undergo designated disinfection, rinsing, and drainage to reduce fish disease (provisions are recommended).

7.2.15 Alarms/Monitor/Control

A central, industrial quality, PLC based supervisory control and data acquisition system (SCADA) is proposed for the Wells Hatchery. The system will consist of a centrally located controller, networked via fiber optic cables to remote I/O control panels located at key locations throughout the site. The system will include user friendly, industrial, operator interface color touch screens to provide hatchery staff access to the control and alarm functions. The system will provide (programmable) control of the well water supply pumps and other process loads to help reduce operating and maintenance costs. The system will also provide a centralized monitoring and alarm system with the capability of off-site secure access to the control and alarm functions. Critical process equipment and back up emergency systems will be monitored and alarmed, and an alarm history log will be provided. An historian type data acquisition system is also recommended to improve hatchery operation and assist with permitting requirements. These data acquisition systems provide a simple tool the staff can use to trend process variables such as flow, temperature, and dissolved oxygen levels.

The display readout hatchery system control and monitoring equipment with specific system alarms will be recommended (flow monitor and alarm, dissolved oxygen monitoring and alarm, level alarms in head boxes and vessels, security and fire monitoring, temperature with logging capability).
7.2.16  **Potable Water**
A designated and serviceable potable water system with suitable and energy-saving alternatives will be recommended (i.e., pumps with flow meters, VFDs, chlorination, constant pressure system, new well/accumulator tank, permitting, provisions for sampling, and testing, etc.).

7.2.17  **Survival Study**
Identification of provisions for ongoing evaluation studies was completed, and preparations were acknowledged for potential DCPUD fish survival research (footprint for tanks, plumbing stub-out for tank supply and drainage).

7.2.18  **Security**
The hatchery requires specific areas of protection from human trespassing. Human safety is the biggest concern, with protection of the rearing areas and equipment also a priority (tie into PUD security, limit public access, fences and signage).
Chapter 8  Site Layout

8.1 Site Layout

The design team from DCPUD, WDFW, and HDR reviewed four alternative site layouts provided by HDR that included arrangements for the main hatchery building, outdoor rearing containment and the main supply headtank. The sites were evaluated in detail, with regard for ease of overall site access, fish collection/transfer, topography, operations during construction, water distribution corridors, rearing water discharge treatment and overall fish rearing operational considerations.

One preferred alternative was selected and later modified when subsequent additional information was provided by members of the review team. The selected alternative was considered the best configuration that addressed the specific site and operational elements for the new rehabilitation project.

Figure 8-1, Figure 8-2, Figure 8-3, Figure 8-4, Figure 8-5, and Figure 8-6 show the preferred site plan, hatchery building, circular tank shelter, garage/shop building, aeration headtank, and clarifier.
Figure 8-1. Site plan.
Figure 8-2. Hatchery building.
Figure 8-3. Circular tank shelter.
Figure 8-4. Garage/shop building.
Figure 8-5. Aeration headtank.
Figure 8-6. Clarifier.
8.2 Effluent Treatment

Hatchery operational reporting from WDFW indicates compliance with the present discharge water quality permit. The change in methods for the majority of the new programs, using circular rearing vessels in lieu of raceways, provides an improved effluent treatment process.

Specific information will be developed at the next stage of design after the Master Plan development. The following treatment options are considered for future design implementation. All effluent discharge points from each rearing facility/container will be assumed to require treatment for some or all of the discharge, depending upon its water quality characteristics, to meet discharge requirements.

The probable treatment system, based on known and assumed information at the time of this Master Plan, will be to utilize a 25 micron rotation filter for circular tank waste drains with the cleaning backwash going to a standard twin settling pond. All manually cleaned raceways, ponds, troughs and outflow from the existing and new hatchery buildings will flow directly to the clarifier. Final design and permitting requirements will be developed as operational parameters are approved in the design phase.

Figure 8-7 indicates the general flow patterns and location of the pollution abatement facility.
8.3 Flow Diagram

A flow diagram was completed for the preferred alternative as shown on Figure 8-8. The flow diagram does not necessarily indicate actual pipe routing, which will be determined in the design phase.
Figure 8-8. General flow diagram.
8.4 Hydraulic Profile

This hydraulic profile (Figure 8-9) reflects the issue of the assumed requirement to aerate surface water in a central head tank by gravity at minimum pool level of 771.0. Assuming the usual aeration methods (there may be other options), aeration of surface water would be possible from pool elevations 777.0 to 780.0. For the pool elevations between 771.0 and 777.0, surface water would not be centrally aerated in this scenario.

If full aeration is required through all pool elevations, temporary pumping or segmenting surface water distribution to lower rearing units with a separate head tank may be needed. This would include configuring any surface water need to the hatchery building with other methods (for example, pump back, local aeration, no aeration for a short period, etc.).

Well water will be pumped to the driving head required and is not a distribution concern.

These elevations are to be considered conceptual and will be refined as required in the conceptual design phase.
Figure 8-9. Hydraulic profile.
8.5 Adult Holding

HDR presented conceptual layouts for 12 alternative configurations for the new adult trapping/handling facility for review by the design team consisting of DCPUD, WDFW, and HDR representatives. The configurations were based on information gathered from design team members and visits to other sites where newer similar facilities were built and in operation. The alternative preferred, shown in Figure 8-10, was selected by the design team and was subsequently refined to incorporate improved fish entrance elements.
Figure 8-10. Adult holding, spawning and surplus site plan.
The Wells Hatchery modernization project will include state-of-the-art fisheries engineering and improvements to operational efficiencies. These aspects include the following areas: adult fish trapping and spawning, incubation and juvenile rearing, fish handling, water sources, water conveyance and use, drain and waste water, and control and alarm systems. Improvements to these aspects of the hatchery will provide a significant savings in manpower, maintenance, water and chemical usage, and electricity. These savings, along with reduced risk of not meeting mitigation requirements, will help to repay the long term capital investment made in the facility.

The various project elements of the Wells Hatchery modernization design that provide improvements to the hatchery and have the resultant effects on operational cost savings are contained within the Master Plan. Projections of the predicted savings can be made during the course of final design when more specific information is developed; however, the areas of improvement generalized below indicate significant potential manpower and energy savings.

Biosecurity will be emphasized in rearing system designs that will minimize cross contamination between rearing programs, which results in reduced chemical use, laboratory examinations, fish culture labor effort to medicate and apply treatments to fish, and mitigates the expense of lost rearing program production due to disease outbreaks.

New circular rearing vessels do not require the labor-intensive cleaning of raceways. This will reduce the labor needed for operation, but will also increase the quality of effluent discharged from the facility and provide higher quality fish for use in mitigation and recovery programs.

Automated feeding systems are expected to significantly reduce the amount of staff time required to manually handle, deliver, and apply fish feed. This again not only saves on manpower, but also allows for hatchery personnel to focus more time on fish health and water quality.

The use of PLC level controllers and the development of a common head tank will limit well pump operation to what is actually needed (also including properly designed PLC/VSD controls), resulting in: significantly lower pumping costs (a large amount of pumped ground water is presently wasted to overflow); increased life of the aquifer, pumps, and wells (less use by limiting operation to actual time/volume rearing demands); and a simpler overall control system, rather than the present manual operation of a complex and unreliable ground water system (more efficient and reliable supply with less operational risk).

New industrial grade control, monitoring, and alarm systems are expected to further reduce risk to the fish production and reduce the number of trained fish culturists required to manually control the system. This would allow remaining staff to more closely monitor fish health and water quality, rather than wrestling with the existing antiquated control and alarm systems.

Improved fish handling during adult trapping, spawning, and juvenile tagging and transfer will result in reduced manpower required to accomplish tasks, and will also result in less stress on fish, improving the quality and health of the fish.

Together, the systems described above, including new circular tanks, automated feeding systems, improved fish handling, and the biosecurity elements of design, will result in considerable savings in the areas of energy, manpower, feed, and chemical usage, while decreasing the risk of rearing losses and providing more environmentally benign operations. Overall, Wells Hatchery will be able to be run more efficiently, and will be able to reliably produce high quality fish to meet the District’s mitigation requirements.
Chapter 10 Planning for Invasive Mussels

10.1 Zebra and Quagga Mussel Introduction
Throughout the western United States, operators of water infrastructure live under the specter of invasive mussel infestations. Two mussels, the zebra mussel (*Dreissena polymorpha*) and the quagga mussel (*Dreissena rostriformis bugensis*), have been spreading from the eastern United States (Lake Erie) across the West. Reports of quagga mussel infestation have been reported in Flathead Lake, Montana, which drains into the Columbia River (Columbia Basin Fish and Wildlife News Bulletin, March 11, 2011). While invasive mussels have not been identified in the mid-Columbia region, it is probable that one or both of these species may colonize and cause impacts to the operations of the Wells Hatchery.

10.2 Colonization Impacts
Colonization of invasive mussels can cause severe impacts to the water body, as well as create ecological impacts to the environment. These impacts include colonizing hard surfaces, depositing detritus on shorelines, changing water quality, and impacting fisheries.

Of major concern to DCPUD in its operation of the Wells Hatchery are colonization impacts to the water system infrastructure. These impacts include loss of hydraulic capacity, obstruction of valves, blockage of screens, increased corrosion of steel and cast iron pipes due to bacterial growth, damage to any moving parts, such as flow meters, and concern that the Wells Hatchery would become a vector for distribution of invasive mussels through its planting program.

10.3 System Assessment
As with any new issue, a comprehensive vulnerability assessment of the threat represented by the mussels is recommended to determine the level of potential impact. This assessment should consider the design of any surface water intake structure, conveyance piping, process water treatment systems, fish rearing systems, and surface water delivery to and from the facility. In addition to Columbia River water, this assessment should address water delivery from other watersheds. Discussion should be held with WDFW to determine if a Hazard Analysis and Critical Control Point (HACCP) plan will be required for this facility. These plans typically address steps to be taken if an unwanted species is detected.

10.4 Monitoring
A monitoring program should be implemented to detect the presence of mussels before they begin to multiply rapidly. Mussels are spread as their microscopic larvae, known as veligers, float down the river. Once veligers are identified in the area, it will only be a matter of time before adults begin to attach and multiply. A single mussel can spawn 1,000,000 veligers a year. This monitoring program can be conducted by WDFW or DCPUD staff trained in the sampling procedures. The earlier a potential threat is identified, the more time DCPUD will have to implement a prevention or treatment program. A monitoring program should be considered during the design process.

10.5 Prevention or Treatment
Prevention programs are being considered, or have been implemented, by state and federal agencies throughout the West. It is the view of most agencies that prevention in the Columbia River system is impractical, and it is only a matter of time before introductions occur. It is still being debated whether the colonization potential of mussels is feasible in the mid-Columbia. The risk of colonization is affected by water quality. The colonization potential of zebra mussels based upon different water quality parameters is presented in Table 10-1.
Table 10-1. Zebra mussel colonization potential.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>High</th>
<th>Moderate</th>
<th>Low</th>
<th>Very Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salinity (ppt)</td>
<td>0.1</td>
<td>1-4</td>
<td>4-10</td>
<td>10-35</td>
</tr>
<tr>
<td>Calcium (mg/L)</td>
<td>25-125</td>
<td>20-25</td>
<td>9-20</td>
<td>&lt;9</td>
</tr>
<tr>
<td>pH</td>
<td>7.5-8.7</td>
<td>7.2-7.5</td>
<td>6.5-7.2</td>
<td>&lt;6.5</td>
</tr>
<tr>
<td></td>
<td>8.7-9.0</td>
<td>9.0</td>
<td>&gt;9</td>
<td></td>
</tr>
<tr>
<td>Water Temperature (°C)</td>
<td>18-25</td>
<td>16-18</td>
<td>9-15</td>
<td>&lt;8</td>
</tr>
<tr>
<td></td>
<td>25-28</td>
<td>28-30</td>
<td>&gt;30</td>
<td></td>
</tr>
<tr>
<td>Dissolved Oxygen (ppm)</td>
<td>8-10</td>
<td>6-8</td>
<td>4-6</td>
<td>&lt;4</td>
</tr>
<tr>
<td>Secchi Depth (cm)</td>
<td>40-200</td>
<td>20-40</td>
<td>10-20</td>
<td>&lt;10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>200-250</td>
<td>&gt;250</td>
</tr>
<tr>
<td>Water Velocity (m/sec)</td>
<td>0.1-1.0</td>
<td>0.09-0.1</td>
<td>0.075-0.09</td>
<td>&lt;0.075</td>
</tr>
<tr>
<td></td>
<td>1.0-1.25</td>
<td>1.25-1.5</td>
<td>&gt;1.5</td>
<td></td>
</tr>
</tbody>
</table>

Source: O’Neill 1996.

A review of the low and very low probability of colonization potential in Table 10-1 does provide some guidance to design considerations of the facility. For example, surface water operations could be conducted when temperatures are below 8 °C or above 30 °C when blending of river water and well water occurs. Maintaining water velocity above 1.5 m per second could also be another useful tool to prevent colonization inside pipes.

Operational considerations might include the drying out of equipment and piping systems. As relative humidity is decreased and air temperature is increased, the number of days to experience 100% mortality increases (Table 10-2).

Table 10-2. Aerial exposure and mortality of zebra mussels.

<table>
<thead>
<tr>
<th>Relative Humidity (%)</th>
<th>Days to 100% Mortality at Air Temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5 °C</td>
</tr>
<tr>
<td>95</td>
<td>27</td>
</tr>
<tr>
<td>50</td>
<td>17</td>
</tr>
<tr>
<td>5</td>
<td>11</td>
</tr>
</tbody>
</table>

Sources:
There are a number of control technologies which can prevent and/or minimize damage from mussel colonization. These control technologies should be considered during the preliminary design phase. Some of these methodologies may not be suitable where the water supply is in contact with ongoing fish culture operations. The categories of control technologies are shown in Table 10-3.

### Table 10-3. Invasive mussel control technologies.

<table>
<thead>
<tr>
<th>Major Technologies</th>
<th>Methods of Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exclusion (prevention of entry)</td>
<td>Sand filter intakes</td>
</tr>
<tr>
<td></td>
<td>Bank filtration</td>
</tr>
<tr>
<td></td>
<td>Permeable barrier</td>
</tr>
<tr>
<td>Prevention of Settling</td>
<td>High-velocity flows</td>
</tr>
<tr>
<td></td>
<td>Coatings</td>
</tr>
<tr>
<td></td>
<td>Electrified surfaces and electrostatic shock</td>
</tr>
<tr>
<td></td>
<td>Cathodic protection</td>
</tr>
<tr>
<td></td>
<td>Acoustics</td>
</tr>
<tr>
<td></td>
<td>Cavitation</td>
</tr>
<tr>
<td>Mechanical Control Methods</td>
<td>Manual scraping</td>
</tr>
<tr>
<td></td>
<td>Pigging</td>
</tr>
<tr>
<td></td>
<td>High-pressure jetting</td>
</tr>
<tr>
<td></td>
<td>Abrasive blast cleaning</td>
</tr>
<tr>
<td></td>
<td>Mechanical filtration</td>
</tr>
<tr>
<td></td>
<td>Disposable substrates</td>
</tr>
<tr>
<td></td>
<td>Mechanical filtration</td>
</tr>
<tr>
<td></td>
<td>Sound treatment</td>
</tr>
<tr>
<td></td>
<td>Vibration</td>
</tr>
<tr>
<td></td>
<td>Cavitation</td>
</tr>
<tr>
<td>Chemical Control Methods</td>
<td>Metallic salts</td>
</tr>
<tr>
<td></td>
<td>Non-oxidizing biocides</td>
</tr>
<tr>
<td></td>
<td>Oxidizing biocides</td>
</tr>
<tr>
<td></td>
<td>Ozone</td>
</tr>
<tr>
<td></td>
<td>Chlorine</td>
</tr>
<tr>
<td>Asphyxiation</td>
<td>DO Deprivation</td>
</tr>
<tr>
<td>Thermal Treatment</td>
<td>Heat Shocking</td>
</tr>
<tr>
<td>Exposure and Desiccation</td>
<td>Desiccation at non-freezing temperatures</td>
</tr>
<tr>
<td></td>
<td>Desiccation at freezing temperatures</td>
</tr>
<tr>
<td>Ultraviolet Irradiation</td>
<td>Mechanical filtration with UV</td>
</tr>
<tr>
<td>Biological Control Methods</td>
<td>Bacterial exposure</td>
</tr>
<tr>
<td></td>
<td>Predation</td>
</tr>
<tr>
<td></td>
<td>Spawning inhibition</td>
</tr>
<tr>
<td>Long-term Design Strategies</td>
<td>Systems approach</td>
</tr>
</tbody>
</table>

Some of these technology options have been tested and are implemented at various locations throughout the country (Table 10-4). Other options are currently under research by federal and state agencies (Table 10-5). During the preliminary design phase, technology options with potential should be investigated further as research results are available.
Table 10-4. Technologies in use.

<table>
<thead>
<tr>
<th>Control Method</th>
<th>How it Works</th>
<th>Effective Dosing Range</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake Structure - Infiltration System</td>
<td>Infiltration intake sieves out veligers and adult mussels</td>
<td>N/A</td>
<td>Prevents mussel introduction to pipes and plant, robust intake system</td>
<td>Must construct new intake system</td>
</tr>
<tr>
<td>Surface coatings</td>
<td>Either antifouling or foul-release coatings make the coated surface partially inhospitable.</td>
<td>Coatings last for approximately 3-10 years</td>
<td>Minimizes settling on inlet structure</td>
<td>Only prevents settling, does not prevent mussel transport into piping and treatment system. Costly and difficult to apply</td>
</tr>
<tr>
<td>Mechanical Cleaning</td>
<td>Scraping, pigging, high pressure water jet</td>
<td>1-4 times per year</td>
<td>Restores capacity of inlet structure</td>
<td>Reactive treatment. May compromise integrity of intake after multiple cleanings.</td>
</tr>
<tr>
<td>Chemical Oxidents</td>
<td>Cause mortality, prevent settling</td>
<td>0.2 mg/L - 10 mg/L depending on oxidant</td>
<td>Very effective treatment</td>
<td>DPB formation, high cost, and treatment impacts</td>
</tr>
</tbody>
</table>

Table 10-5. Technologies being researched.

<table>
<thead>
<tr>
<th>Technology</th>
<th>Method</th>
<th>Current Concerns with Use</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological</td>
<td>Predation</td>
<td>Low Efficiency / Introduction of non-native species</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Spawning Inhibition</td>
<td>Uses serotonin reuptake inhibitors which are among emerging contaminants of concern</td>
<td></td>
</tr>
<tr>
<td>Acoustic</td>
<td>Cavitation</td>
<td>Adverse effects on infrastructure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sound/ultrasound Treatment</td>
<td>Adverse effects on infrastructure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vibration</td>
<td>Adverse effects on infrastructure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Activated Starch</td>
<td>Vendor out of business, no conclusive results</td>
<td></td>
</tr>
<tr>
<td>Chemical Nonoxidants</td>
<td>Aluminum Sulfate</td>
<td>High concentrations required (~125 mg/L), solids production</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chloride Salts</td>
<td>High concentrations required (~10,000 mg/L)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Potassium Salts</td>
<td>High concentrations required (50-300 mg/L)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moluscidicides</td>
<td>Inappropriate for drinking water treatment</td>
<td></td>
</tr>
<tr>
<td>Electrical Physical</td>
<td>Electro-magnetism</td>
<td>Exposure time of 15 days, not proven in flow-through systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Light Sources</td>
<td>Low Efficiency</td>
<td></td>
</tr>
</tbody>
</table>
Chapter 11  Aesthetics and Public Outreach

11.1 Aesthetics

With its location near a dam on the Columbia River, the hatchery will lend itself to various themes of architectural and landscaping options. In general, the new facility will have limited areas of irrigated grass, along with the appropriate smaller trees and vegetation.

Grading of the area will consider land forms that would minimize site excavation and be conducive to proper re-vegetation with native plants and drainage aspects.

The building architecture will be reflective of the area structures now in place, although options for siding and roofing could be chosen to reflect a different theme (Methow Hatchery, as an example).

11.2 Public Outreach (Visitation)

Public awareness of the resource contribution of the Wells Hatchery by DCPUD is important to the project, and the project will incorporate features to allow and enhance the general public’s ability to interpret the fisheries aspects of the facility.

The location near the Dam creates security concerns, and the hatchery itself as a whole is intended for fish production by trained staff. Public safety and biosecurity concerns are paramount for this facility; thus, limited direct access to the facility to scheduled tours will require the prior approval of the hatchery manager.

The upper entrance area has public restrooms, parking, and informational signs generally focusing on the power generation. Enhancement of the kiosk area with informational pictures and text would form part of the public visitation information for the hatchery.
The following schedule (Figure 12-1) reflects the general understanding of the full modernization project and is estimated based on facts presently known or assumed. It is a paramount objective for this modernization project to be constructed in such a manner as to allow for continuing full fish production at the site during the construction phases. The following schedule, which includes involvement of pre-approved potential contractors at the 75 percent design phase, in part addresses the pre-planning effort needed to properly bid a phased project to accommodate this requirement.
Figure 12-1. Preliminary schedule.
Appendix A
Facility Assessment
Douglas County
Public Utility District No. 1

Wells Fish Hatchery Modernization

Facility Assessment/Useful Life Analysis

Prepared by

HDR | ONE COMPANY
Many Solutions®

4717 97th St NW
Gig Harbor, WA  98332

September 2012
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- Acknowledgements ...................................................................... i.4

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## 3. Headworks ........................................................................... 3.1.1
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- 3.2. Job Water Pump Pit General Information .................. 3.2.1
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Appendix A  Facility Assessment Asset Location Site Plan
Appendix B  Facility Water Supply System Drawings
INTRODUCTION

Project Description

HDR has prepared for Douglas County Public Utility District #1 (DPUD) a facility assessment and useful life analysis of the existing hatchery infrastructure at Wells Hatchery. The original facility was constructed between 1965 and 1969 and a major portion of the original facility components are still in use. Some components have been added as facility needs and objectives have changed over time. The objective of this assessment is to review all the existing infrastructure at the facility and evaluate the expected life remaining for those components in the context of possible continued use, repair, replacement or abandonment. This assessment is a part of a Master Plan for the Wells Hatchery Modernization Project. The Master Plan and development phases for this project have been divided into multiple tasks. The Master Plan essentially consists of Tasks 1, 2 and 3.

<table>
<thead>
<tr>
<th>Task 1.0 Phase One</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Water Supply Assessments</td>
<td></td>
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<tr>
<td>1.2 Primary Power Assessments</td>
<td></td>
</tr>
<tr>
<td>1.3 Program Goals Definition</td>
<td></td>
</tr>
<tr>
<td>1.4 Facility Assessment and Useful Life Analysis (Report Herein)</td>
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<td>1.5 Development of Bioprogramming Criteria</td>
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<table>
<thead>
<tr>
<th>Task 2.0 Phase Two: Alternatives Analysis -</th>
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<tbody>
<tr>
<td>Task 3.0 Phase Three: Schematic Design of Preferred Alternative</td>
</tr>
<tr>
<td>Task 4.0 Phase Four: Final Design Development of Bid Documents -</td>
</tr>
<tr>
<td>Task 5.0 Phase Five: Construction Assistance</td>
</tr>
</tbody>
</table>

Prior to beginning the Task 1.4 assessments, HDR assembled data regarding the facility infrastructure. This data included reports, geological assessments, well logs, well reports, drawings, specifications, operation and maintenance manuals, biological programs, and water rights information.

A site visit was held on June 12 and 13, 2012 and attended by the following HDR team with specialties in the listed disciplines:

<table>
<thead>
<tr>
<th>Name</th>
<th>Expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jason Hill, PE</td>
<td>Project Manager, Civil Engineer</td>
</tr>
<tr>
<td>Terra McParland, PE, LEED AP BD+C</td>
<td>Environmental Engineer</td>
</tr>
<tr>
<td>Bruce Bradley, PE, SE</td>
<td>Structural Engineer</td>
</tr>
<tr>
<td>Eric Orton, PE</td>
<td>Mechanical Engineer</td>
</tr>
<tr>
<td>Rick Schmudde, PE</td>
<td>Electrical Engineer</td>
</tr>
<tr>
<td>Ed Donahue, PE</td>
<td>Fisheries Engineer</td>
</tr>
<tr>
<td>Dale Ralston, PE, PhD</td>
<td>Ralston Hydrologic Services</td>
</tr>
</tbody>
</table>
Hatchery staff provided a guided tour of the entire site on the first day and answered questions from the team. The facility was divided into 23 major components for review. The second day was used for data gathering (i.e., measurement, photos, and notes) for each component. This report outlines the findings from the team regarding the existing facility and also includes a useful life projection for each major facility component.

**Major Components and Criteria:**

The facility assessment was broken down into the following major facility components:

Appendix A contains a general asset location site plan of where the below items are generally located.

1. Surface Intake Building and T-Screen Well
2. Site Water Supply Distribution
3. Headworks
   3.1 Surface Water Aerator
   3.2 Job Water Pump Pit
   3.3 North and South Bureau Aerator
   3.4 Upper Pool Well Water Aerator
   3.5 Aeration Tower
   3.6 Well House No. 4
4. Incubation and Administration Building
5. Green Spawning Building
6. Upper Pool
7. Spawning Channel
8. Salmon Rearing Ponds (16/17) (Rainbow Ponds)
9. Adult Salmon Holding Ponds (15U, 15L)
10. Adult Steelhead Holding Ponds (Section A – Section D)
11. Chinook Spawning House
12. Steelhead Spawning House
13. Volunteer Fish Ladder
14. Dirt Ponds (DP1- DP4) (trapping trucking)
15. Adult Trapping Facility
16. Raceways (Bureau) (1-10)
17. Vinyl Raceways (11-14)
18. Above Ground Raceways (18-21)
19. Storage Building (Shop, Feed, Chemical)
20. Facility Drain
21. Pollution Abatement
   21.1 Treatment Pond
   21.2 Vacuum System
22. Primary Power
23. Well Houses

Each component was evaluated and documented with respect to the following main criteria:

- Component Name
- General Component Description
- Size (if applicable)
- Approximate year of construction
- Assessment
  - Architectural
  - Structural
  - Mechanical (HVAC, plumbing)
  - Process Piping
  - Electrical
- Useful Life
- Deficiencies
- Photos

The general information and condition of each component was assessed and documented by these main criteria. Within each assessment area, minor and major deficiencies were listed. Major deficiencies or areas that could be renovated or fixed were listed in the Deficiencies category with the hope to utilize those lists for future development of the entire facility Master Plan. The majority of the problems at the hatchery are related to aging infrastructure, limited water availability, and lack of bio-security features. While the hatchery has been periodically updated, many of the facility components are at the end of their service life or will require renovation to continue operation. This report can be used to help develop those future plans.

Please note that the scope of this project did not include review issues related to the American’s with Disabilities Act (ADA) or Occupational Safety and Health Administration (OSHA) requirements.

Due to the size and complexity of the well water supply system, a separate report was developed to summarize the entire well system. Appendix A presents the referenced drawings for the main site plan and site piping and is contained for reader reference.
Acknowledgments

The following individuals have been involved in the development and review of this facility assessment. Their cooperation and assistance is gratefully acknowledged.

Douglas County PUD

- Shane Bickford, Natural Resources Supervisor
- Greg Mackey, Fisheries Biologist

WDFW

- Jayson Wahls, Wells Complex Manager
- Scott Moore, Hatchery Staff
COMPONENT NAME:

1. SURFACE INTAKE

GENERAL DESCRIPTION:

Surface (river) water for the fish facility is obtained through the intake structure in the forebay. The water travels via gravity feed through a concrete conduit through the West Embankment to the Surface (River) Water Aerator and water supply channel at the Upper Pool. A constant and preset quantity of water is required at downstream systems despite the fluctuations of the reservoir. Hatchery personnel manually adjust the gate opening at the intake structure to account for changes in the forebay elevation. These adjustments were originally controlled automatically by a liquid level float switch/gate movement system which is no longer a functional component of the surface water intake system.

The primary uses of surface water at the fish facility is to supply the four Dirt Rearing Ponds Ponds 16 and 17 during the winter months (December through May), supply Rearing Ponds 16 & 17 and provide attraction flow for returning adult broodstock. Flow to the dirt ponds originates from a gated (Valve S1) 24-inch corrugated metal pipe (CMP) line connected to the Surface (River) Water Aerator. The 24-inch line feeds a 20-inch valved steel header which has 14-inch valved steel lines branching to each Dirt Rearing Pond (See Appendix A for surface water distribution drawings). Surface water from the supply channel at the Upper Pool is also used as irrigation water for Wells & Wade Orchards during the growing season. Two pumps located at the Upper Pool convey the surface water via a 15-inch steel line to the orchards. During the winter months, a portion of this pipeline is used to direct supplementary surface water to the four Dirt Rearing Ponds and Ponds 16 and 17. A 25 horsepower pump, adjacent to the irrigation pumps, produces this supplementary flow. Two job water pumps (Nos. 22J & 23J) at the Upper Pool provide job water to the Incubation and Administration Building as well as various hydrants located throughout the facility. In the event that surface water is needed for supplemental flow or temperature control, a gated crossover connection (Valve D36) exists between the job water system and the 12-inch steel well water pipeline located at the upstream end of the concrete raceways.

Under an emergency situation, surface water can be used to supply the incubation building, raceways, and adult holding facilities by opening the slide gate (Valve D100) on the 20-inch steel well water pipeline and flooding the well water system. This should only be used in the event of complete well failure since other cleaner water sources, including the job water or reuse water, could be used to account for short term shortages in water within the incubation building. Valve D12 is normally open and supplies a source of well water (fresh aerated water) to the section of the 20-inch surface water pipeline downstream from valve D100.
Preceding an extreme flood, the reservoir can be drawn down to elevation 767.00. The elevation of the concrete sill in the denitrifier is elevation 766.83. To maintain an adequate flow at maximum drawdown will require adjustments of the regulating gates and stoplogs.

In 2008, the traveling screen system was taken off line and replaced with a 150 cfs NOAA compliant T-Screen supplied by ISI Inc. The T-screen is attached to four new piles and is mechanically connected to the existing 72-inch concrete pipe that extends approximately 300 feet into the forebay from the screen structure.

The T-screen is equipped with a brush cleaning system where brushes are fixed to the screen superstructure inside and out of the screen face. Each leg of the T-screen rotates in a clockwise motion during cleaning of the screens. In addition to the brushes, water nozzles are activated to provide additional sweep during cleaning to promote additional sweeping flow to carry fine debris away from the screen.

Electrical and hydraulic lines fed down the 72-inch existing pipe connect the screen to electrical and hydraulic equipment on top of the screen structure.

During the renovation of the screening system in 2008, a 72-inch slide gate was installed along with an additional port on the west side of the intake that would serve as redundancy during a potential screen failure. This additional port is operated by a slide gate.

Presently there have been no documented issues with the T-screen.

**SIZE:**

30’x30’x 26’ Tall

**YEAR OF CONSTRUCTION:**

1965-1969 for concrete intake structure and traveling screen system.

2008 T-Screen was added in forebay at end of intake pipe line.

**ASSESSMENT:**

**Architectural:**

The pre-engineered Surface Intake screen building appears to be in good condition with doors working adequately.

**Structural:**

Stair access appears to be in good condition. Handrail appears to be in good conditions. Intake structure is composed of reinforced concrete. Upon visual inspection, the concrete appears to
be in good condition.

**Mechanical (HVAC and Plumbing):**

The decommissioned traveling screen appears to be in good condition from what can be seen, and is not causing any adverse conditions or effects to the concrete or pre-engineered building. Gate operators installed in 2006 are in good condition. T-Screen is functioning as intended with one minor issue being that it has to be manually operated at different forebay surface elevations.

**Process Piping:**

Intake pipeline not inspected due to being in use.

**Electrical:**

Electrical components appear to be in good condition that were installed to operate the new T-Screen.

### Useful Life for Intended and Current Use:

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Remaining Life of Components (2)</th>
<th>Functionality (3)</th>
<th>Useful Life of Facility (4)</th>
</tr>
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<tbody>
<tr>
<td>Architectural</td>
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<td>NA</td>
</tr>
<tr>
<td>Structural</td>
<td>50</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Mechanical</td>
<td>50</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Process Piping</td>
<td>50</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Electrical</td>
<td>20</td>
<td>yes</td>
<td>20</td>
</tr>
</tbody>
</table>

**Notes:**

1. Discipline category represents general profession reviewed.
2. Components represent the features/aspects of the Discipline.
3. Functionality represents whether the current facility does or does not meet the originally intended use (yes/no).
4. Useful life year is based on the least remaining life value noted.

**Deficiencies:**

1. Replace liquid level float switch/gate movement system.
2. Electrical feeds from the hatchery building electrical room are outdated and not up to current code.
PHOTOS:
COMPONENT NAME:

2. SITE WATER SUPPLY DISTRIBUTION

GENERAL DESCRIPTION:

The following descriptions were partially based on the facility operation and maintenance manual developed originally by Bechtel Corporation and then revised by Sverdrup Civil, Inc. in 2002. On June 13 and 14, 2012, a site review of these systems was completed and the results incorporated in this section.

The purpose of this section is to generally describe the obtainable location, purpose and general condition of the water distribution systems at the site. From this basis, removal, replacement, and installation of new pipelines will be recommended following completion of the new facility needs along with predicted well water quantity and sources.

In general, there are three water supply systems that distribute single source surface and well water to the fish production facilities while other systems allow some of the first pass water from the fish production facilities to be recirculated through other portions of the facilities. These systems are normally operated independently, but they are interconnected at several crossover valves allowing water to be supplied by another system during emergency situations. The following describes each system and the valves associated with them based on known information.

Well Water Supply System

The intent for this assessment is to use similar nomenclature so that documents could be referenced and cross referenced by staff members. Each description has been reviewed for accuracy to the best of our knowledge based on our findings from the site visit assessment and the operation and maintenance manual.

Originally operated by separate entities working at the facilities, the groundwater producing wells, their pumps, and the associated valves were given alpha-numeric reference numbers. The letter associated with each designation indicates which water supply series the item was originally associated with while the number distinguishes the item within the supply series. The letter series have the following meanings:

“A” Series: The "A" Series includes wells and valves associated with piping originally operated and maintained by the Washington Department of Fisheries. The series was intended to direct water from the Forebay, Upper Pool, and Parking Lot Wells (2A, 3A, 4A) through centralized aerators prior to distribution to the original concrete raceways and the Incubation and Administration Building. (See Appendix B sheet 1, 2 and 13 of 12)
“B” Series: The "B" Series includes wells and valves associated with piping originally operated and maintained by the Washington Department of Game. This series was intended to supply the rearing ponds with water directly without aeration prior to distribution. The source of water is from the Carpenter Island Wells (5B and 6B) and/or the Wells and Wade Wells (7B, 8B, and 9B). (See Appendix B)

“C” Series: The "C" Series includes wells and valves associated with piping originally operated and maintained by the Bureau of Reclamation (wells 10, 11, 12, 13, and 14). The series was intended to direct water to the Upper Pool or Bureau Aerators for centralized aeration or it can supply unaerated water directly to the Salmon Rearing Area. (See Appendix B)

“D” Series: The "D" Series includes crossover valves which allow flexibility in the water supply system. Operation of these valves can control the supply source for the associated piping. (See Appendix B)

“H” Series: The "H" Series includes valves associated with Herb's Well (15H) and the piping system connecting it to Adult Salmon Holding Ponds. (See Appendix B)

“S” Series: The "S" Series includes the valves and pumps associated with the distribution of the surface water supply to the rearing ponds and water supply channel during normal operating procedures. In emergency situations, surface water may be diverted into the well water system in order to supply water to the entire facility. (See Appendix B)

“T” Series: The "T" Series includes valves associated with the distribution of water within the Incubation and Administration Building. (See Appendix B)

“J” Series: The “Irrigation Water Supply System to Wells and Wade Orchard” as noted on sheet 4 in Appendix B conveys surface water from two pumps located at the southeast corner of the Upper Pool. These pumps deliver surface water from the water supply channel (i.e., spawning channel) to the Wells and Wade Orchards through a carbon steel pipeline during the irrigation season (approximately from the end of March to mid-September). An item to note is that adequate water level in the water supply channel must be maintained at all times during the irrigation season. The water that is in the channel is supplied from the surface water intake in the forebay.

“The “J" Series or Job Water Supply System components includes the pumps and piping system associated with the pressurized surface water that can be routed throughout the hatchery for a number of normal and emergency uses. of water within the Incubation and Administration Building. The job water system is supplied with river water from two pumps located at the Upper Pool of the water supply channel. The pumps are both 40 H.P. and are numbered No. 22J and No. 23J. Adjacent to the job water system is the fire suppression pump and piping system that is routed to the shop area west of the hatchery facility. (See Appendix B)

“R” Series: The “Reuse Water Supply System” begins with a collection structure that is located east of Concrete Raceway Nos. 6, 7, and 8. This structure is divided into three chambers that are separated by stoplogs. The small, central chamber collects effluent from the Incubation and Administration Building’s
Trough Room. This central chamber discharges its water over stoplogs and into the large reuse chamber or it discharges its water through a slide gate and into the large drainage chamber.

In addition to the water spilling into it from the small, central chamber, the reuse chamber is fed with previously utilized water from the concrete raceway tailraces as well as fresh well water from Valve A12. The water that is collected in the reuse chamber can be discharged into a 24-inch pipeline leading to the Adult Steelhead Holding Pond or it can be spilled over stoplogs and into the drainage chamber. This reuse water is the only well water supply to the Adult Steelhead Holding Pond. Three pumps, No. 25, 26, and 27 (note: only two pumps are operable), are located at the downstream end of the Adult Steelhead Holding Pond. They pump reuse water from here to the upstream end of the Adult Salmon Holding Pond. Reuse water is also available at the lower bank of concrete raceways. Slide gates over 24-inch pipes control the flow of water from the tailraces of the upper bank of concrete raceways to the headboxes of the lower bank. No alpha-numeric numbering system is used for the reuse system. (See Appendix B)

“P” Series: The “Potable Water Supply System” supplies potable water for the dam, hatchery, public restrooms (park) and residences all are supplied directly from Well No. 1 located in the Forebay and from Well No. 4. The service is conveyed from the Upper Pool by a 3-inch diameter supply main. The potable water is not treated presently but is tested at regular intervals. To ensure water is delivered to all end users (dam, hatchery building and residences), Well No. 1 must be in continuous operation.

**Size:**

Network of pipes. See Appendix B for drawings of surface water, well water, job water and drain networks.

**Year of Construction:**

1965-1969 (Approximate) (Modification to the supply system were made in the late 1970s to early 1980s)

**Assessment:**

The following list is general observations of above ground pipelines for the well water system “W”, surface water system “S”, job water system “J”, and reuse water supply system “R”.

The review of the site piping conveyance lines was limited to a visual inspection of the exposed pipe above ground. This review addresses the water supply distribution system to the point where it enters major facilities such as hatchery building, raceways, rearing units, adult holding and handling structures. Additional delivery pipe visual observations will be captured under each individual facility assessment.

This assessment will refer to existing as-built drawings developed by Sverdrup Civil, Inc., in 1999 where they describe the general layout as best known for the well water supply lines, surface water supply
lines, job water supply lines, reuse lines and drain lines. As previously stated, along with these drawings, an operation and maintenance manual originally developed by Bechtel Corporation then updated by Sverdrup Civil, Inc. in 2002 was used to further understand the existing conveyance systems along with information obtained at the site visit of June 13th and 14th of 2012.

Appendix B contains site piping drawings for well supply, surface water supply, job water, reuse lines and drain lines as well as hatchery building piping.

The current state of all facilities of the water supply system at the Wells Hatchery was limited to inspection of the exposed exterior of the pipe and fittings. The visual inspection noted the following:

1. The pipe type appears to be carbon steel. We were able to obtain a manufactures marking (8 STD <H> WPBG 59V 1292) from one of the pipes where we were able to further define what ASTM the pipe may be categorized under. The follow are the two ASTM that may be applicable: ASTM A 53/A 53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless. ASTM A 234/A 234M Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature.

2. The general designation from the original as built drawings is carbon steel (CS) where ¾-inch diameter thru 10-inch diameter is schedule 40 pipe. Pipe designated as CS equal to or greater than 12-inch and larger has a minimum wall thickness of 0.375 inches.

3. Surface coating system in various locations has failed and rust is apparent.

4. At several locations, the exposed pipe has been patched with similar material where leaks have occurred. Patches were welded on to the pipe.

5. At one location between the original adult spawning channels, we did observe a 24-inch surface water supply pipe encased in a rough pour of concrete where we are assuming that it was a quick fix for a leak.

6. In some of the aeration boxes we did observe rust scaling build up on the media that we suspect is from the internals of the piping systems.

7. We exercised some of the valves to verify they were operable but could not verify that they are functioning as intended.

8. General conversations with Jayson Wahls, Hatchery Manager, indicated that complete isolation of water seems to be nearly impossible as they have not been able to shut off the water to the hatchery. We are assuming two potential reasons, valves do not seat properly or there is additional cross over piping without valves. Several of the crossover valves are no longer functional and are introducing contaminated surface water into rearing ponds when groundwater is needed. At other times, the failed crossover valves allow groundwater pumped from one well to enter other, non-operating Orchard and Island wells. Another possibility for unexplained water flow is well siphoning.

9. At several locations excessive corrosion was observed at welds and fittings. Fittings could be welded connections or bolted flanged pipe to pipe or pipe to valve.
10. Vacuum lines have ruptured due to water freezing in the pipes.

**USEFUL LIFE FOR INTENDED AND CURRENT USE:**

<table>
<thead>
<tr>
<th>Discipline (1)</th>
<th>Remaining Life of Components (2)</th>
<th>Functionality (3)</th>
<th>Useful Life of Facility (4)</th>
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4. Useful life year is based on the least remaining life value noted.

All piping, with some minor exceptions has been in use longer than or near the normally expected life of the material it is composed. Pending the new hatchery layout and expected well water source and quantity, along with consideration for keeping the hatchery in operation during construction, the cost for complete physical inspections is considered as not warranted for the following rationale:

- New well water pumps and distribution lines will probably be required considering new layouts, findings of the well water assessment (separate report), and distance to confirmed well sources to a central headtank.
- The existing lines would most probably be kept active while new lines are installed and then abandoned.
- Certain main pipes, such as the drain and surface water supply lines may be lined in place.
- In essence, the new facility should have all underground water distribution systems of such quality to match the design life of the facility itself to minimize risk and protect the investment.

**DEFICIENCIES:**

1. Pipeline materials have met and in some cases exceeded their useful life.
2. Observed patchwork on pipes to repair leaks at various locations.
4. The water system cannot be shut off.
5. Several key valves no longer function resulting in river water contaminating the ground water supply system.
6. Interior rust and scale present downstream of all major discharge pipes.
7. Above ground piping exterior coating failing due to weather exposure.
8. Bedding appears to be insufficient for type of pipe as observed where traffic can move across.
9. Various pipes throughout the facility are not supported or secured.
10. Fittings in various locations have excessive rust (scaling).
11. Observed minor leaks in various locations.
12. The system is overly complex due to multiple emergency fixes.
13. The system contains various non-functioning valves that inhibit the isolation of water supplies.
14. The system does not allow water from the two separate ground water systems to be blended. This leave each side of the hatchery dependent upon its own wells water sources without redundancy of water supplies.
15. Crossover values do not allow the surface and well water systems to be isolated.
16. Head boxes are constructed with wood and thin metal that are near a point of failure.
17. Large volumes of ground water are currently spilled out of the head box to provide adequate flow out of the head box. There is no way to adjust the head within the head box other than though spilling additional water.
18. The current system does not function properly as a water conveyance system.
19. Test the potable water and provide treatment (e.g., disinfection) as needed.

Photos:
COMPONENT NAME:

3.1 HEADWORKS – SURFACE WATER AERATOR

GENERAL DESCRIPTION:

The surface water upwells in a center chamber then crests over a weir wall, where then the water cascades over splash plates and gas balances the water. The structure is not covered.

SIZE:

NA

YEAR OF CONSTRUCTION:

1965-1969

ASSESSMENT:

Architectural:

NA

Structural:

The water bearing structure appears to have some post tensioned concrete. Some portions of the concrete structure has scaling present. The grating system has excessive corrosion in sections.

Mechanical (HVAC and Plumbing):

NA

Process Piping:

The gate operators appear to be in good condition. The gate seals could not be inspected due to the aerator being in operation. Inspection of the aeration splash plates revealed some corrosion and they look to be in fair to poor condition

Electrical:

NA
USEFUL LIFE FOR INTENDED AND CURRENT USE:

<table>
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<tr>
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DEFICIENCIES:

1. Open water which compromises biosecurity.
2. The structure does not contain adequate railings (over open water).
3. Existing gate valves are operated manually and are subject to failure and leaking lubricating oils into surface water.

PHOTOS:
COMPONENT NAME:

3.2 HEADWORKS – JOB WATER PUMP PIT

GENERAL DESCRIPTION:

The job water is well water that is pumped throughout the site as service water or emergency supply water to some rearing activities. This pre-engineering metal building contains a pump pit, pumps (1 & 2), slide gates, removable steel grating, and piping. A new fire suppression pump system was installed inside this building.

SIZE:

15’x30’ (approximate)

YEAR OF CONSTRUCTION:

Initial 1965-1969 (Modifications have occurred since but years are unknown)

ASSESSMENT:

Architectural:

The building is a pre-engineered metal building with concrete floor. The exterior face contains some chalking and fading. The roof is in fair condition. Some fading of the surface coating and minor surface rusting was observed. The interior door is rusted.

Structural:

The concrete floor is in good condition. The pre-engineered metal building structure appears to be in good shape with no significant corrosion.

Mechanical (HVAC and Plumbing):

The building is heated using infrared lighting and appears to be adequate. The heat lamps are on a thermostat and only come on when temperatures reach 55 degrees F or colder.

Process Piping:

The job water piping and valves are highly corroded. Gate operators are in poor, inoperable condition. The floor contains no floor drain. There were several piping leaks spilling on the floor. The fire suppression system is new and in excellent condition.

Electrical:

The electrics were fairly new and in good condition.
**Useful Life for Intended and Current Use:**

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4. Useful life year is based on the least remaining life value noted.

**Deficiencies:**

1. Many of the gate valves are inoperable and/or abandoned.
2. Many pipes and valves are corroded.
3. No floor drain.
4. Doors do not function properly.

**Photos:**

![Photo 1](image1)

![Photo 2](image2)
DOUGLAS CO. PUBLIC UTILITY DISTRICT #1

WELLS FISH HATCHERY MODERNIZATION
Facility Assessment / Useful Life Analysis

3.2-4
COMPONENT NAME:

3.3 HEADWORKS – NORTH AND SOUTH BUREAU AERATOR

GENERAL DESCRIPTION:

These are two aeration structures for well water. The North structure is fed water from Pump House No. 4 (Item 3.7). The South structure is fed water from various other wells (10, 11, 12, 13 and 14). The water is pumped to two different aeration column systems each containing four separate columns.

SIZE:

10’x10’ (approximate)

YEAR OF CONSTRUCTION:

1965-1969

ASSESSMENT:

Architectural:

The superstructures for both columns are in poor condition and should be replaced. The North structure is wooden and deteriorating. The South structure is metal siding that is rusting.

Structural:

The concrete foundation/sump structure is leaking and appears to have no waterstops.

Mechanical (HVAC and Plumbing):

NA

Process Piping:

The original drain piping is in poor condition and is leaking around perimeter. Gates are in poor condition. The aerators are corrugated metal columns and are believed to contain ring media. The columns show some sign of corrosion, but are in fair condition. There is no easy access to the gate valve.

Electrical:

NA
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4. Useful life year is based on the least remaining life value noted.

### Deficiencies:

1. The entire facilities needs to be replaced.

### Photos:

[Photos of the facilities]
COMPONENT NAME: 3.4 HEADWORKS – UPPER POOL WELL WATER AERATOR

GENERAL DESCRIPTION:
This steel plate structure is used to aerate water to be used in the upper pool.

SIZE:
15’ x 20’ (approximate)

YEAR OF CONSTRUCTION:
Unknown

ASSESSMENT:

Architectural:
The steel plate structure has excessive surface rust and scaling.

Structural:
The concrete vault is in fair condition. It contains some deterioration but no cracks.

Mechanical (HVAC and Plumbing):
NA

Process Piping:
The aeration structure was in operation during inspection and an internal inspection of the structure was not feasible. Exterior piping leading into the aeration structure showed signs of surface corrosion. Even though we were not able to inspect the inside of the aeration structure, we would assume we would have seen piles of scale inside from the interior of the pipes. Using the general pipe condition of the rest of the facility installed at the same time, it is safe to assume that the process piping has exceeded its design life expectancy and can be rated as being in poor condition.

Electrical:
There are flow meters on the supply line for Well No. 1A and on the 4” domestic water supply line. It appears that neither of these flow meters is operational. Each flow meter is equipped with a local display only. They are not monitored by the central hatchery process alarm system.
USEFUL LIFE FOR INTENDED AND CURRENT USE:

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4. Useful life year is based on the least remaining life value noted.

DEFICIENCIES:
1. Plate steel has excessive corrosion.
2. Connections to concrete show excessive signs of corrosion.
3. Concrete has excessive organic growth and some deterioration.
4. Facility should be replaced.
5. Excessive waste of water out the over flow.

PHOTOS:
COMPONENT NAME:

3.5 HEADWORKS – AERATION TOWER

GENERAL DESCRIPTION:

This tower serves to strip dissolved nitrogen gas out of the well water from the parking lot Wells No. 2A and No. 3A using gravity aeration methods. Water enters the tower and is degassed as it passes through aeration layers in the column.

SIZE:

NA

YEAR OF CONSTRUCTION:

Unknown

ASSESSMENT:

Architectural:

NA

Structural:

The steel is cracked and peeling. There is rust at the base. The concrete base slab is in good condition. However, the steel tower anchoring system is not reliable; as it is anchored to an existing conveyance pipe and to the main hatchery building using guy wires. The base pan has deteriorated with surface rust.

Mechanical (HVAC and Plumbing):

NA

Process Piping:

The exterior supply and discharge piping for the de-nitrification showed signs of heavy corrosion and is in very poor condition. Isolation valves were poor condition, heavily corroded, and very difficult to operate.

Electrical:

NA
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DEFICIENCIES:
1. This structure should be replaced.

PHOTOS:
COMPONENT NAME:

3.6 WELL HOUSE #4A

GENERAL DESCRIPTION:

This pre-engineering metal building contains two booster pumps, a 20” manifold, valves, and piping. Water is fed from here to the Upper Pool Aerator (Item 3.4).

SIZE:

20’ x 20’ (approximate)

YEAR OF CONSTRUCTION:

Unknown

ASSESSMENT:

Architectural:

The building is a pre-engineered metal building with concrete floor. The exterior face contains some chalking and fading. The roof is in poor condition and needs to be replaced. The R-Panel roof contains exposed fasteners. There is no handle for the main access door. The building is not weathertight.

Structural:

The concrete floor is in good condition.

Mechanical (HVAC and Plumbing):

The building is heated using infrared lighting and appears to be adequate.

Process Piping:

The floor contains no floor drain. There were several piping leaks spilling on the floor. The piping has corroded and is in poor condition. The insulation of the pipes is in poor condition. All piping and valves have met their useful life expectancy.

Electrical:

The motor starter for Well #4A and the motor starters for two booster pumps, are located on the wall inside the Well Pumphouse. The starters are in fair condition and could have another 5 to 10 years of useful life.
### Useful Life for Intended and Current Use:

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### Deficiencies:
1. The building roof needs to be replaced.
2. The building should be made weather tight or replaced.
3. Install a floor drain.
4. Install central hatchery process alarm system and tie flow meters to system.

### Photos:
COMPONENT NAME:

4. INCUBATION AND ADMINISTRATION BUILDING

GENERAL DESCRIPTION:

This building is constructed of concrete masonry unit walls, a reinforced concrete spread footing foundation and a pre-stressed T-girder roof system.

SIZE:

74'x144' (approximate)

YEAR OF CONSTRUCTION:

1965-1969 (Additional office space was added in the 1990s)

ASSESSMENT:

Architectural:

The building is in overall good condition. Some roof leakage was observed at the exterior eaves and in the tank room around the skylights. Windows and doors appear to functioning properly. No deficiencies were observed or reported during the site evaluation.

Structural:

Roof system appears to be primarily in fair condition with some minor concrete spalling at the exterior edges of the precast pre-stressed concrete tees. Skylight window seals in incubation and early rearing areas seem to have failed based on discoloring of concrete from water stains. The walls and foundation appear to be in good condition with no visible cracking.

Mechanical (HVAC and Plumbing):

Freezer: The chiller equipment for the freezer is quite old and appears to be original equipment with some repairs and upgrades. The freezer chiller equipment is in fair condition.

Plumbing Fixtures: Many of the plumbing fixtures show signs of wear and/or leakage. Fixtures are in fair to poor condition.

HVAC: Not Inspected
Process Piping:
In general the process piping has met its design life expectancy. Many of the valves are from original construction, and either no longer seat properly or are seized open. The process piping and valving is in poor condition.

According to dates found on the chilling unit, it appears that it was installed or at least upgraded in 2005. The chiller system appears in good condition.

The vertical stack incubators are in good condition. The “Reiff Manufacturing” early rearing troughs are near new and in excellent condition. The concrete feed start troughs are original to the site and are in poor condition.

Electrical:
The Incubation and Administration Building contains the main electrical switchgear serving the Hatchery complex. The existing electrical service is a 1600-amp, 480-volt, 3-phase, 3-wire, DELTA connected service. The power to the main switchboard is available from three independent primary feeds. The normal feed is a 1000 KVA transformer, T7, which is fed from the 14.4 kV emergency power systems complete with stand-by emergency back up generators serving both the hatchery and the power plant. Should transformer T7 fail, a spare transformer, T11, can be manually switched on line to feed the hatchery. Transformer T11 is also fed from the station power emergency bus. A third feed is available at the hatchery, with an 800-amp capacity. This feed is connected to the 480-volt bus off turbines 1 and 2 in the power plant. This must also be manually transferred by opening the 1600-amp main breaker and closing the 800-amp breaker.

*Main Switchboard FS-1:* Located in the main electric room, the switchgear is estimated to be about 5 years old and is in excellent condition. The switchboard uses draw out circuit breakers and has one spare breaker and 4-equipped spaces for future breakers.

*480-volt Distribution Panels:* There are two 480-volt distribution panelboards in the main electrical room. The oldest of the two panels, FSF-2, is believed to be an original panel and is at the end of its service life. The breakers are serviceable but replacement is recommended. The second panel, FSF-3, is newer than FSF-2, but it is still believed to more than 20-years old. Estimated useful life is another 5 to 10 years.

*208-volt Distribution:* With the exception of the new administrative office addition, the 208 volt panels in the main hatchery building are in need of replacement. There is only 45 KVA of available capacity. There are no spare breakers available and no space in any of the panels inspected to add additional breakers. All 208 volt panels are in need of replacement.

*Forebay Pump Starter:* Located in the main electric room, the 150 HP Forebay Pump #1A is controlled by a Square D Well Guard combination reduced voltage starter. Estimated service life is 10 to 20 years.
Administrative Offices: The office addition is relatively new (added in the 1990s) and the electrical systems are in excellent condition.

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DEFICIENCIES:

1. The incubation building provides inadequate biosecurity for ESA listed conservation fish programs.
2. Building roof system has visible concrete spalling in one local area.
3. Skylight seals are compromised.
4. The main electric room is too small for the installed switchgear. There is insufficient working clearance around the switchgear. One of the man doors into the electrical room swings into the space and cannot be fully opened because of insufficient clearance to the main switchboard (Code Violation)
5. The main service is DELTA connected. This is an ungrounded service. For future upgrades, consider changing to a WYE connected electric service.
6. Plumbing fixtures are in poor condition.
7. Process piping in very poor condition
8. Replace concrete start troughs.
PHOTOS:
COMPONENT NAME:

5. GREEN SPAWNING BUILDING

GENERAL DESCRIPTION:
The building is a hot-dipped galvanized steel framed shed. Walls are enclosed with semi-translucent fiberglass corrugated wall panels. The roof is enclosed with prefinished metal roof panels. The structure is founded on reinforced concrete walls with a concrete slab-on-grade floor. The building was constructed with the original spawning channel facility to serve as a sheltered location to perform Chinook spawning activities. It is located at the head of the original Spawning Channel. Spawning use has been abandoned and the building is currently used for general storage.

SIZE:
NA

YEAR OF CONSTRUCTION:
1965-1969

ASSESSMENT:

Architectural:
Green corrugated fiberglass shed. Good Condition.

Structural:
The concrete floor slab and foundation walls are in good condition. All of the galvanized steel framing and wall panels are in good condition. Roof panels exhibit some fading on the exterior surface but are in generally good condition.

Mechanical (HVAC and Plumbing):
NA

Process Piping:
NA

Electrical:
NA
USEFUL LIFE FOR INTENDED AND CURRENT USE:

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4. Useful life year is based on the least remaining life value noted.

DEFICIENCIES:

1. Not in use.
2. Specialized interior fish handling design is not useful and inhibits/prevents other functions.

PHOTOS:
COMPONENT NAME:

6. UPPER POOL

GENERAL DESCRIPTION:

The Upper Pool is located near the headworks for the site in the NW corner of the facility. This area was originally intended for spawning purposes but has been abandoned. The use was converted for salmon rearing at one time but this use has also been abandoned. These pools are not currently in use for rearing but are instead used to route the surface water throughout the facility. The river irrigation pumps for the nearby orchard are located at the end of the Upper Pool.

SIZE:

100’ x 9.8’ x 2.9’

YEAR OF CONSTRUCTION:

1965-1969

ASSESSMENT:

Architectural:

NA

Structural:

The joint material has deteriorated. The concrete contains no visible cracks larger than a hairline. Some minor scaling of the concrete surfaces below the waterline was observed. The railings are sturdy. The steel platforms/walkways are rusted but in good condition. They need to be sandblasted and painted. The condition of the bottom slab is uncertain since it was covered with water and debris during evaluation.

Mechanical (HVAC and Plumbing):

NA

Process Piping:

The sprinkler support cable is in good condition.

Electrical:

A pair of vertical line shaft turbine pumps are located above the water supply sump and provide irrigation to nearby orchard. The associated pump control and distribution equipment is located outdoors, in panels adjacent to the pumps. The electrical gear is in good condition.
**USEFUL LIFE FOR INTENDED AND CURRENT USE:**

<table>
<thead>
<tr>
<th>Discipline (1)</th>
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<th>Functionality (3)</th>
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4. Useful life year is based on the least remaining life value noted.

**DEFICIENCIES:**

1. Function of these rearing units needs to be clarified to determine whether continued use is recommended. It is unlikely they would be suitable for rearing fish.
2. This infrastructure will not be used for fish rearing. Continued pumping of irrigation water to the orchard is likely to continue, and this function will likely need to be maintained.

**PHOTOS:**
COMPONENT NAME:

7. SPAWNING CHANNEL

GENERAL DESCRIPTION:

The concrete spawning channel has not been used for adult holding or natural spawning in over 30 years. Water still passes through the channel to supply gravity fed water to other portions of the facility such as the dirt ponds, adult holding pond and adult volunteer channel. One side of the channel is still used to supply river water to the volunteer ladder. The concrete units are filled in with rock spawning substrate in some portions.

SIZE:

Total length is 6,000’

YEAR OF CONSTRUCTION:

1965-1969

ASSESSMENT:

Architectural:
NA

Structural:
The concrete beams are failing. The walkway supports are failing. The grating and tops are in fair condition. Rodents have burrowed in multiple locations. We could not determine water tightness of the structure. The end joints are failing and there is no way to determine if they are leaking. Extensive vegetation is growing in and around the structure.

Mechanical (HVAC and Plumbing):
NA

Process Piping:
The thin walled supply pipe is above ground and subject to weather conditions. There are many places where there have been pipe breaks that have been either covered in concrete or patched to keep in operation. Piping is in very poor condition. Spawning channel isolation gates are in poor condition.

Electrical:
NA
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4. Useful life year is based on the least remaining life value noted.

DEFICIENCIES:

1. Function of these units needs to be clarified to determine whether continued use is recommended. It is unlikely they would be suitable for spawning fish.
2. Walkway structures need to be replaced.
3. Some undermining from rodents.
4. Some minor cracking.
5. Joints are failing.
6. Piping and gates leak, are corroded, and in very poor condition.
7. The spawning channel will not be used to spawn/rear fish. However, the channel serves as a water conveyance device to supply surface water to much of the hatchery. This functionality will need to be replaced if the channel is abandoned.
PHOTOS:
COMPONENT NAME:

8. SPAWNING CHANNEL REARING PONDS (16-17)

GENERAL DESCRIPTION:
These concrete rearing structures are built within the lower end of the Spawning Channel adjacent to the dirt ponds. They are numbered as Units 16 and 17 and have also been historically referenced as the Rainbow Ponds.

SIZE:

- 16: 245’ x 90’ x 4.1’
- 17: 138’ x 87.8’ x 3.9’

YEAR OF CONSTRUCTION:
1965-1969 (Modified in the 1980s with middle wall and head works)

ASSESSMENT:

Architectural:
NA

Structural:
The concrete appears to be in good condition with very minor scaling below the waterline. The joints contain organic growth. The aerating tray at Pond 16 is badly corroded and requires replacement. The walkway supports are corroded and grating system appears to be unsafe. The aerator base for Pond 17 is in good condition but the end pipe needs to be replaced. There is evidence of animal burrowing. The effluent channel in Pond 16 is in poor condition. The netting is in good condition. Crowding is accomplished with a seine net. Due to the configuration of the walls, the net cannot be used the entire length of the unit.

Mechanical (HVAC and Plumbing):
NA

Process Piping:
The vacuum piping is in poor condition and has a history of leaks and repairs. Sprinkler lines are in poor condition and improperly supported.
Electrical:

Power distribution at the Rearing Ponds is minimal. Two of the valve boxes are not at a sufficient depth to avoid freezing. An extension cord connected heat lamps are used inside the valve box for freeze protection. Temporary wiring should be removed and replaced.

**Useful Life for Intended and Current Use:**

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**Deficiencies:**

1. Walkways are unsafe as they are not sufficiently supported.
2. The aerators need to be replaced.
3. Supply to 17 is leaking prior to entering aeration box.
4. Supply lines show excessive corrosion.
5. Handrails are insufficient for safe use.
6. Slanted wall is problematic for crowding fish and staff access to the pond.
7. The existing sprinklers and vacuum systems should be replaced immediately if rearing vessel is retained for remainder of useful life.
8. A new crowding device with two units that run on two rails is recommended.
9. Remove temporary wiring.
10. Structure appears to be useful if the above deficiencies are addressed.
PHOTOS:
COMPONENT NAME:

9. ADULT SALMON HOLDING PONDS

GENERAL DESCRIPTION:

These reinforced concrete rearing units are used for holding, manual spawning, rearing, and are used in conjunction with the Chinook Spawning House (Item 11). They are numbered as Units 15U and 15L and have also been historically referenced as the Adult Chinook Ponds. Primary water source is surface water from the spawning channel. Hot-dipped galvanized steel grating walkways are used to access various sections of the structure.

SIZE:

- 15U: 217’ x 89.6’ x 4.1’
- 15L: 118’ x 77’ and 34’ x 3.6’

YEAR OF CONSTRUCTION:

1965-1969 (Additional modification of adding a center wall and associated facilities in the early 1980s)

ASSESSMENT:

Architectural:

NA

Structural:

The concrete is in good condition with minor scaling on the walls below the waterline and on the floor slab. The units require resurfacing since the scaling causes clogs during vacuum cleaning. The grating located at the top of the structure is in good condition. The railing and lower grating near the waterline is corroded. A supply pipe is serving as the support for the upper grating. The center wall is in good condition. The wooden shade needs to be replaced. The existing crowder is large and labor intensive. Due to the configuration of the walls, the crowder cannot be used the entire length of the unit. Install a crowder system with two units that runs on two rails. There is no lift system to move adult fish from the pond up to the spawning shed area. Currently all fish are manually lifted from one side of the crowder to the other on each of the inoculation and spawn days. This process is very labor intensive.

Mechanical (HVAC and Plumbing):

NA
Process Piping:
The influent pipe appears to be in fair condition. The reuse piping is showing signs of surface corrosion and is assumed to be in fair condition. The influent well water is aerated in a column which contains ring media. The columns are in fair condition and only starting to show some corrosion. The butterfly valves have exceeded their expected lifespan. The sprinkler system is not supported properly and is in poor condition.

Electrical:
The electrical distributions systems are in poor condition. The electrical power distribution includes a series of underground conduits and post-mounted junction boxes. These conduit systems appear to be installed within an abandoned fish feeding system.

### Useful Life for Intended and Current Use:

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4. Useful life year is based on the least remaining life value noted.

### Deficiencies:
1. The grating is supported on pipes.
2. Wooden shade structures are rotten.
3. Butterfly valves have met their life expectancy.
4. No sprinkler system supports and the sprinkler needs to be replaced.
5. Concrete scaling below the waterline. Minor spalling in several locations.
6. Sloped channel wall hinders crowding.
8. Cracks in walls.
9. Replace electrical system if electrical is needed.
10. Install lift system to move fish to the spawning shed.
11. Structure appears to be useful if the above deficiencies are addressed.

PHOTOS:
COMPONENT NAME:

10. ADULT STEELHEAD HOLDING PONDS

GENERAL DESCRIPTION:

These concrete holding ponds are located immediately to the west of the Steelhead Spawning House (Item 12). The ponds are supplied by reuse water from Bureau raceways. A new crowder, moveable floor, and hoist were installed in 2010.

SIZE:

- Section A, B and C: 23’ x 10’ x 5.75’
- Section D: 9’ x 10’ x 5.75’

YEAR OF CONSTRUCTION:

1965-1969, enhancements in 2010

ASSESSMENT:

Architectural:

NA

Structural:

The concrete appears to be in good condition. The railings are in good condition.

Mechanical (HVAC and Plumbing):

NA

Process Piping:

Due to the age of the piping and that it conveys reuse water; it is assumed that the condition of the pipe is poor. Piping is below grade and could not be visually inspected.

Electrical:

The existing electrical distribution is minimal. The large junction box/panel located immediately outside the Adult Steelhead building is abandoned.
USEFUL LIFE FOR INTENDED AND CURRENT USE:

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4. Useful life year is based on the least remaining life value noted.

DEFICIENCIES:

1. The water reuse system does not provide biosecurity for ESA listed fish. A single pass groundwater source should be installed for each population of fish held within this vessel.

PHOTOS:
COMPONENT NAME:

11. CHINOOK SPAWNING HOUSE

GENERAL DESCRIPTION:

This spawning pavilion is open on three sides. The building is constructed with steel tube framing and metal siding.

SIZE:

10'x10'

YEAR OF CONSTRUCTION:

Added after original construction.

ASSESSMENT:

Architectural:

The pan deck metal roof is in good condition. The metal panel walls are in good condition. Space was noted as being slightly small for current workloads, but seems to meet the hatchery’s needs.

Structural:

Concrete floor in good condition.

Mechanical (HVAC and Plumbing):

NA

Process Piping:

NA

Electrical:

Electrical power is distributed to the Spawning House via underground conduits serving the pole lighting (Pole 41). The shelter electrical includes some receptacles and two fluorescent fixtures. The electrical is minimal, but in good condition.

The electrical equipment rack located near the Chinook Spawning House contains the distribution equipment serving various loads located near the Spawning House. These loads include an electric fish pump outlet, power for the Steelhead Holding Pond and building, as well as the motor controls for Well #15H. The rack assembly also contains one of the facility’s remote alarm panels.
## Useful Life for Intended and Current Use:

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4. Useful life year is based on the least remaining life value noted.

## Deficiencies:

1. No service water.
2. No Floor drains or catch basins
3. Work space limited.
4. No formal chemical storage and distribution system.
5. Icing on walkways and within open building be a problem during Chinook spawning season.

## Photos:

![Photos of the facility](image1.jpg)

![Photos of the facility](image2.jpg)
12. STEELHEAD SPAWNING HOUSE

GENERAL DESCRIPTION:
This building is constructed using galvanized steel framing enclosed on four sides and roof with prefinished metal siding. A lean-to section of the building covers an in-ground reinforced concrete water-holding tank used to spawn Steelhead salmon.

SIZE:
50'x30' (approximate)

YEAR OF CONSTRUCTION:
Unknown

ASSESSMENT:
Architectural:
The pan steel roof and wall panels are in good condition.

Structural:
The floor and sump concrete are in good condition.

Mechanical (HVAC and Plumbing):
This building is used from December to April and contains adequate heat for that period.

Process Piping:
The piping and fish handling system are in good condition. A new fish hoist was added to the facility in 2010, is used to transfer fish to a truck and is in good condition.

Electrical:
The electrics in the Steelhead Spawning House are in good condition. The building has been fitted with numerous 120-volt outlets. The lighting is mostly incandescent, including quartz flood lights and infrared head lamps. There are a few industrial fluorescent light fixtures.
USEFUL LIFE FOR INTENDED AND CURRENT USE:

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DEFICIENCIES:

1. Low overhead clearance.
2. Small work space.

PHOTOS:
COMPONENT NAME:

13. VOLUNTEER FISH LADDER

GENERAL DESCRIPTION:

The volunteer fish ladder is a concrete trapezoidal flume with an ice harbor type ladder within. The downstream end of the facility starts adjacent to the public boat launch on the west side of the tail race and extends upward towards the adult trapping facility near the base of the west abutment of the dam. Crossing bridges are constructed of hot-dipped galvanized steel.

SIZE:

NA

YEAR OF CONSTRUCTION:

1965-1969

ASSESSMENT:

Architectural:

NA

Structural:

The concrete is in good condition overall. Some portions of the system have been abandoned in place. Some of the original functions are no longer known or used (e.g., abandoned adult trapping). Minor surface scaling was observed on the vertical concrete sections below the waterline. The first crossing bridge is loose and should be repaired.

Abandonment of the original adult fish collection facilities and juvenile fish diversion screens in place has resulted in a major portion of this facility being in disrepair.

Mechanical (HVAC and Plumbing):

NA

Process Piping:

Attraction water flow piping original to the site and is assumed to be in poor condition. Adult fish are expected to jump a considerable distance to enter the trap. The water supply screens have been subject to numerous mechanical failures and require considerable maintenance to maintain adequate flow and to prevent fish entrapment.
The batwing gates at the base of the ladder are mechanically adequate but are difficult to operate and subject fish to unnecessary mechanical damage and strike.

**Electrical:**

The existing electrical equipment associated with the Volunteer Fish Ladder has been abandoned in place. Consider removal of all abandoned electrical equipment and wiring.

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**Deficiencies:**

1. Remove or fence abandoned features for safety and to clean up the appearance.
2. Repair bridge and cross walks.
3. Original (abandoned) adult collection facility is in disrepair.
4. Original Humpback (abandoned) screen is in disrepair but blocks existing spawning channel flow. Maintenance and cleaning of abandoned structure is still required.
5. Replace batwings with a motor driven gate system that is fish-friendly.
6. Remove abandoned electrical equipment.
PHOTOS:
COMPONENT NAME:

14. DIRT PONDS

GENERAL DESCRIPTION:

These earthen ponds are used to rear summer Chinook, summer steelhead and coho. The original design was one lined pond. Since the original design, the pond has been divided into four separate ponds. The ponds are currently referred to as DP1 thru DP4. They are used according to the following fish culture schedule: Yearling Chinook – July/August through May; Subyearling Chinook – March/April through May; Steelhead – October/November through May; coho March through April. These ponds are supplied with well water in the summer and early fall and river water for the rest of the rearing period. The inflow is aerated in packed columns. The drum screens do not backwash and are periodically pressure washed. New motors were installed 7/18/97. When the ponds are half way drawn down, the water is sampled to meet the discharge permit requirements. This drainage water discharged directly to the river. Ponds 3 and 4 utilize a fish pump to truck the fish from outfall traps located at the discharge of the ponds.

Pond DP1 is not served by an exterior harvest structure but fish can be released into either volunteer ladder or into Pond DP2. An electric fence (currently not live) surrounds Ponds 1, 3 and 4. Bird deterrent filament wire is laid throughout the pond complex. The ponds are disked once per year and new sand is added to the bottom. Solids are not removed. Pond DP 1 and DP2 leak into each other and DP3 and DP4 leak into each other. Hatchery staff would like to maintain an earthen bottom.

SIZE:

- DP1: 440’ x 100’ x 4’
- DP1: 667’ x 120’ x 4’
- DP1: 520’ x 100’ x 4’
- DP1: 464’ x 110’ x 4’

YEAR OF CONSTRUCTION:

1965-1969 (Original) Modified to four ponds at an undetermined date.

ASSESSMENT:

Architectural:

NA
DOUGLAS CO. PUBLIC UTILITY DISTRICT #1

WELLS FISH HATCHERY MODERNIZATION
Facility Assessment / Useful Life Analysis

Structural:
The ponds do not have internal harvest kettles. The exterior harvest structures are in fair condition.

Predation protection is compromised. Bird deterrent filament wire is laid throughout the pond complex..

Outfall pipes (fish transfer pipes) have excessive rust and leaks. Transfer concrete boxes appear to have typical wear for the age of service. Fish transfer/outfall of Pond 1 should be upgraded.

Sand erodes from the upper end of the pond due to turbulence and is deposited at the lower end of the ponds. The sand is replaced each summer. The ponds are leveled and grated each summer.

Mechanical (HVAC and Plumbing):
NA

Process Piping:
The corrugated discharge pipes at ponds #3 and #4 are in poor condition. The drum screen is in fair to good condition.

Electrical:
The existing electric utilities in place at the Dirt Ponds are very minimal and consist of a few electrical outlets and some station mounted incandescent light fixtures. The ponds also have high and low level float switch alarms installed in the outlet structures.

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DEFICIENCIES:

1. Replace the pond liners to reduce leakage. (May have a liner in bottom but not in between ponds as it was completed at a later date.) Leakage is a biosecurity concern.
2. Replace outfall pipes (fish conveyance pipes) to ladder and transfer boxes.
3. Predation protection has met its design expectancy.
4. Develop method for removing suspended solids to prevent direct discharge into the river or long-term retention within the dirt ponds.
5. Develop concrete energy dissipation structures to reduce erosion within the ponds.
6. Install kettles to allow fish to be flushed from the pond rather than netted and carried to the outfall traps.

PHOTOS:
COMPONENT NAME:

15. ADULT TRAPPING FACILITY

GENERAL DESCRIPTION:

The adult trap at the upstream end of the volunteer channel is the primary means of collecting summer Chinook broodstock. It will also be used to collect summer steelhead broodstock and to perform management of excess adult hatchery fish. The original design of the system has been modified several times since first being constructed. The volunteer ladder acts as the attraction and conveyance of adults for the trap. Adults swim up with the ladder and into a pool that has upwell flow. A side channel with a weir is then activated to attract the adults to jump into a brail system. The fish are lifted and then sorted through flumes to the adult holding ponds. The overall system consists of a series of concrete chambers that have been modified to meet the current use. Portions of the structure have been abandoned.

There are several galvanized steel grating walkways that traverse the facility. Most have guardrails that accompany the walkways.

SIZE:

NA

YEAR OF CONSTRUCTION:

1965-1969 (original) (Several modifications have been made since 1969)

ASSESSMENT:

Architectural:

NA

Structural:

Some of the railings are loose. The concrete is in good condition with minor scaling to the wall surface below the waterline and floor slabs. The wooden structures need to be repainted or replaced. The wooden gates are in fair condition. Some portions of the fence which are constructed of plastic netting should be replaced. The galvanized steel walkways and handrails are in good condition.

Mechanical:

All hoist systems for the adult trapping facility are in poor condition. There are signs of cable and sheave wear. The mechanical brail hoist is operated beyond its design capacity (cable too small and the motor is underpowered). The plastic slats are degrading and walkways within the trap are narrow and unsafe.
Process Piping:

The vacuum system lines span the trapping area, posing tripping hazards. The vacuum line is in very poor condition with many patched leaks. Gates within the trapping area appear original to the facility, are in poor condition, and are past their useful life. The PVC fish chute shows sign of UV degradation, leaks; and is in very poor condition. The sprinkler system is shoehorned into place, improperly supported, shows signs of UV degradation, and is in poor condition.

Electrical:

NA.

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4. Useful life year is based on the least remaining life value noted.

**DEFICIENCIES:**

1. The entire system has exceeded its useful life and needs to be replaced before it fails.
2. The load on the brail and hoist exceed the loads required.
3. Fish need to be manually lifted from the pond overhead into overhead conveyance pipes (river/hatchery pipes).
4. The upwell screens are prone to failure allowing fish into the water supply system. The upwell screens require continual maintenance because they collect debris.
5. Replace plastic net fencing with more durable material.
6. Screen does not meet criteria from pond.
7. If entire system is not replaced, replace vacuum system, replace gates, replace fish chute, and replace sprinkler system.
8. Construct an adult sorting facility that can quickly separate ESA listed and wild fish from the surplus hatchery fish in the trap.

9. Fish in the trap are harassed to exhaustion before they can be manually lifted from the trap for sorting.

10. Existing system is labor intensive and results in fish injury and stress.

Photos:
COMPONENT NAME:

16. BUREAU RACEWAYS (1-10)

GENERAL DESCRIPTION:

Two banks of reinforced concrete raceways were added to the facility and are used to rear fish. They are numbered 1 to 10. They are also used to rear fish for survival studies every ten years. The northern raceways (1-3, 6-8) have both well and river water influent. The water supply can be mixed for temperature management. These raceways can also be supplied with reuse water by pumping from the collection structure. The southern units (Raceways 4-5 and 9-10) can be supplied by well, surface and reuse water. Sprinklers are used along the length of the raceway to break the water surface for fish health and quality. Water from these raceways is reused in the steelhead building. The raceways do not have quiescent zones to collect solids. The units are currently manually vacuumed to remove solids. Galvanized steel grating walkways are located at the top of the interior walls. No handrails or other fall protection was observed at these walkways. A galvanized steel grating walkway is also located at the end of the raceway. Painted steel guardrail was observed at this location.

SIZE:

Between 91.7’ to 92.5’ in length; 9.83’ to 9.78’ in width; 2.885’ to 3.047’ in depth.

YEAR OF CONSTRUCTION:

1965-1969

ASSESSMENT:

Architectural:
NA

Structural:
Concrete is in good condition with minor scaling to the concrete walls below the waterline and floor slab. Shrinkage cracking in the walls was observed but the cracks appeared to be tight. The galvanized steel walkway grating and painted steel handrail is in good condition. The southern units have leakage between the walls at the contraction/construction joints. This could have a negative impact on bio-security between adjacent raceways.

Mechanical (HVAC and Plumbing):
NA

Process Piping:
The pipes entering the units are in poor condition, and have surface corrosion where they enter the units which can start breaking the concrete. The embedded header pipe is rusted and in poor condition. The column aerators have about 5 years of useful life remaining. The influent pipe has surface rust but should last about 10 more years. The splash plates are in poor condition. The PVC sprinklers have UV deterioration, are sagging and have about 3-5 years of useful life remaining. There is an inability to supply adequate volumes of either river or ground water into the upper and lower raceways. There are concerns with biosecurity as the river water lines cannot currently be shut off completely.

**Electrical:**

Power is distributed to the raceways by an underground conduit originating from the main Hatchery Building. 120 volt power serves two-weather proof outlets mounted on the Bureau Raceways.

At least five floats are located in the raceways to signal a level alarm to the central hatchery process alarm system. Some of the original raceway level sensors have been abandoned in place. The active float switches appear to be in reasonable condition and may last a few more years.

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4. Useful life year is based on the least remaining life value noted.

### Deficiencies:

1. Replace the sprinkler line.
2. The splash plates need to be replaced.
3. Resurface the concrete (especially the southern units) to ensure biosecurity.
4. Headers and pipes entering the units are in poor condition with minimal life expectancy left.
5. Correct low flow in raceways.
PHOTOS:
COMPONENT NAME:

17. VINYL RACEWAYS (11-14)

GENERAL DESCRIPTION:

The vinyl raceways (11-14) are rectangular shaped and were installed approximately 20 years ago. The sides and supporting framework are constructed of hot-dipped galvanized cold-formed steel structural members. The floors are constructed of plywood laid on asphalt. A vinyl liner is used to make them water bearing. The raceways were originally installed as temporary structures. Several of the vinyl inserts were replaced in 2011.

SIZE:

- 11: 81.8’ x 7.9’ x 2.6’
- 12: 80.3’ x 8’ x 2.6’
- 13: 81.9’ x 8’ x 2.6’
- 14: 80.5’ x 8’ x 2.5’

YEAR OF CONSTRUCTION:

1990s

ASSESSMENT:

Architectural:

NA

Structural:

Several of the galvanized steel support legs were observed to be broken and/or corroded. Some of the vinyl liners appeared to be faded and chalky from ultraviolet exposure. Cross ties were missing and the floor panels were observed to be bulging outward at several locations. The floors could not be observed. Given that the raceways were constructed as temporary units, they are near the end of their useful life.

Mechanical (HVAC and Plumbing):

NA

Process Piping:

The base of the influent pipe is corroded and is in poor condition.
Electrical:

There are at least two float switches located in the raceways to signal a level alarm to the central hatchery process alarm system. The active float switches appear to be in relatively poor condition and appear to be at the end of their useful.

There are a few power conduits in the area of the vinyl raceways, but the remaining equipment appears to be abandoned in place.

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### DEFICIENCIES:

1. Metal legs are bent and show corrosion.
2. Cross ties show excessive corrosion or are missing.
3. Supply header corroding at ground penetration.
4. Side panels are bulging.
5. These units are near the end of their useful life and should be replaced with permanent rearing vessels.
PHOTOS:
**COMPONENT NAME:**

18. ABOVE GROUND RACEWAYS (18-21)

**GENERAL DESCRIPTION:**

The above-ground, reinforced concrete raceways were added in the early 1990s. A galvanized steel grating walkway is located on top of the center dividing wall. No railing or other fall protection system was observed. The units are numbered 18 to 21. Steelhead and Chinook salmon are started in these units. Water is supplied to the raceways by wells 10C and 11C (Monument Wells) and the orchard wells (7B and 8B) but have overall limited water supply. The water supply enters an aeration column filled with Koch rings before dumping into the raceways.

**SIZE:**

- 18, 19: 97’ x 9.8’ x 3.6’
- 20, 21: 97’ x 9.8’ x 3.6’

**YEAR OF CONSTRUCTION:**

1990s

**ASSESSMENT:**

**Architectural:**

NA

**Structural:**

The concrete units are in good condition. The center walls have minor shrinkage cracks and leaks which could impact biosecurity. No significant scaling of the interior concrete surfaces was observed. The galvanized walkways and bird netting is in good condition.

**Mechanical (HVAC and Plumbing):**

NA

**Process Piping:**

The valve operators are in good condition. The aerators are in good condition but the Koch rings are in poor condition. The screen guides are galvanized, corroding and in poor condition. The piping is in fair condition.
Electrical:

Electrical distribution to the raceways, spawning channels and rearing ponds is minimal. Much of the power additions are through the light pole bases. A 480-volt circuit has been installed for a tagging trailer power by surface mounting conduit on the upper concrete apron of the rearing channel. In some areas, low voltage circuits have been installed using extension cords and temporary connectors. Electrical systems are in need of replacement.

The above ground raceways are equipped with low level float switches used to alarm loss of flow. The floats have an estimated remaining useful life of approximately 5 years.

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4. Useful life year is based on the least remaining life value noted.

### Deficiencies:

1. Resurface or patch the leaks to ensure biosecurity.
2. Koch rings are in poor condition.
3. Screen guides are in poor condition.
4. Electrical system needs to be replaced.
5. Add screen guides so the units can be divided.
6. Piping system is in fair condition.
COMPONENT NAME:

19. STORAGE BUILDING

GENERAL DESCRIPTION:

The pre-engineered pole barn structure is used to store vehicles, fish feed, chemicals (formalin, paint, etc.), gas (oxygen, acetylene, propane), and serves as a workshop. The main portion of the building is open on one side. The other three rooms are enclosed (shop, feed, and chemical storage). The gases are stored in the feed room. The main storage area has a gravel floor while the shop and storage rooms have concrete slab-on-grade floors.

SIZE:

40’ x 120’ (approximate)

YEAR OF CONSTRUCTION:

1990s

ASSESSMENT:

Architectural:

The metal siding and roof are in good condition. The wooden frame is in good condition but attracts birds and spiders. Bird use of the open garage bays reduces the usefulness of the building as a storage area. The storage space has a gravel floor. The building could be relocated if needed due to future facility changes. The main storage area could have overhead doors added but the room would need to be enlarged to house the current large trucks. The shop is currently undersized for its purpose. The chemical storage room is directly adjacent to the spawning channel. A potential chemical spill could make its way into the spawning channel water and end up negatively affecting the fish on-station and ultimately entering the Columbia River.

Structural:

The posts are anchored in concrete. The timber framing, concrete foundation and concrete floor slabs in shop and storage areas are all in good condition.

Mechanical (HVAC and Plumbing):

The chemical storage space contains an emergency eyewash and code-compliant storage shelving. Formalin is stored in this building. Ventilation needs to be added. The shop is a separate room. The chemical storage room is adjacent to the workshop and it is unknown if it is properly fire-rated.
Process Piping:
NA

Electrical:
The electrical systems in the storage building are relatively new and in very good condition. One of the rooms has formalin drums stored inside. If chemicals continue to be stored in this room, the electrical systems should be installed according to the proper classification for these chemicals.

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4. Useful life year is based on the least remaining life value noted.

### DEFICIENCIES:

1. Add overhead doors to the main storage area to eliminate bird habitation.
2. Add ventilation to the chemical storage room or segregate chemical storage space. Chemical storage is too close to the water supply.
3. Chemical storage is not code-compliant
4. Verify and modify if needed to ensure the space is fire-rated.
5. The shop is undersized.
6. Ensure gas storage is code-compliant.
PHOTOS:
COMPONENT NAME:

20. DRAIN SYSTEM

GENERAL DESCRIPTION:

The main underground drain system consists of a 30-inch CMP drain line from the Upper Pool to the tailrace channel downstream of the main dam’s west end wall. This main drain intercepts tributary drains from the Upper Pool Spawning House, Upper Pool water supply channel, Collection Structure, Temporary Vinyl Raceways, the Adult Steelhead Holding Pond, the fish transportation pipe near the Entrance Structure, and a system of drains from the Spawning Channel resting pools. Manholes are located on the main 30-inch line outside of the Upper Pool, at the intersection with the tributary drain system from the Spawning Channel resting pools, and at changes in horizontal alignment of the main drain. (See Appendix B for general layout) Entrances into the drain system are provided as follows:

Upper Pool Spawning House:
An 8-inch corrugated metal pipe drain from the Spawning House connects to the main drain system at Manhole No. 2. Presently, the Spawning House’s water supply and drainage systems are not used.

Upper Pool:
A 12-inch gated CMP drain line connects at the downstream end of the water supply channel to drain the water supply channel and the area at the head of the Spawning Channel. A 12-inch gated CMP drain line also connects to the east face of the pump pit, which allows complete dewatering of the Upper Pool and pump pit.

River Water Aerator:
If required, the River Water Aerator can be drained after Spawning Channel shutdown through the pump pit by opening the 42” x 60” gate to the pump pit when the pump pit is dewatered.

Incubation and Administration Building:
A 10-inch CMP line leads water used in the salmon and steelhead egg incubation trays and water from the building’s floor drains into the main drain system. Water used in the steelhead and rainbow trout incubation troughs is collected after use in a floor sump and drained into the Collection Structure through an 18-inch CMP line. At the Collection Structure, this water enters a separated 4’ x 4’ compartment. By operation of a 12-inch diameter gate, this water can be directed into the main drain system and wasted, or it can be spilled over stoplogs and reused in the Adult Steelhead Holding Pond.
Raceway Nos. 1, 2, 3, 6, 7, & 8:
The effluent water from the headbox of each bank of raceways drains through an 8-inch diameter pipe, and from the raceways drains through 12-inch diameter drain holes in the bottom of the raceways just upstream of the stoplogs, and is wasted into the main drain system via the Collection Structure. Water spilling over the stoplogs into the tailrace at the downstream end of each raceway can be reused in the Adult Steelhead Holding Pond and reuse system or directed into the main drain after passing through the Collection Structure.

Raceway Nos. 4, 5, 9, & 10:
The effluent water from the headbox of each bank of raceways drains through a 12-inch CMP line, collects any raceway underdrain water from the bottom of the raceways and is wasted into the main drain system through the Collection Structure. Water spilling over the stoplogs into the tailrace at the downstream end of each raceway can be reused in the Adult Steelhead Holding Pond or directed into the main drain after passing through the Collection Structure.

Collection Structure:
This structure is divided into three separate compartments. The smallest compartment receives drain water from the Incubation Trough Room in the Incubation and Administration Building and permits this water either to be reused or wasted. The large compartment with the gated outlet collects reusable water and controls flow into the Adult Steelhead Holding Pond. The other large compartment with the ungated outlet collects the unusable water from the raceways and the Incubation and Administration and wastes it into the main drain system (see also Section B-2, Sub-Section D).

Adult Steelhead Holding Pond:
A 24-inch drain line with adjustable weir is located at the downstream end of the pond. This line drains out the water coming through the pond and also the water coming down the fish transportation pipe from the West Fish Ladder sorting facility.

Fish Transportation/Movable Bend Structure:
Water transporting fish from the Movable Bend Structure to the Entrance Structure is drained through grating and a 24-inch CMP line to Manhole No. 8. An 8-inch CMP overflow drain is provided from the Movable Bend Structure into Manhole No. 8.

Dirt Ponds:
Dirt Pond No. 1 has an outlet structure which drains through a 36-inch CMP line directly into the Entrance Channel. Dirt Pond No. 2 has two outlet structures, one which drains through a 36-inch CMP line directly into the Entrance Channel, the other supplies drain water through a 36-inch CMP line to Trapping Structure “A” at the south end of the pond. Dirt Pond No. 3 has an outlet structure which supplies drain water through a 30-inch CMP line to Trapping Structure “A”. Dirt Pond No. 4 has an outlet structure which supplies Trapping Structure “B” with drain water through a 30-inch CMP line.
Trapping Structure “A”:
Trapping Structure “A” has a 30-inch CMP drain at the east end and a gated 24-inch CMP drain at the west end, both of which drain directly to the Entrance Channel.

Trapping Structure “B”:
Trapping Structure “B” has a 24-inch CMP drain at the upstream end and an 18-inch CMP drain at the downstream end that both drain directly to the Entrance Channel.

**SIZE:**
Site Piping Varies

**YEAR OF CONSTRUCTION:**
1965-1969

**ASSESSMENT:**
The review of the drain site piping conveyance lines was limited to a visual inspection of the exposed pipe above ground. This assessment will refer to existing as-built drawings developed by Sverdrup Civil, Inc. in 1999 where they describe the general layout as best known for the drain lines. Also, additional information was reviewed with in the as-built drawings of the Wells Hydroelectric Project. In conjunction with this drawing, an operation and maintenance manual originally developed by Bechtel Corporation then updated by Sverdrup Civil, Inc. in 2002 was used to further understand the existing drain systems along with information obtained at the site visit of June 13th, and 14th of 2012.

**Appendix B** contains site piping drawings for the drain system.

1. Drainage pipe consists of corrugated metal pipe (CMP). All CMP less than 30-inch diameter is 16 gauge. All CMP equal to or greater than 30-inch diameter is 12 gauge.
2. Due to all of the drainage pipe being buried, it was not possible at this time to review the state of facilities of the burred lines.
3. In general, junction boxes appeared to be in good condition with no dysfunctional lids. Concrete of the junction boxes appears to be in good condition.
4. The main drain outfall had excessive corrosion as it day-lighted at the west bank of the tailrace.
5. The condition of the outfall pipe hold downs in the tailrace is unknown. They were not inspected at this time due to high water.
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All piping, with some minor exceptions, has been in use beyond or near the normally expected life of the materials used. Pending the new hatchery layout and consideration for keeping the hatchery in operation during construction, the cost for complete physical inspections is considered as not warranted at this time under the following rationale:

- The existing lines would most probably be kept active while new lines are installed and connected, then the old lines would be abandoned.
- Certain main pipes, such as the drain and surface water supply lines, may be lined in place and continue to be used.
- In essence, the new facility should have all underground water distribution systems of such quality to match the design life of the facility itself to minimize risk and protect the investment.

DEFICIENCIES:

1. Outfall pipe exposed has excessive corrosion where day-lighted.
PHOTOS:
COMPONENT NAME:

21.1 POLLUTION ABATEMENT – TREATMENT POND

GENERAL DESCRIPTION:

The pollution abatement pond is tied into the Venturi vacuum system. The Venturi vacuum system allows staff to remove solids from the rearing units and pump them to the pollution abatement pond. The abatement system serves the Spawning Channel Ponds (16-17), Above Ground Ponds (18-21), Bureau Raceways (1-10), and the Adult Salmon Holding Ponds.

SIZE:

30’ x 10’ (approximate)

YEAR OF CONSTRUCTION:

Unknown

ASSESSMENT:

Architectural:

A grain bin is used to house the venture pump system. It is in fair condition.

Structural:

The pond is a membrane-lined pond. The liner appears to be in good condition and not leaking. The pond contains duckweed. If production is altered, the effluent system might not have capacity for new connections and will need to be upgraded.

Mechanical (HVAC and Plumbing):

NA

Process Piping:

The effluent structure is a PVC pipe channel which is in fair condition.

Electrical:

NA
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3. Functionality represents whether the current facility does or does not meet the originally intended use (yes/no).
4. Useful life year is based on the least remaining life value noted.

## Deficiencies:

1. Replace the effluent PVC pipe channel within 5 years.
2. Replace liner within 15 years.
3. Treatment pond does not meet current effluent standards for hatchery discharge into surface waters.

## Photos:


**COMPONENT NAME:**

21.2 POLLUTION ABATEMENT – VACUUM SYSTEM

**GENERAL DESCRIPTION:**

The Venturi vacuum system was added to allow staff to remove solids from the rearing units and pump them to the pollution abatement pond. The vacuum system serves the Spawning Channel Ponds (16-17), Above Ground Ponds (18-21), Bureau Raceways (1-10), and the Adult Salmon Holding Ponds.

**SIZE:**

NA

**YEAR OF CONSTRUCTION:**

Unknown

**ASSESSMENT:**

Architectural:

NA

Structural:

NA

Mechanical (HVAC and Plumbing):

NA

Process Piping:

The original pollution abatement pipe did not work and the pump system was not large enough so it was replaced with the current Venturi vacuum system. The original pump was abandoned in place. The piping system is comprised of a 4” thin walled pipe that serves as the vacuum. Some of this exposed piping has a history of leaks and repairs. The larger 8” pipe draws solids to the abatement pond. The solids pump is housed inside the grain bin located at the abatement pond. Staff utilize portable irrigation piping to connect to the vacuum. A wand end is attached and used to remove solids from individual rearing units. The raceways are vacuumed 2-3 times per week. The existing system has numerous holes and leaks due to age and freezing.

Electrical:

The electrical distribution equipment and controls are housed in the grain bin positioned over the treatment pond. The combination starter for the vacuum pump is NEMA 12 rated and beginning to
show corrosion due to its location. Extension cords are being used to supply power for lighting and freeze protection systems.

**USEFUL LIFE FOR INTENDED AND CURRENT USE:**

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3. Functionality represents whether the current facility does or does not meet the originally intended use (yes/no).
4. Useful life year is based on the least remaining life value noted.

**DEFICIENCIES:**

1. Replace the 4” vacuum piping system.
2. Inadequate suction to meet pollution removal needs for the hatchery.
3. Upgrade electrical. Remove extension cords.

**PHOTOS:**

![Image 1](image1.jpg)

![Image 2](image2.jpg)
COMPONENT NAME:

22. PRIMARY POWER

GENERAL DESCRIPTION:

The main electrical service to most of the fish facilities is located at the Fish Administration building. The service voltage for the facilities is 480-volts, 3-phase, 4-wire. There are three separate primary electric feeds to the main switchboard “FS-1”. Any one of these three electric feeds can be manually selected to provide power to the main switchboard. Two of the three primary feeds can be fed by one of two standby diesel electric generators. The diesel generators used to provide back-up power to the fish facilities also provide backup power to the hydroelectric power plant.

Two of the three feeds to the main switchboard, FS1-M1 and FS1-M2, are provided by pad mounted transformers located outside the Administration Building. Either one of these feeds can be used as the “normal” feed to the facilities. Transformer T7 feeds 480-volt power to a 1600-amp main circuit breaker in switchboard FS-1. The primary electric feed to transformer T7 comes off the 480-volt bus for turbines 5 and 6 in the hydroelectric plant. The second feed to the main switchboard is provided by transformer T11, also a 1000 KVA pad mounted transformer. Transformer T11 is located adjacent to transformer T7, and derives its primary power off the 480-volt bus for turbines 3 and 4. The 480-volt power from both turbine buses is stepped up to 14.4-kv to transformers T11 and T7, via transformers T12 and T13, respectively. The third and final power feed to the main switchboard, comes directly off the 480-volt bus for turbines 1 and 2. Unlike the other two feeds, this third feed has only an 800-amp capacity and has no back-up diesel generator capabilities. These three available feeds to the main switchboard are manually controlled to provide power to the switchboard. The three feeds are switched via draw-out circuit breakers in the main switchboard. Mechanical interlocks are provided for these three power sources, so only one feed can be closed at a time.

The main switchboard, FS-1, is fairly new, and consists of 2000 amp main bussing, braced for 50,000 amps interrupting capacity. The board is manufactured by Meyers Power Products. All breakers in the main switchboard are draw-out style breakers. The switchboard and breakers are in excellent, like new condition; however it was installed with insufficient working clearances in the front of the board. One of the doors into the electric room, swings into the room, and hits the main switchboard before it is fully open. The door should be changed to swing out of the room.

The main switchboard, FS-1, feeds power to two 480-volt distribution panel boards in the main electric room, as well as power to the process water chiller in the Administration Building. In addition to these three loads, the main switchboard also provides power to the 150 HP, Forebay Pump #1A, one of the main water sources for the fish facility. The condition of the distribution panelboards and well pump controls are discussed elsewhere in this report.
In addition to the main distribution panel in the Fish Administration Building, primary station power is also distributed to the “Monument Pump Area”. The Monument Pump Area includes power for production wells #10C and 11C. This same distribution provides primary power to the Bureau wells (west embankment) which includes production wells #12C, 13C and 14C. Power for these wells is supplied from a 14.4-kv feeder connected to the manual transfer switch at the two large diesel generators. Just like the Forebay Pump #1A, the Monument and Bureau Wells can be (manually) backed up from the diesel generators. This 14.4-kv line powers two-225 KVA pad mounted distribution transformers, stepping the voltage down to 480-volts. Even though the actual service voltage is not documented on the available one line diagram, it is assumed the service voltage is delta connected, 480-volt, 3-phase, 3-wire. These two distribution transformers, T8 and T9, feed secondary power to two manual transfer switches. One manual transfer switch feeds power to (Monument) wells 10C and 11C; the other manual transfer switch feeds power to (Bureau) wells 12C, 13C, and 14C. Each manual transfer is connected to give the operator the ability to manually connect either set of wells to either transformer.

Additional primary power serves hatchery wells located at the Carpenter Island location and the adjoining W&W Orchard. Wells #5B and 6B are located at Carpenter Island. A 14.4-kv electric feed is routed to the island coming off the manual transfer switch at the station power diesel generator location. This station power feed is stepped down to 480-volts and then is connected to an automatic transfer switch located on Carpenter Island. This transfer switch provides power to Wells #5B and 6B. The stand-by electric feed to the automatic transfer switch, comes off an electric feed provided by Chelan County PUD. Chelan County PUD provides 13.2-kv overhead power to a bank of pole mounted transformers. These transformers step the voltage down to 480-volts and provide the stand-by power to the automatic transfer switch serving Well #5B and 6B.

Chelan County PUD is also the primary electric service provider for four other (hatchery) wells located at the W & W Orchard. Wells #7B and 8B are served from Chelan County’s pole mounted transformer banks. Well #9B, which is currently not in service, is also feed from a pole mounted transformer. A Chelan County pad mounted transformer provides electric power to Well #25, also located at the W & W Orchard.

**Size:**

NA

**Year of Construction:**

1965-1969 (Approximate) (Has been modified since inception)
ASSESSMENT:

Architectural:
NA

Structural:
NA

Mechanical (HVAC and Plumbing):
NA

Process Piping:
NA

Electrical:
The primary power distribution systems are estimated to be over 20 years old, yet the overall condition is quite good. The system is configured to provide redundant distribution facilities including utility transformers, and has the capability of backup power from the station’s stand-by emergency diesel generators. The complexity of these redundant facilities would be a concern for most installations, but at a power generating station such as Wells this probably is not a major issue since there are highly qualified personnel operating and maintaining these systems.

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3. Functionality represents whether the current facility does or does not meet the originally intended use (yes/no).
4. Useful life year is based on the least remaining life value noted.
**DEFICIENCIES:**

1. Deficiencies related to secondary distribution systems have been noted in section 4 Incubation and Administration Building assessment.

**PHOTOS:**

NA
**COMPONENT NAME:**

### 23.1 WELL HOUSES - 5B AND 6B

**GENERAL DESCRIPTION:**

Well house for wells 5B and 6B is located to the north of well house 7B and 8B on what is referred to as Carpenter Island.

**SIZE:**

Unknown

**YEAR OF CONSTRUCTION:**

Unknown

**ASSESSMENT:**

**Architectural:**
The metal siding and roof is in good condition. The building framing is in good condition.

**Structural:**
The building has a concrete foundation and concrete slab which are both in very good condition.

**Mechanical (HVAC and Plumbing):**
NA

**Process Piping:**
NA

**Electrical:**
The Carpenter Island well house has two independent primary electric feeds. The normal feed is an underground 14.4 KV feeder from Well Spawning facility station power. The 14.4 kV line feeds a 225 kVA pad mounted transformer at the well house. This stand-by feed to the Carpenter Island well house is from a pole mounted transformer operated by Chelan County PUD. The two 480 feeds are connected to an automatic transfer switch which in turn provides power to wells 5B and 6B.

The electrical distribution equipment is in very good condition. At the Carpenter Island location, the electrical equipment is in the process of being updated with a new starter and variable frequency drive for 6B. Well 5B is abandoned.
### Useful Life for Intended and Current Use:

<table>
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4. Useful life year is based on the least remaining life value noted.

### Deficiencies:

1. None at this time

### Photos:
DOUGLAS CO. PUBLIC UTILITY DISTRICT #1

WELLS FISH HATCHERY MODERNIZATION
Facility Assessment / Useful Life Analysis

23.1-3
COMPONENT NAME:

23.2 WELL HOUSES – 7B AND 8B

GENERAL DESCRIPTION:

Wells 7B and 8B are located on private property, the W & W Orchard, on the south side of the site. Wells number 7B and 8B are located in a well house.

SIZE:

Unknown

YEAR OF CONSTRUCTION:

Unknown

ASSESSMENT:

Architectural:
The building is a wood framed metal sided building with dirt floor. The exterior face shows mild corrosion and loose fasteners. The roof is in poor condition and needs to be replaced. The building is not weather tight

Structural:
The concrete building foundation appears in good condition

Mechanical (HVAC and Plumbing):
The building is heated using infrared lighting and appears to be adequate.

Process Piping:
The piping has corrosion and is in fair condition.

Electrical:
Wells 7B and 8B and served from a separate overhead primary distribution system metered by Chelan County PUD. A pole mounted transformer provides 480-volt power to W & W Orchard Pump House. The Chelan County overhead line continues north to serve the Carpenter Island Well House.

The electrical equipment serving wells 7B and 8B appears to be fairly new and in very good condition with variable frequency drives installed on each well.
### USEFUL LIFE FOR INTENDED AND CURRENT USE:

<table>
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4. Useful life year is based on the least remaining life value noted.

### DEFICIENCIES:

1. The building needs to be replaced
2. Install concrete floor slab.

### PHOTOS:
**COMPONENT NAME:**

23.3 WELL HOUSES – 9B

**GENERAL DESCRIPTION:**

Well 9B is located on private property, the W & W Orchard, on the south side of the site. Well 9B is located just outside the well house that contains wells number 7B and 8B. **Well 9 is a condemned well and is no longer in service.**

**SIZE:**

Unknown

**YEAR OF CONSTRUCTION:**

Unknown

**ASSESSMENT:**

**Architectural:**

NA

**Structural:**

NA

**Mechanical (HVAC and Plumbing):**

NA

**Process Piping:**

NA

**Electrical:**

Wells 7B, 8B and 9B are served from a separate overhead primary distribution system metered by Chelan County PUD. A pole mounted transformer provides 480-volt power to W & W Orchard Pump House. A second pole mounted transformer provides power to well 9B. Well 9B is currently out of service.
# Useful Life for Intended and Current Use:

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4. Useful life year is based on the least remaining life value noted.

## Deficiencies:

NA

## Photos:

NA
Appendix A

Facility Assessment Asset Location Site Plan
Appendix B

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Appendix B
Analysis of Production Well Field
Douglas County
Public Utility District No. 1

Wells Fish Hatchery Modernization

Analysis of the Production Well Field

Prepared by

RALSTON HYDROLOGIC SERVICES, INC.

and

HDR FISHERIES DESIGN CENTER

4717 97th St NW
Gig Harbor, WA 98332

September 2012
ANALYSIS OF THE PRODUCTION WELL FIELD FOR THE WELLS HATCHERY SITE

Prepared for HDR Engineering

Gig Harbor, Washington

September, 2012
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INTRODUCTION

Ground water serves as a high priority part of the overall water supply for operation of the Wells Hatchery which is part of the Wells Dam complex located on the Columbia River in Central Washington (Figure 1). A number of wells located both upstream and downstream of the dam are operated to supply water to the hatchery (Figure 2). The purpose of this report is to provide an analysis of this production well network. The objectives are to analyze each well with respect to present and potential future water supply and to present recommendations relative to potential well rehabilitation, pump placement and the present and optimal yields for each well. The potential for construction of new wells also is addressed.

This report is based on the following information sources: 1) hydrogeologic information for the area and for the individual wells; 2) historical information on construction, pump installation and operation of each well; and 3) aquifer test (discharge and drawdown) information from all wells for which tests could be conducted.

HYDROGEOLOGIC ANALYSIS

Aquifer Identification

The Wells Hatchery site is underlain by a thin mantle of unconsolidated sediment overlying bedrock. The unconsolidated sediment consists of mostly coarse-grained material. Bedrock is logged as granite based on samples taken from exploration boreholes drilled in advance of the construction of the Wells Dam.

The shallow, unconsolidated sediments are associated with periodic floods from Glacial Lake Columbia and Glacial Lake Missoula which were formed behind ice dams during the last ice age (10,000 years to 1.6 million years ago). Gresens (1983) provides a description of the deposition of glacial flood sediments associated with the flood water that traversed down the Columbia River in this portion of Washington. The sediments range from very coarse gravel deposits to isolated silt and clay units. Logs of exploration boreholes constructed upstream of the dam site describe the material as sand and gravel deposits with isolated silt and clay layers.

The aquifer hosted by the shallow, unconsolidated sediments is the water source for the hatchery wells including those above the dam and those below the dam. All of the wells are completed to obtain water from sand and gravel layers above the bedrock.

Ground water in the shallow sedimentary aquifer is believed to be hydraulically connected to the Columbia River, both above and below the dam. However, the nature of hydraulic connection is different above the dam than below the dam. The reservoir formed above the dam overlies the shallow sedimentary aquifer in the area. Sediment accumulation upstream of the dam likely has resulted in the presence of a silt-clay layer overlying the sedimentary aquifer. The hydraulic connection of the aquifer with water in the reservoir is through the silt-clay layer. The area of hydraulic interconnection is very large, over the base of the reservoir near the dam.
Ground water in the shallow aquifer below the dam is hydraulically connected with the river but only along the present river channel. The shallow aquifer likely is thinner beneath the present river channel given the turbulence and high velocity of river flow immediately below the dam. Certainly, the high velocity and turbulence of the river precludes the deposition of fine-grained sediment (silt and clay) in the reach immediately below the dam. The hydraulic connection between the shallow aquifer and the river below the dam likely is only along the edge of the river and possibly below the present river channel. The hydrogeologic conceptual model described above is investigated in more detail in a later portion of the report.

**Characteristics of Wells**

The amount of geologic and well construction information on the 15 wells that are associated with the Wells Hatchery Site varies from almost nothing (well 9B) to well construction information and well driller reports (wells 12C, 13C and 14C). Well information was copied from a binder provided by Kristy Oules of Public Utility District #1 of Douglas County (DCPUD) (personal communication, 2012). This information includes drawings of the wells based on borehole television surveys plus pump installation, repair and placement data and pump curves in some instances. Recordings of the borehole television surveys were not in the files. Thus, the only data obtained from the surveys are the drawing of each well. In addition, plan maps showing locations and geologic logs of test boreholes prior to dam construction were obtained from DCPUD. A limited number of well driller reports were obtained from the web site of the Washington Department of Ecology. Additional information on wells 12C, 13C and 14C was obtained from the files of the U.S. Bureau of Reclamation (USBR) office in Boise. Borehole video surveys of wells 11C and 13C were run on September 4, 2012. The videos of these wells allow assessment of current conditions.

The following section of the report provides a summary of the information obtained for each of the wells associated with the Wells Hatchery Site. Wells 1A, 2A, 3A, 10C, 11C, 12C, 13C, and 14C are located upstream of the dam. Wells 4A, 5B, 6B, 7B, 8B and 15H are located downstream of the dam. Figure 2 shows the locations of wells. A summary of the well information is presented in Table 1.

**Well 1A**

- Well 1A was drilled prior to 1963 during the geotechnical investigation of site selected for the Wells Dam. The well was apparently used as a water supply source during construction of the dam. The casing was raised with the filling of the pool such that the casing is about 50 feet longer than when drilled. The well is now located within the reservoir and is accessible only by boat. The depth of water in the reservoir near the well is about 50 feet.
- Geologic data for well 1A are available from drawings prepared by Becktel Corporation (1963). The geologic log is as follows based upon the depth below the present top of casing: well graded sand and gravel from land surface (depth of 50 feet) to 60 feet, sandy
gravel with silt from 60 to 76 feet, sand and gravel from 76 to 89 feet, well graded sand and gravel from 89 to 111 feet, sandy gravel with silt from 111 to 114 feet and granite starting at 115 to the bottom of the well at 116 feet.

- A well drawing based on a borehole television log obtained in 2006 provides the following well completion information. The well has 16-inch diameter casing over the full depth. The casing was raised with the filling of the pool such that the casing is about 50 feet longer than when drilled. The static depth to water in 2006 was 5 feet below the top of the casing. The 16-inch diameter casing is perforated in the depth interval from 86 to 106 feet.

- The pump and motor were replaced in 1997. Notation in the records says that “well 1A stopped operating at 5:00 am on December 29”.

- The pump was replaced in 2006 and again in 2010. The 2010 information indicates that casing in the well has a bend at about 55 feet. This is about 5 feet below ground surface. A smaller diameter pump was installed in 2010 to lessen the bind in the pump column. The present line-shaft turbine pump has a 10-inch diameter pump column and is powered by a 150 HP electric motor. The pump intake is at 90 feet. Based on the well construction diagram, this means that the pump intake is about 4 feet below the top of the perforated casing.

- The discharge from well 1A is measured using an inline flow meter within the hatchery facility. This meter is installed about 4 feet from an elbow in the pipeline which may impact the accuracy of the readings. The average discharge rate of well 1A is given as 3,714 gallons per minute (gpm), based on a handout summary from DCPUD. The results of measurement of the discharge of well 1A using an ultra-sonic flow meter are presented later in the report.

- No historic water level data has been found for this well except for the static depth to water value shown from the borehole television log. Water-level data collected from well 1A and other wells during field hydraulic testing are presented in a later portion of the report.

- There is access at the well for water level measurements.

**Well 2A**

- Wells 2A and 3A are located close together in a small parking lot along the northwest edge of Wells Dam. A water well report that likely is for well 2A indicates that the well was drilled in 1983. On the report, the casing diameter is given as 12 inches with a well depth of 88 feet. This information generally matches a well construction summary based on a borehole television log taken in 2006. The geologic log on the well report shows the following: boulder/sand/gravel from 0 to 34 feet, sand and gravel from 34 to 87 feet and granite from 87 to 88 feet. The water well report indicates that a 10-inch diameter, 80-slot, wire-wrapped screen was installed in the depth range of 67 to 87 feet. Based on the borehole television log, the screen placement is given as 70 to 89 feet. The depth to
water in well 2A at the time of drilling was 24 feet. At that time, the well was tested at a rate of 1,580 gpm with 7 feet of drawdown after one hour of pumping.

- According to information taken from the DPUD binder, well 2A was rehabilitated in 2004. The pump was also rebuilt at this time. Reasons for the well rehabilitation and for the pump repair are not given.
- Additional work was done on well 2A in 2007. The work included surging and bailing the well, rebuilding the pump and installing a flow meter.
- The flow meter is installed too close to changes in the pipe configuration (elbow, valves …) to provide valid discharge measurements. Also, the discharge pipe from well 2A was not full when the pump was running when visited in 2012, which makes the discharge measurement invalid.
- A notation indicates that a pump test was run in 2007 with a pumping water level at 67 feet below land surface at a discharge rate of 400 gpm. This discharge rate likely is not valid.
- Based on 2007 information, well 2A has a 15 hp electric motor, a column diameter of 6 inches with the pump set at 75 feet. This places the pump intake about 7 to 8 feet below the top of the screen.
- The access port on this well when visited in May 2012 facilitated water-level measurement between the surface casing and the pump chamber casing. Thus, water-level measurements taken using this access port did not represent what is occurring within the pump chamber casing. A second access port on the pump base was constructed in June 2012 which allows measurement of water levels inside the pump chamber casing.

**Well 3A**

- A water well report that likely is for well 3A indicates that the well was drilled in 1976. The casing diameter cannot be read off the well report but is identified as 14 inches on a depiction of the well created based on a borehole television log taken in 2006. The log shows that an 80-slot, stainless steel screen was installed in the depth range of 34 to 84 feet. The notation from the borehole television depiction gives the screen location as 33 to 83 feet. The geologic log of the well is as follows: sand and gravel from 0 to 20 feet, sand from 20 to 40 feet, sand and fine gravel from 40 to 75 feet, gravel from 75 to 86 feet, and sand (heaving) from 86 to 90 feet. The log has the notation “fine dam fill” following the material notations in the 0 to 40-foot range. The static depth to water value and the well yield information cannot be read off the water well report.
- According to information taken from the DCPUD binder, work was done on well 3A in 2003. The well was rehabilitated by surge jet and dry ice. The pump was rebuilt including cleaning the bowls, discharge and line shaft.
- Additional work was done on the well in 2007. The work included rebuilding the pump, cleaning the well, conducting a borehole television survey and installing a flow meter.
The 2007 data indicate that 25 hp motor is installed with a column diameter of 8 inches and a setting for the pump intake at 75 feet. This places the pump intake 42 feet below the top of the screen.

- The flow meter was installed too close to changes in the pipe configuration (elbow, valves ...) to provide valid discharge measurements. Also, the discharge pipe from well 3A was not full in 2012 when the pump is running, which makes the discharge measurement invalid.
- An access port which allows measurement of water levels was constructed in June 2012. Prior to that time, no water-level measurements could be obtained from the well when the pump was in place.

**Well 10C**

- Wells 10C through 14C are located along the northwestern portion of the dam embankment or a dike along the west side of the reservoir. All of the wells are located immediately adjacent to the reservoir.
- Information for well 10C is available as notes taken after viewing a borehole television survey. The date of well construction is not known. The well has a depth of 90 feet and has 12-inch diameter casing to about 69 feet. An 8-inch diameter stainless steel, wire-wrapped screen extends from 69 to 90 feet. The depth to water in 2006 was 24 feet.
- The pump and well were rehabilitated in 2006. The well was scrubbed, surged and bailed and the pump was repaired. The 2006 data indicate the well is equipped with a 20 hp electric motor, has a 6-inch diameter pump column and a pump intake at a depth of 65 feet. This is one of the few wells where the pump intake is above the top of the screen.
- The flow meter was installed too close to changes in the pipe configuration (elbow, valves ...) to provide valid discharge measurements.
- The well can be accessed for water-level measurement.

**Well 11C**

- Information for well 11C includes notes taken after viewing a borehole television survey conducted in 2006. The date of well construction is not known. The well has 20-inch diameter casing to about 65 feet. An 18-inch diameter stainless steel, wire-wrapped screen extends from 65 to 85 feet. The depth to water in 2006 was 23 feet.
- The pump was removed and rebuilt in 2006 and the well was cleaned out, surged and bailed. The pump has a 40 hp motor and an 8-inch diameter pump column. The pump intake was set at a depth of 78 feet, which placed it in the lower portion of the well screen. A test pump indicated a discharge rate of 1,380 gpm with 16 feet of drawdown.
- A flow meter was installed in 2006 but is too close to changes in the pipe configuration (elbow, valves ...) to provide valid discharge measurements.
- The pump ceased working in May 2012 and has been removed from well 11C.
• A borehole video survey was conducted on well 11C on September 4, 2012. The well screen started at a depth of about 64 feet and extended to the bottom of the well at about 84 feet. The video showed that the casing above the screen had what appeared to be chemical precipitates. The screen openings appeared to be about 50 percent open over the 20-foot length of the screen. Much of the filling appeared to be chemical precipitates although some biological growth was evident on the video log.
• Access is available for water-level measurements for this well.

Well 12C
• Information for well 12C is available as notes taken after viewing a borehole television survey plus a well log that might be from well 12C. According to the log, the well was drilled for the USBR in 1986 to a depth of 97 feet. The geologic log is as follows: 0 to 28 feet –sandy silt, gravel and cobbles; 28 to 58 feet – sandy silt and gravel; 58 to 89 feet – sand and gravel with silt layers; 89 to 97 feet - sandy silt and gravel. The well was completed with 14-inch diameter casing and a 14-inch diameter telescope size screen from 54 to 85 feet. The slot size varies from 200 slot at the top to 100 slot at the bottom. A five hour pump test was run with a discharge rate of 2,000 gpm with 3.9 feet of drawdown. The static depth to water was 18 feet.
• The well was serviced in 2006 including rebuilding the motor and replacing bearings in the pump. The well was scrubbed, surged and bailed. A flow meter was installed in 2006 but is too close to changes in the pipe configuration (elbow, valves …) to provide valid discharge measurements. A pump test was run with the yield at 1,380 gpm with 4 feet of drawdown. However, the discharge measurement probably is not valid.
• The well has a 30 hp electric motor with an 8-inch diameter pump column. The pump intake is set at 48 feet. This well has the pump intake set above the top of the screen.
• Access is available for water-level measurements for this well.

Well 13C
• Information for well 13C is available in the form of notes taken after viewing a borehole television survey plus a well log that could be from well 13C. The log indicates that the well was drilled in 1986 for the USBR to a depth of 99 feet. The geologic log is as follows: 0 to 20 feet –sandy silt, gravel and cobbles; 20 to 30 feet – sand and gravel; 30 to 35 feet – sand and gravel; 35 to 41 feet - sand and gravel with silt layers; 41 to 60 feet - sand and gravel; 60 to 64 feet – sand; 64 to 67 feet – silty sand and gravel; 67 to 97 feet - sand and gravel; 97 to 98 feet –sand, silt and gravel; 98 to 99 feet – granite. The well was completed with 14-inch diameter casing and a 14-inch telescope size screen from 44 to 96 feet with 30-slot openings. A five hour pump test was run with a discharge rate of 2,000 gpm with 3.8 feet of drawdown. The static depth to water was 19 feet.
• The pump was rebuilt in 2002 and again in 2003. The well was developed in 2003 using dry ice and a jet surge method.
• A flow meter was installed in 2006 but is too close to changes in the pipe configuration (elbow, valves …) to provide valid discharge measurements.

• Well 13C had a 30 hp electric motor with an 8-inch diameter pump column. The pump intake was set at 62 feet, which is about almost 20 feet below the top of the screen. The pump recently ceased working and was removed from well 13C in June 2012.

• A borehole video survey was conducted well 13C on September 4, 2012. The well screen started at a depth of about 47 feet and extended to the bottom of the well at about 98 feet. The screen openings appeared to be about 90 percent open over the approximate 50-foot length of the screen. The limited filling of the screen appeared to be mostly from chemical precipitates.

• Access is available for water-level measurements for this well.

Well 14C

• Information for well 14C is available as notes taken after viewing a borehole television survey plus a well log that could be from well 14C. The log indicates that the well was drilled in 1985 for the USBR to a depth of 61 feet. The geologic log is as follows: 0 to 22 feet – sand, gravel and cobbles; 22 to 32 feet – silty sand and gravel; 32 to 33 feet – sand and silt; 33 to 37 feet - sandy silt; 37 to 41 feet – silty sand; 41 to 44 feet – sand, silt and gravel; 44 to 50 feet – sand and gravel; 50 to 61 feet – granite. Fourteen-inch diameter casing was placed in the well. Well 14C was capped and not completed with a screen at the time when the well was drilled. No pump test was conducted.

• The notes taken from viewing the borehole television survey in 2006 showed that well 14C had been completed with 14-inch diameter pump chamber casing and 12-inch diameter stainless steel, wire-wrapped screen in the depth interval of 40 to 60 feet. The dominant water producing zone is the sand and gravel in the 44 to 50-foot interval.

• The well was rehabilitated in 2004 and the pump was repaired. The pump was noted as vibrating. The 2005 information indicates that the pump was rebuilt and the column was replaced. The 2005 information indicates that well 14C has a 15 hp electric motor and a 6-inch diameter pump column. The pump intake was set at 40 feet which is at the top of the screen.

• A flow meter was installed in 2006 but is too close to changes in the pipe configuration (elbow, valves …) to provide valid discharge measurements.

• Information provided during the 2012 field trip indicates that well 14C is not used because it produces poor quality water.

• Access is available for water-level measurements for this well.

Well 4A

• Well 4A is located below the dam within the western portion of the hatchery.

• The information available for well 4A is very limited. The only page providing information about the well in the DPUD binder is a summary of work done on the well in
2003. The work included rehabilitating the well with dry ice, installing new bowls, conducting a borehole television survey of the well and reinstalling the pump. Files for the other wells provide well construction information based on a review of the borehole television log. No information of that type is available for well 4A even though DCPUD apparently paid for the well survey. The pump that was installed in the well in 2003 has a 30 pm electric motor, a 12-inch diameter column with the pump intake set at a depth of 70 feet.

- The well can be accessed for water-level measurement.
- Well 4A was not included in the field data collection effort because water from the well is not used for any hatchery operations.

**Well 5B**

- The Carpenter Island wells (5B and 6B) are located within the same building located southeast of the hatchery below the dam
- A borehole television survey conducted in 2006 is the primary source of information for well 5B. A drawing developed from the survey shows 12-inch diameter casing to a depth of 73 feet with perforations every 6 inches in the depth range of 53 to 60 feet. The casing in the depth range of 60 to 73 feet is depicted as blank. The static water level is given as 33.7 feet below the top of the casing. The date of well construction is not known.
- The first documented work on this well is from 2000 and included replacement of the pump and rebuilding of the 30 hp motor. A note on the work summary indicates that the well was rehabilitated using a surge block and dry ice. A replacement pump was installed with the rebuilt motor. The notation on the 2000 work sheet indicates that the pump was surging.
- Extensive work was done on the well and pump in 2001. A notation on the sheet indicates the following: 1) pump tested 700 gpm, 2) the casing was perforated every 6 inches from 53 to 60 feet and 3) then pump tested 950 gpm. A second note indicates that the pump was not currently in use. The “well is dry due to (low) water table this year.”
- The well was cleaned, surged and bailed in 2006. The pump was also rebuilt and a flow meter was installed. The meter was located is too close to changes in the pipe configuration (elbow, valves …) to provide valid discharge measurements. A pump test was run and indicated the well produced 900 gpm with 3.7 feet of drawdown. The flow measurement may not be valid.
- The pump installed in 2006 had a 30 hp motor, a 6-inch column diameter and a pump intake depth of either 67 or 73 feet. This means that the pump is placed below the perforated interval of 53 to 60 feet. The pump shaft in well 5B presently is reported to be broken. There are no plans to repair this well in part because of the close proximity to well 6B.
- Access is available for water-level measurements for this well.
Well 6B

- A borehole television survey conducted in 2006 is the primary source of information for well 6B. The date of well construction is not known. A drawing developed from the survey shows 20-inch diameter casing to a depth of 35 feet with an 18-inch diameter stainless steel, wire-wrapped screen in the depth range of 35 to 55 feet. The static depth to water is given as 31 feet. This means that the static water level in the well at the time of the survey was only 4 feet above the top of the screen.
- Work done on this well in 2006 included replacing the pump, rebuilding the motor, and cleaning the wells by scrubbing, surging and bailing. A flow meter was also installed but is too close to changes in the pipe configuration (elbow, valves …) to provide valid discharge measurements. The well was tested at 3,500 gpm with 4.5 feet of drawdown but the validity of the discharge measurement is questionable. The well was equipped with a 100 hp motor, a 10-inch diameter pump column and a pump intake set at 50 feet. This means that the pump was placed in the lower third of the screen. A note on the 2006 form indicates that the “water level is not sufficient to run pump.”
- In 2009, the well was rehabilitated and the pump was repaired. The pump is now run by a 50 hp motor.
- A 2009 document in the file describes the following problem. “Fluctuating water table has resulted in pump cavitation. Pump has lost efficiency and needs to be repaired.” Details are not presented regarding the pump repairs or the well rehabilitation effort.
- A variable frequency-drive motor has been installed on well 6B.
- Access is available for water-level measurements for this well.

Well 7B

- Wells 7B and 8B are located in the same building on a bench above the river flood plain south east of the Carpenter Island wells and south of the hatchery. An irrigated orchard is located immediately adjacent to the wells.
- Information for well 7B is available as notes taken after viewing a borehole television survey plus a well driller’s report dated in 1960 that might be from well 7B. The well was originally drilled for Wells and Wade Fruit Company. The drawing based on the borehole television survey indicates 16-inch diameter casing to a depth of 113 feet with approximately 50 perforations in the depth interval of 103 to 113 feet. The driller’s report indicates a well depth of 112 feet with 240 perforations in the depth range of 98 to 112 feet. When drilled, the static depth to water was 65 feet and the yield was 2,100 gpm with a drawdown of about 0.2 feet.
- In 2001, the pump was pulled and replaced by a new pump. The depth of the pump intake was not noted on the available notes for the well.
- A flow meter was installed in 2006 but is too close to changes in the pipe configuration (elbow, valves …) to provide valid discharge measurements.
- A new 100 hp pump was installed in 2011.
• A variable frequency-drive motor has been installed on well 7B.
• Access is available for water-level measurements for this well.

**Well 8B**

• There is no geologic or well construction information for this well. A borehole television log is listed on a 2006 invoice but no drawing of the well was included in the DCPUD binder. A flow meter was installed in 2006 but is too close to changes in the pipe configuration (elbow, valves …) to provide valid discharge measurements.
• The pump was pulled in 2000. The motor was repaired and the shaft was replaced.
• A 2009 form indicates that a 40 pm electric motor is installed at the site with a pump column of 10 inches. The depth of setting of the pump is not shown.
• A variable frequency-drive motor has been installed on well 8.
• Access is available for water-level measurements for this well.

**Well 9B**

• Well 9B is located a short distance northeast of wells 7B and 8B.
• Information on well 9B is limited to a single form that indicates the well was equipped with a 20 hp motor in 2005. The 2005 notation also indicates that this well is the Wells and Wade Orchard fire pump. Data were not collected from this well because it is not used for hatchery operations.
• An access port for water level measurement was constructed in 2012.

**Well 15H**

• Well 15H is located within the hatchery immediately downstream from the dam.
• Information for well 15H is available as notes taken after viewing a borehole television tape. The well is 58-feet deep and has 12-inch diameter pump chamber casing. A 10-inch diameter wire-wrapped screen is placed in the well in the depth range of 42 to 58 feet. A note on the bottom of a DCPUD summary form for well 15H indicates the following. “This well developed in 1991 using spare motor and discharge head already on site…. Two test wells were drilled and this one selected…” The date of well construction is not known.
• The pump and motor for this well were last worked on in 2006. The DCPUD form indicates that a 15 hp motor was installed with the pump intake set at 58 feet. If this information is correct, the pump intake is set at the very bottom of the well screen and the well.
• An access port for water level measurement was constructed in 2012.

**Hydrogeologic Conceptual Model**

The hydrogeologic conceptual model of the Wells Hatchery site is based on the following presumptions.
1. The production wells located upstream of the dam (1A, 2A, 3A, 10C, 11C, 12C, 13C and 14C) are presumed to be completed in the same aquifer, are presumed to be hydraulically interconnected and are presumed to be hydraulically connected to the river above the dam.

2. The production wells located downstream of the dam (5B, 6B, 7B, 8B and 15H) are presumed to be completed in the same aquifer, are presumed to be hydraulically interconnected and are presumed to be hydraulically connected to the river below the dam.

3. The aquifer upstream of the dam is presumed to be hydraulically isolated from the aquifer downstream the dam by the cutoff wall created as part of dam construction.

The hydrogeologic conceptual model relative to the hydraulic interconnection of the wells upstream of the dam was tested as follows. A short-term aquifer test was conducted on May 9, 2012 to determine the degree of hydraulic connection between well 1A and the other upstream production wells. Well 1A, which had been pumped continuous for an extended period, was shut off for 30 minutes and then turned back on. Water level data were collected using data loggers in wells 1A and 13C (set on 1-minute readings) and by hand in some of the remaining upstream wells. Figure 3 shows the hydrograph for well 1A and Figure 4 shows the hydrograph for well 13C. Figure 3 shows the very rapid water-level recovery in well 1A when the pump was turned off and the very rapid drawdown when the pump was turned back on. The maximum water-level recovery when the well was off was about 14.9 feet. The water level in the well at the end of the 30-minute recovery period was slightly below the water-level in the reservoir. This difference could be measured easily because well 1A is located within the reservoir. The water-level response shown in Figure 4 for well 13C is typical of the response measured in the other upstream production wells. The water-level in well 13C recovered about 2 feet with about 2 feet of drawdown when well 1A was turned back on. The rapid water-level response in well 13C indicates that the aquifer is at least partially confined. Likely the confining layer is the silt-clay layer deposited on the bed of the reservoir. Data from the well 1A aquifer test confirm that the upstream production wells are hydraulically interconnected.

The hydrogeologic conceptual model relative to the hydraulic connection of the aquifer above the dam with the river above the dam was tested by comparing the hydrograph of the river water-level elevation with the hydrograph of the depth to water in well 14C. Figure 5 is a plot of the average daily elevation of the river upstream of the dam for the period of 2008 through the middle of 2012. The river water level data for the forebay above Wells Dam were provided by Douglas County PUD (Bickford, 2012) for the past 5 years. The water level elevation in the reservoir above the dam is held in the elevation range of 778 to 781 feet most of the time. The river elevation has been lowered to 776 feet several times a year for short periods. The lowest water-level elevation of the river behind the dam during the available period of record was 771.6 feet in November 2008. Figure 6 shows the river water level data for a period in 2012 when a data logger was operating in well 14C. The well data are shown as depth to water because the well-head elevation is not available. The well hydrograph is similar to the river hydrograph.
except that the ground water does not appear to show a response to short-term changes in river elevation such as in the period of May 16-18. The hydrograph comparison, plus the fact that well water levels are about the same elevation as the river, are sufficient to conclude that there is hydraulic connection of the aquifer with the river above the dam.

The hydrogeologic conceptual model relative to the hydraulic interconnection of the wells downstream of the dam is supported by the results of a 2009 study of the Carpenter Island wells (5B and 6B) and the Orchard wells (7B and 8B) conducted by GeoEngineers (2009). They concluded the following (page 5). “The long-term pumping of Well 7B appears to result in approximately 3 feet of drawdown interference in Wells 5B and 6B.” There are no field data to support or refute the conceptual model that well 15H is completed in the same aquifer and is hydraulically connected to the other downstream production wells. The pumping effect of the Orchard and Carpenter Island wells on well 15H likely would be very small.

The hydrogeologic conceptual model relative to the hydraulic connection of the aquifer below the dam with the river was tested by comparing the hydrograph of the water-level elevation of the river below the dam with the hydrograph of the water level elevation in well 5B. Figure 7 is a plot of the elevation of the river downstream of the dam for the period of 2008 through the middle of 2012. The elevation of the river below the dam is in the range of 707 feet to 714 feet during the summer, fall and winter for most years. The river level was much higher during the spring and early summer of each year with the peak water elevation dependent on the magnitude of the spring runoff event. Figure 8 shows the river water level data for a period in 2012 when a data logger was operating in well 5B. The 2012 seasonal rise in water-level elevation in the river below the dam starts in March and continues to a peak in late June. The data logger record for well 5B starts in June and extends into late July. These data show a water-level rise and then decline that likely represents a ground-water response to the flood event in the river. The lag between the June 28th peak in the surface water level and the July 17th peak in the ground-water level in well 5B may be attributed to the distance between the river and the well. The single water level measurement in well 5B shown on Figure 8 in early May is important because it shows the magnitude of the water-level rise that occurs in the ground-water system associated with the higher river flow. The May measurement of well 5B was taken when well 6B was pumping. The two wells are about 15 feet apart. The pumping water level measurement in well 5B was adjusted to reflect static conditions using drawdown data when well 6B was pumped on July 12th. The two data points below the remainder of the 5B water levels on Figure 8 represent a time when well 6B was being operated at a rate of 2,100 gpm. This pumping rate likely is similar to what well 6B was producing on May 10th when the measurement was taken. In summary, the hydrograph for well 5B shows that there is a hydraulic connection between the aquifer that supplies water to the wells below the dam and the river.

The ultimate source of ground water that is pumped from the “upstream” wells is seepage from the Columbia River into the aquifer. The hydraulic connection between the river and the aquifer is at the base of the pool and is limited somewhat by fine-grained sediments that are
deposited behind the dam. The chemical quality of ground water likely is similar to surface water.

The ultimate source of ground water that is pumped from the “downstream” wells also is the Columbia River. However, there are two ways that water from the river enters the ground water system. First, the aquifer is hydraulically connected to the river along the river channel. Second, the aquifer receives recharge from the irrigation of orchards along the west side of the river. The source of the irrigation water is the Columbia River. The amount of recharge provided by irrigation of the orchards is not known. The irrigation recharge source is important because it might impact the water quality of the water obtained from wells 7B and 8B and to a lesser extent from wells 5B and 6B.

Four factors make operation of the “downstream” production wells different from operation of the “upstream” production wells. First, the “downstream” wells are located some distance from the river whereas the “upstream” wells are either along the shore line or within the pool. Second, hydraulic connection of the aquifer to the river occurs over a much greater area for the upstream wells than the downstream wells. Third, the available drawdown (distance from the static water level to the top of the aquifer) is much greater for the “upstream” wells than for the “downstream” wells. This is because ground-water levels in the shallow aquifer under non-pumping conditions are equilibrated to the water level in the river both above the dam below the dam. Fourth, most of the downstream wells are located near an irrigated orchard which may provide recharge water to the aquifer. A potential exists that chemicals used on the orchards may infiltrate down to the shallow aquifer and be carried into the production wells. The potential for this is greater for wells 7B and 8B than for wells 5B and 6B. There is little potential for chemicals used in the orchards to reach well 15H, the remaining downstream production well. This is because well 15H is located up-gradient of the orchards, closer to the dam. There are no land use activities that have a similar potential for contamination for the upstream wells.

**Relationship between Pump Placement and Well Construction**

General engineering practice is to place the intake for a line-shaft turbine pump above the top of the screen or perforated interval in a well. There are three general reasons for following this engineering practice.

- First, wells completed in unconsolidated material (such as sand and gravel) should have a screen slot size selected to retain about 50 percent of the material by size. Thus, a small amount of fine material (sand and silt) continues to enter the screen over the life of the well. Most of the methods used to perforate the casing either prior to installation or after the casing is installed result in a small number of large openings. Perforated casing generally has smaller percent open area which results in a higher entrance velocity at a given pumping rate. The higher entrance velocity through larger holes results in greater sand entry into the well. In a properly selected pump chamber casing, the up-hole velocity in the well is not sufficient not to carry sand or silt up into the pump. Placement of the pump intake within or below the
screens or perforated casing will result in sand or silt directly entering the pump. Sand entering the pump causes erosion of the pump bowls and pump failure.

- Second, the pump bowls often are a fairly tight fit within the screen. Setting the pump bowls within the screen effectively limits water inflow to the portion of the screen below the bottom-most pump bowl. This results in lower yield, greater drawdown, higher entrance velocities and potentially greater pumping of sand.

- Third, placement of the pump intake above the top of the screen prevents lowering the pumping water level below the top of the screened or perforated interval. A number of problems occur when the pumping water level is low enough that water enters the well via the screen or perforated section and falls down to the pumping water level within the casing. Chemical precipitates are formed on the casing/screen and biological reactions result in bio-fouling of the casing/screen. These reactions result in plugging of the screen or perforated section which in turn leads to greater entrance velocities into the well and thus greater drawdown. Also, the falling water results in small bubbles of air entering the pump. The bubbles cause erosion of pump bowls similar to sand particles.

The second important engineering practice is to maintain the pumping water level a proper distance above the pump. Most pumps are designed to operate with a water level a set distance above the top of the pump bowls. This is termed net positive suction head. Lowering the water level below the top of the bowls can cause damage to the pump. Jacobs Engineering (2009, pages 1-2) stated the following relative to well 6B. “…the recent pump failures resulted from ingestion of air-entrained water into the pump, apparently the result of the pump operating with insufficient water depth above the pump intake.” In the most extreme case, the pumping water level can be low enough so the pump surges (intermittently pumps air and then water). This results in even greater damage to both the pump and the motor.

These two general engineering practices have not been followed in past operations of the production wells at the Wells Hatchery site. The end result of this action has been excessive pump and motor problems, unreliable well water supply for the hatchery and major operational costs. The lack of a reliable ground-water supply has threatened successful fish cure at times.

The intake for the pump for the majority of the DPUD wells is set within the screened or perforated interval (wells 1A, 2A, 3A, 5B, 6B, 11C, 13C and 15H). Three wells (10C, 12C and 14C) have the pump intake at or above the screen and two wells (7B and 8B) have insufficient information to judge the pump placement relative to the screen or perforated section. Pump surging is reported for several of the wells and was observed during the field visits in May and June in several wells. Later sections of the report address the present conditions in each production well and provides recommended actions to correct any problems in well and pump operations.

ANALYSIS OF PRODUCTION WELLS
Introduction

This portion of the report presents a summary of the present condition of each production well and includes recommendations for target pump placement, target pump yields and the potential benefits from well rehabilitation. The wells are divided into upstream and downstream groups because the downstream production wells have issues that are not common to the upstream wells. Wells 4A and 9B are excluded from the analysis because they do not provide water for hatchery operations. Wells 14C and 5B are excluded because they are non-operative with no plans to put them back into service. Table 1 provides a summary of the information for each production well.

Upstream Production Wells

Well 1A

Well 1A is unique in two ways. First, this well has the largest yield of any of the production wells. Second, the well is located within the reservoir behind Wells Dam and is accessible only by boat. Both factors are important relative to the role this well plays and can play in hatchery operations.

Water-level data collected during the May 9th aquifer test showed that well 1A had very rapid water-level recovery when the pump was turned off and very rapid drawdown when the pump was turned back on (Figure 3). This response pattern is indicative of considerable well loss (friction of water entering the well). The well loss likely results from the use of perforated casing rather than a wire-wrapped well screen which has a greater percent open area.

The pumping depth to water in well 1A (about 23 feet below the top of the casing) was more than 60 feet above the top of the uppermost perforations (about 86 feet below the top of the casing). The available information indicates that the pump intake is at a depth of about 90 feet, which places it within the top of the perforated section of casing.

The discharge rate measured by the in-line flow meter was checked against a reading obtained by an ultrasonic flow meter. Readings from an ultrasonic flow meter indicated a discharge rate of about 3,200 to 3,300 gpm whereas the in-line flow meter reading was about 3,600 to 3,700 gpm. The flow meter is installed about 4 feet upstream from an elbow in the discharge line which likely impacts the accuracy of the readings. An estimated specific capacity (discharge rate divided by drawdown) of about 218 gpm/ft was calculated for well 1A using the May 9th recovery data and the June 12th discharge rate obtained from the ultrasonic flow meter.

Four minor problems are apparent with well 1A.

- First, well 1A is located within the reservoir behind Wells Dam. This makes maintenance and repair activities more complex. There is nothing that can be done to address this issue except to consider using well 1A in a backup role rather than as a primary water supply source.
Second, the bend in the casing at a depth of 55 feet (about 5 feet below land surface) has caused problems with line-shaft turbine pumps in the past. A pump with a smaller diameter pump column was installed in the well in 2010 to combat this problem. Consideration should be given to installing a submersible pump if the present line-shaft turbine pump fails.

Third, the well is completed with perforated casing. The percent open area of perforated casing typically is less than 5 percent and may be less than 3 percent. This makes the well less efficient. Much of the 14 feet of recovery shown on Figure 3 when well 1A was turned off probably is from well loss. This is not a major problem since there is plenty of available drawdown.

Fourth, the pump intake presently is set about 4 feet below the top of the perforations. Consideration should be given to raising the pump intake to above the top of the perforated section the next time the pump is removed from the well.

In summary, well 1A is the largest of the production wells for the hatchery. This well should be able to produce 3,200 to 3,300 gpm for hatchery operations into the foreseeable future. There are no problems with the size of the pump chamber casing or the available drawdown. Because of access issues, consideration should be given to using this well as a backup for hatchery operations if the remaining production wells provide enough water. The pump intake should be placed above the top of the perforations the next time it is removed from the well. Consideration should be given to installing a submersible pump if the present line-shaft turbine pump fails.

Well 2A

Well 2A has a 12-inch diameter pump chamber casing and is completed with 10-inch diameter, 80 slot, wire-wrapped screen in the depth interval of 67 to 87 feet. The available drawdown is about 45 feet based on an assumed depth to water of 22 feet. According to the water well report, well 2A had initial discharge rate of 1,580 gpm with 7 feet of drawdown in 1983. The design yield of the screen installed in well 2A is about 1,000 gpm based on an entrance velocity of 0.1 ft/sec (U.S. Bureau of Reclamation, 1985). The pump intake is set at a depth of 75 feet, well down into the screen.

Well 2A has a history of pump and well problems. The well and pump were repaired in 2002, 2004 and 2007. The discharge rate after the 2007 work was 400 gpm with a drawdown of about 45 feet to the top of the screen. The 2007 discharge measurement may not be valid because of the location where the meter was installed. When tested in June 2012, well 2A had a discharge rate of about 125 gpm with a drawdown of about 51 feet.

The specific capacity of well 2A has decreased over time: 225 gpm/ft in 1983, 9 gpm/ft in 2007 (if the discharge rate is valid) and 2 gpm/ft in 2012. The available information indicates that the screen in well 2A is severely plugged, probably with chemical precipitates and possibly with biological material. Much of the problem with this well stems from setting the pump within the screen and lowering the pumping water level below the top of the screened interval.
Wells 2A and 3A are located about 10 feet apart. Thus, pumping one well has an impact on the water level in the second well. During a pumping test on May 8, 2012, operation of well 3A caused a drawdown of about 3 feet in well 2A after about 40 minutes of pumping. This does not appear to be a significant problem.

In summary, there is little value in operating well 2A in its present condition. The well can be brought to greater productivity with an intensive rehabilitation effort. Likely the original pumping rate of 1,580 gpm cannot be achieved with redevelopment. However, a pumping rate of about 800 gpm may be achieved with the pump intake placed above the top of the screen. A key factor in this prediction is the relatively large amount of available drawdown (about 45 feet).

**Well 3A**

Well 3A has a 14-inch diameter pump chamber casing with 80-slot, wire-wrapped well screen in the depth range of 34 to 84 feet. The design yield of the screen installed in well 3A is about 2,400 gpm. The available drawdown is much less for well 3A than for well 2A because of the long screened section. The pump intake is set at 75 feet, which is more than three-quarters down into the screen.

The well and pump were rehabilitated in 2003 with additional work on both the well and pump in 2007. Well 3A yielded about 830 gpm with 15 feet of drawdown after the 2007 work. The discharge measurement using the installed flow meter may not be valid. Well 3A was pumped in 2012 at a rate of about 425 gpm with a drawdown of about 18.9 feet. The specific capacity of well 3A has decreased from 55 gpm/ft in 2007 to 22 gpm/ft in 2012. The available information indicates that the screen in well 3A is partially plugged, probably with chemical precipitates and possibly with biological material. Well 3A is similar to well 2A in that much of the problem stems from setting the pump within the screen and lowering the pumping water level below the top of the screened interval.

In summary, well 3A can be pumped at a rate of about 425 gpm at this time. However, there will be continual deterioration of both the pump and the well. This is because the pump is set in the bottom quarter of the screen and the pumping water level is about 5 feet below the top of the screen. With rehabilitation, the yield could be as much as 500 gpm with the pump set above the top of the screen. This should minimize long-term well and pump problems.

**Well 10C**

Well 10C is one of five wells that are located along the southwest side of the reservoir behind Wells Dam (Figure 2). The well has 12-inch diameter pump chamber casing with an 8-inch wire-wrapped well screen in the depth range of 69 to 90 feet. The design yield of the screen in well 10C cannot be calculated because the slot size was not given.

The pump and well were rehabilitated in 2006. The records show that the pump intake is at a depth of 65 feet, which is above the top of the screen. The pumping rate in 2006 was noted
as 900 gpm with 15 feet of drawdown. The 2006 discharge measurement is questionable because of problems with the flow meter.

Static and pumping water-level data were obtained in May 2012. The drawdown was about 28.8 feet. A discharge rate from well 10C of 640 gpm was measured using an ultra-sonic flow meter in June 2012. The specific capacity values in 2006 and 2012 are 60 gpm/ft and 22 gpm/ft respectively.

In summary, well 10C can be pumped at a rate of 640 gpm while keeping the pumping water level about 18 feet above the top of the screen. The decrease in specific capacity between 2006 and 2012 likely is because of chemical and biological plugging of the screen. Rehabilitation of this well could result in a pumping capacity of about 1,000 gpm.

**Well 11C**

Well 11C has 20-inch diameter pump chamber casing with an 18-inch wire-wrapped well screen in the depth range of 65 to 85 feet. The design yield of the screen in well 11C cannot be accurately calculated because the slot size was not given. The pump intake was at a depth of 78 feet which is in the lower portion of the screen.

The pump and well were rehabilitated in 2006. The well after rehabilitation discharged 1,380 gpm with 16 feet of drawdown. The validity of the discharge measurement is in question because the flow meter was not installed correctly.

Well 11C was pumping when visited in May 2012 but the discharge could not be measured because the flow meter was installed incorrectly. The drawdown at that time was about 44 feet. The pump on well 11C was not operative when the ultrasonic flow from meter was being used in June 2012 and thus discharge drawdown data could not be collected.

The existing pump was removed from the well in July 2012 and a test pump was installed in order to obtain discharge/drawdown information. The well was pumped at a rate of 500 gpm with about 26 feet of drawdown (Picatti Pump, personal communication, 2012). They attempted to raise the discharge rate to 700 gpm but the pump broke suction. The pump intake was set at a depth of 60 feet. The duration of the test was about 35 minutes. The specific capacity of well 11C decreased from 86 gpm/ft in 2006 (assuming the discharge rate is valid) to 19 gpm/ft in 2012. The decrease in productivity likely is because of chemical and biological fouling of the screen because the pumping water level was lowered below the top of the screen. The borehole video log of well 11C, taken in September 2012, shows that the openings in the screen are approximately 50 percent plugged.

In summary, the maximum yield from well 11C is about 500 gpm. Pumping the well at 500 gpm resulted in a depth to water of 50 feet, which is above the top of the well screen. Rehabilitation of the well probably would result in a pumping rate of about 1,000 gpm with the pump set above the top of the screen.

**Well 12C**
Well 12C has 14-inch diameter pump chamber casing with 14-inch diameter telescope size wire-wrapped well screen in the depth range of 54 to 85 feet. The screen varies from 200 slot at the bottom, 150 slot in the middle and 100 slot at the bottom. The design yield of the screen in well 12C is about 2,600 gpm. The yield after it was drilled in 1986 was 2,000 gpm with 3.9 feet of drawdown. The pump and well were both rehabilitated in 2006. The records show that the pump intake is at a depth of 48 feet, which is above the top of the screen. The pumping rate in 2006 was noted as 1,380 gpm with 4 feet of drawdown. However, the discharge reading may not be valid because of problems with the flow meter.

Static and pumping water-level data were obtained in May 2012. The drawdown was about 4.8 feet. The discharge rate from well 12C was measured using an ultra-sonic flow meter as 1,240 gpm in June 2012. The specific capacity values in 1986, 2006 and 2012 are 512 gpm/ft, 345 gpm/ft and 258 gpm/ft respectively.

In summary, the present yield of well 12C is about 1,240 gpm. The specific capacity of the well has decreased since it was drilled but still higher than most of the production wells. Consideration should be given to placing a pump in well 12C that will yield up to 2,500 gpm.

Well 13C

Well 13C has a 14-inch diameter pump chamber casing with 14-inch telescope size wire-wrapped, 30-slot well screen in the depth range of 44 to 96 feet. The design yield of the screen is about 1,600 gpm. When drilled in 1986, the well had a discharge rate of 2,000 gpm with 2.7 feet of drawdown.

The well and pump were rehabilitated in 2006. The yield and drawdown at that time were 1,380 gpm and 2.3 feet respectively. However, the discharge reading may not be valid because of problems with the flow meter. The pump on well 13C was inoperative during the May and June site visits.

The existing pump was removed from the well and a test pump was installed in July 2012 in order to obtain discharge/drawdown information. The well was pumped at rates of 500, 850 and 1,150 gpm with a maximum drawdown of about 3 feet (Picatti Pump, personal communication, 2012). Water-level measurements were reported only to the nearest foot. The test pump was set at a depth of 60 feet. The duration of the test was about 35 minutes. The specific capacity of well 13C decreased from 740 gpm/ft in 1986 to 383 gpm/ft in 2012.

The borehole video log of well 13C, taken in September 2012, shows that there is little plugging of the screen openings. There is little need to rehabilitate this well.

In summary, well 13C was test pumped at a maximum rate of 1,150 gpm with about 3 feet of drawdown. The available drawdown in this well (distance between the static water level and the top of the screen) is about 20 feet. The specific capacity of the well has decreased since it was drilled but still is the highest of the upstream production wells. Consideration should be given to placing a pump in well 12C that will yield up to 2,500 gpm.
Downstream Production Wells

Well 6B

Well 6B has 20-inch diameter casing with 18-inch diameter wire-wrapped screen in the depth interval of 35 to 55 feet. The slot size of the screen is not given and thus a design yield cannot be calculated. The pump intake is at a depth of 50 feet which is near the bottom of the screen.

The well and pump were rehabilitated in 2006 and again in 2009. The well was tested in 2006 at 3,500 gpm with 4.5 feet of drawdown. However, the discharge reading may not be valid because of problems with the flow meter. Information is not available concerning the rehabilitation work done in 2009.

A pumping test was conducted using well 6B in July 2012 with flow controlled by the variable speed pump and discharge measured using the ultra-sonic flow meter. The well was pumped at rates of about 1,000 gpm, about 1,700 gpm and about 2,200 gpm for short (10 minute) periods separated by similar periods of no pumping. The drawdown was about 1.2 feet at 1,000 gpm, about 2.0 feet at 1,600 gpm and about 3.0 feet at 2,200 gpm.

The specific capacity of well 6B was about 780 gpm/ft based on the 2006 data although the discharge measurement may not be valid. Based on the 2012 data, the specific capacity of well 6B is about 833 gpm/ft at 1,000 gpm, about 850 gpm/ft at 1,600 gpm and about 730 gpm/ft at 2,200 gpm. These data indicate that well 6B is an excellent producer. However, well 6B has operational problems when ground-water levels are low.

The ground-water levels in the downstream wells are lower in the late summer, fall and winter because of two factors. First, the ground-water levels are lower because the river elevation below the dam is lower (Figure 8). Second, operation of the Carpenter Island and Orchards wells creates a local cone of depression in the ground-water levels. The low ground-water levels result in very little available drawdown (distance from the static water level to the top of the screen) in well 6B. For example, a pump repair document in February 2006 has the notation that the “water level is not sufficient to run pump” in well 6B.

In summary, well 6B has excellent yield characteristics when the ground-water level is high but this water source cannot be used when the ground-water level is low without causing significant well and pump problems. The present setting of the pump intake is at a depth of 50 feet, which is near the bottom of the screen. Moving the pump up above the top of the screen would decrease well and pump costs but will make the well essentially inoperative during low water levels portions of the year. This well can be used reliably during the spring and early summer. The pump intake should be placed above the top of the screen. Additionally, a control should be placed in the well which would turn the pump off when the pumping water level dropped to near the top of the pump bowls.

Well 7B
Well 7B has 16-inch diameter pump chamber casing with perforations in the depth interval of 98 to 112 feet. The design yield of the well cannot be calculated. The depth of the pump intake is not known.

The pump was replaced in 2001. The records do not show any other pump or well rehabilitation efforts on this well. The initial yield of the well in 1960 was noted as 2,100 gpm with drawdown of about 0.2 feet. GeoEngineers (2009) determined that the water level in well 7B rose 4.3 feet after 6 hours of recovery following several months of continuous pumping. Static and pumping water-level data, obtained from well 7B in May and June 2012, indicate a drawdown of about 2.8 feet. The ultrasonic flow meter was used to determine a pumping rate of about 1,630 gpm from well 7B in June 2012. The above data indicate that the specific capacity of well 7B in 2012 is about 582 gpm/ft.

The elevation range of the perforated casing in well 7B is more than 20 feet lower than the elevation range of the screen in well 6B. The static water-level elevation is about the same in both wells. This means that well 7B has 20 feet of greater available drawdown than well 6B. For example, GeoEngineers (2009) present data that show that the static water level in well 6B was 5 feet below the top of the screen on July 6, 2009 while the pumping water level in well 7B was about 7 feet above the top of the perforated interval. This means that well 7B can be operated when low ground-water levels prohibit the operation of well 6B.

In summary, well 7B has excellent yield characteristics and has greater available drawdown than well 6B. The well has perforated casing rather than well screen but the well loss does not appear to be a major problem. One negative relative to wells 7B and 8B is the potential for ground-water contamination associated with irrigation of the orchards located immediately adjacent to these wells.

Well 8B

There is no information relative to the construction of this well or the placement of the pump. The line-shaft turbine pump has a 40-hp motor. Static and pumping water-level data, obtained from well 8B in May and June 2012, indicate a drawdown of about 3.7 feet. A discharge rate of 550 gpm was determined for well 8B in June 2012 using the ultrasonic flow meter. This gives a specific capacity of 150 gpm/ft. Wells 7B and 8B are located about 10 feet apart. The amount of mutual drawdown likely is small enough that both wells can be pumped at the same time. Consideration should be given to raising the pump from the present level (reported to be 58 feet at the bottom of the well) to just above the screen at 42 feet below land surface.

Well 15H

Well 15H is located immediately downstream of the dam in the hatchery area, a considerable distance from the other downstream production wells. The well has 12-inch diameter pump chamber casing and a 10-inch diameter well screen in the depth range of 42 to 58
feet. Well 15H is equipped with a 15 hp motor with the pump set at a depth of 58 feet. According to the available information, the pump intake is located at the bottom of the well.

An aquifer test was conducted on well 15H in June 2012. The static and pumping water levels were 20.3 and 28.2 feet below the top of casing. The pumping rate was determined using the ultrasonic flow meter to be about 475 gpm. This gives a specific capacity of about 60 gpm/ft.

In summary, well 15H is located away from the other downstream wells, discharges about 475 gpm and has a pumping water level about 14 feet above the top of the screen. Consideration should be given to changing the piping network to allow discharge from well 15H to enter the general water supply for the hatchery.

**GROUND-WATER TEMPERATURE ANALYSIS**

The spatial and temporal variation in the temperature of water discharged from the production wells is an important aspect of the hatchery water supply. Water temperature data from wells are limited to readings taken by a temperature logger placed in an intake to the hatchery and readings taken by the data loggers installed in selected production wells. These data are presented in the following paragraphs.

Greg Mackey (2012) provided water temperature data from a logger he installed in the Upper Pool Wells Water Aerator, which is where water from wells 1A, 10C and 11C enter the hatchery. Hourly temperature readings are available from May 1, 2012 to August 7, 2012 with data logger downloads on June 13 and August 7. The temperature readings range between 9.2 and 11.0 degrees C with an average of 9.7 degrees C in the period of May 1 to June 13, 2012. The temperature range (9.7 to 10.0 degrees C) is much smaller in the period of June 13 to August 7, 2012. However, the average temperature (9.8 degrees C) is nearly the same. The different temperature patterns before and after the June 13th download may have been related to different placement of the unit within the aerator.

Data loggers were operated in the following wells at various times during the investigation of the Wells Hatchery site in 2012: 1) upstream wells 1A, 13C and 14C and 2) downstream wells 5B and 15H. The data sets are described below.

- **Well 1A** – The data logger was set at a depth of about 36 feet in this well and operated for the period of May 9-19, 2012. The average water temperature was 9.9 degrees C with a variation generally less than 0.1 degrees C.
- **Well 13C** – The data logger was set at a depth of about 33.5 feet below the top of the casing and operated for the period of May 8-10, 2012. The average water temperature was 4.8 degrees C with a variation generally less than 0.1 degrees C.
- **Well 14C** – The data logger was set at a depth of about 20.9 feet below the top of the casing and operated for the period of May 10 to July 30, 2012. The average water temperature was 9.2 degrees C with a gradual rise in water temperature from 6.1 degrees C on May 10th to 12.2 degrees C on July 30th.
Well 5B – The data logger was set at a depth of about 56 feet below the top of the casing and operated for the period of June 14 to July 31, 2012. The average water temperature was 9.9 degrees C with a range from 8.3 to 10.7 degrees C. Analysis of a temporal plot of water level and water temperature data from well 5B is presented later in this section.

Well 15H – The data logger was set at a depth of about 54 feet below the top of the casing and operated for about 22 hours during June 12-13, 2012. The average water temperature was 10.4 degrees C with little temporal variation.

Comparison and analysis of the water temperature data are problematic because of several factors. First, the temperature logger used by Mackey (2012) and the data loggers installed in the wells were not calibrated to a standard or to each other. This makes comparison between sites difficult. Second, the well temperature data are susceptible to influence from seasonal changes in air temperature, particularly if the logger is less than about 50 feet below land surface.

Several general observations can be reached from the water temperature data. The water temperature measured in May from wells 13C and 14C (4.8 and 6.1 degrees C respectively) is much lower than the May water temperature from well 1A (9.9 degrees C). The ground-water temperature in the aquifer at well sites 13C and 14C may be influenced by the water temperature in the pool of water west of the embankment where the wells are located. The water temperature readings from the aerator are similar to the data logger readings in well 1A. This is logical since most of the water in the aerator is derived from well 1A.

The temporal variations of water temperature in well 5B, shown on Figure 8, are difficult to explain. The two water-level measurements on July 12th that are below the remainder of the data represent a time when well 6B was being pumped for an aquifer test. The drop in water temperature in well 5B on July 12th represents an impact from pumping water from well 6B. The drop in water temperature in well 5B from 10.6 degrees C to 8.5 degrees C on July 18th (based on hourly data logger readings) does not correlate with the operation of well 6B (no drawdown is shown in the water-level record). The water temperature in well 5B increases after July 18th so it is approximately 10.6 degrees C by July 31th. Potential reasons for this temperature pattern include delayed impacts of high flow in the river (colder water during spring runoff) and impacts from irrigation of the orchards. Collection of temperature data from at least one well upstream of the dam and at least one well downstream of the dam over a year-long period is needed to understand ground-water temperature patterns.

GROUND-WATER SUPPLY ANALYSIS

The three factors of primary importance in evaluation of the production wells are as follows: 1) the specific capacity (discharge divided by drawdown), 2) the available drawdown (static water level minus the top of screen) and 3) the pump setting relative to the screen or perforated interval. Table 1 presents a summary of information for the site production wells.

Analysis of Upstream Wells
Our present understanding of the aquifer and hydraulic connection between the aquifer and the river indicates that the total water supply obtained from upstream wells is limited only by the hydraulic characteristics of the individual wells. Well interference between wells does not appear to be a major issue. Long-term water-level decline does not appear to be a problem because of the nature of the hydraulic connection of the aquifer with the river. The upstream production wells may be divided into two groups based on the evaluation factors described above: group 1 includes wells 1A, 12C and 13C; group 2 includes wells 2A, 3A, 10C and 11C. Well 14C is not included in the analysis because there are no plans to put this well back into service.

Wells 1A, 12C and 13C are clearly better production sources than the other upstream wells.

- Wells 1A, 12C and 13C all have 2012 specific capacity values greater than 200 gpm/ft. The high specific capacity values indicate that these wells are hydraulically very efficient.
- The available drawdown in well 1A (about 86 feet) greatly exceeds the drawdown measured in 2012 (about 15 feet) at a pumping rate of about 3,200 gpm. Well 12C has an available drawdown of about 31 feet which is greater than the present drawdown of about 5 feet at a pumping rate of 1,240 gpm. Well 13C has less available drawdown (about 21 feet) than the other two wells but the available drawdown still exceeds the drawdown of about 3 feet at a pumping rate of 1,150 gpm.
- The pump intake in well 12C is set above the top of the screen which is the ideal location to minimize well and pump maintenance problems. Well 1A has the pump intake set about 4 feet below the top of the perforated section. The pump has been removed from well 13C. A new pump for well 13C should be placed so the intake screen is at a depth of about 43 feet to reduce well and pump maintenance problems. Raising the pump up in well 1A to be above the perforated interval should be done the next time that well or pump maintenance is required.
- The pumping rate of all three of these wells could be increased without well rehabilitation: well 1A could be increased from 3,200 gpm to about 4,000 gpm; well 12C could be increased from 1,240 gpm to about 2,000 gpm; and well 13C could be increased from the test pump rate of 1,150 gpm to about 2,000 gpm. The installation of different pumps would be required for the higher yields.
- The specific capacity values of wells 12C and 13C while high are much less than was determined when the wells were originally constructed (Table 1). Rehabilitation of these wells might improve the hydraulic efficiency sufficiently to allow pumping rates of 3,000 gpm each. The well rehabilitation approach that should be followed for hatchery wells is presented in a later section of the report.

The remaining four upstream production wells (2A, 3A, 10C and 11C) have significant production problems.
The specific capacity of wells 3A, 10C and 11C are in the range of 19 to 22 gpm/ft. This is about an order of magnitude less than wells 1A, 12C and 13C. Well 2A has a specific capacity (about 2 gpm/ft) which indicates that this well has a very low hydraulic efficiency.

Wells 2A, 10C and 11C have available drawdown of about 40 feet or more which means that this is not a limiting factor for operation. However, well 3A has a significant problem with only about 10 feet of available drawdown.

The pump intakes are located near the bottom of the screen section in wells 2A, 3A and 11C. This has and will continue to cause major well and pump problems. The pump intake in well 10C is correctly located above the top of the screen.

Well rehabilitation would increase the hydraulic efficiency of all four of these wells. The well yields after rehabilitation would likely be about twice the 2012 pumping rates shown on Table 1.

Analysis of Downstream Wells

Operation of the downstream wells is constrained by a more limited hydraulic connection of the aquifer with the river coupled with a lower static water level which limits available drawdown. Pairs of downstream wells are located very close together (5B and 6B in one location and 7B and 8B in another location). The temporal variation of ground-water levels below the dam is very important relative to operation of the production wells.

Wells 6B and 7B have very high specific capacity values (Table 1). The adjacent wells in each well pair (5B and 8B) have limited data but appear to have lower specific capacity values. Well 15H is located at considerable distance from the other downstream production wells and has a lower specific capacity value. The downstream wells are evaluated in three groups based on location. Table 1 presents a summary of information for the site production wells.

The Carpenter island wells (5B and 6B) are located on the valley floor and penetrate the aquifer at relatively shallow depths.

The 2012 specific capacity of well 6B is higher than any of the other production wells. The very high specific capacity indicates that the aquifer has very high hydraulic conductivity and that the well is hydraulically efficient. Specific capacity data for well 5B in 2012 are not available because the pump was not operative. Likely the specific capacity of well 5B is lower than well 6B because of the use of slotted casing rather than a well screen.

The primary problem with well 6B is the lack of available drawdown when ground-water levels are low. The static depth to water in July 2009 was 40 feet which is 5 feet below the top of the screen section (GeoEngineers, 2009). The well cannot be operated when the water level is this low without causing major well and pump problems. Alternatively, the well operates efficiently when the water level is high such as in July 2012 when the...
static depth to water in well 6B was 19 feet. The well cannot be operated without causing well and pump damage when the depth to water in the well is greater than about 30 feet.

- The present pump setting in well 6B is at 50 feet which is toward the bottom of the screen section of 35 to 55 feet. The pump in well 5B is reportedly set at 67 feet which is below the screen section.
- The recommendation for well 6B is to operate it as long as static ground-water levels are within about 30 feet of land surface. The well should be taken off line when the levels are lower to limit long-term damage to the pump and the well. A water-level control could be installed so the pump would turn off whenever the water-level dropped to near the pump intake. However, this pump operation may not be suitable for hatchery operation.

The Orchard wells (7B and 8B) are located on a bench southwest of the Carpenter Island wells.

- The 2012 specific capacity of well 7B is the second highest among all of the wells after well 6B. Well 8B has a lower specific capacity but is still a good producing well.
- The elevation of the top of the screen in well 7B is more than 20 feet lower than the top of the screen in well 6B. The static water-level elevations are approximately the same in the two wells. Thus, well 7B has about 20 more feet of available drawdown as compared to well 6B. This makes it possible for well 7B to operate when ground-water levels below the dam are low.
- The depths of the pump settings are not known for wells 7B and 8B.
- The recommendation is to operate well 7B as it is presently configured. Consideration should be given to placing a pump in the well that will yield 2,000 gpm. Well 8B should be operated at the present pumping rate of about 550 gpm. The available information indicates that wells 7B and 8B can be pumped at the same time.
- Consideration should be given to collection and analysis of water samples relative to constituents that might be associated with an irrigated orchard operation.

Well 15H is located within the hatchery immediately below the dam.

- The specific capacity of well 15H (60 gpm/ft) is lower than the other downstream wells but higher than 4 of the 7 upstream wells.
- The static water level on well 15H was about 20 feet below the top of the casing on June 13, 2012. This gives an available drawdown of slightly more than 20 feet. We do not know whether well 15H has the same seasonal water-level pattern as is shown on Figure 8 for well 5B.
- Based on available information, the pump in well 15H is set at 58 feet, which is at the bottom of the screened interval. The pump should be raised to above the top of the screen to minimize well and pump damage.

Well Rehabilitation
Well rehabilitation is an option to increase the productivity of existing production wells. Based on available information, past rehabilitation efforts have included swabbing the well and using dry ice. These efforts likely have not been effective in cleaning screens that have been clogged by chemical and/or biological processes.

Future well rehabilitation efforts should include the following steps.

1. Conduct a borehole television survey of the well after the pump has been removed. The camera should provide color views of the well and should allow side views as well as views along the length of the borehole. The side views are particularly useful for detecting the nature of the material plugging the screens.

2. Develop a plan for well rehabilitation based on the conclusions reached from the borehole television survey. An acid treatment of the well may be needed if calcium precipitates are believed to be present. Sterilization of the well may be needed if biological fouling of the screen is apparent.

3. Both of these approaches should be coupled with high velocity water jetting to fully clean the screen openings and the material immediately outside of the screen.

4. Test pumping of the well likely will be needed to obtain the information needed to select the proper pump.

The key to successful well rehabilitation is to find and use a contractor who is familiar with the well development procedures described above and has the required equipment.

**Analysis of Well Field Productivity**

This portion of the report presents a summary of the combined capacity of the hatchery production wells under different combinations of conditions. The combined yields of the wells are presented as a series of alternatives on Table 2. Descriptions of the alternatives are presented below.

- Alternative 1 represents current conditions with the project wells 11C, 13C, 14C and 5B not in service. The yields given for the remaining wells are based on the ultrasonic flow meter analysis. Most of the combined yield of 10,585 gpm is derived from wells 1A, 12C, 6B and 7B.

- Alternative 2 is the same as alternative 1 except that wells 11C and 13C are back in service without rehabilitation. The well 11C pumping rate is what was determined during the test pumping. The discharge rate for well 13C is estimated based on the aquifer test of that well. The combined discharge is 13,085 gpm.

- Alternative 3 is the same as alternative 2 except that well 2A is taken out of service and well 6B is turned off because of low water levels. The combined discharge is reduced down to 10,760 gpm.

- Alternative 4 is the same as alternative 3 except that wells 11C and 13C have been rehabilitated at put back into service at higher pumping rates. Also, different pumps have
been placed in wells 1A and 12C to allow higher pumping rates. The combined
discharge rate is 13,720 gpm

- Alternative 5 is the same as alternative 4 except that wells 2A and 12C have been
  rehabilitated and put back into service at higher pumping rates. Also, a larger pump has
  been placed in well 7B. The combined discharge is 16,530 gpm

- Alternative 6 is the same as alternative 5 except that a new upstream production well has
  been constructed with a discharge rate of 2,000 gpm. The most likely site for a new well
  is the parking lot in the general vicinity of wells 2A and 3A. The new well should not
  have a negative impact on wells 2A and 3A if it located more than 100 feet away. The
  combined discharge rate is now 18,530 gpm

CONCLUSIONS AND RECOMMENDATIONS

Four factors make operation of the “downstream” production wells different from
operation of the “upstream” production wells. First, the “downstream” wells are located some
distance from the river whereas the “upstream” wells are either along the shore line or within the
pool. Second, hydraulic connection of the aquifer to the river occurs over a much greater area
for the upstream wells than the downstream wells. Third, the available drawdown (distance from
the static water level to the top of the aquifer) is much greater for the “upstream” wells than for
the “downstream” wells. Fourth, most of the downstream wells are located near an irrigated
orchard where there is potential that chemicals used on the orchards may infiltrate down to the
shallow aquifer and be carried into the production wells.

Most of the historic pump and well problems stem from two problems. First, pump
intakes have been placed within the screened or perforated intervals of a number of the
production wells. The result of this action has been plugging of the well screens and failure of
the pumps. The intake for the pump should be at least one foot above the top of the well screen.
Second, the required water level over the pump bowls has not been maintained. This results in
pump failures. Sheets that provide pump curves also provide recommended minimum heights of
water over the bowls. Both of these problems need to be corrected for all project wells.

The following is a list of recommendations relative to operation of the project production
wells.

- Well 1A should continue to be operated at an approximate pumping rate of about
  3,200 gpm. The discharge rate can be increased to 4,000 gpm with a change in the
  pump. The pump intake should be raised to be above the top of the perforations the
  next time pump servicing is needed.

- Well 2A should be taken out of service until it is rehabilitated.

- Well 3A should continue to be operated at an approximate pumping rate of 425 gpm
  until the pump fails. This well is a low-priority candidate for rehabilitation in the
  future because of the lack of available drawdown.
• Well 10C should continue to be operated at an approximate pumping rate of 640 gpm. The discharge rate can be approximately doubled with well rehabilitation.
• Well 11C should be rehabilitated at this time and then put back into service. The pumping rate after rehabilitation should be about 1,000 gpm.
• Well 12 C should continue to be operated at an approximate pumping rate of 1,240 gpm. Installation of a different pump would allow a discharge rate of about 2,000 gpm. The discharge rate could be as high as 3,000 gpm if the well is rehabilitated.
• Well 13 C should be put back into service with a 2,000 gpm pump. The pumping rate could be as high as 3,000 gpm if the well was rehabilitated.
• Well 6B should continue to be operated as long as the depth to water is less than about 30 feet. This well should be taken out of service when static water levels drop below 30 feet to limit damage to the well and pump.
• Well 7B should continue to be operated at an approximate pumping rate of 1,630 gpm. Replacing the pump would allow a discharge rate of 2,000 gpm.
• Well 8B should continue to be operated at an approximate pumping rate of 475 gpm. The previous well rehabilitation efforts have not been very successful. Based on information gained from the borehole television surveys, well rehabilitation efforts should include an acid treatment to remove chemical precipitates, a chlorine treatment to eliminate biological material and then high velocity water jetting to further clean the screen.

The previous well rehabilitation efforts have not been very successful. Based on information gained from the borehole television surveys, well rehabilitation efforts should include an acid treatment to remove chemical precipitates, a chlorine treatment to eliminate biological material and then high velocity water jetting to further clean the screen.

The location and construction of any new wells should be focused on sites upstream of the dam. Potential drilling sites are limited because of surface land uses and the requirement to be upstream of the core of the dam. One site that should be considered for a new well is the parking area in the vicinity of wells 2A and 3A.

REFERENCES CITED


GeoEngineers, 2009, Preliminary Assessment of Water Level Data from Carpenter Island and Orchard Wells 5B, 6B, 7B, 8B and 9B at Wells Hydroelectric Project; Draft memorandum from Joel Purdy of GeoEngineers to Rolf Wielick of Jacobs Engineering Group, July 20.


Mackey, Greg, 2012, Personal communication, Water Temperature Data, Public Utility District #1 of Douglas County.


Picatti Pump, 2012, Personal communication; Data sheets showing discharge and water level data from pump tests of wells 11C and 13C

### Table 1  Summary of Well Information

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Note: Red highlight indicates discharge measurement from incorrectly installed inline flow meter.
Table 2 Analysis of Alternative Well Field Yields (gpm)

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<td>Sum</td>
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<td>10,760</td>
<td>13,720</td>
<td>16,530</td>
<td>18,530</td>
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</table>

Alt #1 includes those pumps that can be operated today
Alt #2 is Alt #1 plus wells 11C and 13C put into service without rehabilitation
Alt #3 is Alt #2 with well 2A taken out of service and well 6B turned off because of low water levels
Alt #4 is Alt #3 with wells rehabilitation of wells 11C and 13C and larger pumps in wells 1A and 12C
Alt #5 is Alt #4 with wells rehabilitation of wells 2A and 12C
Alt #6 is Alt #5 with the construction of a new well
Figure 1  General Location Map

Wells Dam and Hatchery
Figure 2  Well Location Map
Well 1A was turned off for 30 minutes and then turned back on.

Figure 3  Hydrograph for Well 1A During the May 9, 2012 Aquifer Test
Hydraulic response of turning well 1A off and on

Figure 4 Hydrograph for Well 13C During the May 9, 2012 Aquifer Test
Figure 5  Plot of the Water-Level Elevation of the River Above the Dam
Figure 6  Plot of River Water Level Elevation Above the Dam and Depth-to-Water in Well 14C
Figure 7  Plot of the Water-Level Elevation of the River Below the Dam
Figure 8  Plot of River Water-Level Elevation Below the dam and Water-Level Elevation in Well 5B for January Through July of 2012
Figure 8  Plot of Water-Level Elevation and Water Temperature for Well 5B
To: Jason Hill and Ed Donahue, HDR Engineering, Fisheries Design Center  
From: Dale Ralston, Ralston Hydrologic Services  
Subject: Recommended Action for Wells 11C and 13C at the Wells Hatchery  
Date: September 15, 2012

The purpose of this memo is to provide you with the following relative to wells 11C and 13C at the Wells Hatchery site: 1) summary of information, 2) recommendations relative to rehabilitation efforts and 3) recommendations relative to sizing and placement of pumps. Pumps have been removed from both wells.

**SUMMARY OF INFORMATION**

**Well 11C**

After being rehabilitated in 2006, well 11C was tested with a discharge rate of 1,380 gpm and a drawdown on 16 feet. Well 11C was pumped at a rate of 500 gpm with about 26 feet of drawdown in July 2012. The specific capacity of well 11C decreased from about 86 gpm/ft in 2006 to about 19 gpm/ft in 2012. The decrease in productivity is likely the result of chemical and biological fouling of the screen because the pump intake and the pumping water level were both below the top of the screen.

Based on a borehole video survey of well 11C taken in 2012, the well is completed with a wire-wrapped well screen in the depth range of about 64 to 84 feet. The video shows that the casing above the screen is encrusted with chemical precipitates as is the screen. The screen is about 50 percent plugged over the 20-foot length. Much of the material filling the slots in the screen appears to be chemical precipitates although some biological growth is evident on the video log. The large observed decrease in specific capacity in well 11C is consistent with the large percent of the well screen that appeared to be plugged.

**Well 13C**

Well 13C had a discharge rate of 2,000 gpm with a drawdown of 2.7 feet shortly after it was drilled in 1986. After being rehabilitated in 2006, well 11C was tested with a discharge rate of 1,380 gpm and a drawdown of 2.3 feet. In July 2012, well 13C was pumped at a maximum rate of 1,150 gpm with about 3 feet of drawdown. The specific capacity of well 11C decreased from about 740 gpm/ft in 1986 and about 600 gpm/ft in 2006 to about 380 gpm/ft in 2012.
The borehole video survey of well 13C conducted in 2012 shows that the well screen is in the depth range of about 47 feet to about 98 feet. The screen appears to be about 10 percent plugged over the approximate 50-foot length. The limited filling of the screen openings appears to be mostly from chemical precipitates. The decrease in specific capacity of well 13C between 1986 and 2012 likely is related to partial plugging of the screen. The well still has a high specific capacity but likely would benefit from cleaning of the well screen.

**REHABILITATION OF WELLS**

Well 11C needs to be rehabilitated if it to be put back into service. Likely the yield of well 11C can be increased from 500 gpm to at least 1,000 gpm with proper rehabilitation. Well 13C can be put back into service without rehabilitation at a pumping rate of about 2,000 gpm. However, the well yield could be as high as 3,000 gpm with proper rehabilitation.

Based on information from several sources, I have concluded that application of the “Aqua Freed” method best fits the well rehabilitation needs for the production wells at the Wells Hatchery. My sources include the president of a well drilling firm that does considerable work repairing and rehabilitating water wells in Idaho and Washington and the several members of the operating staff of the Entiate Fish Hatchery. In addition, I have been in contact with Scott Barrett, president of Water Recovery Systems in Spokane, Washington, who is the local dealer for the “Aqua Freed” process. The following is a summary of information gained relative to this well rehabilitation process.

- The “Aqua Freed” process is described on the web site for Water Recovery Systems ([http://wrswater.com/aqua-freed/](http://wrswater.com/aqua-freed/)) as follows. “The Aqua Freed water well rehabilitation process uses gaseous and liquid carbon dioxide to restore water wells…. One of the active components from the injected gas is carbonic acid, a mild acid, which under atmospheric conditions produces a pH of +/- 6.0. However, there is pressure in an aquifer or a sealed well, allowing the pH conditions to become reduced to as low as 5.0, still relatively mild.” The steps of the process are as follows: 1) a packer is placed in the well above the well screen. Gaseous carbon dioxide is injected through the packer into the well which produces a carbonic acid which penetrates through the screen and into the surrounding aquifer material. 2) liquefied carbon dioxide is injected into the well and 3) after treatment the well is mechanically developed using surge/airlift methods.

- Scott Barrett of Water Recovery Systems indicated the cost per well for the “Aqua Freed” process is in the range of $8,000 to $13,000 per well dependent mostly on the diameter and length of the screen. Scott agreed to provide a cost estimate for wells 11C and 13C based on drawings of the wells that I would provide. His cost estimate should be available early in the week of September 17-21, 2012.

- Scott indicated that he had been cleaning the production wells at the Entiate Fish Hatchery for several years and recommended that I contact them.

- Josh Homer, staff biologist at the Entiate Hatchery, provided information relative to the application of the “Aqua Freed” process by Water Recovery Services at their site. He
said that rehabilitation of their well #1 resulted in an increase of water production from 300 to 450 gpm. Rehabilitation of their well #5 resulted in an increase in production from 100 to 300 gpm. He thought that the cost was about $10,000 per well. Josh indicated that Jason Reeves, maintenance supervisor at the Entiate Hatchery has more detailed information relative to rehabilitation of the wells. Greg Mackey of DCPUD suggested that I talk with Craig Chisam who is the hatchery manager. I could not reach either Jason or Craig on September 14th.

Based on the available information, I recommend that the “Aqua Freed” well rehabilitation process be conducted on well 11C. Well 13C can be put back into service without rehabilitation at a pumping rate of about 2,000 gpm. An analysis should be conducted to determine whether it is cost effective to rehabilitate well 13C using the “Aqua Freed” process in order to increase the potential pumping rate from about 2,000 to about 3,000 gpm.

**SIZING AND PLACEMENT OF PUMPS IN WELLS 11C AND 13C**

The bottom of the pump intake should be located a minimum of about two feet above the top of the well screen. This would be about 62 feet below the top of the casing in well 11C and 45 feet below the top of the casing in well 13C.

The pumping water level should be maintained no deeper than about two feet above the uppermost pump bowl. Depending on the number of pump bowls used for each well, this likely would be a depth of about 55 feet in well 11C and a depth of about 38 feet in well 13C.

Test pumping well 11C likely is needed prior to selection of a pump and motor. The results of the test pump would also provide useful information to judge the effectiveness of the “Aqua Freed” rehabilitation approach. Test pumping of well 13C would also be needed if it is rehabilitated.

Please contact me if you have any comments or questions. I anticipate providing an updated version of this memo after I have received comments from Josh and Craig from the Entiate Fish Hatchery and a cost estimate from Scott for application of the “Aqua Freed” process for wells 11C and 13C. Thank you.
MEMORANDUM

To: Greg Mackey, P.U.D No. 1 of Douglas County
   Jason Hill and Ed Donahue, HDR Engineering, Fisheries Design Center
From: Dale Ralston, Ralston Hydrologic Services
Subject: Collection of Ground-Water Temperature Data
Date: October 11, 2012

The purpose of this memo is to respond to an email from Greg regarding the collection of water temperature data from production wells at the Wells Hatchery site. The water temperature data can be collected either from loggers installed within or attached to the outside of the distribution pipes or from loggers installed within the individual wells. I have not been able to identify suitable temperature loggers that may be installed within or attached to the outside of distribution pipes. Thus, my comments in this memo are directed toward collection of water temperature data with each production well.

Data loggers that are installed relatively shallow within production wells provide water temperature data that are influenced by surface temperature conditions. A logger should be placed about 50 feet or more below land surface to represent ground-water temperature within the aquifer at all times. A logger installed at a depth of less than about 50 feet will reflect aquifer water temperatures when the well is pumping (because of the thermal mass of the water in the pump column) and earth temperatures when the well is not pumping. Interpretation of the temperature data from a logger placed at less than 50 feet below land surface is difficult without knowing when the well was being pumped. The best approach is to install temperature loggers at depths greater than 50 feet in wells or to use data loggers that record both water temperature and water pressure (height of water above the transducer).

I presently have data loggers installed in wells 5B and 14C. These wells were selected because neither well is presently in use or is likely to be put into use. These data loggers could be removed and downloaded, restarted and placed in two of the wells that are operational (i.e. wells 1A and 7B). Three additional data loggers could be purchased and installed in three of the remaining production wells (i.e. wells 10C, 6B and 12C). We would have loggers collecting water temperature and water level data in three wells above the dam (1A, 10C and 12C). The temperature data from wells 10C and 12C should represent conditions in 11C and 13C. The two wells with loggers below the dam (6B and 7B) represent to two pairs of wells below the dam.
I recommend that you consider using Solinst Junior Edge (about $400 each) or Solinst Edge (about $600 each) if new loggers are to be purchased. An optical reader (about $200) would be needed if the units are to be operated by on-site personnel. One advantage of the Solinst data loggers is that water levels are recorded in addition to water temperature.

In summary, I recommend that you install your temperature loggers at a depth of at least 50 feet below land surface if you decide to take that route. Alternatively, the purchase of three data loggers plus the associated optical reader would allow monitoring of both water level and water temperature data. The loggers could be used at the site for a number of years into the future.

Please contact me if you have any questions or comments. Thank you.
MEMORANDUM

To: Jason Hill and Ed Donahue, HDR Engineering, Fisheries Design Center
From: Dale Ralston, Ralston Hydrologic Services
Subject: Well Rehabilitation and Construction Program
Date: December 1, 2012

The purpose of this memo is to provide you with my ideas relative to a plan for rehabilitation and construction of wells for the DCPUD Hatchery to insure that the facility has a reliable water supply from ground water. I visualize that the plan would involve a sequence of steps. My ideas relative to these steps are presented below.

- **Step #1 – Wells 11C and 13C**
  - The first step includes wells 11C and 13C because the pumps have been removed from these wells and plans are in place to rehabilitate these wells using the “Aqua Freed” process.
  - After rehabilitation, the pumps removed from these wells would be placed back in the wells. A program of aquifer testing would be conducted using the pumps that were originally on each of these wells
    - The tests would be run on each well individually with the nearby wells either remaining pumping or remaining off depending on the water needs. Not having other wells going on or off during the tests aids in the interpretation of results.
    - Each well would be tested by initially running the well with the control valve wide open. The discharge rate would need to be measured, likely with the ultrasonic measuring device. The drawdown should be measured with a combination of hand data collection using an electric tape and operation of a data logger. Assuming the maximum pumping rate can be maintained, each well should be operated continuously for a period of at least four hours. Water-level recovery data should be obtained until the water levels nearly reach the original static prior to testing.
    - The well being tested should be turned off if the maximum discharge rate cannot be maintained. The test should be started again at a lower pumping
rate after the water levels have recovered to near the original static. The test should be conducted as described above.

- Depending on the results of the testing program, the existing pumps could be used for a well operation or new pumps could be purchased, installed in the wells and put into service.
  - The results from wells 11C and 13C would be used to judge whether the “Aqua Freed” process should be used for other project wells or whether an alternative approach should be identified and used for future well rehabilitation.

- **Step #2 – Well 12C**
  - The pump would be pulled from well 12C.
  - Well 12C would be rehabilitated using the “Aqua Freed” process or an identified alternative process.
  - A program of aquifer testing would be needed prior to putting well 12C back into service.
    - The existing pump yielded 1,240 gpm with 4.8 feet of drawdown and would not be suitable for the anticipated yield of 2,500 to 3,000 gpm after rehabilitation.
    - A temporary test pump could be brought in to conduct the aquifer test or a permanent pump with a variable speed drive that could yield at least 3,000 gpm could be purchased and placed in the well.
    - The aquifer test would be conducted in a manner similar to that described above for wells 11C and 13C.

- **Step #3 – New well 16**
  - Alternative well site locations
    - The only logical place to construct a new well upstream of the dam is in the parking lot close to wells 2A and 3A.
    - The alternative location for a new well is below the dam, probably within the footprint of the hatchery.
  - The first new well should be located in the parking lot close to wells #2A and #3A.
    - Problems of well construction on the dam and near the reservoir will need to be addressed. These include: dam stability issues, dam operational issues during drilling, disposal of water and cuttings generated during drilling and long-term well access.
    - The new well should be constructed with 16-inch diameter pump chamber casing and 16-inch diameter telescope, stainless steel, wire-wrapped well screen. The screen should be placed in the bottom half to the bottom one-third of the aquifer and the slot size should be selected based on grain-size analysis.
The permanent pump should be selected based on the results of an aquifer test that includes both step-drawdown and constant rate pumping. Water-level data should be collected in wells 2A and 3A to determine if one or both of the wells can be operated simultaneous with the new well, 16 if desired.

- **Step #4 – Assessment of well field yield**
  - The combined yield of the upstream wells (1A, 10C, 11C, 12C, 13C and 16) should be determined both with and without the operation of well 1A.
  - The combined yield of the downstream wells (6B, 7B, 8B and 15H) should be determined under both low and high water-level conditions.
  - The combined yield of the upstream and downstream wells should be assessed and compared to anticipated hatchery needs during both low and high water-level conditions.
  - The above assessments would result in the identification of need for additional water supply sources from ground water for the hatchery.

- **Step #5 – Well 7B (if additional water supply is needed)**
  - The pump should be removed from well 7B and a borehole video log should be obtained and assessed relative to the need for well rehabilitation.
    - If needed, well 7B would be rehabilitated using the “Aqua Freed” process or an identified alternative process.
  - The pump removed from this well would be placed back in the well. A program of aquifer testing would be conducted.
    - The tests would be run on well 7B with the nearby wells (5B and 8B) remaining off.
    - The well would be tested by initially running the pump with the control valve wide open. The discharge rate would need to be measured, likely with the ultrasonic measuring device. The drawdown would need to be measured with a combination of hand data collection using an electric tape and operation of a data logger. Assuming the maximum pumping rate can be maintained, well 7B should be operated continuously for a period of at least four hours. Water-level recovery data should be obtained until the water levels nearly reach the original static prior to testing.
    - The well should be shut off if the maximum discharge rate cannot be maintained. The test should be started again at a lower pumping rate after the water levels have recovered to near the original static. The test should be conducted as described above.
    - Depending on the results of the testing program, the existing pump could be used for a long-term period or a new pump could be purchased, installed in the well and put into service.

- **Step #6 – Well 1A (if additional water supply is needed)**
• The existing pump should be removed from well 1A.
• A new pump should be installed in well 1A that will yield 4,000 to 4,500 gpm.

Step #7 – New well 17 (if additional water supply is needed)
• Unless new information indicates otherwise, well 17 should be constructed below the dam within the footprint of the hatchery.
  ▪ Consideration should be given to conducting a surface geophysical study to detect the topography on the top of the granite. The new well should be drilled at a location where sand and gravel backfilled channels are present in the granite surface and the aquifer is thickest.
• The new well should be constructed with 16-inch diameter pump chamber casing and 16-inch diameter telescope, stainless steel, wire-wrapped well screen. The screen should be placed in the bottom half or the bottom one-third of the aquifer and the slot size should be selected based on grain-size analysis.
• The permanent pump should be selected based on the results of an aquifer test that includes both step-drawdown and constant rate pumping as described above. Water-level data should be collected in wells 15H, 4A, 5b and 8B to determine the mutual interference effects.

Additional water steps, if needed, would involve rehabilitating wells 2A and 10C. I do not think that wells 3A and 14C should be put into service. Please contact me if you have any questions or comments. Thank you.
Appendix C
Bioprogramming Summary
Douglas County
Public Utility District No. 1

Wells Fish Hatchery Modernization

Bioprogramming Summary
Version 10

Prepared by

HDR Fisheries Design Center

4717 97th St NW
Gig Harbor, WA  98332

April 2013
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Attachment C. Chinook Programs
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Bioprogramming and Rearing Requirements

Production Objectives

The objectives of Douglas County PUD’s steelhead propagation programs at Wells Hatchery are to intended rebuild and increase natural production of indigenous summer steelhead stocks and, along with the summer Chinook programs, mitigate for the loss of fishing opportunity (harvest) that would have been available in the region in the absence of a hydroelectric project. Additionally, implementation of the Sturgeon propagation program will seek to improve and restore natural production of native Upper Columbia White Sturgeon. The kokanee, rainbow trout and cutthroat trout programs cultured at the facility are also intended to create angler harvest opportunity in the region. Douglas County PUD worked cooperatively with various state and federal fisheries agencies, including National Marine Fisheries Service (NMFS), United States Fish and Wildlife Service (USFWS), Washington Department of Fish and Wildlife (WDFW), the Confederated Tribes of the Colville Reservation, the Confederated Tribes and Bands of the Yakama Nation and the Confederated Tribes of the Umatilla Indian Reservation and to develop the fish production targets for Wells Hatchery. These targets will be pursued via the rearing objectives for each species. The Anadromous and Resident fish release objectives at Wells Hatchery, in general, give consideration to the following parameters; number of fish released, lifestage, size at liberation, as well as timing and location of the release.

Bioprogramming Overview

Fish hatchery bioprogramming is a tool utilized to anticipate the fish rearing environment necessary to meet the established production goals. The process references fish culture specifications obtained from various recognized fish culture manuals as well as various established fish rearing facilities and fish production managers. Site specific assumptions from the information received were made when necessary in order to create a model of the anticipated growth, desired rearing space and required inflow to produce healthy fish. Density indices, flow indices, condition factor, annual water temperature profile, mortality rate, initial weight and length provided the biomodeling components utilized to formulate the anticipated growth models. The biomodels represent the potential growth that the fish may attain for a specific rearing period. From this growth model, the amount of inflow and rearing vessel space required during each segment of the production cycle may be calculated. Where applicable to the specific Wells Hatchery program, the stages measured in the bioprograms are; adult holding, egg incubation, fry production, outdoor rearing, and final rearing.

Fish Production Bioprogramming

The criteria for each fish species used to develop the Wells Hatchery bioprogram are contained in attached appendices. The specifications and assumptions categories utilized for development of the Wells Hatchery bioprogram are outlined below.
1. Survival
   a. Larva to Release % Mortality

2. Rearing
   a. Fish length at first feeding
   b. Fish per pound at first feeding
   c. Condition factor
   d. Temperature units per inch of growth
   e. Maximum density for early rearing troughs, intermediate troughs, and circular tanks.
   f. Feed Conversion

3. Site Specifications/Flow Calculations
   a. Site elevation
   b. Flow available
   c. Salinity
   d. Ammonia
   e. pH
   f. Well temperature
   g. Flow index

The facility related parameters, along with species specific rearing criteria regarding survival and rearing environment criteria, were researched, referenced and applied to all of the fish species slated for production at Wells Hatchery. **Attachment A** illustrates the specifications and assumptions applied in order to formulate the anadromous and resident fish and bioprograms.

**Steelhead** (*Oncorhynchus mykiss*). The initial summer steelhead bioprogram was prepared on May 18, 2012. Additional versions were developed to compare density index specifications, document potential inflow sources and model a variation in a specific program’s release population. The goals for size at release and identification of the particular Wells Hatchery steelhead program segments with transfer to off site acclimation prior to release were illustrated within the bioprogram. The growth projections for summer steelhead were divided into individual profiles based on the various release sites and program objective. Due to the variety of hatching intervals, required rearing segregation, density index criteria and multiple final rearing locations, it was necessary to individualize the fish culture specifications applied to the multitude of steelhead growth models. The probable water source and historical inflow source information for rearing steelhead rearing at Wells Hatchery were also documented. Specification and assumption references included WDFW Fish Health, Piper, Wedemeyer, and DCPUD. The growth model for steelhead is contained in **Attachment B**.

**Chinook** (*Oncorhynchus tshawytscha*). The initial summer Chinook bioprogram was prepared on May 18, 2012. Additional versions were developed to facilitate assessment of the programming alternatives relative to the rearing provisions needed to achieve 56,000 total pounds of summer Chinook produced. The alternative program modeling developed growth profiles and flow requirements representing an increase in the number of sub-yearling juveniles released coupled with two models that displayed increases in yearling Chinook release objectives. The bioprogram identified the variances in space and
flow requirements throughout the rearing cycle from adult collection through final liberation for the different strategies. Ultimately, increasing yearling production to attain the desired release poundage was selected as the preferred alternative. Probable water source and historical information regarding the established Chinook rearing inflow source were also documented in the bioprogram. In addition to the Wells Hatchery on site release programs, the adult collection and incubation requirements for producing eyed Chinook eggs for the Lake Chelan triploid program were documented. Specification and assumption references included WDFW Fish Health, Piper, Wedemeyer, and DCPUD. The growth model for Chinook is contained in Attachment C.

Rainbow Trout (Oncorhynchus mykiss). The initial rainbow trout bioprogram was prepared on May 18, 2012. An additional version comparing the use of well water versus river or reuse inflow for final rearing was prepared. The comparison quantified the reduction in well water pumped to the rainbow ponds if the final rearing programs utilized inflow from the Columbia River intake or reused well water from simultaneously reared anadromous fish programs. The river intake provision was limited by the time of year when the Columbia River temperature was favorable for Resident salmonid rearing. Additionally, historic information regarding the established sources of inflow used for final rearing at Wells was documented in the growth profiles. The various stocking sizes and anticipated total number of rainbow poundage produced at the Wells facility was provided by DCPUD. As a whole, the bioprogramming identified the space and flow required to produce fingerlings, catchable (2.2 fpp), and 2000 jumbo (1.0 fpp) rainbow trout from the eyed egg lifestage. Informational references included WDFW Fish Health, Piper, and DCPUD. The growth model for rainbow trout is contained in Attachment D.

Lahontan Cutthroat Trout (Oncorhynchus clarki henshawi). The Lahontan cutthroat egg incubation requirement was prepared on May 18, 2012 with the fry production growth model following on May 30, 2012. The provisions for the total cutthroat production target, as identified by DCPUD, were illustrated within the bioprogram. Sourced from Lake Lenore broodstock, eggs will be obtained at an off site spawning location and transported to Wells Hatchery for incubation. After incubation occurs to the eyed stage, large portion of the partially developed eggs will be transferred off site to other trout stocking programs operated by IDFG, ODFW and WDFW. The remaining population segment will be hatched at the Wells facility then transferred as fed fry to the WDFW Columbia Basin Hatchery in Moses Lake, Washington. The model developed a growth profile and space requirements for the fry as well as the incubation requirements for the segments to be transferred out as eyed eggs. Informational references for the bioprogram included WDFW Fish Health, Piper, and DCPUD. The growth model for Lahontan cutthroat is contained in Attachment D.

Kokanee (Oncorhynchus nerka). The kokanee incubation requirement was prepared on May 18, 2012. The goal for number of eggs and the lifestage at transfer, as identified by DCPUD, were illustrated within the bioprogram. Sourced from Palmer Lake broodstock, eggs will be obtained at an off site spawning location and transported to Wells Hatchery for incubation. Upon development to the eyed egg stage, the entire egg population will be transferred to the WDFW Omak Hatchery in Omak Washington. The model identified the necessary incubation space and incubation inflow required to
attain the kokanee eyed egg production objectives. Informational references included WDFW Fish Health and DCPUD. The incubation requirements for kokanee are contained in Attachment F.

Contingency Program. A contingency rearing model was created to identify additional rearing space and flow for the purpose of future adaptive management. The growth model simulated production of 100,000 steelhead yearlings in order to project the greatest release poundage and subsequently the upper limit of flow and rearing space that may be required for any future programming changes. Production translation figures were identified for Chinook and Coho using the rearing provisions identified by the steelhead based contingency program growth model. In order to anticipate prospective incubation needs, Coho were modeled as they have the lowest fecundity (eggs per female) and represent the potentially the greatest need for incubation space and flow. Additional notations were made relative to the translated Chinook and Coho production figures, as alterations in adult holding would be necessary if those species were used for future Wells Hatchery programming adaptations. The growth model for the contingency program is contained in Attachment E.

**Production Targets and Release Sizes**

The following table illustrates the production targets, as identified by DCPUD, referenced for conception of the Wells Hatchery biopromgrams.

**Table 1.** Breakdown of the Wells Hatchery target numbers and sizes by program and species.

<table>
<thead>
<tr>
<th>Species/Program</th>
<th>Number</th>
<th>Lifestage</th>
<th>Target Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer Steelhead/Twisp</td>
<td>48,000</td>
<td>Yearling</td>
<td>6 fpp</td>
</tr>
<tr>
<td>Summer Steelhead/Methow</td>
<td>100,000</td>
<td>Yearling</td>
<td>6 fpp</td>
</tr>
<tr>
<td>Summer Steelhead/Columbia R.</td>
<td>200,000</td>
<td>Yearling</td>
<td>6 fpp</td>
</tr>
<tr>
<td>Summer Steelhead/Omak Cr.</td>
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<td>Yearling</td>
<td>6 fpp</td>
</tr>
<tr>
<td>Summer Steelhead/Okanogan R.</td>
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<td>Yearling</td>
<td>6 fpp</td>
</tr>
<tr>
<td>Summer Steelhead/Salmon Cr.</td>
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<td>6 fpp</td>
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<tr>
<td>Summer Chinook</td>
<td>465,000</td>
<td>Yearling</td>
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<td>Summer Chinook/Triploid</td>
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<td>Sub-yearling</td>
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<td></td>
<td>100,000</td>
<td>Eyed egg</td>
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<tr>
<td>Rainbow Trout</td>
<td>32,000</td>
<td>Yearling-Catchable</td>
<td>2.2 fpp</td>
</tr>
<tr>
<td>Rainbow Trout</td>
<td>2000</td>
<td>Yearling-Jumbo</td>
<td>1 fpp</td>
</tr>
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</table>

*Source: Wells Hatchery Programs as of 2012: updated on May 23, 2012. Mackey*

**Adult Holding**

Adult holding requirements were determined via information produced within the steelhead and Chinook biopromgrams. Using the anticipated egg quantities from the incubation requirement analysis, the number of adults needed and the corresponding holding space required was calculated. As the
various Chinook and steelhead program alternatives were explored, the corresponding variations in adult holding were also illustrated in the individual bioprogram developed. Each program variation had an effect on the requirements for adult holding space. This resultant data was an additional factor used to analyze the various alternatives. Criteria for adult holding a Wells Hatchery referenced WDFW Fish Health specifications. The adult holding specifications are illustrated in Attachment F.

Incubation

Incubation needs were derived from the individual program growth profiles. Species specific survival factors and release goals were referenced to calculate the egg goals. The consequent egg goals provided the inputs used to determine the incubation space and flow required for each program planned for incubation at the facility. The associated incubation requirement for the various prospective program alternatives was also a factor used in the comparison process. Anticipated survival for this lifestage was referenced by the WDFW evaluation report (Snow et al 2010) and the stack tray utilization and inflow specification was modeled after the existing WDFW egg incubation protocol at Wells Hatchery. The incubation specifications are illustrated in Attachment F.

Inflow Summary

A comprehensive inflow summary was produced identifying each individual species flow requirements by rearing stage and month. The table referenced flow requirement information produced by the incubation summary, individual growth models and adult holding calculations. The resulting quantities were summarized in gallons per minute and cubic feet per second. Additionally the flow summary created referenced historical information to project delineation of the anticipated source; well, river or reuse. Overall, the comprehensive inflow summary was considered a major resource for analyzing the various programming alternatives. The inflow summary is illustrated in Attachment G.

Rearing Unit Allocation

In order to identify the availability of rearing space relative to transition of each program through the entire rearing cycle, a rearing unit allocation model was developed for outdoor rearing at Wells Hatchery which is presented in Appendix E of the Wells Fish Hatchery Modernization Master Plan Volume 1. The model used specific color codes to plot the location of each program in association to the calendar month. The exercise was utilized to locate vacant rearing vessels, identify the rearing space reduction due to decommission of existing vessels, and earmark the programs anticipated to rear in new containers after the facility modernization.

Supporting Conclusion

The Wells Fish Hatchery bioprograming procedure involved identification, illustration, and comprehensive assessment of the fish culture design criteria associated with modernizing the existing rearing facility. Additionally, a major element of the bioprogramming effort identified the unique rearing provisions necessary to raise White Sturgeon at the facility. The well established multispecies
fish hatchery was also modeled to produce Chinook, steelhead, kokanee and two species of trout. Using the information generated by the comprehensive bioprograms for each species by lifestage, the required space and flow necessary to meet the Wells Hatchery fish production targets was characterized. It is our thesis that adoption of the recommended biomodeling framework will provide a quality fish rearing environment and the adaptive management options necessary for implementation of Douglas County PUD’s aquatic resource management strategies.

References

Attachment A

Specifications and Assumptions
### Anticipated Survival

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<tr>
<th>Month</th>
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<td>64</td>
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**Length at First Feeding**

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### Feed Conversion

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### Condition Factor

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<td>54</td>
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### Maximum Density Index for Early Rearing

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<tr>
<td>Nov-14</td>
<td>57</td>
<td>FI @ 1000 MSL</td>
</tr>
</tbody>
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### Site Specifications/Flow Calculations

- **Available well water inflow:** 23.16 cfs
- **Assumed:** 2.5 cubic feet/adult
- **Actual:** 2.0 cubic feet/adult

### DC PUD Wells Hatchery : List of Specifications & Assumptions

- **Version 10 - Prepared March 15, 2013**
- **DC PUD Wells Hatchery : List of Specifications & Assumptions**

### Site Elevations

- **Available well water inflow:** 23.16 cfs
- **Piper Flow Rate Calculations:**
  - **Minimum of five p.p.m. effluent D.O.**
  - **Flow rates calculated using Piper 1982. Flow index (Fi) maintains Temperatures rounded to the nearest whole number.**

### Water Temperature Profile

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<th>H °F</th>
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<tr>
<td>3-7</td>
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<td>1-20</td>
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### Temperature Profile based on 5/1/12 WDFW-DCPUD data. Temperatures rounded to the nearest whole number.

### Flow rates calculated using Piper 1982. Flow index (Fi) maintains minimum of five p.p.m. effluent D.O.
Attachment B

Steelhead Programs
**STEELHEAD - Columbia River**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Temp.</th>
<th>Degree</th>
<th>Growth</th>
<th>Growth Assumed</th>
<th>Monthly</th>
<th>Number</th>
<th>Fish per Pound</th>
<th>Fish on Hand</th>
<th>Max. Wt.</th>
<th>Vel.</th>
<th>Density Req'd</th>
<th>Feed</th>
<th>Total</th>
<th>Un-ionized</th>
<th>Un-ionized</th>
<th>Un-ionized</th>
<th>Assumed 100% saturation in, minimum ppm out</th>
<th>Circular Tank Rearing Provisions</th>
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**STEELHEAD - Twisp**

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<th>Growth Assumed</th>
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<th>Fish on Hand</th>
<th>Max. Wt.</th>
<th>Vel.</th>
<th>Density Req'd</th>
<th>Feed</th>
<th>Total</th>
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<th>Un-ionized</th>
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<td>Rate Factor</td>
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<td>Number of Fish On Hand (b)</td>
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<td>Feed (lb/cf/in)</td>
<td>Time Index (lb/gpm/in)</td>
<td>NH3 Loading (lbs/day)</td>
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<td>Flow (gpm)</td>
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<td>0.20</td>
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<td>143 Ground</td>
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1. Inflow blended to reduce temperature, simulate natural seasonal gradients, & prepare fish for remote acclimation site transfer.
3. Density referenced from client meeting 9/6/2012.
4. SWPC: STEELHEAD - Omak Creek For Grant Co. PUD
5. Water Source: STEELHEAD - Omak Creek For Grant Co. PUD
Attachment C

Chinook Programs
### Chinook Programs

<table>
<thead>
<tr>
<th>Date</th>
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<th>Temp (°F)</th>
<th>Days</th>
<th>Growth Potential</th>
<th>Growth Rate Factor</th>
<th>Growth Assumed</th>
<th>Monthly Rate</th>
<th>Mortality</th>
<th>Number Transferred or Released</th>
<th>Max. Wt. on Hand (lb)</th>
<th>Density (lbs/cu ft)</th>
<th>Req'd Space (cu ft)</th>
<th>Feed Total (lbs/day)</th>
<th>Un-ionized NH3 Loading (mg/l)</th>
<th>Flow Index (lb/gpm/in)</th>
<th>Probable Water Source</th>
<th>Recorded DP Flow Composition</th>
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<td>1.41</td>
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<td>90%</td>
<td>0</td>
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<td>0.125</td>
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<table>
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<th>Date</th>
<th>Event</th>
<th>Temp (°F)</th>
<th>Days</th>
<th>Growth Potential</th>
<th>Growth Rate Factor</th>
<th>Growth Assumed</th>
<th>Monthly Rate</th>
<th>Mortality</th>
<th>Number Transferred or Released</th>
<th>Max. Wt. on Hand (lb)</th>
<th>Density (lbs/cu ft)</th>
<th>Req'd Space (cu ft)</th>
<th>Feed Total (lbs/day)</th>
<th>Un-ionized NH3 Loading (mg/l)</th>
<th>Flow Index (lb/gpm/in)</th>
<th>Probable Water Source</th>
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<tbody>
<tr>
<td>2 Jan-15</td>
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<td>1.41</td>
<td>1.205.6</td>
<td>100%</td>
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<td>0.005231</td>
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**Total Combined Poundage:** 56,058
Attachment D

Rainbow and Cutthroat Programs
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<th>Temp.</th>
<th>Days</th>
<th>Length</th>
<th>Fish per Period</th>
<th>Rate</th>
<th>Growth</th>
<th>Growth Potential</th>
<th>Assumed 100% saturation in, minimum 5ppm out</th>
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<tbody>
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<td>3 Feb-26</td>
<td>51.0</td>
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<td>3,530</td>
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<td>0.88 3,530</td>
<td>1.9%</td>
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<td>0.89 3,534</td>
<td>0.89 3,534</td>
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<tr>
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<td>3,530</td>
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<td>0.89 3,534</td>
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<td>0.89 3,534</td>
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<tr>
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<td>0.89 3,534</td>
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**NOTE:** The DT, Kinsman, & Li, Chelan Trout Camp Chinook eyed egg programs are identified in the incubation section.
Attachment E

Contingency Program
<table>
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<th>Date</th>
<th>Event</th>
<th>Avg. Temp. (°F)</th>
<th>Avg. Degree Days for Period</th>
<th>Degree Factor</th>
<th>Growth Rate</th>
<th>Growth Assumed</th>
<th>Length (inches)</th>
<th>Fish per Pound</th>
<th>Mortality Rate</th>
<th>Number Transferred or Released</th>
<th>Number of Fish On Hand</th>
<th>Max. WL (lb)</th>
<th>Density</th>
<th>Req'd Space (cu ft)</th>
<th>Total Feed (lbs)</th>
<th>Feed (lbs)</th>
<th>Total Un-Ionized NH3 Loading (lbs/day)</th>
<th>Un-Ionized NH3 Conc. (mg/l)</th>
<th>NH3 Flow Index (lbs/gpm/in)</th>
<th>NH3 Flow (gpm)</th>
<th>Probable Water Source</th>
<th>Circular Tank Rearing Provisions</th>
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<td>6 May 31</td>
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<td>100%</td>
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<td>0</td>
<td>111,383</td>
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<td>1.74</td>
<td>18</td>
<td>Ground</td>
<td>313</td>
<td>1</td>
<td>313</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Jun-30</td>
<td></td>
<td>48.0</td>
<td>100%</td>
<td>100%</td>
<td>1.4</td>
<td>0.9%</td>
<td></td>
<td>110,352</td>
<td>0</td>
<td>0</td>
<td>110,352</td>
<td>0.9%</td>
<td>0.9%</td>
<td>1.45</td>
<td>425</td>
<td>Ground</td>
<td>313</td>
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<td>313</td>
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</tr>
<tr>
<td>8 Jul-31</td>
<td></td>
<td>51.0</td>
<td>100%</td>
<td>100%</td>
<td>2.1</td>
<td>317.2</td>
<td></td>
<td>109,279</td>
<td>0</td>
<td>0</td>
<td>109,279</td>
<td>344</td>
<td>344</td>
<td>1.54</td>
<td>42</td>
<td>Ground</td>
<td>313</td>
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<td>313</td>
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</tr>
<tr>
<td>9 Aug-31</td>
<td></td>
<td>52.0</td>
<td>100%</td>
<td>100%</td>
<td>2.9</td>
<td>132.6</td>
<td></td>
<td>108,253</td>
<td>0</td>
<td>0</td>
<td>108,253</td>
<td>816</td>
<td>0.8%</td>
<td>3.62</td>
<td>45</td>
<td>Ground</td>
<td>313</td>
<td>1</td>
<td>313</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Sep-30</td>
<td></td>
<td>54.0</td>
<td>100%</td>
<td>99%</td>
<td>1.5</td>
<td>64.0</td>
<td></td>
<td>107,251</td>
<td>0</td>
<td>0</td>
<td>107,251</td>
<td>1.875</td>
<td>2.34</td>
<td>2.34</td>
<td>180</td>
<td>Ground</td>
<td>626</td>
<td>2</td>
<td>626</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 Oct-31</td>
<td></td>
<td>58.0</td>
<td>100%</td>
<td>100%</td>
<td>4.6</td>
<td>31.1</td>
<td></td>
<td>106,238</td>
<td>0</td>
<td>0</td>
<td>106,238</td>
<td>3.416</td>
<td>3.750</td>
<td>1.62</td>
<td>518</td>
<td>Ground</td>
<td>533</td>
<td>3</td>
<td>533</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 Nov-30</td>
<td></td>
<td>57.0</td>
<td>100%</td>
<td>100%</td>
<td>5.5</td>
<td>18.1</td>
<td></td>
<td>105,243</td>
<td>0</td>
<td>0</td>
<td>105,243</td>
<td>5.813</td>
<td>5.330</td>
<td>1.36</td>
<td>180</td>
<td>Ground</td>
<td>1252</td>
<td>4</td>
<td>1252</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Dec-31</td>
<td></td>
<td>52.0</td>
<td>100%</td>
<td>90%</td>
<td>6.1</td>
<td>13.0</td>
<td></td>
<td>104,237</td>
<td>0</td>
<td>0</td>
<td>104,237</td>
<td>8.023</td>
<td>6.585</td>
<td>1.61</td>
<td>818</td>
<td>River / Well</td>
<td>1565</td>
<td>5</td>
<td>1565</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Jan-31</td>
<td></td>
<td>48.0</td>
<td>90%</td>
<td>90%</td>
<td>6.6</td>
<td>10.4</td>
<td></td>
<td>103,246</td>
<td>0</td>
<td>0</td>
<td>103,246</td>
<td>9.969</td>
<td>7.687</td>
<td>1.81</td>
<td>704</td>
<td>River / Well</td>
<td>1878</td>
<td>6</td>
<td>1878</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Feb-28</td>
<td></td>
<td>45.0</td>
<td>90%</td>
<td>90%</td>
<td>6.9</td>
<td>9.0</td>
<td></td>
<td>102,350</td>
<td>0</td>
<td>0</td>
<td>102,350</td>
<td>11.418</td>
<td>8.281</td>
<td>1.49</td>
<td>281</td>
<td>River / Well</td>
<td>2191</td>
<td>7</td>
<td>2191</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Mar-31</td>
<td></td>
<td>48.0</td>
<td>90%</td>
<td>90%</td>
<td>7.4</td>
<td>7.3</td>
<td></td>
<td>101,371</td>
<td>0</td>
<td>0</td>
<td>101,371</td>
<td>13.830</td>
<td>9.380</td>
<td>2.24</td>
<td>217.1</td>
<td>River / Well</td>
<td>2504</td>
<td>8</td>
<td>2504</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Apr-30</td>
<td></td>
<td>48.0</td>
<td>90%</td>
<td>90%</td>
<td>7.8</td>
<td>6.1</td>
<td></td>
<td>100,434</td>
<td>0</td>
<td>0</td>
<td>100,434</td>
<td>16.448</td>
<td>10.494</td>
<td>10.494</td>
<td>2356</td>
<td>River / Well</td>
<td>2504</td>
<td>8</td>
<td>2504</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 May-31</td>
<td>Release</td>
<td>50.0</td>
<td>90%</td>
<td>90%</td>
<td>8.1</td>
<td>6</td>
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<td>100,000</td>
<td>0</td>
<td>0</td>
<td>100,000</td>
<td>18,009</td>
<td>11,134</td>
<td>1.74</td>
<td>1,280</td>
<td>River / Well</td>
<td>2504</td>
<td>8</td>
<td>2504</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ The Contingency Program rearing model reflects space & flow for 100K Steelhead (16,231 total lbs. at release), which translates to approximately 100K Chinook @ .125 density or up to 163-260K Coho @ 0.20 density (depending on release size).
Attachment F

Incubation and Adult Holding
INCUBATION SUMMARY

<table>
<thead>
<tr>
<th>Species</th>
<th>Fecundity</th>
<th>Survival to Pond</th>
<th>Egg Requirement</th>
<th># Females</th>
<th>Eggs per Tray</th>
<th>Females per Tray</th>
<th># of Trays</th>
<th># Single Stacks</th>
<th># Double Stacks</th>
<th>GPM Req.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer Steelhead Twisp</td>
<td>5,400</td>
<td>80.1%</td>
<td>71,166</td>
<td>14</td>
<td>5,400</td>
<td>1</td>
<td>14</td>
<td>2</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Summer Steelhead Methow</td>
<td>5,400</td>
<td>90.1%</td>
<td>146,504</td>
<td>27</td>
<td>5,400</td>
<td>1</td>
<td>27</td>
<td>4</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Summer Steelhead Columbia</td>
<td>5,400</td>
<td>90.1%</td>
<td>278,135</td>
<td>52</td>
<td>5,400</td>
<td>1</td>
<td>52</td>
<td>8</td>
<td>4</td>
<td>40</td>
</tr>
<tr>
<td>Summer Steelhead GCPUD Omak</td>
<td>5,400</td>
<td>80.1%</td>
<td>76,489</td>
<td>13</td>
<td>5,400</td>
<td>1</td>
<td>13</td>
<td>3</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>Summer Steelhead GCPUD Okan</td>
<td>5,400</td>
<td>80.1%</td>
<td>76,489</td>
<td>13</td>
<td>5,400</td>
<td>1</td>
<td>13</td>
<td>3</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>Summer Chinook Subyearling</td>
<td>4,100</td>
<td>88.5%</td>
<td>598,408</td>
<td>146</td>
<td>4,100</td>
<td>1</td>
<td>146</td>
<td>21</td>
<td>11</td>
<td>105</td>
</tr>
<tr>
<td>Summer Chinook Yearling</td>
<td>4,100</td>
<td>99.4%</td>
<td>578,604</td>
<td>142</td>
<td>4,100</td>
<td>1</td>
<td>142</td>
<td>21</td>
<td>11</td>
<td>105</td>
</tr>
<tr>
<td>Summer Chinook Triploid</td>
<td>4,100</td>
<td>n/a</td>
<td>100,000</td>
<td>25</td>
<td>4,100</td>
<td>1</td>
<td>25</td>
<td>4</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Rainbow Trout</td>
<td>n/a</td>
<td>80.0%</td>
<td>125,000</td>
<td>17</td>
<td>7,500</td>
<td>n/a</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>Lahontan Cutthroat Trout</td>
<td>n/a</td>
<td>75.0%</td>
<td>313,333</td>
<td>6</td>
<td>7,500</td>
<td>n/a</td>
<td>4</td>
<td>6</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>Palmer Kokanee (Green)</td>
<td>n/a</td>
<td>75.0%</td>
<td>300,000</td>
<td>n/a</td>
<td>7,500</td>
<td>n/a</td>
<td>4</td>
<td>6</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>Contingency Program</td>
<td>3,300</td>
<td>80.1%</td>
<td>136,065</td>
<td>47</td>
<td>3,000</td>
<td>1</td>
<td>47</td>
<td>9</td>
<td>4</td>
<td>35</td>
</tr>
</tbody>
</table>

NOTES:
1) Eyed Rainbow & Cutthroat hatching may occur in shallow troughs
2) Assumes seven trays per half stack are used for incubation.
3) Assumes five gpm inflow per half stack
4) Coho fecundity used in order to model the max. potential for contingency program incubation space & inflow.

ADULT HOLDING SUMMARY

<table>
<thead>
<tr>
<th>Species</th>
<th>Number</th>
<th>Cubic Ft. per Adult</th>
<th>Cubic Ft. Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steelhead Twisp</td>
<td>30</td>
<td>2.5</td>
<td>75</td>
</tr>
<tr>
<td>Steelhead Methow</td>
<td>58</td>
<td>2.5</td>
<td>145</td>
</tr>
<tr>
<td>Steelhead Columbia</td>
<td>111</td>
<td>2.5</td>
<td>278</td>
</tr>
<tr>
<td>Steelhead Omak</td>
<td>32</td>
<td>2.5</td>
<td>80</td>
</tr>
<tr>
<td>Steelhead Okanogan</td>
<td>32</td>
<td>2.5</td>
<td>80</td>
</tr>
<tr>
<td>Total Steelhead</td>
<td>263</td>
<td></td>
<td>658</td>
</tr>
<tr>
<td>Chinook Subyearling</td>
<td>312</td>
<td>10</td>
<td>3,120</td>
</tr>
<tr>
<td>Chinook Yearling</td>
<td>303</td>
<td>10</td>
<td>3,030</td>
</tr>
<tr>
<td>Chinook Triploid</td>
<td>54</td>
<td>10</td>
<td>540</td>
</tr>
<tr>
<td>Total Chinook</td>
<td>669</td>
<td></td>
<td>6,690</td>
</tr>
<tr>
<td>Contingency Program</td>
<td>100</td>
<td>2.5</td>
<td>250</td>
</tr>
</tbody>
</table>

NOTES:
1) Assumes an equal sex ratio and adult prespawning survival factors of 94.4% for Steelhead, 93.8% for Chinook. Contingency represents enough adults to obtain 138K green Coho eggs.
2) To achieve the Contingency Program’s translated 103K Chinook & 125-260K Coho production, the associated Adult Holding would represent: 680 cubic ft. for the Chinook and 308-638 cubic ft. for Coho.
Attachment G

Inflow Regime
## INFLOW REQUIREMENTS

<table>
<thead>
<tr>
<th>Month</th>
<th>Adult Holding</th>
<th>Incubation</th>
<th>Early Rearing</th>
<th>Final Rearing</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(gpm)</td>
<td>cfs</td>
<td>(gpm)</td>
<td>cfs</td>
<td>(gpm)</td>
</tr>
<tr>
<td>December</td>
<td>128</td>
<td>398</td>
<td>200</td>
<td>30</td>
<td>70</td>
</tr>
<tr>
<td>January</td>
<td>128</td>
<td>398</td>
<td>200</td>
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<td>30</td>
</tr>
<tr>
<td>February</td>
<td>128</td>
<td>398</td>
<td>100</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>March</td>
<td>128</td>
<td>398</td>
<td>100</td>
<td>30</td>
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<td>April</td>
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<td>70</td>
</tr>
<tr>
<td>May</td>
<td>128</td>
<td>398</td>
<td>100</td>
<td>70</td>
<td>35</td>
</tr>
<tr>
<td>June</td>
<td>660</td>
<td>15</td>
<td>30</td>
<td>35</td>
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<td>July</td>
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<td>September</td>
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<td>128</td>
<td>398</td>
<td>660</td>
<td>230</td>
<td>230</td>
</tr>
</tbody>
</table>

1. Steelhead and Contingency Program inflow requirements represent circular tank sweeping velocity requirements when applicable.
Appendix D
Wells Hatchery Modernization Production Program
## Wells Hatchery Programs as of 2013: updated on January 11, 2013

<table>
<thead>
<tr>
<th>Species</th>
<th>Program</th>
<th>Life Stage</th>
<th>Number</th>
<th>Pounds</th>
<th>Size</th>
<th>Broodstock</th>
<th>Spawning/Incubation</th>
<th>Rearing</th>
<th>Acclimation</th>
<th>Release</th>
<th>Biosecurity Group</th>
<th>Owner</th>
<th>Rearing Vessel</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steelhead</td>
<td>Twisp NNI: Conservation</td>
<td>Yearling</td>
<td>8,000</td>
<td>8,000</td>
<td>6 fpp</td>
<td>26 Twisp WxW (Spawn in ~April)</td>
<td>Wells Hatchery</td>
<td>Wells Pond</td>
<td>Twisp River</td>
<td>A</td>
<td>Douglas PUD</td>
<td>New Circulars</td>
<td>Broodstock held, spawned, incubated to eyed egg at Methow Hatchery, then moved to Wells Hatchery for grow out.</td>
<td></td>
</tr>
<tr>
<td>Steelhead</td>
<td>Twisp Inundation: Conservation</td>
<td>Yearling</td>
<td>40,000</td>
<td>6 fpp</td>
<td>Methow Hatchery</td>
<td>Wells Hatchery</td>
<td>Wells Pond</td>
<td>Twisp River</td>
<td>A</td>
<td>Douglas PUD</td>
<td>New Circulars</td>
<td>The two Twisp steelhead programs act as one program totaling 48,000 smolts, comprised of the two mitigation obligations listed above. Otherwise, the fish are identical and function as one program.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steelhead</td>
<td>Methow Safety-Net: Conservation/ Harvest</td>
<td>Yearling</td>
<td>100,000</td>
<td>50,000</td>
<td>6 fpp</td>
<td>52 total: Twisp HxH (up to 25% of the broodstock), WNFH HxW, Methow Safety-Net HxH</td>
<td>Wells Hatchery</td>
<td>Wells Hatchery</td>
<td>Methow Hatchery</td>
<td>Methow River</td>
<td>B</td>
<td>Douglas PUD</td>
<td>Dirt Pond #4</td>
<td>Brood collected in the Methow Basin from up to 3 locations, in order of priority: Twisp HxH (up to 25% of broodstock), WNFH HxW, Methow Safety-Net HxH. Brood will be held temporarily at Methow Hatchery, and trucked to Wells for long-term holding prior to spawning. May be reduced to 60,000 smolts.</td>
</tr>
<tr>
<td>Steelhead</td>
<td>Columbia Safety-Net: Conservation/ Harvest</td>
<td>Yearling</td>
<td>200,000</td>
<td>6 fpp</td>
<td>104 total: Methow Safety-Net HxH, HxH Wells Stock</td>
<td>Wells Hatchery</td>
<td>Wells Hatchery</td>
<td>Wells Hatchery</td>
<td>Columbia River direct from Wells Hatchery</td>
<td>B</td>
<td>Douglas PUD</td>
<td>Dirt Pond #3</td>
<td>Brood collected at Methow Hatchery, Wells Hatchery volunteer channel, Wells Dam fishway traps. Current production is 160,000, but could increase to 200,000.</td>
<td></td>
</tr>
<tr>
<td>Steelhead</td>
<td>Omak: Conservation</td>
<td>Yearling</td>
<td>0 to 50,000</td>
<td>0 to 8,333</td>
<td>6 fpp</td>
<td>Wells Stock (HxH) collected in the Okanogan (spring collection) or Wells Stock (HxH) collected at Wells Dam (autumn collection)</td>
<td>Wells Hatchery</td>
<td>Wells Hatchery</td>
<td>Omak Creek</td>
<td>Omak Creek (Okanogan)</td>
<td>C</td>
<td>Grant PUD</td>
<td>New Circulars</td>
<td>Grant/CCT programs. The max combined program is 100,000 (110,000 with 10% overage allowance). Goal is to maximize Omak and Salmon Creek programs at the expense of the Okanogan program, but still achieve 100,000 total. Programs can vary in size year to year according to broodstock availability. Brood collected in spring, except Wells Stock backup would need to be collected the previous autumn. These would be surplused as eggs or fry (see Ringold program) or released if Okanogan brood were collected in spring.</td>
</tr>
<tr>
<td>Steelhead</td>
<td>Okanogan: Conservation</td>
<td>Yearling</td>
<td>0 to 100,000</td>
<td>0 to 16,667</td>
<td>6 fpp</td>
<td>Wells Stock (HxH) collected in the Okanogan (spring collection) or Wells Stock (HxH) collected at Wells Dam (autumn collection)</td>
<td>Wells Hatchery</td>
<td>Wells Hatchery</td>
<td>TBD</td>
<td>Okanogan Basin (TBD)</td>
<td>D</td>
<td>Grant PUD</td>
<td>New Circulars</td>
<td>Grant/CCT programs. The max combined program is 100,000 (110,000 with 10% overage allowance). Goal is to maximize Omak and Salmon Creek programs at the expense of the Okanogan program, but still achieve 100,000 total. Programs can vary in size year to year according to broodstock availability. Brood collected in spring, except Wells Stock backup would need to be collected the previous autumn. These would be surplused as eggs or fry (see Ringold program) or released if Okanogan brood were collected in spring.</td>
</tr>
<tr>
<td>Species</td>
<td>Program</td>
<td>Life Stage</td>
<td>Number</td>
<td>Pounds</td>
<td>Size</td>
<td>Broodstock</td>
<td>Spawning/Incubation</td>
<td>Rearing</td>
<td>Acclimation</td>
<td>Release</td>
<td>Biosecurity Group</td>
<td>Owner</td>
<td>Rearing Vessel</td>
<td>Notes</td>
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<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Steelhead</td>
<td>Ringold: Surplus Eggs or Fry</td>
<td>Up to 120,000</td>
<td>NA</td>
<td>NA</td>
<td>Wells Stock, number is variable</td>
<td>Wells Hatchery</td>
<td>Ringold</td>
<td>Ringold</td>
<td>Columbia River</td>
<td>B</td>
<td>WDFW</td>
<td>Green Deep Troughs</td>
<td>Ringold Hatchery can absorb surplus steelhead eggs or fry due to over-collection of broodstock when trying to fill programs that rely on Wells Dam autumn collections for backup to spring collections at local collection sites.</td>
<td></td>
</tr>
<tr>
<td>Summer Chinook</td>
<td>Inundation Yearlings: Harvest</td>
<td>Yearling</td>
<td>320,000</td>
<td>32,000</td>
<td>10 fpp</td>
<td>206 Wells Stock</td>
<td>Wells Hatchery</td>
<td>Wells Hatchery</td>
<td>Wells Hatchery</td>
<td>Columbia River direct from Wells Hatchery: April 15</td>
<td>E</td>
<td>Douglas PUD</td>
<td>Dirt Pond #1</td>
<td>Incubation water chilled to 42 F. No coagulated yolk problem. Adults arrive July/August; spawn in October.</td>
</tr>
<tr>
<td>Summer Chinook</td>
<td>Inundation Subyearlings: Harvest</td>
<td>Subyearling</td>
<td>484,000</td>
<td>9,680</td>
<td>50 fpp</td>
<td>320 Wells Stock</td>
<td>Wells Hatchery</td>
<td>Wells Hatchery</td>
<td>Wells Hatchery</td>
<td>Columbia River direct from Wells Hatchery: May 15</td>
<td>E</td>
<td>Douglas PUD</td>
<td>Dirt Pond #2</td>
<td>Incubation water not chilled- have coagulated yolk problem. Adults arrive July/August; spawn in October.</td>
</tr>
<tr>
<td>Off-License Settlement (OLS) Fish: 20,000 Pounds of Rainbow Trout Equivalents</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Rainbow</td>
<td>Jumbo Rainbow</td>
<td>Catchable</td>
<td>2,000</td>
<td>2,000</td>
<td>1 None</td>
<td>Wells Hatchery (spawned off-station, incubation only)</td>
<td>Wells Hatchery</td>
<td>None</td>
<td>Region 2 lowland lakes</td>
<td>F</td>
<td>WDFW</td>
<td>New Circulars</td>
<td>Catchable trout for Region 2 lowland lakes and kids fishing derbies.</td>
<td></td>
</tr>
<tr>
<td>Rainbow</td>
<td>Catchable Rainbow</td>
<td>Catchable</td>
<td>32,000</td>
<td>14,545</td>
<td>2.2 None</td>
<td>Wells Hatchery (spawned off-station, incubation only)</td>
<td>Wells Hatchery</td>
<td>None</td>
<td>Region 2 lowland lakes</td>
<td>F</td>
<td>WDFW</td>
<td>Pond 16</td>
<td>Catchable trout for Region 2 lowland lakes and kids fishing derbies.</td>
<td></td>
</tr>
<tr>
<td>Rainbow</td>
<td>Fingerling Rainbow</td>
<td>Fingerling</td>
<td>60,000</td>
<td>2,000</td>
<td>30 None</td>
<td>Wells Hatchery (spawned off-station, incubation only)</td>
<td>Wells Hatchery</td>
<td>None</td>
<td>Conconully Lake and Reservoir</td>
<td>F</td>
<td>WDFW</td>
<td>Bureau Raceways or circulars</td>
<td>Fry plants to Conconully Lake and Reservoir.</td>
<td></td>
</tr>
<tr>
<td>Cutthroat</td>
<td>Lahontan Cutthroat</td>
<td>Eyed Eggs</td>
<td>160,000</td>
<td>160</td>
<td>1,000 None</td>
<td>Wells Hatchery (spawned off-station, incubation only)</td>
<td>Wells Hatchery</td>
<td>None</td>
<td>Transferred to other programs</td>
<td>G</td>
<td>WDFW</td>
<td>No rearing – eyed eggs only</td>
<td>Brood from Lake Lenore. Eyed eggs are for Omak Hatchery, IDFG, ODFW</td>
<td></td>
</tr>
<tr>
<td>Cutthroat</td>
<td>Lahontan Cutthroat</td>
<td>Fry</td>
<td>75,000</td>
<td>100</td>
<td>750 None</td>
<td>Wells Hatchery (spawned off-station, incubation only)</td>
<td>Wells Hatchery</td>
<td>None</td>
<td>Transfer to Columbia Basin Hatchery</td>
<td>G</td>
<td>WDFW</td>
<td>Shallow Troughs</td>
<td>Fry are transferred to Columbia Basin Hatchery in August.</td>
<td></td>
</tr>
<tr>
<td>Summer Chinook</td>
<td>Lake Chelan Triploid</td>
<td>Eyed Eggs</td>
<td>100,000</td>
<td>500</td>
<td>200 Wells Summer Chinook</td>
<td>Wells Hatchery</td>
<td>Chelan Falls Hatchery</td>
<td>Chelan Falls Hatchery</td>
<td>Lake Chelan</td>
<td>H</td>
<td>WDFW</td>
<td>No rearing – eyed eggs only</td>
<td>Eggs are taken as part of the Wells summer Chinook program and treated to turn into triploids.</td>
<td></td>
</tr>
<tr>
<td>Kokanee</td>
<td>Palmer Lake Kokanee</td>
<td>Eyed Eggs</td>
<td>300,000</td>
<td>300</td>
<td>1,000 None</td>
<td>Wells Hatchery to eyed egg. Omak Hatchery for remainder of incubation</td>
<td>Omak Hatchery</td>
<td>None</td>
<td>Palmer Lake</td>
<td>I</td>
<td>WDFW</td>
<td>No rearing – eyed eggs only</td>
<td>These fish require a high level of biosecurity.</td>
<td></td>
</tr>
<tr>
<td>Species</td>
<td>Program</td>
<td>Life Stage</td>
<td>Number</td>
<td>Pounds</td>
<td>Size</td>
<td>Broodstock</td>
<td>Spawning/Incubation</td>
<td>Rearing</td>
<td>Acclimation</td>
<td>Release</td>
<td>Biosecurity Group</td>
<td>Owner</td>
<td>Rearing Vessel</td>
<td>Notes</td>
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</tr>
</tbody>
</table>
| Sturgeon | DCPUD | Sturgeon: Conservation | Juveniles | 5,000 (Build to 6,500) | NA | >230 mm up to ~300 mm | None | Wells Hatchery | Wells Hatchery | Wells Hatchery | Columbia River | J | Douglas PUD | New Indoor Combis  
| Sturgeon | Summer Chinook | USFWS Entiat | Adult | 248 | NA | NA | Wells Stock | Entiat NFH | Entiat NFH | Entiat River | G | USFWS | Salmon Adult Pond  
| Sturgeon | Summer Chinook | Chelan PUD | Adult | 373 | NA | NA | Wells Stock | Eastbank | Eastbank | Various | G | Chelan PUD | Salmon Adult Pond |
| Steelhead | All Programs | Adult | 1,000 | NA | NA | NA | NA | NA | NA | NA | NA | Douglas PUD, USFWS, Grant PUD/CCT | NA | Remove excess hatchery-origin adults for management purposes |
| Steelhead | All Programs | Adult | 700-800 | NA | NA | NA | NA | NA | NA | NA | NA | Douglas PUD, USFWS, CCT | NA | Remove excess hatchery-origin adults for surplus or management purposes |
| Steelhead | All Programs | Adult | 77 | NA | NA | NA | NA | NA | NA | NA | NA | Douglas PUD, USFWS, CCT | NA | Not currently implemented. Remove excess hatchery-origin adults for management purposes |
| Programs Likely To Be Discontinued – Do Not Include in Design Until Further Notice |
| Steelhead | WNFH | Eyed Eggs | 60,000 | NA | NA | ~32 Wells Stock | Wells Hatchery | Winthrop NFH | Winthrop NFH | Methow River | B | USFWS | Steelhead Adult Pond  
| Summer Chinook | Yakama Nation | Green Eggs | 345,000 | NA | NA | 167 Wells Stock | Wells Hatchery | Marion Drain | ? | ? | F | Yakama Nation | NA | YN helps spawn fish. |
| Coho | Yakama Nation | Smolts | 125,000 | NA | NA | NA | Various | Various | Wells Hatchery | Columbia River | M | Yakama Nation | Pond 15 | Spring acclimation only. Current program, but unclear if this program will continue. Uses Pond 15. |

Broodstock Collection for Non-Wells Hatchery Programs

Surplus and Adult Management Activities (Occur in the Wells Hatchery Volunteer Channel and Trap)
Appendix E
Rearing Allocation Illustrations
VERSION 10 ALT #1
EARLY APRIL WELLS HATCHERY
REARING UNIT ALLOCATION

P15L  P15U

DP 1
DP 2
DP 3
DP 4

COL. SH
MET

SH ADULTS

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

CK
YEARLINGS

CK
SUBYRLNG

SH
CATCHABLE

RB
CONTINGENCY

RB
JUMBO

RB
FNGRLNG

CONT

CT 1  CONT  CONT  CONT
CT 9  CONT  CONT  CONT
CT 13 CONT  CONT  CONT
CT 17 CONT  CONT  CONT

RBT C RW 18  RBT F RW 20
RW 19  RBT J - RW 21

CT 10  CT 11  CT 12
CT 14  CT 15  CT 16
CT 18  CT 19  CT 20
VERSION 10 ALT #1
LATE APRIL WELLS HATCHERY
REARING UNIT ALLOCATION

SH ADULTS

P 15L
P 15U

DP 1
SUB CK

DP 2
YEAR CK

DP 3
COL. SH

DP 4
MET SH

RW 1
RW 5
RW 4
RW 10
RW 2
RW 7
RW 3
RW 8
RW 9
RW 11
RW 12
RW 13
RW 14
RW 15
RW 16
RW 17
RW 18
RW 19
RW 20
RW 21

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
EARLY MAY WELLS HATCHERY
REARING UNIT ALLOCATION

VERSION 10 ALT #1

DP 1
SUB CK
DP 2
DP 4
MET SH

P 15L
P 15U

SH POND

RBT F R W 20
RBT J - R W 21

CONT
CONT
CONT
CONT
CONT
CONT
CONT
CONT
CONT
CONT
CONT
CONT
CONT
CONT

CT 9
CT 10
CT 11
CT 12
CT 13
CT 14
CT 15
CT 16
CT 17
CT 18
CT 19
CT 20

RW 1
RW 2
RW 3
RW 4
RW 5
RW 6
RW 7
RW 8
RW 9
RW 10

CK
YEARLINGS
CK
SUBYRLNG
SH
CATCHABLE
RB
JUMBO
RB
FNGRLNG
CONT
CONTINGENCY

JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
LATE MAY WELLS HATCHERY
REARING UNIT ALLOCATION

- DP 1
- DP 2
- DP 3
- DP 4

- RW 1
- RW 5
- RW 4
- RW 10
- RW 2
- RW 7
- RW 8
- RW 9
- RW 3
- RW 21
- RW 19
- RW 20
- RBT C RW 18
- RBT F RW 20
- RBT J - RW 21

- CT 1
- CT 2
- CT 3
- CT 4
- CT 5
- CT 6
- CT 7
- CT 8
- CT 9
- CT 10
- CT 11
- CT 12
- CT 13
- CT 14
- CT 15
- CT 16
- CT 17
- CT 18
- CT 19
- CT 20

- CATCHABLE
- JUMBO
- FNGRLNG
- CONTINGENCY

- CK YEARLINGS
- CK SUBYRLNG
- SH
- RB

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
VERSION 10 ALT #1
LATE AUGUST WELLS HATCHERY
REARING UNIT ALLOCATION

SH POND

DP 1
DP 2
DP 3
DP 4

CK
SURPLUS
ADULTS

RBT C RW 18
RBT F RW 20

RBT C RW 18
RBT F RW 20

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

CK
YEARLINGS

CK
SUBYRLNG

SH
CATCHABLE

RB
JUMBO

RB
FNGRLNG

RB
CONTINGENCY

CONT
CONTINGENCY

CT 3
COL SH
COL SH

CT 6
MET SH

CT 10
TWISP SH

CT 14
OMAK SH

CT 18
OKAN SH

CT 11
CT 12
CT 7
CT 8
CT 15
CT 16
CT 19
CT 20

RW 1
RW 10
RW 3
RW 4
RW 7
RW 9
RW 8
RW 6
RW 2
RW 5

CT 1
CT 2
CT 3
Cont

RBT C RW 18
RBT F RW 20
LATE OCTOBER WELLS HATCHERY REARING UNIT ALLOCATION

<table>
<thead>
<tr>
<th>DP 1</th>
<th>DP 2</th>
<th>DP 3</th>
<th>DP 4</th>
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<tr>
<td>CK</td>
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<td>MET</td>
</tr>
<tr>
<td>ADULTS</td>
<td>15L</td>
<td>SH</td>
<td>SH</td>
</tr>
<tr>
<td>RW 1</td>
<td>RW 5</td>
<td>RW 4</td>
<td>RW 10</td>
</tr>
<tr>
<td>RW 3</td>
<td>RW 7</td>
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<tr>
<td>RW 2</td>
<td>RW 6</td>
<td>RW 1</td>
<td>RW 19</td>
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<td>RW 1</td>
<td>RW 10</td>
<td>RW 2</td>
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<td>RW 10</td>
<td>RW 2</td>
<td>RW 5</td>
</tr>
<tr>
<td>RW 1</td>
<td>RW 10</td>
<td>RW 2</td>
<td>RW 5</td>
</tr>
</tbody>
</table>

- CK: YEARLINGS
- CK SUBYRLNG
- SH: CATCHABLE
- RB: JUMBO
- RB FNGRLNG
- CONT: CONTINGENCY

JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
VERSION 10 ALT #1
EARLY NOVEMBER WELLS HATCHERY
REARING UNIT ALLOCATION

DP 1
DP 2
DP 3
DP 4

SH ADULTS
CK ADULTS

P 15L

YEAR CK
COL SHEB

RBT C RW 18
RW 20
RW 19
RBT J - RW 21

CT 1
CT 2
CONT
CONT

CT 5
CT 6
CONT
CONT

TWISP SH
TWISP SH
TWISP SH
CT 12

OMAK SH
OMAK SH
OMAK SH
CT 16

OKAN SH
OKAN SH
OKAN SH
CT 20

CK YEARLINGS
CK SUBYRLNG
SH CATCHABLE
RB JUMBO
RB FNGRLNG
CONT CONTINGENCY

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
VERSION 10 ALT #1
EARLY DECEMBER WELLS HATCHERY
REARING UNIT ALLOCATION

DP 1
DP 2
DP 3
DP 4

MET
SH
COL

YEAR CK

P 15L
P 15U

RW 1
RW 2
RW 3
RW 4
RW 5
RW 6
RW 7
RW 8
RW 9
RW 10

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

SH ADULTS

CK YEARLINGS
CK SUBYRLNG
SH CATCHABLE
RB JUMBO
RB FNGRLNG
CONT CONTINGENCY

CT 1
CT 2
CONT
CONT

CT 5
CONT
CONT
CONT

TWISP SH
TWISP SH
TWISP SH
CT 12

OMAK SH
OMAK SH
OMAK SH
CT 16

OKAN SH
OKAN SH
OKAN SH
CT 20

RBT C RW 18
RBT J - RW 21

RW 20
RW 19
**WELLS HATCHERY REARING UNIT DIMENSIONS & VOLUMES**

1. **DP 1**
   - 440' x 100' x 4'
   - 176,000 ft³

2. **DP 2**
   - 667' x 120' x 4'
   - 432,160 ft³

3. **DP 3**
   - 520' x 100' x 4'
   - 208,000 ft³

4. **DP 4**
   - 464' x 110' x 4'
   - 204,160 ft³

**SH POND**
- 78' x 10' x 5.8'
- 4,485 ft³

**P15 L**
- 118' x 22.3' x 3.6'
- 9,474 ft³

**P15 U**
- 217' x 21.3' x 4.2'
- 19,464 ft³

**CONCRETE RWY 1-10**
- 89' x 9.8' x 2.8'
- 2,442 ft³ ea.

**CONCRETE RWY 18-21**
- 95' x 9.8 x 3.6'
- 3,352 ft³ ea.

**12 - CIRCULAR TANKS**
- 20' x 5' – 4' water
- 1,256 ft³ ea.
- Columbia, Methow, Twisp, & Contingency

**8 - CIRCULAR TANKS**
- 20' x 5' – 3.5' water
- 1,099 ft³ ea.
- Omak, Okanogan

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¹ Existing vessel dimensions sourced by Wells Pond Volumes data sheet. WDFW 2012.
Douglas County
Public Utility District No. 1

Wells Fish Hatchery Modernization

Surface Water Supply

Prepared by

HDR Fisheries
DESIGN CENTER

4717 97th St NW
Gig Harbor, WA  98332

September 2012
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Surface Water Supply and Distribution System ............................................................................................ 1
  Intake Screening and Primary Distribution ............................................................................................... 1
  “S” Series: Surface Water Supply .............................................................................................................. 2
  “I” Series: Wells & Wade Orchard Supply ................................................................................................. 2
  “J” Series: Job Water Supply ..................................................................................................................... 3
  Emergency Distribution ............................................................................................................................ 3
Appendix A  Intake Plans
Appendix B  Surface Water Distribution Plans
Appendix C  Water Temperature Data and Reservoir Water Fluctuation Information for the Surface Water and Pool
Summary

In 2008, an existing traveling screen system was taken off line and replaced with a permitted NOAA-compliant T-Screen with 1.75 mm screen openings providing 100 cfs withdrawal at 0.2 fps approach velocity and up to 150 cfs with an approach velocity of 0.4 fps.

The Option One installation method (see Appendix A) was chosen for the T-screen which is attached to 4 new piles and is mechanically connected to the existing 72-inch concrete pipe that extends approximately 300 feet into the forebay from the screen structure. The T-screen is equipped with a brush cleaning system where brushes are fixed to the screen superstructure inside and out of the screen face.

The water travels via a concrete conduit through the West Embankment to the surface (river) water aerator and water supply channel at the upper pool. A constant and preset quantity of water is required at the downstream systems despite the fluctuations of the reservoir. Preceding an extreme flood, the reservoir can be drawn down to elevation 767 with the highest pool of 791.

The primary uses of surface water at the fish facilities is to supply the four steelhead rearing ponds during the winter months (November through May), supply Salmon Rearing Ponds 16 & 17 and provide attraction flow for returning adult Chinook broodstock. The surface water also supplies the fish ladder with past documentation indicating a total ladder water supply ranging from 48 cfs to 100 cfs.

Surface water from the supply channel at the Upper Pool is also used to supply up to 10 cfs of irrigation water for Wells & Wade Orchards during the growing season designated by agreement from November to May. Two pumps located at the Upper Pool convey the surface water via a 15-inch steel line to the orchards.

The surface water also supplies the Job Water distribution system with two pumps located at the upper pool, distributing water to various hydrants throughout the site.

Water temperature data, reservoir water fluctuation information and related plan sheets for the surface water supply and distribution system are shown in Appendix A, B and C.

Surface Water Supply and Distribution System

Intake Screening and Primary Distribution

In 2008, the traveling screen system was taken off line and replaced with a 150 cfs NOAA compliant T-Screen supplied by ISI Inc. The T-screen is attached to 4 new piles and is
mechanically connected to the existing 72-inch concrete pipe that extends approximately 300 feet into the forebay from the screen structure.

The T-screen is equipped with a brush cleaning system where brushes are fixed to the screen superstructure inside and out of the screen face. Each leg of the T-screen rotates in a clockwise motion during cleaning of the screens. In addition to the brushes, water nozzles are activated to provide additional sweep during cleaning to promote additional sweeping flow to carry fine debris away from the screen.

Electrical and hydraulic lines fed down the 72-inch existing pipe connect the screen to electrical and hydraulic equipment on top of the screen structure.

During the renovation of the screening system, a 72-inch slide gate was installed along with an additional port on the west side of the intake that would serve as redundancy during a potential screen failure. This additional port is operated by a slide gate.

Surface (river) water for the fish facilities is obtained through this intake structure in the forebay, with the water traveling via a concrete conduit through the West Embankment to the surface (river) water aerator and water supply channel at the upper pool. A constant and preset quantity of water is required at the downstream systems despite the fluctuations of the reservoir. Hatchery personnel must adjust the gate opening at the intake structure to account for changes in the forebay elevation. These adjustments were originally controlled automatically by a liquid level float switch/gate movement system which is no longer in use.

“S” Series: Surface Water Supply

The primary uses of surface water at the fish facilities is to supply the four dirt rearing ponds during the winter months (November through May), supply Salmon Rearing Ponds 16 and 17 and provide attraction flow for returning adult Chinook broodstock. Flow to the steelhead ponds originates from a gated (Valve S1) 24-inch CMP line connected to the Surface (River) Water Aerator. The 24-inch line feeds a 20-inch valved steel header which has 14-inch valved steel lines branching to each steelhead rearing pond.

“I” Series: Wells & Wade Orchard Supply

Surface water from the supply channel at the Upper Pool is also used as irrigation water for Wells & Wade Orchards during the growing season. Two pumps located at the Upper Pool convey a maximum of 10 cfs of surface water via a 15-inch steel line to the orchards. During the winter months, a portion of this pipeline is used to direct supplementary surface water to the four Steelhead Rearing Ponds. A 25 horsepower pump, adjacent to the irrigation pumps, produces this supplementary flow.
“J” Series: Job Water Supply

Two job water pumps (Nos. 22J & 23J) at the Upper Pool also provide surface water for the job water supply to the Incubation and Administration Building as well as various hydrants located throughout the facility. In the event that surface water is needed for supplemental flow or temperature control, a gated crossover connection (Valve D36) exists between the job water system and the 12-inch steel well water pipeline located at the upstream end of the concrete raceways.

Emergency Distribution

Under an emergency situation, surface water can be used to supply the incubation building, raceways, and adult holding facilities by opening the slide gate (Valve D100) on the 20-inch steel well water pipeline and flooding the well water system. This should only be used in the event of complete well failure since other sources such as job water or reuse water could be used to account for short term shortages. Valve D12 is normally open and supplies a source of well water (fresh aerated water) to the section of the 20-inch surface water pipeline downstream from Valve D100.

Preceding an extreme flood, the reservoir can be drawn down to elevation 767. The elevation of the concrete sill in the denitrifier is elevation 766.83. To maintain an adequate flow at maximum drawdown will require adjustments of the regulating gates and stoplogs.
Appendix A

Intake Plans
WELLS HATCHERY SURFACE WATER INTAKE REPLACEMENT
PUBLIC UTILITY DISTRICT NO. 1
Douglas County, Washington

VICINITY MAP

PROJECT LOCATION

LOCATION MAP

DRAWING LIST

1. C1 COVER SHEET AND LIST OF DRAWINGS
2. C2 CIVIL/STRUCTURAL/Mechanical/Electrical SPECIFICATIONS SHEET 1
3. C3 CIVIL/STRUCTURAL/Mechanical/Electrical SPECIFICATIONS SHEET 2
4. C4 EXISTING SITE PLAN
5. C5 HATCHERY INTAKE SITE PLAN
6. C6 SCREEN HOUSE STRUCTURE PLAN AND SECTION
7. C7 CYLINDRICAL TEE SCREEN PLAN AND ELEVATION
8. C8 FIXED TEE SCREEN SECTIONS, OPTION 1
9. C9 DETAILS AND SECTIONS
10. C10 DETAILS
11. C11 TEE SCREEN ASSEMBLY, OPTION 2

PROJECT DESCRIPTION:
A. THE LOCATION OF THE PROJECT IS AT WELL'S DAM SCREEN HOUSE AS SHOWN ON THE CONTRACT DRAWINGS.
B. THE PROJECT INCLUDES PROVIDING ALL LABOR, MATERIALS AND EQUIPMENT TO DESIGN AND INSTALL A TEE SCREEN WITH FLOTTATION SCREEN CLEANING SYSTEM AS AN ATTACHMENT TO THE EXISTING MECHANICAL AND ELECTRICAL EQUIPMENT INSTALLATION. THE TEE SCREEN SHALL BE DESIGNED FOR A WATER INTAKE OF 1050 CUBIC FEET PER SECOND WITH AN AVERAGE VELOCITY NOT EXCEEDING 150 FEET PER SECOND. THE TEE SCREEN SHALL BE LOCATED AT THE END OF THE EXISTING 76-INCH DIAMETER WATER PIPE APPROXIMATELY 66'7" TO 77'1" C.D. FROM THE SCREEN HOUSE.
C. DRAWINGS AND SPECIFICATIONS ARE MEANT TO BE USED FOR BIDDING AND CONSTRUCTION. THE CONSTRUCTION COMPLETION IS SUBJECT TO REQUIREMENTS SPECIFIED IN PART V, GENERAL CONDITIONS, SECTION 2C.2 CONSIDERATIONS.

D. OTHER PROJECT REQUIREMENTS:
* INSTALLATION OF A TYPICAL SEDIMENT BARRIER CURNET AROUND THE POTENTIAL IMPACTED AREAS DURING CONSTRUCTION IN THE FOREST AS SHOWN ON THE CONTRACT DRAWINGS.
* INSTALLATION OF FOUR PIPE PILES AS SHOWN ON THE CONTRACT DRAWINGS.
* ELEVATION CONSTRUCTION (LESS THAN 5 CY).
* INSTALLATION OF A FLOATING DEBRIS BOOM AROUND THE NEW PIPE STRUCTURE (OPTION 2 ONLY).
* INSTALLATION OF A NEW EMERGENCY GATE AND TRASH CHUTE AS SHOWN ON THE CONTRACT DRAWINGS (ONLY OPTION 2).
* ELECTRICAL POWER AND CONNECTION ON SHORE SHALL BE PROVIDED BY THE DISTRICT.

DATE: 4/5/2001
PROJECT: D01-12
PART 3 CIVIL SPECIFICATIONS CONTINUED:

5.3.2.1 SURFACING OR OTHER PROTECTIVE WORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CODES AND REGULATIONS OF THE JURISDICTION IN WHICH THE WORK IS TO BE PERFORMED.

5.3.4 CONCRETE CUTTING AND REMOVAL ONLY FOR OPTION 1.

5.3.5 HEAVY DUTY AND REMOVAL MATERIALS AND PREPARATORY WORK TO RECEIVE REWORK.

5.3.6 USE ANY NEEDED SEALER, SANDING PASTE, AND ANY OTHER MATERIALS AS SPECIFIED BY THE CONTRACTOR.

5.3.7 SEALER APPLICATION AND SEALER MATERIALS, AND CHANNEL SEAL MATERIALS.

5.3.7.1 GENERAL:
A. CURING AND RAKING OF THE CEMENT ITSELF IS THE CONTRACTOR'S RESPONSIBILITY.
B. CONCRETE MIXTURES SHALL BE MIXED IN ACCORDANCE WITH THE REQUIREMENTS OF THE Specifications.

PART 4 FILE INSTALLATION

4.1 FILE INSTALLATION SHALL BE A PART OF THE IN-PLACE CONCRETE STRUCTURE OR ASSEMBLY OF THE STRUCTURAL STEEL, UNLESS OTHERWISE SPECIFIED.

4.1.1 ALL FILE INSTALLATION SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE Specifications.

4.1.2 FILE INSTALLATION SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE Specifications.

4.1.3 ALL FILE INSTALLATION SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE Specifications.

4.1.4 FILE INSTALLATION SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE Specifications.

4.1.5 FILE INSTALLATION SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE Specifications.

PART 5 ELECTRICAL

5.1 ALL WORK TO BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE Specifications.

5.1.1 ALL WORK TO BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE Specifications.

5.1.2 ALL WORK TO BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE Specifications.

5.1.3 ALL WORK TO BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE Specifications.

5.1.4 ALL WORK TO BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE Specifications.

5.1.5 ALL WORK TO BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE Specifications.

5.1.6 ALL WORK TO BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE Specifications.
SCREEN CLEANING SYSTEM A WATER PRESSURE DIFFERENTIAL REBUFFERING PUMP AND EXISTING SCREEN ASSEMBLY TO ADD NEW CYLINDRICAL TEE SCREEN ASSEMBLY TO CUTOFF BUILDING GS.

- OPTION 1 - FIXED TEE SCREEN WITH AUTOMATED CLEANING SYSTEM
  * PIPES SHALL BE 10' DIA X 1/2' HSS AS SHOWN IN CONTRACT DRAWINGS.
  * PIPES ARE NOT REQUIRED TO BE FILLED WITH CONCRETE.

- OPTION 2 - RETRACTABLE TEE SCREEN WITH AUTOMATED CLEANING SYSTEM
  * PIPES SHALL BE 12' DIA X 1/2' HSS FILLED WITH CONCRETE 4400 PSI AND EXTENDED TO ELEVATION TBD.

NOTES:
1. CONTRACTOR TO VERIFY EXISTING PIPE D.O. AND ELEVATIONS.
2. VS TBD, 0 HIGH POOL
3. VS TBD, 0 LOW POOL
4. SCREEN ELEVATION SCALE: NONE

BIDDING NOTES:
- SCREEN PLAN SCALE: 1/100 OF FEET
- SCREEN ELEVATION SCALE: NONE

DOUGLAS COUNTY PUD
WELLS HATCHERY
SURFACE WATER INTAKE MODIFICATIONS
CYLINDRICAL TEE SCREEN PLAN AND ELEVATION

C7
NOTE:
1. SCREEN CLEANING SYSTEM AND DIFFERENTIAL MEASURING EQUIPMENT TO BE SIZED BY SCREEN FABRICATOR.
2. THE TEE SCREEN FABRICATOR SHALL SUBMIT FOR REQUEST FOR SUBSTITUTION THEIR OWN TEE CONNECT DESIGN.
3. THE TEE SCREEN FABRICATOR SHALL SUBMIT FOR REQUEST FOR SUBSTITUTION THEIR OWN TEE SCREEN CONNECTION TO THE EXISTING 12" DIA RDG DESIGN.
NOTE:
OPTION 1 - RETRACTABLE TEE SCREEN SHALL BE DESIGNED AND FABRICATED BY INTAKE SCREEN INC. OR APPROVED EQUIVALENT.

EQUIPMENT NOTES:
OPTION 1 - FIXED TEE SCREEN WITH AUTOMATED CLEANING SYSTEM.
- PILES SHALL BE 18" DIA x 1/2" HSS AS SHOWN IN CONTRACT DRAWINGS.
- PILES ARE NOT REQUIRED TO BE FILLED WITH CONCRETE.

OPTION 2 - RETRACTABLE TEE SCREEN WITH AUTOMATED CLEANING SYSTEM.
- PILES SHALL BE 24" DIA x 1 1/2" HSS FILLED WITH CONCRETE (4000 PSI) AND EXTENDED TO ELEVATION #750.
Appendix B

Surface Water Distribution Plans
Appendix C

Water Temperature Data and Reservoir Water Fluctuation Information for the Surface Water and Pool

Columbia River Daily Average Surface Water Temperatures
10-year average taken at Chief Joe Dam

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<td>Grand Total</td>
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Surface Water Temperature C

- Graph showing the temperature of surface water over the months from January to December.
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Exhibit B

Pre-filing Consultation Record Supporting the Wells Hatchery

Modernization Master Plan
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</tr>
<tr>
<td>March 20, 2013</td>
<td>Final HCP Hatchery Committee Meeting Minutes</td>
</tr>
<tr>
<td>April 17, 2013</td>
<td>Final HCP Hatchery Committee Meeting Minutes</td>
</tr>
<tr>
<td>May 14, 2013</td>
<td>Email notification to HCP Hatchery Committee that the Master Plan is available for 60 day review period</td>
</tr>
<tr>
<td>May 15, 2013</td>
<td>Final HCP Hatchery Committee Meeting Minutes</td>
</tr>
<tr>
<td>May 17, 2013</td>
<td>Email to HCP Hatchery Committee with suggested review sections for the Wells Master Plan</td>
</tr>
<tr>
<td>June 19, 2013</td>
<td>Final HCP Hatchery Committee Meeting Minutes</td>
</tr>
<tr>
<td>July 13, 2013</td>
<td>End of HCP Hatchery Committee review period for the Master Plan – no comments received</td>
</tr>
<tr>
<td>July 17, 2013</td>
<td>Final HCP Hatchery Committee Conference Call Meeting Minutes – Master Plan finalization notice</td>
</tr>
<tr>
<td>August 2, 2013</td>
<td>Email notification to HCP Hatchery Committee that the Master Plan was finalized with no comments received</td>
</tr>
<tr>
<td>September 17, 2013</td>
<td>Email notification to HCP Hatchery Committee – Approval of the Final Summary for Wells Hatchery Modernization Workshop Meeting Minutes</td>
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</table>
The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees’ meeting was held at Chelan PUD headquarters in Wenatchee, Washington, on Wednesday, February 20, 2013, from 9:30 am to 2:45 pm. Attendees are listed in Attachment A to these meeting minutes.

**ACTION ITEM SUMMARY**

- Chelan PUD will draft a study plan to test Methow spring Chinook broodstock collection at the Rocky Reach Trap (Item I).
- Bill Gale will provide U.S. Fish and Wildlife Service’s (USFWS) Entiat National Fish Hatchery (NFH) and Leavenworth NFH Biological Assessments (BAs) and Biological Opinions (BiOps) to the Hatchery Committees as examples of consultation materials for bull trout (Item II-A).
- Craig Busack and Bill Gale will provide Kristi Geris with a list of people who should be invited to the discussion on hatchery and genetic management plans (HGMPs) for non-listed programs and the need for bull trout consultations (Item II-A).
- Kristi Geris will distribute a Doodle Poll for a 1-hour discussion on the status of HGMPs for non-listed programs (Item II-A).
- Josh Murauskas and Chris Moran will provide a proposal for evaluating release strategies for the Wenatchee Steelhead Program, including a consideration of how the release strategy for steelhead would affect the Chiwawa spring Chinook program, no later than one week prior to the Hatchery Committees March 20, 2013 meeting (Item III-A).
- Josh Murauskas will distribute to the Hatchery Committees an updated revised draft
Analytical Framework 5-Year Update with comments received to date that have been incorporated (Item IV-A).

- Josh Murauskas will distribute a Doodle Poll to the Hatchery Committees to schedule a Hatchery Monitoring and Evaluation (M&E) Workgroup meeting to prepare the final revised draft Analytical Framework 5-Year Update for Hatchery Committee review (Item IV-A).

- **Greg Mackey will provide the Wells Hatchery Modernization Master Plan to the Hatchery Committees for review, when available (Item V-C).**

- Chelan PUD, Douglas PUD, Grant PUD, and the Colville Confederated Tribes (CCT) will meet to discuss proportional responsibilities for funding run-composition sampling at Wells Dam for summer Chinook; and Chelan PUD will provide an update on the discussions at the Hatchery Committees’ March 20, 2013 meeting (Item VI-A).

- Keith Wolf will provide Kristi Geris with CCT’s Chief Joseph Hatchery (CJH) M&E presentation materials for distribution to the Hatchery Committees (Item VI-B).

**STATEMENT OF AGREEMENT DECISION SUMMARY**

- No Statements of Agreement (SOA) were approved at this meeting.

**AGREEMENTS**

- No agreements were discussed at this meeting.

**REVIEW ITEMS**

- The draft residual steelhead manuscript *Ecologic and demographic costs of releasing non-migratory juvenile hatchery steelhead in the Methow River, Washington* was distributed to the Hatchery Committees on February 19, 2013, for a 60-day review with comments due to Charlie Snow no later than April 22, 2013.

**FINALIZED REPORTS**

- The Yakama Nation (YN) Expanded Acclimation Plan was finalized and distributed to the Hatchery Committees on January 29, 2013.
I. Welcome, Agenda Review, Meeting Minutes, and Action Items

Mike Schiewe welcomed the Hatchery Committees and reviewed the agenda. The following revisions were made to the agenda:

- Lynn Hatcher added an update on the Nason Creek Hatchery permit timeline.
- Josh Murauskas added an update on spring Chinook brood collection at the Eastbank Hatchery outfall (EBO).
- Greg Mackey added a Wells summer Chinook HGMP update to the National Marine Fisheries Service (NMFS) HGMP agenda item; and he also added a Hatchery Evaluation Technical Team (HETT) update.
- Kirk Truscott added an update on run-composition sampling at Wells Dam for summer Chinook.

The revised draft January 16, 2013 meeting minutes were reviewed. Kristi Geris said that after the revised minutes were distributed to the Hatchery Committees on February 12, 2013, NMFS provided clarification on two pending items under their discussion on Methow HGMPs and Hatchery Litigation Updates. Geris said that Hatcher clarified that: 1) the draft Mid-Columbia HGMPs currently under review include draft HGMPs for Methow steelhead and Methow spring Chinook programs; and 2) the review period for Methow HGMPs in the Federal Register will be 30 days. Responding to a question from Mackey, Mike Tonseth clarified that during run-composition sampling at Wells Dam, all fish are screened for presence-absence of coded-wire tags. Geris said that she will revise the minutes to reflect this clarification. The Hatchery Committees members present approved the January 16, 2013 meeting minutes, as revised.

Action items from the last Hatchery Committees meeting on January 16, 2013, and follow-up discussions were as follows:

- Geris will verify with Bill Gale the final revisions to the revised December 12, 2012 Hatchery Committees meeting minutes, regarding edits to a statement that Gale made during Chelan PUD’s discussion on Methow spring Chinook production (Item I). Geris said that she received Gale’s approval via email on January 18, 2013, prior to distributing the final meeting minutes to the Hatchery Committees.
The Hatchery M&E working group will provide the revised Analytical Framework 5-Year Update to the Hatchery Committees for review prior to the February 20, 2013 meeting of the Hatchery Committees (Item III-A).

The updated revised draft Analytical Framework 5-Year Update was redistributed to the Hatchery Committees on January 25, 2013.

Craig Busack will provide Geris with the NMFS Production Advisory Committee (PAC) briefing documents on the draft Methow spring Chinook and steelhead HGMPs, for distribution to the Hatchery Committees (Item IV-A).

Geris said that Busack provided the documents and that they were posted to the ftp site and distributed to the Hatchery Committees on January 22, 2013.

Chelan PUD will draft a study plan to test Methow spring Chinook broodstock collection at the Rocky Reach Trap (Item VI-A).

Muraukas said that Chelan PUD is discussing the logistics of trapping fish at the existing trap, and added that trapping summer Chinook is being considered to test the functionality of the trap. He said that Chelan PUD still plans to provide the Hatchery Committees with a proposal prior to conducting any work.

Geris will set up a WebEx meeting for 11:00 am on Monday, January 28, 2013, for the CCT, Chelan PUD, Douglas PUD, and Grant PUD to discuss run-composition sampling at Wells Dam for summer Chinook upstream of Wells Dam (Item VIII-A).

Geris said that the meeting was scheduled as discussed.

Tonseth will provide Geris summer Chinook broodstock collection estimates for discussion during the run-composition sampling WebEx meeting scheduled for January 28, 2013, for distribution to the Hatchery Committees (Item VIII-A).

Tonseth provided these estimates on January 17, 2013.

II. NMFS

A. HGMP Update (Craig Busack)

Craig Busack updated the Hatchery Committees on several topics, including the timeline for review and current status of Mid-Columbia hatchery programs HGMPs, and the requirements for consultations on non-direct take hatchery programs. Busack began by noting that the draft Okanogan section 10(j) sufficiency letter will be sent for CCT review tomorrow. He said that the Methow spring Chinook and steelhead sufficiency letters are on hold pending resolution of comments received from the YN and USFWS on HGMP
supplemental materials or supporting documents. Once these comments are addressed and
differences are resolved, the Methow spring Chinook and steelhead sufficiency letters will be
finalized. He indicated that no revisions will be made to the actual HGMP themselves, but
that revisions only relate to the supporting documentation that includes new data collected
after the HGMPs were originally submitted. Busack reported that the Wenatchee steelhead
and Chiwawa spring Chinook draft BiOps are almost complete and will be sent for agency
review after National Oceanic and Atmospheric Administration General Council (NOAA
GC) legal review. He said that a new draft BiOp for the Nason Creek Hatchery Program will
be out in early March 2013, and added that this is only the BiOp—not National
Environmental Policy Act (NEPA) documentation. Kirk Truscott asked when a permit for
the Nason Creek program will be required; Mike Tonseth responded that a permit will be
needed by early May 2013. Busack also noted that the Leavenworth NFH spring Chinook
and Entiat NFH spring Chinook draft BiOps are still in final review. He reminded the
Hatchery Committees that the NMFS final review process is now taking longer than in the
past due to greater scrutiny by the NOAA General Counsel (GC). He said that the
Leavenworth spring Chinook and Entiat spring Chinook draft BiOps were originally
anticipated to be completed this week; however, they have been delayed by further
revisions.

Busack asked Truscott about the status of the Okanogan steelhead HGMP, to which Truscott
replied that the CCT are still working on a draft. Busack said that NMFS needs a draft soon
to stay on schedule. He also indicated that NMFS needs the draft Mid-Columbia coho
HGMP and any revisions completed by March 2013. He also indicated that NMFS is
requesting up-to-date information on all non-direct take programs because Permit 1347
(which covers those programs) is about to expire. NMFS is planning to issue a supplemental
BiOp rather than issue a new BiOp and is completing the NEPA process again. Nonetheless,
Busack said that this would require updating previous information. He said that NMFS
already has a summer Chinook HGMP from Grant PUD, but they still need summer and fall
Chinook HGMPs from Chelan PUD and Douglas PUD. Mackey asked about the nature of
the new information and level of detail that NMFS would be requiring in the HGMPs.
Alene Underwood added that Chelan PUD was under the impression that they were not
required to submit a full HGMP. Busack replied that the requirement for a full HGMP was
still under internal discussion, and a determination should be reached next week. He added that if a full HGMP is required, NMFS would like them as streamlined as possible.

Mackey asked about the timeline for completing a new HGMP, and asked if the Hatchery Committees’ review process could be expedited to facilitate submitting a new HGMP to NMFS as soon as possible. He said he anticipated that the program descriptions would remain largely the same. Mike Schiewe asked if a 30-day review period would suffice; Busack replied that in order to finish the process by October 2013, and if a new NEPA is not required, then receiving the new HGMP within the next few months would be acceptable. Tonseth noted that permit 1347 coverage is primarily for brood collection and release, and he added that brood collection will be complete by mid-September 2013 and juvenile releases will not take place until spring 2014. He said, therefore, that a new permit is not technically needed until April 2014—Busack agreed, but added that he would still like to try to meet the October 2013 deadline.

Lastly, Busack said that he wanted to alert the Hatchery Committees about the need for bull trout consultation requirements associated with the non-direct take HGMP consultations. He explained that if a program needs a section 10 permit from NMFS, Biological Assessments (BAs) also need to be completed and approved by USFWS for bull trout and any other USFWS-listed species. This consultation is typically required to be complete before NMFS issues the section 10 permits. Busack clarified that development of BAs for USFWS-listed species is not NMFS’ responsibility, and he recommended that the BAs are developed in coordination with USFWS in order to ensure that the documents meet USFWS’ expectations. Busack explained that NMFS wrote a BA for Snake River Fall Chinook because USFWS agreement was needed quickly. He added that NMFS is still revising it to satisfy USFWS expectations. Bill Gale asked why NMFS is responsible for consultations with USFWS. Busack explained that when NMFS completes a section 10 consultation and issues a permit that NMFS becomes the action agency. He explained that for NMFS-listed species, NMFS consults with itself, and for USFWS-listed species, NMFS consults with USFWS. NMFS has no responsibility with respect to USFWS-listed species. Gale said that he can provide USFWS Entiat NFH and Leavenworth NFH BAs and BiOps to the Hatchery Committees as examples of consultation materials for bull trout. Busack suggested setting up a Hatchery Committees conference to further discuss needed input for HGMPs for summer/fall Chinook.
non-direct take programs. Gale and Busack agreed to provide Kristi Geris with a list of NMFS and USFWS staff that should be included in the conference call, and Geris will distribute a Doodle Poll to establish a time and date for a 1-hour discussion.

III. Chelan PUD

A. Wenatchee Steelhead Release Strategy (Josh Murauskas)

Josh Murauskas reviewed that, as discussed at the Hatchery Committees’ November 14, 2012 meeting, hatchery steelhead smolts released into the Wenatchee River experienced an unprecedented and significant reduction in the combined probability of migration and survival in 2012. Murauskas said that the cause of these poor results will be difficult to discern because of many concurrent changes to program. He noted that the 2012 releases were the first after relocating the program from Turtle Rock to the Chiwawa Facility and after implementation of new release techniques. Murauskas said that based on 2012 steelhead survival results, Chelan PUD is advocating reverting back to the release strategy that was performed prior to 2012. A paper on the release strategy for hatchery-origin steelhead in the Wenatchee River Basin (Attachment B) was distributed to the Hatchery Committees by Kristi Geris on February 19, 2013.

Mike Tonseth noted that the previous release strategy (drop planting in the Wenatchee directly from Turtle Rock) was the only strategy available prior to relocating the program—not because it was preferred. Murauskas added, however, that the previous release strategy was also three times as successful. He also noted that residualism did not appear to be an issue in 2012 because less than one-tenth of a percent of passive integrated transponder (PIT) tags were detected after July 1, 2012, and that committee-approved population estimates of resident Oncorhynchus mykiss (O. mykiss) are low (e.g., Hillman et al. reports). He also noted that smaller release groups and delayed releases that result from volitional releases may negate the desired benefits. Tonseth cautioned also that there are several factors that influence these results, such as differences in the behavior of hatchery-by-hatchery (HxH) and wild-by-wild (WxW) hatchery populations. He suggested that a larger sample size is needed prior to making any conclusions. Bill Gale noted that in Figure 5 of Attachment B (i.e., survival of juvenile steelhead under the new release strategy in 2012 by release group [circular vessels]), the non-migrant group migrated at a higher rate than typical; and Tonseth added that the term “non-migrant” needs to be carefully defined. Charlie Snow commented
that hatchery operations can influence migration rates. Kirk Truscott suggested that releases from circular tanks need to be considered separately from releases out of raceways because they are reared differently, and, in 2012, releases from circular tanks were intentionally delayed. Tonseth said that in 2012, the raceway fish survived at a slightly higher rate than those from circular tanks. Mike Schiewe noted that this may be a good opportunity to develop a more rigorous study, and suggested testing different rearing strategies to gather empirical data. Keely Murdoch said that she would be supportive of conducting further testing prior to making a decision, and also recommended testing both HxH and WxW in each test group. Alene Underwood explained that Chelan PUD would like the Hatchery Committees to approve a new release strategy in time for 2013 releases, and Murauskas added that they also do not want the same results as last year. Murauskas also added that bird predation increases by May. He said that a recent query indicated that about 1,555 Wenatchee steelhead PIT tags have been collected from area bird colonies, and added that those are from later releases. Schiewe suggested that Chelan PUD should have a proposal ready for review by the Hatchery Committees’ March 20, 2013 meeting, and Tonseth recommended that Chelan PUD consider impacts to the Chiwawa spring Chinook program. Murauskas said that he and Chris Moran will provide a proposal for evaluating release strategies for the Wenatchee Steelhead Program, including a consideration of how the release strategy for steelhead would affect the Chiwawa spring Chinook program, no later than one week prior to the Hatchery Committees’ March 20, 2013 meeting.

B. Summer Chinook Brood Collection at the Eastbank Outfall (EBO) (Josh Murauskas)
Josh Murauskas said that Chelan PUD and WDFW are working to complete preparations to utilize the EBO as the primary broodstock source for the Chelan Falls summer Chinook program. Mike Tonseth added that summer Chinook broodstock collection at the EBO will be included in the 2013 Broodstock Protocols for Chelan Falls’ broodstock collection. Chris Moran said that Chelan PUD and WDFW were also discussing potentially tagging fish and wiring the outfall to see how many and what type of fish are around the outfall. Murauskas added that the EBO might turn out to be a useful tool for stray management.
IV. Chelan PUD, Douglas PUD, and Grant PUD

A. 5-Year M&E Plan Update Discussion and Review of Draft Plan (Josh Murauskas and Greg Mackey)

Greg Mackey said that the updated revised draft Analytical Framework 5-Year Update was redistributed to the Hatchery Committees on January 25, 2013, with comments due no later than February 14, 2012. Mackey said that he received comments from Tracy Hillman, Andrew Murdoch, and Keely Murdoch. Andrew Murdoch’s comments on the draft plan were distributed to the Hatchery Committees on February 15, 2013, and Keely Murdoch’s comments on the draft plan were distributed to the Hatchery Committees on February 19, 2013. Josh Murauskas said that all comments received have now been incorporated into the draft plan, and he said that after he incorporates Chelan PUD comments, he plans to redistribute the revised draft plan to the Hatchery Committees for additional review. Mackey suggested scheduling another Hatchery M&E Workgroup meeting to decide on language and edits based on comments received. He added that most of the comments received were clarifications to explanatory text, and that not many significant changes were received.

Mike Tonseth noted that many of the substantial changes (e.g., revisions to the hypotheses) were reconciled during the last Hatchery M&E Workgroup meeting. Mackey said that a glossary and index were incorporated into the revised draft that was distributed on January 25, 2013, and he noted that those items still need to be further populated. Mike Schiewe reminded the Hatchery Committees that the target is to complete this plan by April 2013, prior to contracting for future years. Murauskas confirmed that the draft plan is on schedule to meet that deadline. Mackey said that a revised draft will be available for review prior to the Hatchery Committees’ March 20, 2013 meeting, and then final comments and edits can be addressed prior to the Hatchery Committees’ April 17, 2013 meeting, when the plan will be up for approval. Murauskas said that he will distribute a Doodle Poll to the Hatchery Committees to schedule a Hatchery M&E Workgroup meeting to prepare the final revised draft Analytical Framework 5-Year Update for Hatchery Committee review.
V. Douglas PUD

A. HETT Update (Greg Mackey)

Greg Mackey reminded the Hatchery Committees that when he was running the Predation, Competition, and Disease (PCD) risk models for Douglas PUD hatchery programs, he encountered problems when hatchery fish are smaller in size than wild fish, which resulted in the program crashing. Mackey said that he is having the code reviewed by a computer programmer to determine what type of effort would be involved to pinpoint the error. Once this information is available, future actions regarding the PCD Risk model can be decided upon.

B. Confidence in Estimation of Broodstock Numbers (Greg Mackey)

Greg Mackey said that he had recently completed exploratory work on broodstock calculations and summarized the work in a PowerPoint presentation on managing risk and expectations in broodstock collection (Attachment C), which was distributed to the Hatchery Committees by Kristi Geris on February 19, 2013. Mackey reviewed the basic broodstock calculation used to determine broodstock needed to produce a target production value. He noted that variability exists for each parameter used to calculate broodstock numbers, and this variability can be incorporated into broodstock calculations. He explained that using a deterministic approach would result in occasionally collecting too few, or too many broodstock, resulting in 10 percent less than the target production value may result in failing to meet mitigation obligations; whereas, broodstock numbers resulting in 10 percent greater than the target production value will likely result in overages. He then presented findings from a modeling exercise that explored the frequency at which a given program may be over or under acceptable bounds of production. Mackey noted that different programs may have a different emphasis on target production values (i.e., some programs may have an emphasis on not being below the lower 10 percent bound, versus others that may have an emphasis on meeting the target production value). He also noted that minimal changes to small programs, such as adding one female to the Twisp River spring Chinook program, could be significant in terms of resulting production values within, or outside, of the plus-or-minus 10-percent range. Mackey concluded that knowledge of these concepts and of the probability of
possible outcomes can allow for more informed and effective management of broodstock collection. Kirk Truscott also recommended being aware that biases exist in brood collected data versus brood spawned data. Keely Murdoch said that the YN adapts their strategies based on data received in order to address variability in the YN’s coho program. Mackey noted that a deterministic approach provides a number based on average conditions, while a probabilistic approach provides the number of broodstock needed, but also provides the likelihood of different, unintended outcomes, which managers can use to make better informed decisions. He said that he may develop a white paper on the results, and explore how this can inform future broodstock protocols.

C. Update on Wells Hatchery Modernization (Greg Mackey)

Greg Mackey said that Douglas PUD has been working with HDR Engineering, Inc., on planning for the modernization of the Wells Hatchery facility; and he added that Grant PUD has also been involved. Mackey said that the master plan is nearing completion (due March 2013); the plan will include a review and assessment of current infrastructure. He said that a groundwater well field assessment is also being conducted as part of bioprogramming to evaluate water needs for Wells Hatchery operations. He said that some of the wells may need to be upgraded. Mackey clarified that the facility is not undergoing a full rebuild, but it will be upgraded, as needed. He said that there are three major upgrades planned, including: 1) a new incubation building for anadromous programs (the existing incubation building will be used for the white sturgeon program and resident trout); 2) installation of fiberglass circular tanks for the Twisp and Okanogan steelhead programs; and 3) upgrades to the volunteer channel trap. Mackey said that a spawning facility will be developed that is integrated with the adult trapping and holding facility; however, those details are not yet worked out. Existing infrastructure such as the dirt ponds and Bureau ponds will be retained. He said that the next step will be to begin the design drawings, which he said should take about one year; and once completed, Douglas PUD will go out to bid for construction. He said that construction could potentially take a couple of years, as needed, to schedule around existing programs at the facility. Mackey said that once the Wells Hatchery
Modernization Master Plan is complete, he will provide the plan to the Hatchery Committees for review.

Keely Murdoch asked about the Hatchery Committees’ opportunity to comment and approve the plan. Mackey said that all upgrades will meet or exceed current standard WDFW rearing requirements. Mackey said that Douglas PUD did not intend to seek Hatchery Committees’ approval because the modifications are not for the purpose of improving program performance, but rather they are upgrading the facility because of aging infrastructure. Bill Gale said that the Hatchery Committees have commented on these types of plans in the past, and he asked Mackey what role he thought, if any, that the Hatchery Committees had in this modernization process. Mackey said that Douglas PUD is already meeting program targets, therefore, upgrades to Wells Hatchery is not a matter for the Hatchery Committees to approve. Gale replied that the Hatchery Committees have a role in how Hatchery mitigation is met—not just when targets are not being met. Schiewe said that once the master plan is complete, it will be available to the Hatchery Committees for review; and the Hatchery Committees’ role in approving the plan can be further discussed at that time. Mackey agreed that upon review of the master plan by the Hatchery Committees, Douglas PUD will consider input from the Hatchery Committees. Tonseth said that he just wants to make sure that WDFW has enough time to review any proposed modifications, if needed, and to make sure program obligations will be met.

VI. CCT

A. Run-Composition Sampling at Wells Dam for Summer Chinook (Kirk Truscott)

Kirk Truscott reviewed the need for run-composition sampling for summer Chinook upstream of Wells Dam. He said that based on Josh Murauskas’ power analysis that was distributed to the Hatchery Committees on February 5, 2013, a minimum of 38 adults from each group (hatchery and wild) is needed for sex and age analysis. Truscott also recalled that Mike Tonseth calculated that a sample size of roughly 500 fish will be needed for Carlton brood collection efforts. Tonseth said that given these numbers, the only issue that remains is how the sampling effort will be funded. Chelan PUD, Douglas PUD, Grant PUD, and the
CCT agreed to meet to discuss proportional responsibilities for funding run-composition sampling at Wells Dam for summer Chinook. Muraskas said that Chelan PUD will provide an update on the discussions at the Hatchery Committees March 20, 2013 meeting.

B. CJH M&E Presentation (Kirk Truscott/Keith Wolf)

Keith Wolf introduced himself and distributed to the Hatchery Committees a supplemental packet of CJH M&E information (Attachment D) including: 1) a glossary of terms and variables; 2) an overview of the CJH program; 3) highlights from the draft 2013 CJH Implementation Plan (not included in Attachment D); 4) CJH 2013 spring, summer, and fall Chinook production summary (also not included in Attachment D, but previously distributed to the Hatchery Committees on September 14, 2012); and 5) the CJH Annual Program Review (APR) agenda. Wolf said that he will provide Kristi Geris with all CJH presentation materials for distribution to the Hatchery Committees (Note: Wolf provided the CJH presentation materials to Geris on February 21, 2013, which were distributed to the Hatchery Committees on the same day; the CJH M&E presentation is included in these meeting minutes as Attachment E).

Wolf presented an overview of the CJH Research, Monitoring, and Evaluation (RM&E) Programs, including a workflow diagram, and program assumptions and principles. Kirk Truscott noted that the CJH program is not a typical hatchery program. He said that instead, the program focuses heavily on meeting natural escapement, percent hatchery origin spawners (pHOS), and proportion of natural influence (PNI) values in the Okanogan Basin. Wolf shared a picture of the Okanogan adult fish weir and said that there are plans to upgrade the weir this year, including modification of the shape of the weir to facilitate more efficient trapping, installation of additional cameras, and an increase in trap size. Wolf said that the weir will be monitored to ensure that impingement does not occur with the new design. He said that a newly installed PIT tag array is located approximately one mile downstream of the weir. Todd Pearsons asked what the purpose of this weir is, and Wolf replied that it is primarily for managing genetics and stock composition. Wolf added that broodstock collected at this weir have a higher likelihood of being Okanogan fish. Truscott
said that the weir also serves an adult management purpose. Truscott said that other collection locations include the purse seine, tangle nets, and Wells Dam. Tonseth noted that CJH may not be a suitable location to collect natural origin brood, and Truscott said that the priority 2013 collection location is the purse seine. He said that if the broodstock quota is not being met by about August, other options will be investigated to collect the balance. Wolf said that the weir would be the last option for broodstock collection.

Wolf reviewed the CJH capture, tagging, and genetics programs. He said that in 2012, the CCT experimented with a new smolt trap that was not very successful. He said that trapping occurred at night, and all species were monitored. Tonseth asked if steelhead parr were PIT tagged, and Wolf replied that they are at the Omak facility; however, they are not PIT tagged at CJH. Tonseth asked if PIT tagging steelhead parr has been considered at CJH, and Wolf replied that it has been considered; however, trapping can only occur up to a certain flow, and there is high flow at CJH. Truscott said that the CCT is not planning to PIT tag steelhead in 2013. Wolf reviewed juvenile sampling objectives and said that the CCT were working on a new statistical approach to run regression analyses for abundance estimates.

To finish his presentation, Wolf reviewed the CJH field offices and acclimation sites. He said that details on tagging are well documented in the APR, and that adult fish management, data management, and other presentations and reports are available online at the CCT website. Lastly, Wolf encouraged Hatchery Committees members to attend the CJH APR in March 2013.

VII. HCP Administration

A. Next Meetings

The next scheduled Hatchery Committees meetings are on March 20, 2013 (Douglas PUD office); April 17, 2013 (Chelan PUD office); and May 15, 2013 (Douglas PUD office).

List of Attachments

Attachment A     List of Attendees
<table>
<thead>
<tr>
<th>Attachment B</th>
<th>Release Strategy for Hatchery-Origin Steelhead in the Wenatchee River Basin</th>
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<tr>
<td>Attachment C</td>
<td>Managing Risk and Expectations in Broodstock Collection Presentation</td>
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<td>Attachment D</td>
<td>CJH M&amp;E Supplemental Packet</td>
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<td>Attachment E</td>
<td>Chief Joseph Hatchery M&amp;E Presentation</td>
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# Attachment A
## List of Attendees

<table>
<thead>
<tr>
<th>Name</th>
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<tr>
<td>Mike Schiewe</td>
<td>Anchor QEA, LLC</td>
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<td>Kristi Geris</td>
<td>Anchor QEA, LLC</td>
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<td>Josh Muraskas*</td>
<td>Chelan PUD</td>
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<td>Alene Underwood*</td>
<td>Chelan PUD</td>
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<td>Greg Mackey*</td>
<td>Douglas PUD</td>
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<td>Todd Pearsons†</td>
<td>Grant PUD</td>
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<tr>
<td>Keely Murdoch*</td>
<td>Yakama Nation</td>
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<tr>
<td>Kirk Truscott*</td>
<td>Colville Confederated Tribes</td>
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<td>Keith Wolf</td>
<td>Colville Confederated Tribes</td>
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<tr>
<td>Lynn Hatcher**†</td>
<td>National Marine Fisheries Service</td>
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<tr>
<td>Craig Busack*††</td>
<td>National Marine Fisheries Service</td>
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<tr>
<td>Bill Gale*</td>
<td>U.S. Fish and Wildlife Service</td>
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<tr>
<td>Mike Tonseth*</td>
<td>Washington Department of Fish and Wildlife</td>
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<tr>
<td>Chris Moran†</td>
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<td>Jayson Wahls</td>
<td>Washington Department of Fish and Wildlife</td>
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<td>Charlie Snow</td>
<td>Washington Department of Fish and Wildlife</td>
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**Notes:**
- * Denotes Hatchery Committees member or alternate
- † Joined by phone
- †† Joined by phone for the HGMPs Update
FINAL MEMORANDUM

To: Wells, Rocky Reach, and Rock Island HCPs Hatchery Committees  
Date: April 18, 2013

From: Mike Schiewe, Chair

Cc: Kristi Geris

Re: Final Minutes of the March 20, 2013 HCP Hatchery Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees’ meeting was held at Douglas PUD headquarters in East Wenatchee, Washington, on Wednesday, March 20, 2013, from 9:30 am to 1:00 pm. Attendees are listed in Attachment A to these meeting minutes.

ACTION ITEM SUMMARY

• Greg Mackey will provide the Wells Hatchery Modernization Master Plan to the Hatchery Committees for review, when it is available (Item I).

• Chelan PUD, Douglas PUD, Grant PUD, and the Colville Confederated Tribes (CCT) will meet to discuss proportional responsibilities for funding run-composition sampling at Wells Dam for summer Chinook; and Chelan PUD will provide an update on the discussions at the Hatchery Committees April 17, 2013 meeting (Item I).

• Lynn Hatcher will check on the status of internal National Marine Fisheries Service (NMFS) discussions regarding processing of Hatchery and Genetic Management Plans (HGMPs) for non-listed programs currently covered by Permit 1347 (Item II-A).

• Josh Murauskas will distribute a summary of changes to the revised draft Analytical Framework 5-Year Update to the Hatchery Committees no later than March 22, 2013. Following distribution of this list, Hatchery Committees representatives will provide a list of additional objective-level change that should be considered, if any, including suggested revisions, to Kristi Geris for distribution to the Hatchery Committees no later than April 5, 2013 (Item IV-A).

• Alene Underwood will revise and redistribute Chelan PUD’s pilot study proposal to trap spring-run Chinook salmon at Rocky Reach Dam in 2013, as recommended; and
Chelan PUD will also brief Bill Gale on the details of the proposal (Item IV-D).

- Hatchery Committees representatives will submit edits and comments on the draft 2013 Upper Columbia River Salmon and Steelhead Broodstock Objectives and Site-Based Broodstock Collection Protocols to Mike Tonseth no later than April 8, 2013 (Item VI-A).

STATEMENT OF AGREEMENT DECISION SUMMARY

- No Statements of Agreement (SOAs) were approved at this meeting.

AGREEMENTS

- Hatchery Committees representatives present agreed to use the steelhead broodstock collected in the fall of 2012 for the Douglas PUD Methow Safety-Net program broodstock, and to not collect additional broodstock in the Methow basin in the spring of 2013 for this program, unless an unexpected need for additional broodstock is identified by hatchery personnel (Item II-A).
- Hatchery Committees representatives present agreed to Chelan PUD’s 2013 Wenatchee River Basin Steelhead Release Strategy (Item V-B).

REVIEW ITEMS

- The draft residual steelhead manuscript *Ecologic and demographic costs of releasing non-migratory juvenile hatchery steelhead in the Methow River, Washington* was distributed to the Hatchery Committees on February 19, 2013, for a 60-day review with comments due to Charlie Snow no later than April 22, 2013.
- The draft 2013 Upper Columbia River Salmon and Steelhead Broodstock Objectives and Site-Based Broodstock Collection Protocols were distributed to the Hatchery Committees on March 15, 2013, for review with comments due to Mike Tonseth no later than April 8, 2013.
- The revised draft Analytical Framework 5-Year Update was distributed to the Hatchery Committees on March 19, 2013, for final review. Approval of the draft plan will be requested at the Hatchery Committees April 17, 2013 meeting.
I. Welcome, Agenda Review, Meeting Minutes, and Action Items

Mike Schiewe welcomed the Hatchery Committees and reviewed the agenda. The following revisions were made to the agenda:

- Greg Mackey said that Douglas PUD’s 2013 program activities update will include: 1) Twisp Weir and Twisp and Chewuch ponds update; 2) Wells Hatchery summer Chinook HGMP update; 3) Methow spring Chinook HGMP and Wells Complex Steelhead HGMP sufficiency letters; 4) Methow spring Chinook broodstock collection analysis; 5) future of spring Chinook broodstock collection for Methow and Okanogan programs; and 6) steelhead broodstock collection for 2013 Methow Safety Net.
- Alene Underwood added a brief discussion on a Carlton Acclimation Facility Capacity Utilization Draft SOA.
- Schiewe said that Craig Busack’s agenda item to discuss HGMPs for non-listed programs and bull trout consultations has been postponed; however, Lynn Hatcher said that he would provide an HGMP update in lieu of Busack’s agenda item.
- Mike Tonseth added a brief discussion on the draft 2013 Upper Columbia River Salmon and Steelhead Broodstock Objectives and Site-Based Broodstock Collection Protocols.
- Kirk Truscott requested clarification regarding the February Monitoring and Evaluation (M&E) Progress Report for the Chelan PUD Hatchery Programs that was distributed to the Hatchery Committees by Tracy Hillman on March 19, 2013.

The revised draft February 20, 2013 meeting minutes were reviewed. Kristi Geris said that comments and revisions received from members of the Committees were incorporated in the revised minutes. She said that Tom Kahler noted an error in Chelan PUD’s discussion on “Spring Chinook Brood Collection at the Eastbank Outfall (EBO).” He noted that “spring” should read “summer.” The Hatchery Committees members present approved the February 20, 2013 meeting minutes, as revised.
Action items from the last Hatchery Committees meeting on February 20, 2013, and follow-up discussions were as follows:

- **Chelan PUD will draft a study plan to test Methow spring Chinook broodstock collection at the Rocky Reach Trap (Item I).**
  
  A pilot proposal to test trapping of spring-run Chinook salmon at Rocky Reach Dam in 2013 was distributed to the Hatchery Committees by Geris on March 19, 2013.

- **Bill Gale will provide U.S. Fish and Wildlife Service’s (USFWS) Entiat National Fish Hatchery (NFH) and Leavenworth NFH Biological Assessments (BAs) and Biological Opinions (BiOps) to the Hatchery Committees as examples of consultation materials for bull trout (Item II-A).**
  
  Gale provided the documents and said that they were distributed to the Hatchery Committees on February 21, 2013.

- **Busack and Gale will provide Geris with a list of people who should be invited to the discussion on HGMPs for non-listed programs and the need for bull trout consultations (Item II-A).**
  
  Busack and Gale provided these lists.

- **Geris will distribute a Doodle Poll for a 1-hour discussion on the status of HGMPs for non-listed programs (Item II-A).**
  
  A Doodle Poll was distributed, but the discussion was deferred to a future meeting.

- **Josh Murauskas and Chris Moran will provide a proposal for evaluating release strategies for the Wenatchee Steelhead Program, including a consideration of how the release strategy for steelhead would affect the Chiwawa spring Chinook program, no later than one week prior to the Hatchery Committees March 20, 2013 meeting (Item III-A).**

  Murauskas provided this proposal and it was distributed to the Hatchery Committees by Geris on March 15, 2013.

- **Murauskas will distribute to the Hatchery Committees an updated revised draft Analytical Framework 5-Year Update with comments received to date that have been incorporated (Item IV-A).**

  Murauskas provided the revised draft and it was distributed to the Hatchery Committees by Geris on February 27, 2013.

- **Murauskas will distribute a Doodle Poll to the Hatchery Committees to schedule a Hatchery M&E Workgroup meeting to prepare the final revised draft Analytical...**
Framework 5-Year Update for Hatchery Committee review (Item IV-A).
Murauskas distributed a Doodle Poll.

- **Greg Mackey will provide the Wells Hatchery Modernization Master Plan to the Hatchery Committees for review, when available (Item V-C).**
  Mackey said that the master plan is still under development, and that it may be available by the end of April 2013. This action item will be carried forward.

- **Chelan PUD, Douglas PUD, Grant PUD, and the CCT will meet to discuss proportional responsibilities for funding run-composition sampling at Wells Dam for summer Chinook; and Chelan PUD will provide an update on the discussions at the Hatchery Committees’ March 20, 2013 meeting (Item VI-A).**
  Todd Miller said that WDFW developed a budget for the work and provided this to Peter Graf at Grant PUD. He said that he and Graf are now drafting a statement of work which Miller anticipates should be available for discussion at the Hatchery Committees April 17, 2013 meeting.

- **Keith Wolf will provide Geris with CCT’s Chief Joseph Hatchery (CJH) M&E presentation materials for distribution to the Hatchery Committees (Item VI-B).**
  Geris said that Wolf provided the presentation materials and that they were distributed to the Hatchery Committees on February 21, 2013.

II. Douglas PUD

A. 2013 Program Activities Update (Greg Mackey)

Twisp Weir and Twisp and Chewuch Ponds Update

Greg Mackey said that the Twisp Weir was set up on March 11, 2013, and operations started the following day. He said that Twisp and Chewuch ponds were watered up and fish were already being transferred to the ponds on March 11, 2013. He said that Twisp steelhead and spring Chinook will be co-mingled with 5,000 of each species passive integrated transponder (PIT) tagged. He said that Charlie Snow monitors the fish as they exit the pond through the outfall channel. Mackey said that no issues have been observed to date with co-acclimating the Twisp spring Chinook and steelhead in the Twisp Pond.

Wells Hatchery Summer Chinook HGMP Update
Mackey said that Douglas PUD has completed drafting their Wells Hatchery Summer Chinook HGMP. He said that the recent Methow Hatchery Spring Chinook HGMP and the draft 2005 Summer Chinook HGMP that Kirk Truscott drafted were used as templates, with program-specific revisions and updates, as needed. Mackey said that Jayson Wahls, Wells Hatchery Complex Manager, reviewed the HGMP, and that Section 2, which summarizes effects on other populations, was updated with current information. He said that he hopes to get the draft HGMP to the Hatchery Committees for review as soon as possible. Mike Tonseth asked about the status of internal NMFS discussions regarding the processing of HGMPs for non-listed programs currently covered by Permit 1347. Lynn Hatcher said that he will check on this and report back to the Hatchery Committees.

Methow Spring Chinook and Wells Complex Steelhead HGMP Sufficiency Letters
Mackey said that Douglas PUD received Methow Spring Chinook and Wells Complex Steelhead HGMP sufficiency letters, which means that Douglas PUD is now in consultation. Tonseth said that spring Chinook and steelhead sufficiency letters have also been sent to USFWS regarding the Winthrop NFH programs.

Methow FH Spring Chinook Broodstock Collection Analysis
Mackey said that with all of the changes in the Methow spring Chinook Hatchery programs (i.e., survival study adjustments, recalculations, HGMPs, Chelan PUD withdrawal), there has been interest in releasing all 135,000 spring Chinook in the Methow River, and not releasing a portion in the Chewuch River. He said that, based on preliminary analyses, releasing a portion of the Methow Hatchery production in the Chewuch River would likely reduce the returns to Methow Hatchery, and hence the numbers that could be collected as broodstock. He added that this was part of the results when percent hatchery-origin spawners (pHOS) analyses were completed for the Methow basin. Mackey said that he has started analyses to further explore this; however, the analysis is incomplete. He said that so far he has found that the Methow Hatchery program should usually be able to fulfill its broodstock needs with 135,000 Chinook smolts released from the Methow Hatchery. However, he said that
excess Methow Hatchery-origin broodstock that would be used in the Winthrop NFH safety-net program are likely to not be available in sufficient numbers, or at all in some years.

**Future of Spring Chinook Broodstock Collection for Methow and Okanogan Programs**

Mackey said that he and Kirk Truscott have discussed the issue of collecting spring Chinook broodstock for the Methow and Chief Joseph Hatchery spring Chinook programs at Wells Dam. He said that a primary concern is that broodstock collected at Wells Dam cannot be readily sorted into those of Methow- versus Okanogan-origin and that when Chief Joseph Hatchery is at full operation, those fish will greatly outnumber Methow fish. Therefore, trapping at Wells Dam will necessitate handling large numbers of fish to sort through and identify target fish for certain programs. In addition, this means that wild fish will be subjected to this handling along with hatchery-origin fish. Using analytical means to identify wild fish would necessitate holding fish, resulting in migratory delay of non-target fish. Okanogan natural-origin fish would be at risk of being collected as Methow fish because they would be genetically indistinguishable. A fledgling Okanogan population would be at risk if unintentional by-catch for broodstock occurred. He added that a strategy to collect spring Chinook broodstock will need to be developed, especially when CJH begins returning large numbers of fish. Truscott added that neither the Methow nor Okanogan rivers have adult collection capabilities. He said that these issues would need to be addressed soon. Truscott noted that the Methow conservation fish have coded-wire tags (CWTs), so that they can be differentiated. Tonseth said that the first generation safety net fish out of Winthrop also have CWTs. Truscott recommended considering marking strategies for each program in order to differentiate the groups. Truscott asked about the possibility of alternate fin clips, although not typically accepted, and added that it may be useful to conduct a literature review on differential survival. Mackey noted that trapping is known to affect fish passage and it would need to be determined to what degree aggressive trapping would be acceptable. Microchemistry analysis may be a method that could discriminate wild fish, but this would require holding fish, inflicting handling stress and migration delay on non-target fish. Truscott said that CJH is not releasing spring Chinook at CJH this year, and that broodstock collected will be for 2015 releases. Tonseth said that the earliest returns from the Okanogan River will be in 2016—with jacks in 2015. Truscott said that collecting broodstock in-basin for the Methow Program would be complicated; Tonseth noted that
improvement to Foghorn Dam was identified in the U. S. Bureau of Reclamation’s (Reclamation’s) analysis in response to a BiOp reasonable and prudent alternative (RPA) action implementation for steelhead. Keely Murdoch noted that Bill Gale also should be a part of this discussion because of the Winthrop NFH program. Truscott and Mackey agreed. Mackey said that he will continue to run analyses on in-basin trap efficiency and likelihood of achieving broodstock collection to support both programs.

Steelhead Broodstock Collection for 2013 Methow Safety Net
Mackey said that all needed steelhead broodstock for the Methow Safety-Net program were collected in fall 2012 for the 2013 brood year Wells Hatchery Steelhead Programs, and that full egg take has been reached (the fish collected in the fall at Wells Dam and Hatchery spawn prior to when fish remaining in the river move to spawning areas in the spring and become susceptible to broodstock collection once again). Hence, for the 2013 brood year Methow Safety Net Program, he proposed that adult steelhead broodstock already collected and spawned in sufficient numbers to meet egg take requirements be used for the program in lieu of collecting broodstock in the Methow Basin. The return cohort for this brood year does not include returns from the new Twisp stock program, and therefore, returns to the Methow are of the same Wells stock as those already collected. Therefore, there is no advantage to collecting more fish. If additional fish are needed this spring, they would be collected at Wells Dam/Hatchery or the in the Methow basin in spring 2013. Charlie Snow agreed with this proposal and added that any excess fish could go to Ringold Hatchery. Mike Tonseth asked if the Twisp Weir has been considered to fill the safety net program, and Mackey said that 25 percent of the program can be collected from the Twisp Weir and the balance would come from Winthrop NH; and then if needed, additional broodstock could come from Methow Hatchery, or Wells Dam/hatchery. Keely Murdoch said that her only concern is that all broodstock were collected in the fall, which might not be representative of run timing for the entire run. She added, however, that if it is just for one year and only for the safety net program, then this option may not pose a significant issue. Mackey said that essentially, the process is the same as last year. Hatchery Committees representatives present agreed to use the steelhead broodstock collected in the fall of 2012 for the Douglas PUD Methow Safety-Net broodstock, and to not collect additional broodstock in the Methow basin in the spring of 2013 for this program, unless an unexpected need for additional
broodstock is identified by hatchery personnel with any excess fish going to Ringold Hatchery.

III. NMFS

A. HGMP Update (Lynn Hatcher)
Lynn Hatcher said that Craig Busack is working on the Mid-Columbia Coho BiOp, and that the Leavenworth NFH spring Chinook and Entiat NFH spring Chinook draft BiOps are still in final review by National Oceanic and Atmospheric Administration (NOAA) General Counsel (GC). Hatcher reminded the Hatchery Committees that the NMFS final review process is taking longer than in the past due to greater scrutiny by the NOAA GC. Mike Tonseth asked if the longer review process is due to more extensive reviews or due to pending lawsuits; and Hatcher replied that both reasons are true. Greg Mackey asked about the status of Methow HGMPs, and Hatcher replied that the US v OR Production Advisory Committee (PAC) is still waiting for NMFS and the Yakima Nation (YN) to address several pending issues. Mike Schiewe cautioned that NMFS needs to be mindful that consultations in the Methow have started and deadlines must be met, or agencies will be unable to obtain their permits and will subsequently default on their program requirements.

IV. Douglas PUD, Chelan PUD, and Grant PUD

A. 5-Year M&E Plan Update (Greg Mackey and Josh Murauskas)
Josh Murauskas said that the Hatchery M&E Workgroup met on March 18, 2013. He said that they addressed all comments and edits to the draft Analytical Framework 5-Year Update and a revised draft for final review was distributed to the Hatchery Committees on March 19, 2013. Mike Tonseth said that some components of the plan that consist of tables containing management objectives and targets have yet to be resolved, have been removed from the document, and will instead be added as appendices to the plan when they are fully developed. Murauskas said that, ultimately, the revised plan is similar to the previous plan only with further clarifications and objectives in meeting hatchery goals.

Keely Murdoch noted that the 5-year update of the Hatchery M&E Plan involved two steps: 1) updating the M&E plan to reflect changes in the way the programs are now operated; and
2) considering changes based on the 5-year analyses and reviewing each objective to evaluate if results of the 5-year analyses indicate changes to the plan are warranted. She questioned whether the second part of the review had been completed, and noted that the Hatchery Committees agreed that this step was important for making meaningful revisions to the M&E plan, implementation plan, and/or hatchery program itself. Murdoch asked, for example, how objectives for steelhead reference populations will be addressed. Greg Mackey explained that there are no data available to address steelhead objectives using reference populations, but Tracy Hillman's white paper on using reference streams for M&E analysis has been cited in and appended to the plan. This document described approaches for situations when reference population data are not available. Todd Pearson said that language in the plan was modified, as necessary, to accommodate missing data. Mike Schiewe reminded the Hatchery Committees that the workgroup revising the Hatchery M&E Plan was open to all members and included regular participation by Hatchery Committees members and technical representatives of WDFW and BioAnalysts, which were collectively the biologists most familiar with implementation of the first 5 years of the M&E Program and analyses of the results. He said that based on the progress reports at Hatchery Committees’ meetings during the past several months, it was his understanding that the framework was modified based on lessons learned. Murdoch said that she had participated in all but the last meeting of the working group, and that she did not think that the second step had been well-documented. Tonseth added that in terms of program-by-program review, any modifications to any one program would be captured in the appendix, but would not be applied to the entire plan.

Murdoch suggested the need for better documentation of what changes were made, and why they were made. She recalled that, in the past, program objectives were reviewed and rewritten to be achievable, and said that she would like to see the same process implemented with this revision. Murauskas reminded the Hatchery Committees that the intention was to have this plan approved in April 2013 for contracting purposes. Mackey said he believes that a comprehensive review process was completed, and was uncertain that such a formalized record is necessary. He also said that Andrew Murdoch and Tracy Hillman both participated
in the review and revision process, and noted that they were among the lead authors of the annual reports and the 5-year summary report.

Schiewe suggested, in consideration of getting the programs in place for 2014, to proceed with the timeline on approving the revised plan, and reconvening again to develop a more detailed record and to evaluate if there are any additional changes needed. Murdoch said she would prefer that the Hatchery Committees review the reports to verify that all updates are incorporated. Kirk Truscott added that it would also be worthwhile to see an executive summary that summarizes what changes were made; and Murauskas said that he will distribute a summary of changes made to the revised draft Analytical Framework 5-Year Update to the Hatchery Committees no later than March 22, 2013. Following distribution of this list, Hatchery Committees representatives will provide a list of additional objective-level changes, if any, which should be considered, including suggested revisions, to Kristi Geris for distribution to the Hatchery Committees no later than April 5, 2013.

V. Chelan PUD

A. M&E Request for Proposal (Josh Murauskas)

Josh Murauskas said that a Wenatchee River Basin Hatchery M&E Request for Proposal (RFP) Timeline (Attachment B) was distributed to the Hatchery Committees by Kristi Geris on March 19, 2013. He said that this timeline is intended to highlight the path forward for the Wenatchee River Basin Hatchery M&E RFP process.

B. 2013 Wenatchee Steelhead Releases (Josh Murauskas)

Josh Murauskas said that Chelan PUD and WDFW discussed ways to improve steelhead releases in the Wenatchee basin, and summarized their discussions and proposed testing in Chelan PUD’s 2013 Wenatchee River Basin Steelhead Release Strategy (Attachment C), which was distributed to the Hatchery Committees by Kristi Geris on March 15, 2013. He said that the apparent survival to McNary Dam of forced released fish will be compared with those of volitionally released fish and will be sorted by PIT tags, using both circular tanks and raceways. He acknowledged that the migration rate of hatchery-by-hatchery (H×H) and
wild-by-wild (W×W) progeny may be different and could affect results. He said that a key difference with the volitional group in 2013 versus 2012 is that the releases will begin earlier, hopefully improving survival.

Mike Tonseth expressed concern with the release strategy, and in particular with the different parental origins and the potentially different migration patterns based on those origins. He said that recent literature indicates that certain parental crosses have a higher tendency to residualize, and asked whether the 2013 strategy could address this. He also noted that a condition in the hatchery permits specifies that non-migrants can only be released in the lower Wenatchee River. Murauskas acknowledged Tonseth’s concerns, and said that hopefully some of these issues can be addressed during review of PIT-tag data. Tonseth said that fish need to be sampled over time to determine dominant origin, and added that he would like this included in this year’s work. Murauskas said that Chelan PUD is discussing possible options to obtain additional information, such as installing antennas in the raceways and subsequent in-stream detections.

Regarding the second point (No. 2) in Attachment C, Tonseth asked what the proposed method is for comparing performance of different release strategies. Murauskas explained that if volitional release starts in April, it could bias the forced release; so, a net will be installed to make sure the forced release is representative of the entire population. Tonseth asked if the split would occur before or after the 25,000 fish destined for Blackbird Pond are moved out, and Murauskas replied that Blackbird fish will be taken out prior to installing the net, and that the PIT-tag data will later be tested for random distribution. Murauskas said that fish that do not volitionally exit the rearing raceway will be released in the lower Wenatchee River at Tumwater, as outlined in the Section 10 permit. Lynn Hatcher said that he thought those fish would go to Blackbird Pond, and Tonseth clarified that anything left is treated as a non-migrant. He added that they would not go to Blackbird Pond because there is no co-manager agreement, and the residualism rate is not known. Hatcher asked if the fish that are released below Tumwater would migrate, and Tonseth replied that they may. He added that Charlie Snow authored a white paper about non-migrants’ potential to migrate
that indicated that migration may simply depend on whether the fish are released in riverine waters or put in landlocked water.

Tonseth noted that according to the February M&E Progress Report for the Chelan PUD Hatchery Programs that was distributed on March 19, 2013, the steelhead population in the proposed strategy is incorrect, and therefore, the sample sizes need to be updated accordingly. Murauskas said that Chris Moran had originally proposed release dates; however, Murauskas stated that some flexibility may help operator in terms of logistics. Tonseth said that the existing data should be reviewed to determine what release time would result in the highest survival, and Murauskas explained that survival in 2012 was so poor, that nothing could be deduced by reviewing these data. Tonseth noted that any proposal should not impact spring Chinook releases in the Chiwawa River. He said that fishery managers are discussing starting spring Chinook volitional releases a day or so earlier than the spill start date and then pushing them out after about one week so that the steelhead volitional release can be initiated.

Kirk Truscott said he thinks that the release dates for circulars and raceways, respectively, need to be the same in order to maintain the same conditions. Murauskas said that forced release cannot be matched with volitional released fish over several weeks. He added that smolt trap data indicate that the maximum steelhead migration peaks in early-May. Keely Murdoch said that she is okay with volitional release not starting the same time, and added that release dates are not what is being compared, but rather, two different strategies are being compared—one is to push the fish out at the usual date, and the other is to let them leave on their own. She said that if the evaluation is when one release strategy works the best, then release dates should be compared.

Tonseth said that he has concerns about dividing the pond and achieving representative sample sizes. He asked if there will be enough PIT tags on each side of the pond, and Murauskas replied that PIT tag data will be reviewed from both groups, when available, to determine if there were representative populations. Truscott asked about the W×W progeny
in the ELISA pond, and Alene Underwood said that those fish will not be involved in the release strategy study.

Schiewe summarized that the idea was not to have a perfect experiment, but rather to begin sorting out possible explanations for low survival in 2012 and find a solution to have better survival in future years. Hatchery Committees representatives present agreed to Chelan PUD's 2013 Wenatchee River Basin Steelhead Release Strategy.

C. **Spring Chinook HGMPs (Joe Miller)**

Joe Miller said that Chelan PUD is preparing a document that requests Endangered Species Act (ESA) coverage for their Methow spring Chinook program. He said that the document focuses on the aspects of the program that have changed from the original HGMP submittal in 2010, as outlined in a handout provided at the meeting and also distributed via email on March 21, 2013 (Attachment D). Miller said that the document will include targets that are reflective of existing HCP targets, and that a variety of facilities will be included that may be available to ensure that ESA coverage exists for multiple contingencies. He added that the basic life-history stages and hatchery locations for Chelan PUD's spring Chinook Hatchery program will also be described. He said that issues that will be addressed include straying, adult management, and percent hatchery origin spawners (pHOS).

Miller said that Chelan PUD is awaiting the results of discussions at the PAC meeting; however, they will need to move forward with this document soon. He said that this document is not a new HGMP, but rather an update.

D. **Spring Chinook Pilot at Rocky Reach (Alene Underwood)**

Alene Underwood said that a proposal to trap spring-run Chinook salmon at Rocky Reach Dam in 2013, including an overview of the trap design (Attachment E) was distributed to the Hatchery Committees by Kristi Geris on March 19, 2013. She said that the proposal basically looks to target spring Chinook, collect them in the trap, verify their species, and release them; this would happen over a 4-week sampling period from May to June 2013. She said
that the trap has been used successfully for bull trout and steelhead with virtually no passage delays, and added that the trap will be videotaped. She said that if no impacts are observed to non-target fish, then a path forward will be proposed.

Mike Tonseth asked how the facility will be staffed in the future if this proposal does prove feasible. He said that his assumption would be that a person would be needed to monitor the trap for fish that are not PIT-tagged. Joe Miller replied that in terms of the pilot, a protocol and/or additional information will be developed, if requested. He added that there are many broodstock issues coming up, and to the extent that this trap benefits hatchery programs, it makes sense. Mike Schiewe said that in terms of passage, this proposal will likely also go to the HCP Coordinating Committees for approval. Miller added that use of this trap has been approved in the past, and so he does not foresee this being an issue. He added that he believes use of the trap is covered by the current permit; however, he is unsure regarding direct take authority. He said that Chelan PUD is proposing only small numbers and the fish will not be taken out of the water. Tonseth said that identifying and isolating the fish will likely be the challenge and Underwood said that this has been accomplished before.

Underwood said that Chelan PUD will be asking for approval of the proposal at the Hatchery Committees’ April 17, 2013 meeting. Miller said that a letter will be prepared for NMFS that is similar to the letter that was developed for the Parental Based Tagging (PBT) study. Kirk Truscott requested that a summary be included in the proposal that indicates the reason behind the proposal. Underwood said that she will revise and redistribute Chelan PUD’s pilot study proposal to trap spring-run Chinook salmon at Rocky Reach Dam in 2013, as recommended. Chelan PUD will also brief Bill Gale on the details of the proposal.

E. Carlton Acclimation Facility Capacity Utilization SOA (Alene Underwood)

Alene Underwood said that the Carlton Acclimation Facility Capacity Utilization Draft SOA that was distributed to the Hatchery Committees by Kristi Geris on March 19, 2013, is a draft for discussion purposes only. She said that the draft SOA is an agenda item at the Priest Rapids Coordinating Committee (PRCC) Hatchery Subcommittee’s (HSC’s) March 21, 2013 meeting, and that she just wanted to distribute the draft document to the Hatchery Committees prior to the HSC discussion. Mike Tonseth suggested revising the text to reflect
that the proposal applies to 2013 broodstock only. He acknowledged, however, that the long-term plan for Chelan PUD’s 60,516 Methow spring Chinook mitigation obligation is still unknown. Underwood said that if the Committee as a whole agrees to the revision, she will update the language.

**VI. WDFW**

A. *Draft 2013 Upper Columbia River Salmon and Steelhead Broodstock Objectives and Site-Based Broodstock Collection Protocols (Mike Tonseth)*

Mike Tonseth said that the draft 2013 Upper Columbia River Salmon and Steelhead Broodstock Objectives and Site-Based Broodstock Collection Protocols (Attachment F) were distributed to the Hatchery Committees by Kristi Geris on March 15, 2013. He said that with the deadline to NOAA being April 15, 2013, Tonseth requested that Hatchery Committees representatives submit edits and comments on the draft 2013 Broodstock Protocols no later than April 8, 2013. Tonseth reviewed notable 2013 protocols, as described in Attachment F, and said that the 2013 protocols were largely based on the 2012 Methow Spring Chinook Broodstock Genetic Results, that were also distributed to the Hatchery Committees on March 15, 2013.

**VII. CCT**

A. *February M&E Progress Report for the Chelan PUD Hatchery Programs (Kirk Truscott)*

Kirk Truscott requested clarification on rearing activities for the 2011 Brood Wells Summer Chinook Yearling Program, as described in the February M&E Progress Report for the Chelan PUD Hatchery Programs that was distributed to the Hatchery Committees on March 19, 2013. He said that the progress report indicated that Chelan Falls’ yearlings are being reared at Chelan Falls Hatchery, and Mike Tonseth clarified that the yearlings are being reared at the Chelan Falls Acclimation Facility. Truscott also asked about the size difference of fish reared in circulars at the Chelan Falls Acclimation Facility, and Alene Underwood suggested that the transfer size could have been different.
VIII. HCP Administration

A. Next Meetings

The next scheduled Hatchery Committees’ meetings are on April 17, 2013 (Chelan PUD office); May 15, 2013 (Douglas PUD office); and June 19, 2013 (Chelan PUD office).

List of Attachments

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<td>Draft 2013 Upper Columbia River Salmon and Steelhead Broodstock Objectives and Site-Based Broodstock Collection Protocols</td>
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Notes:
* Denotes Hatchery Committees member or alternate
† Joined by phone
The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees’ meeting was held at Chelan PUD headquarters in Wenatchee, Washington, on Wednesday, April 17, 2013, from 9:30 am to 2:30 pm. Attendees are listed in Attachment A to these meeting minutes.

**ACTION ITEM SUMMARY**

- Greg Mackey will provide the Wells Hatchery Modernization Master Plan to the Hatchery Committees for review, when available (Item I).
- Chelan PUD, Douglas PUD, Grant PUD, and the Colville Confederated Tribes (CCT) will discuss proportional responsibilities for funding run-composition sampling at Wells Dam for summer Chinook; and an update will be provided on the discussions at the Hatchery Committees May 15, 2013, meeting (Item I).
- National Marine Fisheries Service (NMFS) will have a standing agenda item to provide a Hatchery and Genetic Management Plan (HGMP) update at future Hatchery Committees meetings (Item I).
- Mackey will provide the final Revised Analytical Framework 5-Year Update to Kristi Geris for distribution to the Hatchery Committees (Item II-A).
- Douglas PUD and Chelan PUD will provide their final Statements of Agreement (SOAs) approving the Revised Analytical Framework 5-Year Update to Geris for distribution to the Hatchery Committees (Item II-A).
- Representatives of the Hatchery Committees will submit recommendations for peer reviewers to participate along with Hatchery Committees members in the review of
responses to the Chelan PUD Hatchery Monitoring and Evaluation (M&E) Request for Proposals (RFPs; Item II-A).

- Alene Underwood will provide the final SOA for the Carlton Acclimation Facility Capacity Utilization to Geris for distribution to the Hatchery Committees (Item III-A).
- Underwood will provide the revised Spring Chinook Pilot Study at Rocky Reach to Geris for distribution to the Hatchery Committees no later than April 19, 2013; email approval of the pilot study will be requested from Hatchery Committees representatives no later than April 26, 2013 (Item III-A).
- Lynn Hatcher will provide NMFS direction on what type of additional documentation is needed from the PUDs to obtain new permits (i.e., a full HGMP versus an updated program description) by Friday, April 26, 2013, including a timeline of when documents are needed, to Geris for distribution to the Hatchery Committees (Item IV-A).
- Hatchery Committees representatives will review Mackey’s white paper on Methods for Estimating Likelihoods of Outcomes in Broodstock-Collection prior to the Hatchery Committees May 15, 2013, meeting, when the Committees will discuss its use in developing future broodstock protocols (Item IV-D).

STATEMENT OF AGREEMENT DECISION SUMMARY

- The Douglas PUD SOA approving the revised Monitoring and Evaluation Plan for PUD Hatchery Programs: 2013 Update was approved by Hatchery Committees representatives (Item II-A).
- The Chelan PUD SOA approving the Revised Analytical Framework 5-Year Update was approved by Hatchery Committees representatives (Item II-A).
- The SOA for the Carlton Acclimation Facility Capacity Utilization was approved by Hatchery Committees representatives present (Item III-A).

AGREEMENTS

- Hatchery Committees representatives present approved the Revised Analytical Framework 5-Year Update (Item II-A).
• Hatchery Committees representatives present agreed that, in the event that Carson ancestry is detected in natural-origin fish collected for broodstock at Methow hatcheries, those fish will be retained and used for broodstock (Item V-A).

REVIEW ITEMS

• The draft residual steelhead manuscript *Ecologic and demographic costs of releasing non-migratory juvenile hatchery steelhead in the Methow River, Washington* was distributed to the Hatchery Committees on February 19, 2013, for a 60-day review with comments due to Charlie Snow no later than April 22, 2013.
• Kristi Geris sent an email to the Hatchery Committees on April 1, 2013, notifying them that the draft 2012 Annual Chelan PUD Hatchery M&E Report is available for download from the FTP site and is out for a 30-day review period, with comments due to Tracy Hillman by April 30, 2013.

FINALIZED REPORTS

• No reports have been finalized since the last Hatchery Committees meeting.

I. Welcome, Agenda Review, Meeting Minutes, and Action Items

Mike Schiewe welcomed the Hatchery Committees and reviewed the agenda. The following revisions were made to the agenda:

• Mike Tonseth added an update on Chelan Falls summer Chinook.
• Greg Mackey added an update on Wells subyearling release numbers.

The revised draft March 20, 2013 meeting minutes were reviewed. Two outstanding comments were discussed.

• Regarding Chelan PUD’s discussion on 2013 Wenatchee Steelhead Releases, Tonseth clarified that hatchery permits specify that non-migrants—not migrants—must be released in the lower Wenatchee River.
• Regarding the discussion of the February M&E Progress Report for the Chelan PUD Hatchery Programs, Kirk Truscott clarified details of his question about the size of fish reared at the Chelan Falls Acclimation Facility.
Kristi Geris said that all other comments and revisions received on the draft meeting minutes were incorporated. The Hatchery Committees members present approved the March 20, 2013 meeting minutes, as revised.

Action items from the last Hatchery Committees meeting on March 20, 2013, and follow-up discussions were as follows:

- **Mackey will provide the Wells Hatchery Modernization Master Plan to the Hatchery Committees for review, when it is available (Item I).**

Mackey said that Douglas PUD anticipates that the draft Master Plan will be complete by April 30, 2013, as which time he will provide it to the Hatchery Committees for review. Mackey reminded Committees members that the new Federal Energy Regulatory Commission (FERC) license requires agency reviews on many documents (such as this one), and because of uncertainty about FERC deadlines, will likely require expedited review. Mackey noted that the Master Plan, excluding the appendices, includes bio-programming and other conceptual information, but will not include detailed engineering or design specifications. Keely Murdoch asked if an additional review will be held for the engineering specifications, and Mackey replied that Douglas PUD had not yet planned for one. He said, however, that the HCP Coordinating Committees and NMFS will review plans related to fish passage. Murdoch noted that for the Priest Rapids Hatchery rebuild, Grant PUD held meetings where the engineers explained the designs to those interested. She said that these meetings included discussions that resulted in design changes, and added that it may be beneficial to do something similar for the Wells Hatchery modernization. Bill Gale said that changes included significant improvements in how fish are handled, general hatchery operations, and worker safety. Mackey said that Douglas PUD had been considering inviting the HDR Engineering, Inc. (HDR) team to present details of the modernization at a future meeting. He also said that Jayson Wahls of the Washington Department of Fish and Wildlife (WDFW) has been involved in the entire process, and many design issues have been addressed on the ground level. Murdoch agreed that Wahls’ involvement was good, but added that it still may be beneficial to obtain additional input from other sources. Tonseth added that the Hatchery Committees are responsible for making sure modifications do not compromise the programs. He also added that meeting with the engineers may help
expedite moving the plans forward, opposed to scheduling additional review periods. Mackey said that Douglas PUD will discuss options for review of the engineering aspects of the modernization.

- **Chelan PUD, Douglas PUD, Grant PUD, and the CCT will meet to discuss proportional responsibilities for funding run-composition sampling at Wells Dam for summer Chinook; and Chelan PUD will provide an update on the discussions at the Hatchery Committees April 17, 2013 meeting (Item I).**
Alene Underwood said that Chelan PUD and Grant PUD staff had discussed the need for additional information before reaching any agreement. Peter Graf said that Grant PUD is now coordinating with Todd Miller at WDFW, and that discussions are underway. An update on progress will be provided at the Hatchery Committees May 15, 2013 meeting.

- **Hatcher will check on the status of internal NMFS discussions regarding processing of HGMPs for non-listed programs currently covered by Permit 1347 (Item II-A).**
Hatcher said that Craig Busack has received additional materials from the PUDs and that he is now in the process of determining if information received to date is sufficient to request a time extension on the current Permit 1347. Hatcher added that Busack said to contact him directly with any questions. Schiewe reminded the Hatchery Committees that NMFS needs a U.S. Fish and Wildlife Service (USFWS) consultation for bull trout and any other USFWS-listed species from the PUDs in order for NMFS to issue new permits. Gale recommended contacting Karl Halupka (USFWS), and added that Halupka will do his best to complete consultations in a timely manner. Hatcher said that NMFS, WDFW, and USFWS plan to hold a meeting on April 19, 2013 to discuss Section 7 permitting. Schiewe suggested that NMFS have a standing agenda item to provide a HGMP update at future Hatchery Committees meetings. Hatcher said that he would ask Busack about requesting a set time for the update.

- **Josh Murauskas will distribute a summary of changes to the revised draft Analytical Framework 5-Year Update to the Hatchery Committees no later than March 22, 2013. Following distribution of this list, Hatchery Committees representatives will provide a list of additional objective-level change that should be considered, if any, including suggested revisions, to Geris for distribution to the Hatchery Committees no later than April 5, 2013 (Item IV-A).**
Murauskas provided a summary of changes to the revised draft Analytical Framework 5-Year Update as distributed to the Hatchery Committees by Geris on March 22, 2013.

- **Underwood will revise and redistribute Chelan PUD’s pilot study proposal to trap spring-run Chinook salmon at Rocky Reach Dam in 2013, as recommended; and Chelan PUD will also brief Gale on the details of the proposal (Item IV-D).**

Underwood provided Chelan PUD’s revised pilot study proposal as distributed to the Hatchery Committees by Geris on April 16, 2013.

- **Hatchery Committees representatives will submit edits and comments on the draft 2013 Upper Columbia River Salmon and Steelhead Broodstock Objectives and Site-Based Broodstock Collection Protocols to Tonseth no later than April 8, 2013 (Item VI-A).**

  Tonseth said that he will discuss pending comments during his agenda item today.

## II. Chelan PUD, Douglas PUD, Grant PUD

### A. **DECISION: Revised Monitoring and Evaluation Plan for PUD Hatchery Programs: 2013 Update (Alene Underwood and Greg Mackey)**

Greg Mackey said that the 5-year update of the M&E plan titled “Monitoring and Evaluation for PUD Hatchery Programs: 2013 Update” was distributed to the Hatchery Committees by Kristi Geris on March 19, 2013, for final review. Keely Murdoch provided comments on the revised draft update on April 11, 2013. Kirk Truscott also provided verbal comments on the draft update. Mackey said that, with Murdoch’s and Truscott’s comments addressed, a final draft was distributed to the Hatchery Committees by Geris on April 16, 2013. Mackey reviewed the changes with the Hatchery Committees and additional edits and clarifications were made to the document as recommended by Hatchery Committees representatives.

Hatchery Committees representatives present approved the Monitoring and Evaluation for PUD Hatchery Programs: 2013 Update, and Mackey said that he will provide the final document to Geris for distribution to the Hatchery Committees.

Truscott asked if the Monitoring and Evaluation for PUD Hatchery Programs: 2013 Update will be the basis for RFPs to implement the program, and Alene Underwood replied that it will and that the document will also be appended to the RFPs. Underwood said that Chelan
PUD plans to put out their Hatchery M&E RFPs for implementation in 2014 no later than mid-May 2013. She said that RFPs will be out for 2 months, and then proposals received will be reviewed by an expert panel. Joe Miller said that the expert panel is not yet in place yet, and that Chelan PUD plans to seek input from all Hatchery Committees representatives on the composition of the panel. Mike Tonseth noted that with the Monitoring and Evaluation for PUD Hatchery Programs: 2013 Update appended to the RFPs, alternative methods to achieve M&E objectives could potentially be proposed by parties. He asked if and when the Hatchery Committees will have a chance to review proposals submitted in response to the RFPs, and in particular any alternative methods? Mike Schiewe said that the review panel would include Hatchery Committees members that did not have a conflict of interest, as defined in the Hatchery Committees’ Conflict of Interest Policy. He said that as outlined in the Policy, members with a conflict will not vote on or be asked to approve or disapprove proposals, but may, at the discretion of the Hatchery Committees participate in discussions on the proposals. Schiewe indicated that members without a conflict will participate on the review panel, and that all members will be asked to recommend external reviewers to assist in the review of proposals. Murdoch asked about the Hatchery Committees’ review and approval of the annual Implementation Plans, which in the past has been completed prior to annual contracting. Underwood noted that the contractor(s) will have already been selected by the time the first Implementation Plan is reviewed. Murdoch said that there could be issues approving the Implementation Plan if the Hatchery Committees find that a contractor is unable to meet components of the Implementation Plan. She asked if any significant changes are anticipated with implementation, and Miller replied that he is not expecting anything. Murdoch asked about Douglas PUD’s RFP process, and Mackey replied that Douglas PUD must periodically issue RFPs for contracts, but will not be on the same timeline as Chelan PUD’s RFP process. Bill Gale asked about the Grant PUD process, and Peter Graf said that Grant PUD will go out with an RFP with Chelan PUD.

Schiewe reiterated that the Hatchery Committees members without a conflict of interest will be part of the expert review panel. All Hatchery Committees representatives will have the opportunity to recommend outside reviewers. Lynn Hatcher asked about limitations to who can be recommended for the panel in terms of cost, and then asked who funds the review. Underwood said that Chelan PUD and Grant PUD would take care of costs for individual reviewers. Murdoch asked how far removed a person would need to be from the conflicted
party, and Schiewe replied that the Hatchery Committees Conflict of Interest Policy includes as a conflicted party someone who works for the same agency. Underwood added that this decision is also partly up to the discretion of the person in question—do they feel that they are conflicted? Gale noted that there are also several good, potential reviewers who are retired. The Hatchery Committees agreed to submit recommendations for peer reviewers to participate along with Hatchery Committees members in the review of responses to the Hatchery M&E RFPs.

Returning to the just-approved Hatchery M&E program document, Mackey said that Douglas PUD is also requesting approval of a SOA approving the Monitoring and Evaluation for PUD Hatchery Programs: 2013 Update. Douglas PUD’s draft SOA was distributed to the Hatchery Committees by Geris on April 16, 2013. Mackey reviewed the SOA, and Hatchery Committees representatives provided comments and suggested revisions, including the addition of a conditional statement regarding the completion and approval of pending appendices. Underwood said that Chelan PUD is also planning to request approval of a SOA, and that they intend to use the same format and language as Douglas PUD.

The Hatchery Committees representatives present approved the Douglas PUD SOA as revised, and approved a Chelan PUD SOS contingent on the use of the same language as the revised Douglas PUD SOA. *(Note: Douglas PUD’s final SOA [Attachment B], and Chelan PUD’s final SOA [Attachment C] were distributed to the Hatchery Committees by Geris on April 19, 2013, and April 22, 2013, respectively.)*

### III. Chelan PUD

**A. DECISION: Carlton Acclimation Facility Capacity Utilization SOA (Alene Underwood)**

Alene Underwood said that the revised draft SOA for the Carlton Acclimation Facility Capacity Utilization was distributed to the Hatchery Committees by Kristi Geris on April 16, 2013. Underwood reminded the Hatchery Committees that the intent of this SOA is to merely recognize the existence of sufficient capacity at the Carlton Acclimation Facility to accommodate both Chelan PUD’s 60,516 spring Chinook and Grant PUD’s 200,000 summer Chinook programs, but does not obligate the Hatchery Committees to support Carlton as a
permanent location for overwinter rearing Chelan PUD’s spring Chinook obligation. Joe Miller added that the way the SOA was previously written seemed to imply approval of the Carlton Acclimation Facility as a permanent location for Chelan PUD.

Bill Gale questioned whether a SOA is really needed if the only intent is to recognize capacity at the Carlton Acclimation Facility, and Mike Schiewe said that the SOA supports Chelan PUD’s relationship with Grant PUD at the facility. Gale also suggested indicating that the SOA only applies to brood year (BY) 2013, and Mike Tonseth recalled that agreement was already reached by the Hatchery Committees that Chelan PUD would use the Carlton Acclimation Facility for BY 2013, as documented in the Hatchery Committees December 12, 2012 meeting minutes. Miller added that specifying BY in the SOA will require a new SOA each year, which Chelan PUD would like to avoid. Gale said that Chelan PUD’s spring Chinook program will need to be re-addressed in 2014 regardless, and Miller agreed in terms of the use of the facility, not capacity. Miller suggested adding a statement to the SOA reflecting that the use of the Carlton Acclimation Facility as a long-term location for overwinter rearing will be determined in the future by the Hatchery Committees. Schiewe also suggested adding a statement reflecting that the Hatchery Committees have previously agreed to use the Carlton Acclimation Facility for BY 2013. Gale asked if the Hatchery Committees should expect an additional SOA on how these fish will be marked and evaluated, and Tonseth replied that Chelan PUD has already plans to tag 25 percent with passive integrated transponder (PIT) tags.

Tonseth noted that the SOA acknowledges that the facility is capable of accommodating the programs; however, it does not state the actual capacity of the Carlton Acclimation Facility. Underwood said that the capacity of the facility has already been stated in previous documentation, and Gale suggested simply referencing that documentation.

Underwood incorporated all suggested revisions and the revised SOA for the Carlton Acclimation Facility Capacity Utilization was approved by Hatchery Committees representatives present. The final SOA for the Carlton Acclimation Facility Capacity Utilization (Attachment D) was distributed by Geris to the Hatchery Committees on April 18, 2013.
B. DECISION: Spring Chinook Pilot at Rocky Reach (Alene Underwood)

Alene Underwood said that a revised Chelan PUD pilot study proposal to trap spring-run Chinook salmon at Rocky Reach Dam in 2013 was distributed to the Hatchery Committees by Kristi Geris on April 16, 2013. She said that, as requested at the Hatchery Committees March 20, 2013 meeting, an introductory paragraph was added providing a brief background on the purpose of the pilot study. Following distribution of the latest version of the draft pilot study she said that an additional paragraph about next steps was also added based on comments received from Bill Gale. Mike Tonseth requested that a refined description of trap operations also be included. Mike Schiewe noted that the HCP Coordinating Committees will also need to review this pilot study with regards to potential effects on fish passage. Kirk Truscott asked what data Chelan PUD will be collecting regarding trap efficiency, and Joe Miller replied that the pilot study proposes to simply document ease of operation and any potential problems that need to be addressed. Gale asked that if only ad-clipped fish are targeted, why not collect the fish to obtain additional data? Tonseth replied that collecting and handling the fish might require direct take coverage at Rocky Reach Dam. Underwood added that this pilot only aims to look at operation of the trap. Truscott asked about the efficiency of the trap when the ladder is full of fish. Miller responded that is one of the issues that the pilot study will address. Schiewe said that the Hatchery Committees need to come to agreement on exploring this trap as a collection location for broodstock, and the HCP Coordinating Committees will review the pilot from a fish passage issue perspective. Miller said that Chelan PUD will revise the draft pilot and redistribute it to the Hatchery Committees for email approval. Gale requested that the revisions clearly state the information gaps and how they will be addressed. Tonseth suggested outlining the questions that this year’s evaluations are set to address, and also outlining the questions that still need to be addressed, and by whom (i.e., the Hatchery Committees and/or HCP Coordinating Committees). Schiewe reminded the Hatchery Committees that agreement needs to be reached soon because the spring run has already started.

Underwood said that she will provide the revised Spring Chinook Pilot at Rocky Reach to Geris for distribution to the Hatchery Committees no later than April 19, 2013, and email approval of the pilot study will be requested from Hatchery Committees representatives no later than April 26, 2013.
C. Dryden Update (Alene Underwood)

Alene Underwood updated the Hatchery Committees on progress on Chelan PUD’s plan for Dryden total maximum daily load (TMDL) compliance (Attachment E) that was originally distributed to the Hatchery Committees on July 18, 2012. The plan was redistributed to the Hatchery Committees by Kristi Geris on April 10, 2013. Regarding Action #1, Underwood said that Chelan PUD is currently conducting phosphorus sampling while fish are on station at the Dryden facility. She said that last year it took about one month to get results back. Regarding Action #2, Underwood said that the low phosphorous feed trial was not ready in time for the 2013 acclimation period; and added that Chelan PUD is still waiting for certain information to come together to move forward. She said that, as for 2014, it is uncertain whether the feed trial will be performed in conjunction with the size evaluation that is already planned. Regarding Action #3, Underwood said that samples are still being collected at Chelan Falls, and that she plans to touch base with the Leavenworth National Fish Hatchery to verify that the circular tanks are still on track to be completed by the end of 2013. Regarding Action #4, Underwood said that she has met with Northwest Fisheries Science Center scientists, Chris Moran, and Eastbank Fish Hatchery staff, and that evaluating 2012 brood is underway. Regarding Action #5, Underwood said that this year the fish on station will be the last of the 864,000 program, and that next year Chelan PUD will evaluate phosphorus discharges from the reduced program.

Also, in March 2013, Underwood said that there was an outbreak of fungus in the summer Chinook at the Dryden facility. She said that losses amounted to approximately 300 to 500 per day. Mike Tonseth said that the fungus was a secondary infection, and added that Bob Rogers has been looking into these losses and is finding deep tissue bruising in the fish. He also added that the bruising appears to be from a lateral hit, and that Rogers plans to evaluate the transportation vessels. Tonseth noted that while each year fungus is observed at the Dryden facility, these issues are not present at the Carlton facility which uses the same equipment. Tonseth said that this increases interest in evaluating the water quality at Dryden. Bill Gale also suggested that something may exist at the Dryden facility that causes additional stress in combination with the injury. Gale asked if the Dryden facility fish are always reared in the same raceways, and Tonseth replied that they are not. Mike Schiewe asked about temperatures of receiving versus rearing water at Dryden and Carlton, and
Tonseth replied that they are relatively similar. He added that fish transfers are only allowed when the water is equal to or less than a 10 degree difference.

IV. Douglas PUD

   A. Wells Subyearling Release Numbers Update (Greg Mackey)

   Greg Mackey said that higher than typical hatchery survival at Wells Hatchery resulted in surplus subyearling summer Chinook for release in 2013. WDFW has inquired about what to do with the excess fish and identified a need at Prosser Fish Hatchery. Mackey said there are about 600,000 subyearling Chinook on station, of which about 500,000 will be tagged and released to fulfill the 484,000 subyearling Chinook mitigation component under the Wells HCP; the remaining 100,000 will be transferred to Prosser Fish Hatchery, which recently experienced a significant loss of summer Chinook due to a pump failure.

   B. Wells Hatchery Master Plan (Greg Mackey)

   Greg Mackey discussed this agenda item during the review of action items from the last Hatchery Committees meeting on March 20, 2013.

   C. HGMP for Wells Summer Chinook (Greg Mackey)

   Greg Mackey said that Rob Jones at NMFS indicated that Douglas PUD needs to provide a full HGMP for the Wells summer Chinook program. However, there has also been discussion of needing to submit only a program description. As a result, Mackey said that Douglas PUD develop an updated HGMP, which can serve both purposes. He said that Mike Tonseth has already reviewed the document and provided comments. The draft Wells Summer Chinook HGMP, along with a one-page Wells Summer Chinook HGMP summary, and a draft SOA approving the HGMP, were distributed to the Hatchery Committees by Kristi Geris on April 16, 2013. Mackey said that the updated HGMP is largely the same as the 2005 draft HGMP with the exception of incorporating at least 10 percent natural fish in the broodstock. Mackey said that effects on other species and populations were also updated with excerpts from the recent 5-Year M&E report. He added that it was modeled after the 2005 draft that Kirk Truscott developed, and also follows the current draft Methow Hatchery Spring Chinook HGMP.
Mackey said that he is still unsure of when NMFS will need the program description and/or HGMP, and depending on that deadline, Douglas PUD may request an expedited Hatchery Committees review. Mike Tonseth noted that the timeline really depends on whether NMFS needs an actual HGMP or just a program description. He added that if NMFS only requests a program description, then it would seem that NMFS has already determined that only the program description will suffice to get permitted. Lynn Hatcher said that he will provide NMFS direction on what type of additional documentation is needed from the PUDs to obtain new permits (i.e., a full HGMP versus an updated program description), including a timeline of when documents are needed, to Geris for distribution to the Hatchery Committees by Friday, April 26, 2013. Joe Miller indicated that Chelan PUD is not planning to submit any new HGMPs pending further direction from NMFS.

**D. Methods for Estimating Likelihoods of Outcomes in Broodstock-Collection (Greg Mackey)**

Greg Mackey briefly reviewed and summarized his exploratory work on broodstock estimation and managing risk and expectations in broodstock collection that he presented at the Hatchery Committees February 20, 2013 meeting. He said that he has now incorporated parameters from the draft 2013 Broodstock Protocols into his analyses (Attachment F) to facilitate discussions on applying these methods to brood collection in 2013, or future years. *(Note: the presentation [Attachment F] was distributed to the Hatchery Committees by Kristi Geris on April 18, 2013.)* Mackey added that a white paper on the broodstock collection estimation approach was also distributed to the Hatchery Committees by Geris on April 9, 2013; however, a small revision was made to the paper and a revised draft will be distributed to the Hatchery Committees following the meeting.

Mackey briefly reviewed the broodstock collection formula, as discussed at the Hatchery Committees February 20, 2013 meeting. He then reviewed the Methow spring Chinook program with the draft 2013 Broodstock Protocols paremeters used in the model (highlighted in tan in Attachment F). Mackey reminded the Hatchery Committees that these are not concrete values and are not intended to advocate anything, but rather are meant to inform decisionmaking. Bill Gale said that this formula seems to have real potential to ground truth the current methods of estimating broodstock needs. Mike Tonseth added that there are a few other things to consider when estimating broodstock requirements, depending on
whether the program was for listed- and non-listed species, and the potential constraints of a 33 percent extraction rate for natural origin recruits (NORs). He said that, for example, the draft 2013 Broodstock Protocols estimated the need for 88 total Methow spring Chinook, including 20 hatchery- and 68 natural-origin adults to meet program goals. He said that additional natural-origin fish cannot be added because it would exceed the 33 percent extraction rate. As for listed programs, Tonseth said that NMFS may prefer to be under the production goal, rather than over (i.e., surplus). He said that all of these types of considerations need to be evaluated before modifying the protocols. Tonseth said that he has no objections to incorporating the use of Mackey’s modeling approach, but exactly how it is used needs to be considered. Keely Murdoch said that she supports the use of Mackey’s method if it helps to meet program goals. Tonseth suggested that it might be useful to test the formula this year on a pilot basis to guide collection of broodstock for the Wells subyearling Chinook program. Gale commented that the difficulty has not been with coming up with the numbers, per se, but rather collection logistics such as where and when to collect. Mike Schiewe noted that, if the draft 2013 Broodstock Protocols are modified, that WDFW needs to make sure the Hatchery Committees are included in the discussion and that better attention to version control is needed to avoid the same tracking issues experienced with the 2012 Broodstock Protocols. Mackey said that this information is meant more for use as a managerial tool—not necessarily to dictate the process. It can be used by managers to assess tradeoffs in risk of collecting too few or too many fish for broodstock. He said that the white paper on the broodstock collection estimation approach explains how this method works and how to use it. Hatchery Committees representatives said that they will review Mackey’s white paper on *Methods for Estimating Likelihoods of Outcomes in Broodstock-Collection* prior to the Hatchery Committees May 15, 2013 meeting, when the Hatchery Committees will discuss its use in developing future broodstock protocols.

V. **WDFW**

A. **2013 Broodstock Collection Protocols (Mike Tonseth)**

Mike Tonseth recalled the Hatchery Committees’ decision to release 27 natural-origin Carson lineage adult spring Chinook, collected as broodstock for the Methow Hatchery program, into the Methow River in 2012; this was discussed at the Hatchery Committees June 20, 2012 meeting. He added that the Yakama Nation (YN) decided to abstain from the
decision, and Keely Murdoch explained that the abstention was because the YN had not anticipated the need for a decision, nor had they had the opportunity to fully assess the potential outcomes. Tonseth said that the draft 2013 Broodstock Protocols was once again unclear on Carson ancestry, and that he would like to avoid a similar situation as in 2012. Tonseth said that because numbers of returning NORs are expected to be limited in 2013, Hatchery fish will need to be incorporated to meet program obligations. He said that from this perspective, he sees the question as: what is better to retain for broodstock—natural-origin fish with some degree of Carson lineage or hatchery origin fish which may possess a lower degree of Carson lineage? Hatchery Committees representatives present agreed that, in the event that Carson ancestry is detected in natural origin fish collected for broodstock, those fish will be retained and used for broodstock. Tonseth said that this decision will be reflected in the 2013 Broodstock Protocols.

B. Chelan Falls Summer Chinook Update (Mike Tonseth)

Mike Tonseth said that Bob Rogers recently contacted him about an emerging fish health issue with summer Chinook at Chelan Falls Hatchery. Tonseth said that Rogers initially thought it was a bacterial gill disease related to gas bubble trauma (BGD). He said that fish were dying in Circulars 1 and 2, with the fish Circular 2 dying more rapidly. He added that the dissolved oxygen (DO) was quite low in Circulars 3 and 4, and fish in those tanks were taken off feed. Tonseth said that even after feed was halted, DO remained depressed. He said that a decision was made to release Circular 2 due to the disease issue; and because of the low DO in Circulars 3 and 4 and increasing disease in Circular 1, all tanks were ultimately released a few days earlier than planned. Tonseth said that Rogers is developing a pathology report, and once available, will be distributed to the Hatchery Committees for discussion. Alene Underwood added that the water seemed turbid, but there is no indication why. Tonseth noted that the fish health issues were first observed around the same time that Chelan Falls Powerhouse had issues. Underwood said that the facility had recently experienced generator issues and it was not realized that the pump was down for an extended amount of time. She also added that Chelan PUD is now discussing a supplemental oxygen system to avoid a similar situation in the future. Tonseth said that 2013 summer Chinook practices are being compared to those executed in 2012 to identify any differences. He said that low DO was only experienced in Circulars 3 and 4, and added that in addition to BGD, erythrocytic inclusion body syndrome (EIBS), or anemia in fish, was also observed.
Tonseth recalled that EIBS had previously been detected in fish at the Eastbank Annex; however, it had no significant impacts on the fish. He added that although fish at the Eastbank Annex had EIBS, fish at the Eastbank Hatchery did not. Underwood said that even with the loss, program goals were still met.

VI. HCP Administration

A. Next Meetings

The next scheduled Hatchery Committees’ meetings are on May 15, 2013 (Douglas PUD office), June 19, 2013 (Chelan PUD office), and July 17, 2013 (Douglas PUD office).

List of Attachments

Attachment A  List of Attendees
Attachment B  Douglas PUD’s final SOA approving the Monitoring and Evaluation for PUD Hatchery Programs: 2013 Update
Attachment C  Chelan PUD’s final SOA approving the Revised Analytical Framework 5-Year Update
Attachment D  Final SOA for the Carlton Acclimation Facility Capacity Utilization
Attachment E  Chelan PUD’s Plan for Dryden TMDL Compliance
Attachment F  Methods for Estimating Likely Programmatic Outcomes for Broodstock Collection Targets Presentation
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Notes:
* Denotes Hatchery Committees member or alternate
EMAIL NOTIFICATION TO HCP HATCHERY COMMITTEE THAT THE MASTER PLAN IS AVAILABLE FOR 60 DAY REVIEW PERIOD

MAY 14, 2013
Good morning HCP-HC: The Wells Hatchery Master Plan is now available for download from the FTP site (instructions below). This document is up for your 60-day review with comments due to Douglas PUD by Saturday, July 13, 2013. The document can be accessed with the following link

Emily Pizzichemi 😊

ANCHOR QEA, LLC
epizzichemi@anchorqea.com

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From: Greg Mackey [mailto:gregm@dcpud.org]
Sent: Monday, May 13, 2013 4:56 PM
To: Emily Pizzichemi
Cc: Mike Schiewe; Shane Bickford; Tom Kahler
Subject: Wells Hatchery Master Plan for HC comments

Emily,

I just posted the Wells Hatchery Master Plan for the Hatchery Committee to review (60 day review) on the Anchor FTP site, under a new folder called Wells Hatchery Master Plan. The document is too large to email, so I posted it directly.

Could you please confirm the link/posting is working properly, and then notify the Hatchery Committee that the document is available for their review?

By my calculation, comments will be due to Douglas PUD by July 13, 2013 (start date of May 14, 2013).

Thank you,

greg

Gregory Mackey
Fisheries Biologist
Public Utility District No. 1 of Douglas County
1151 Valley Mall Parkway
FINAL HCP HATCHERY COMMITTEE MEETING MINUTES

MAY 15, 2013
To: Wells, Rocky Reach, and Rock Island HCPs Hatchery Committees  
Date: June 20, 2013

From: Mike Schiewe, Chair

Cc: Kristi Geris and Emily Pizzichemi

Re: Final Minutes of the May 15, 2013 HCP Hatchery Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees' meeting was held at Douglas PUD headquarters in East Wenatchee, Washington, on Wednesday, May 15, 2013, from 9:30 am to 1:30 pm. Attendees are listed in Attachment A to these meeting minutes.

ACTION ITEM SUMMARY

- Mike Tonseth will consult with Ken Warheit (Washington Department of Fish and Wildlife [WDFW] geneticist) and then provide the Wenatchee spring Chinook trapping/sampling protocols, including the genetic inclusion/exclusion criteria, to Emily Pizzichemi and Kristi Geris for distribution to the Hatchery Committees (Item II-A).

- Lynn Hatcher will send a status update on Wenatchee spring Chinook permitting to Emily Pizzichemi and Kristi Geris for distribution to the Hatchery Committees no later than May 31, 2013 (Item II-A).

- Emily Pizzichemi and Kristi Geris will arrange a conference line and distribute details to the Hatchery Committees for a conference call to review the status of Wenatchee spring Chinook permitting, scheduled for June 3, 2013, at 10:00 am (Item II-A).

- Hatchery Committees representatives will provide the names of recommended statisticians, salmon ecologists, and hatchery biologists to serve on a technical peer review panel to rank responses to the Chelan PUD Hatchery Monitoring and Evaluation (M&E) Requests for Proposal (RFPs) to Mike Schiewe (with a copy to Kristi Geris) no later than June 3, 2013 (Item III-A).

- Greg Mackey will revise the Wells Hatchery Summer Chinook Program Hatchery
and Genetic Management Plan (HGMP) and Statement of Agreement (SOA) accordingly, as requested by the Hatchery Committees, and Emily Pizzichemi will distribute the revised documents to the Hatchery Committees no later than May 17, 2013 (Item IV-A).

(*Note: the revised documents were received from Mackey and distributed to the Hatchery Committees by Pizzichemi on May 16, 2013; and the revised HGMP and SOA were approved by email vote on May 22, 2013, with the Yakama Nation [YN], the Colville Confederated Tribes [CCT], the U.S. Fish and Wildlife Service [USFWS], WDFW, and Douglas PUD approving, and the National Marine Fisheries Service [NMFS] abstaining.)*

- Hatchery Committees representatives will send their approval or requested changes to the Wells Summer Chinook HGMP to Mike Schiewe (with copies to Emily Pizzichemi, Kristi Geris, and Greg Mackey) no later than May 22, 2013 (Item IV-A).
- Mackey will provide a list of critical sections in the Wells Hatchery Modernization Master Plan to help guide review to Emily Pizzichemi for distribution to the Hatchery Committees (Item IV-B). (*Note: the list was received from Mackey and distributed to the Hatchery Committees by Pizzichemi on May 20, 2013.)*
- The Hatchery Committees June 19, 2013 meeting will be held at 9:00 am in the Chelan PUD Auditorium (Item VI-A).

**STATEMENT OF AGREEMENT DECISION SUMMARY**

- Douglas PUD’s revised Wells Summer Chinook HGMP and SOA were approved by email vote on May 22, 2013, with the YN, CCT, USFWS, WDFW, and Douglas PUD approving, and NMFS abstaining.

**AGREEMENTS**

- There were no agreements discussed at today’s meeting.

**REVIEW ITEMS**

- Emily Pizzichemi sent an email to the Hatchery Committees on May 14, 2013, notifying them that the Wells Hatchery Master Plan is available for download from
the ftp site and is out for a 60-day review period, with comments due to Greg Mackey no later than July 13, 2013.

**FINALIZED REPORTS**

- There are no reports that have been recently finalized.

**I. Welcome, Agenda Review, Meeting Minutes, and Action Items**

Mike Schiewe welcomed the Hatchery Committees and asked for any additions or other changes to the agenda. Bill Gale added a brief status update on permitting at the Leavenworth and Tumwater National Fish Hatcheries (NFHs).

The revised draft April 17, 2013 meeting minutes were reviewed. Four outstanding comments were discussed.

- Under the Agreements section, USFWS requested to clarify that natural-origin fish with Carson ancestry collected “at Methow Hatcheries” will be retained and used for broodstock.
- Regarding the Conflict of Interest Policy in the context of the M&E RFPs for PUD Hatchery Programs, Douglas PUD requested that Mike Schiewe’s statement be revised so as to not limit the definition of a conflict of interest to professional relationships.
- Regarding the discussion of the revised M&E Plan, Douglas PUD requested to clarify that the Chelan PUD SOA was approved contingent on the use of the same language as the revised Douglas PUD SOA.
- Regarding the Chelan Falls Summer Chinook Update, Mike Tonseth clarified that the emerging fish health issue with summer Chinook at Chelan Falls Hatchery was bacterial gill disease (BGD).

Emily Pizzichemi said that all other comments and revisions received on the draft meeting minutes were incorporated. The Hatchery Committees members present approved the April 17, 2013 meeting minutes as revised.

Action items from the last Hatchery Committees meeting on April 17, 2013, and follow-up discussions were as follows:
• *Greg Mackey will provide the Wells Hatchery Modernization Master Plan to the Hatchery Committees for review, when available (Item I).*

Emily Pizzichemi notified the Hatchery Committees that the Wells Hatchery Modernization Master Plan was available for download from the ftp site for a 60-day review beginning on May 14, 2013, with comments due no later than July 13, 2013.

• *Chelan PUD, Douglas PUD, Grant PUD, and the CCT will discuss proportional responsibilities for funding run-composition sampling at Wells Dam for summer Chinook; and an update will be provided on the discussions at the Hatchery Committees meeting on May 15, 2013 (Item I).*

Peter Graf said that Grant PUD is waiting to hear back from WDFW before making a final decision on how to proceed. Alene Underwood proposed removing this item from the list of Action Items as the responsible parties are working on it. The Hatchery Committees representatives present agreed to remove this item from the Action Items with the stipulation that any problems regarding funding run-composition sampling at Wells Dam for summer Chinook are reported to the Hatchery Committees.

• *NMFS will have a standing agenda item to provide a HGMP update at future Hatchery Committees meetings (Item I).*

Craig Busack provided the first of these standing monthly updates at this meeting.

• *Greg Mackey will provide the final revised M&E Plan for PUD Hatchery Programs: 2013 to Kristi Geris for distribution to the Hatchery Committees (Item II-A).*

Kristi Geris distributed the final revised M&E Plan for PUD Hatchery Programs: 2013 to the Hatchery Committees in an email dated April 19, 2013.

• *Douglas PUD and Chelan PUD will provide their final SOAs approving the Revised Analytical Framework 5-Year Update to Kristi Geris for distribution to the Hatchery Committees (Item II-A).*

Kristi Geris distributed the Final Douglas PUD and Chelan PUD SOAs to the Hatchery Committees in emails dated April 19, 2013, and April 22, 2013, respectively.

• *Representatives of the Hatchery Committees will submit recommendations for peer reviewers to participate along with Hatchery Committees members in the review of responses to the Chelan PUD Hatchery M&E RFPs (Item II-A).*

Hatchery Committees representatives will provide recommendations for peer reviewers to Mike Schiewe no later than June 3, 2013.
• **Alene Underwood will provide the final SOA for the Carlton Acclimation Facility Capacity Utilization to Kristi Geris for distribution to the Hatchery Committees (Item III-A).**

  Kristi Geris distributed the final SOA for the Carlton Acclimation Facility Capacity Utilization in an email dated April 18, 2013.

• **Alene Underwood will provide the revised Spring Chinook Pilot Study at Rocky Reach to Kristi Geris for distribution to the Hatchery Committees no later than April 19, 2013; email approval of the pilot study will be requested from Hatchery Committees representatives no later than April 26, 2013 (Item III-A).**

  Kristi Geris distributed the updated Rocky Reach Spring Chinook Pilot Study to the Hatchery Committees in an email dated April 22, 2013. Approvals or abstentions were received from all Committees representatives via email.

• **Lynn Hatcher will provide NMFS direction on what type of additional documentation is needed from the PUDs to obtain new permits for the existing Permit 1347 that will expire on October 22, 2013 (i.e., a full HGMP versus an updated program description) by Friday, April 26, 2013, including a timeline of when documents are needed, to Kristi Geris for distribution to the Hatchery Committees (Item IV-A).**

  Lynn Hatcher said that he and Craig Busack are working on this item and will get back to the Hatchery Committees representatives with more information.

• **Hatchery Committees representatives will review Greg Mackey’s white paper on Methods for Estimating Likelihoods of Outcomes in Broodstock-Collection prior to the Hatchery Committees May 15, 2013 meeting, when the Committees will discuss its use in developing future broodstock protocols (Item IV-D).**

  Greg Mackey said that although this paper should be discussed because of its potential influence on future broodstock collection protocols, he recommended revisiting the topic at a later date.

### II. NMFS

#### A. Monthly HGMP Update

Craig Busack said that the Entiat Biological Opinion (BiOp) was completed and signed on April 18, 2013. He said NMFS is currently working on consultations for the Mid-Columbia coho program, which requires two BiOps—one for construction of facilities and one for operations. Busack hopes to have the draft BiOp completed by June 2013. Busack said that
Amilee Wilson (NMFS) expects to complete the joint BiOp for the Chiwawa, Nason, and White River spring Chinook programs by June 14, 2013. Wilson has alerted Busack that completion of the National Environmental Policy Act (NEPA) Environmental Assessment (EA) for the Nason Creek and White River programs may cause a delay. Busack said that the Chiwawa spring Chinook program is currently covered by the existing Permit 1196; however, broodstock collection at Tumwater Dam (TWD) for the Nason program will require new permits. Busack added that the new permits will not be available until the NEPA packages are complete. Busack said that the Leavenworth NFH spring Chinook BiOp was delayed because it is being revised to fit a new BiOp template. NMFS is focusing on approval of the Wenatchee spring Chinook BiOp before finalizing the Leavenworth NFH spring Chinook BiOp.

Busack reiterated that the probable completion date for the Chiwawa spring Chinook BiOp is June 14, 2013. Joe Miller asked what ramifications this new deadline will have on the broodstock collection schedule, and Mike Tonseth replied that the biggest issue with the delayed timeline is getting staff prepared on short notice. Alene Underwood said that even though the rivers are running high right now, it is possible that the spring Chinook run will reach Chiwawa soon. Underwood said that the existing permit can be used to collect spring Chinook at the Chiwawa weir if the fish start to run before June 14, 2013, when the new permit is issued for collection at TWD. Bill Gale said that, from the USFWS perspective, collecting at TWD would be preferable, but Kirk Truscott said that sampling and collecting at TWD will require new permits. Tonseth said that with the expected permit completion date of June 14, 2013, broodstock collection can begin as early as June 17, 2013, but it will be a rush to deploy staff.

Underwood asked about the broodstock genetic testing turnaround time for spring Chinook collected at TWD, and Tonseth said that he received more information from Ken Warheith (WDFW geneticist) to discuss at the Priest Rapids Coordinating Committee Habitat Subcommittee (PRCC HSC) meeting on May 16, 2013. Underwood requested that the topic also be discussed today for the benefit of the Hatchery Committees. Tonseth said that genetic testing is expected to take about 4 business days, or less if there is a rush. He said this timeline fits the original proposal time of a 2-week holding period for individual fish, and that hatchery staff will be expected to maintain this schedule. Underwood requested a
written protocol to discuss with hatchery staff. Tonseth replied that he is setting up a meeting for the week of May 20, 2013, to discuss the holding plan protocol, and Underwood asked to be included in the discussion. Miller expressed concern about the lack of genetic criteria for inclusion/exclusion in broodstock for each of the Wenatchee spring Chinook programs. Tonseth replied that Warheit is currently travelling and unavailable, but that he will compile more details early next week, including a scope of work and a budget for the genetic testing component. He added that he will eventually arrange a conference call to review everything with the Hatchery Committees.

Hatcher asked Tonseth about starting sampling on June 17, 2013, particularly with the NEPA process not expected to be completed until June 14, 2013. Hatcher suggested that the public review period could delay the sampling start date even more. Busack stressed that June 14, 2013, is a tentative deadline and that he will have to verify when the public comment period opens and closes. Schiewe said that Underwood’s idea of setting up a contingency plan is relevant and that WDFW and Chelan PUD may have to collect spring Chinook at the Chiwawa weir under the existing permit authority. Tonseth said that there is a difference of opinion on how sampling at Chiwawa weir may affect bull trout. Gale said that, as far as USFWS is concerned, operating the Chiwawa Weir and TWD collection facilities simultaneously is not recommended because of potential impacts on bull trout and he cannot guarantee USFWS support of dual operation. Busack asked about USWFS’s permit coverage and Gale said that the state currently has Section 6 coverage for blanket fish actions. Truscott added that the state’s Section 6 coverage explicitly mentions Chiwawa. Tonseth cited conversations he previously had with Karl Halupka and said that they currently have coverage under Section 6 provided WDFW is the operator. He said that if they move forward with collecting broodstock at the Chiwawa weir, WDFW will approve the sampling. Gale said that he supports broodstock collection at TWD under a new permit and not running Chiwawa.

Keely Murdoch asked when staff will begin work on the reproductive success study and suggested loading the computer (at TWD) with passive integrated transponder (PIT)-tag files for definitive identifications, and Tonseth agreed. She said that if fish are getting handled at TWD regardless, then it makes sense to collect those that can be positively identified as natural origin Chiwawa adults at TWD to avoid double-handling and recollection at the
Chiwawa Weir. Josh Murauskas supported Murdoch’s idea, and said that there are many PIT-tags from Chiwawa on wild fish—last year there were over 74. Tonseth agreed that PIT-tags can certainly be used for identification if they are linked to the weir computer system. Tonseth said that he hopes to have a clear indication by the end of May 2013 as to whether or not June 14, 2013, is a feasible deadline. Schiewe requested that NMFS provide a permit update no later than May 31, 2013, and Emily Pizzichemi will set up a conference call for June 3, 2013, to discuss the update from Busack with the Hatchery Committees representatives.

Busack gave an update on the permit 1347 programs, which include the non-listed summer and fall Chinook programs. He said that NMFS intends to issue a 10-year extension on the permits, which will expedite the consultation process. The process will still require issuing a BiOp; however, he said that the same EA can be used. Busack said that this has already been completed for the Wenatchee summer Chinook program and that he believes that he has all of the appropriate information for the other programs. Gale asked if they are required to have a separate consultation for bull trout, and Busack proposed that he and Gale discuss the issue outside of the meeting. For the Okanogan programs, Busack said that he needs an HGMP on steelhead from the CCT as soon as possible.

Busack said that BiOps also must be written for the section 10(j) programs (i.e., experimental populations). In order to expedite the NEPA process, he said that he plans to use the Chief Joseph Dam Environmental Impact Statement (EIS) and the Bonneville Power Administration permit to cover the substitution of MetComp fish for Carson fish. Gale asked how many BiOps have to be written, and Busack said that separate BiOps are needed for the hatchery action (holding fish) and release of fish. Busack said that the hatchery BiOp needs to be completed as soon as possible so that the CCT can legally possess the fish. Truscott said he is concerned that if the release permit fails after he has already acted on the transfer authorization, he will be stuck holding fish. He added that if the CCT accepts the fish before they have the section 10(j) permit, they would be releasing endangered spring Chinook instead of threatened spring Chinook. Hatcher said that, considering this fact, they would need permits by April 2014 because, once the fish are released, they are technically covered under section 10(j). He added that the EA and BiOp on the release action are already underway, and so the entire process should be complete by fall 2013. Gale asked if the two
different permitting processes (hatchery holding and release effects) are dependent or if they can be exclusively finalized, and Busack said that they can be separately filed. Gale asked about public comment and Busack said that he has not yet set a date, but would like to put out all of the Methow and Okanogan HGMPs at the same time.

Busack said that there has been considerable discussion within NMFS recently about whether the currently contemplated permits for the Methow basin are *U.S. v. Oregon* compliant. He said that they are currently finalizing the details in the proposals for spring Chinook and steelhead; and will be asking the Hatchery Committees for comments and/or formal approvals. He highlighted the new items in the General Management Framework for Methow Spring Chinook and Steelhead (Attachment B), which was distributed to the Hatchery Committees by Pizzichemi on May 14, 2013. Specifically for spring Chinook, Busack said that the framework includes a requirement for a relative reproductive success study to determine if hatchery-origin fish spawning in the vicinity of hatchery outfalls are contributing to natural production, and if the estimated percentages of hatchery origin spawners (pHOS) have been adjusted to reflect this. He said that this is not intended to be a large study, but rather just a few years of monitoring. For steelhead, Busack said that the previous pHOS values may have been optimistic, and so he has proposed a 2-stage standard—a pHOS of 0.5 over the entire basin (October 2013 to October 2020); and a pHOS of 0.50 calculated over the entire basin, with 0.25 in half of the “production area” (October 2020 to October 2023). Murdoch offered several comments on the draft Management Framework document. Regarding spring Chinook, she considered the hatchery outfall area “artificial,” a place where wild fish and hatchery fish interaction is minimal, and she thinks that this area should be discounted from the pHOS calculation. She claimed that in this area, the hatchery fish are not contributing to natural origin recruit (NOR) fish productivity. Busack said that natural production by hatchery fish, whether or not they mix with the wild fish when reproducing, is the issue, because such production ultimately introduces hatchery genetics into the natural population. Murdoch agreed that data should be collected, but she maintained that it should not be used to adjust pHOS value. Greg Mackey suggested that a few years of data under the forthcoming management regime with reduced fish numbers, adult management activities, and potentially adjusted release locations, might help decide if there should be further studies conducted in the area. Gale agreed with Busack that the fish in that area should be considered and suggested that the BiOp be amended to allow for
revisions within the first 5 years of data collection. Regarding steelhead, Murdoch said that she is concerned that the Phase II pHOS goal of 0.5 may be too restrictive given the current state of the run. She asked, for example, what happens if they hit pHOS = 0.6 but are still seeing positive trends in the population, will they have to move fish down to the Columbia? Murdoch also suggested adding adaptive management language to the draft Framework.

Busack said that he anticipated using a 3-year geomean for pHOS and not assessing pHOS on a one-year basis. Gale suggested revising the Management Framework so that the initial targets for pHOS are moving toward a Phase II goal. Regarding Methow steelhead (i.e., Attachment B, page 3, Overall point 3), Mackey reminded the Hatchery Committees representatives that the previously agreed-upon total steelhead release was 250,000 individuals, which is what the HGMPs reflect, but this new draft Management Framework has 350,000 as the upper limit. Schiewe suggested that if the upper limit (i.e., 350,000) was a change from what had previously been agreed to in approval of the HGMP, then it should be brought back to the Hatchery Committees for discussion regardless of U.S. v. Oregon. Gale noted that the Wells HGMP states that the upper basin limit for steelhead release is 150,000. Tonseth pointed out that once the fish move from the upper Methow to the lower Methow, they can be moved to the Columbia River if necessary. Mackey recommended that the limit should be 250,000, regardless of where they come from—not 250,000 from the upper basin and 350,000 overall (as written in the draft Management Framework). Busack said that he thought the Hatchery Committees previously agreed that 250,000 should come from the upper basin. Gale said that if the draft Management Framework is left as it is currently written, once permits are obtained, U.S. v. Oregon will need to approve increasing the count from the upper basin from 150,000 to 250,000.

Busack said that because agreement cannot be reached on the new spring Chinook monitoring measure, NMFS may change the pHOS standard from a flat value to a sliding scale to allow for adaptive management. NMFS may also change the total steelhead release number back to 250,000 individuals. Busack said that he will amend and discuss the revised document at the next Joint Fisheries Parties (JFP) conference call. Schiewe reminded Busack that Hatchery Committees approval is independent of U.S. v. Oregon approval. Schiewe suggested that Busack include the PUDs in these discussions.
Busack said that NMFS recently received Chelan PUD’s permit application detailing their portion of the Methow spring Chinook program. Chelan PUD proposed releasing spring Chinook at two acclimation sites in the Methow, and Busack asked the Hatchery Committees members for their input. Miller said that there is no new information in the plan—just a scope of activities, as discussed previously with the Committees.

III. Chelan PUD

A. Suggestions for M&E RFP Technical Review Panel (Alene Underwood)

Alene Underwood asked Hatchery Committees representatives to recommend people for the M&E RFP Review Panel. Mike Schiewe requested that all suggestions be sent to him (with a copy to Kristi Geris) via email no later than June 3, 2013. He suggested identifying potential reviewers by areas of expertise, and added that potential reviewers should include statisticians, salmon biologists, hatchery biologists, and any other fields of study that the Hatchery Committees deem applicable. Bill Gale said that he has already approached two people—Barry Berejikian of NMFS and Brian Cates, USFWS retired. Gale said that he would like to provide more information about compensation, and Underwood replied that Chelan PUD will fund all expenses related to the project, including travel. Lynn Hatcher recommended Larry Lestelle as a good salmon ecology expert. Underwood said that she anticipates that Chelan PUD will select a minimum of three reviewers, and the final number will depend on qualifications, availability, the number of proposal submissions, and the number of interested reviewers. Muraskas suggested that Chelan PUD compile a list of reviewers, assess their availability, and then come back to the Hatchery Committees for final review. Gale asked if Anchor QEA would facilitate the discussion and review process, and Underwood replied that Chelan PUD and Grant PUD will facilitate the process, but the reviewers will be independent. Muraskas described Chelan PUD’s recent experience with a review panel for a sturgeon study, recalling that it consisted of three reviewers working independently; however, one also facilitated the group. Underwood added that for that particular review process, Chelan PUD also conducted an internal review and ranking process. The internal reviews and the expert panel reviews were both considered when making a final contract decision. She said that this RFP will follow a similar protocol. Muraskas recommended Dr. John Skalski for his statistical knowledge, and Dr. John Clark, the chief scientist for Alaska Department of Fish and Game (ADFG), for his salmon biology expertise. Muraskas said that Clark is a good choice because he is close enough to the
Columbia River to understand the issues, but far enough removed to provide a unique view. Keely Murdoch said that the YN hoped that no one would be removed from consideration based on their perceived views or opinions. Schiewe reminded the Hatchery Committees that non-conflicted members of the Hatchery Committees may sit on the panel, and clarified that a conflicted party includes individuals from agencies that are bidding on the project and responding to the RFP.

Underwood said that the RFP closes July 9, 2013, and that she would like the panel to begin the ranking process immediately upon closing. The Hatchery Committees agreed to discuss how to choose reviewers at the Hatchery Committees’ June 19, 2013 meeting, once Chelan PUD has had a chance to compile the names and contact information of potential experts. Murdoch asked if the panel is only judging the scientific merit of the proposals or if they are making any final decisions about the study. Underwood confirmed that the panel is solely judging the scientific merit of the proposals in the context of the study, and that their rankings will only be used to inform Chelan PUD’s final decision. Underwood also stated that Chelan PUD will be considering the cost effectiveness of each proposal, not necessarily the lowest cost, but the quality of work available for the proposed price.

Mike Tonseth said that he had questions about the RFP itself. He pointed out that sockeye were not mentioned at all, and Murdoch added that sockeye should be addressed because there is an M&E obligation to consider the species. Murauskas said the issue of whether or not the District will continue to fund the upper Wenatchee trap or other activities pertaining to sockeye monitoring has not been resolved, which is why sockeye was not included in the RFP. Tonseth asked if an addendum to the RFP will go out once all of the questions and issues have been resolved, and Underwood replied that Chelan PUD will internally discuss the sockeye question and apprise the Hatchery Committees once a decision is made. Underwood clarified that even though something is not contained within the RFP, that fact does not mean that the RFP does not cover it, and that it is precedent for outstanding issues such as this to be dealt with internally and then clarified to potential proposers in an addendum.

Tonseth asked, regarding spring Chinook in the Wenatchee River, whether the respective PUDs planned to fund hatchery programs independent of their dams. Murauskas replied
that there is a geographical dilemma—Grant PUD has responsibilities for Nason Creek and White River, whereas Chelan PUD has responsibility for the Chiwawa; therefore, Chelan PUD and Grant PUD will each assume responsibility for their own portion of the bill.

Tonseth said that the language is misleading because it only mentions those three locations, when, in reality, assessing stray rates requires monitoring additional tributaries and reaches. Underwood stressed that the RFP is intended as a guide and that if a potential bidder does not already know that stray sampling also may occur outside of the Chiwawa (or other tributary), then they probably are not qualified to pursue the work. Tonseth asked why the other Mid-Columbia dams are not mentioned, and Murauskas replied that the Methow will be covered by Grant PUD and Douglas PUD in a separate RFP. The in-hatchery monitoring component for Chelan Falls will be addresses at a later date. Tonseth said that there is concern within WDFW about this RFP having too many last-minute changes and addenda. Underwood reminded the group to send all questions or concerns related to clarifications of the RFP to Jackie Krueger.

**B. Rocky Reach Trap Pilot Update (Alene Underwood)**

Alene Underwood said that Chelan PUD started operating the Rocky Reach trap during the week of May 13, 2013. She said that visibility was low due to high turbidity, and added that Chelan PUD is hopeful that the turbidity will abate in the near future. Tonseth asked if Chelan PUD is tracking days where high turbidity impedes visibility. He added that if turbidity compromises the ability to collect data, then the program might not be a viable undertaking. Underwood said that Chelan PUD keeps a daily log of water quality and that if the problem persists, they will consider different sampling options before shutting the program down completely. Underwood invited Hatchery Committees members to view the trap with the Coordinating Committees at the Coordinating Committees meeting on May 21, 2013, or at another convenient time.

**IV. Douglas PUD**

**A. DECISION: Wells Summer Chinook HGMP/Program description (Greg Mackey)**

Greg Mackey reminded the Hatchery Committees that the Wells Hatchery Summer Chinook HGMP and associated draft SOA were distributed to the Hatchery Committees for review by Kristi Geris on April 16, 2013. Mike Schiewe asked if the new program differs from the current program, and Mackey replied that Douglas PUD will be releasing the same number
of fish, but the HGMP incorporates the Hatchery Committee approved (Sept. 19, 2012) change in timing for release of subyearlings (revised from mid-June to mid-May), because this change has been shown to improve survival. Mackey said that the only other change is that up to 10 percent of the broodstock will be composed of NORs. Kirk Truscott said that, conceptually, this is a status quo program with the exception of the 10 percent NORs expectation. Tonseth said that the aim was to take as many NORs that enter the volunteer trap, with 10 percent as a goal but not a requirement. Mackey also added that the HGMP language should allow flexibility for years in which it is not possible to reach the 10 percent goal. Kirk Truscott suggested including a statement such as, “in any year that there will be a proposal to collect NORs at Wells, it will be addressed in the Broodstock Collection Agreement.” Tonseth agreed that the percentage will be a sliding scale based on the number of fish captured and that they will provide a proposal to the Hatchery Committees for NOR collection. Bill Gale said that a segregated harvest program like this one, by definition, does not typically include targeting NORs for broodstock. He expressed concern that the proposal was creating a hybrid of a segregated program and an integrated program. Gale said that he approves the “up to 10 percent” language, but is uncomfortable defining the numbers in terms of the volunteer channel. Tonseth clarified that using the volunteer trap for sampling is not targeting NORs, but natural-origin fish use the volunteer channel and can be incorporated into the broodstock. Lynn Hatcher agreed with Gale and was concerned that the language suggested that Douglas PUD would be targeting NORs at the dam. Mackey proposed that the language be amended to reflect that broodstock will be composed primarily of hatchery-origin adults, with up to 10 percent of natural-origin. If 10 percent natural-origin fish is expected to be exceeded in any given year, WDFW will present the supporting data and proposal to the Hatchery Committees for inclusion in the Annual Broodstock Collection Protocol. Tonseth added that 10 percent from the volunteer channel should be considered a baseline, but anything above 10 percent NORs—whether from the volunteer channel or from anywhere else—should be justified in the Broodstock Protocol.

Truscott recommended that the monitoring and evaluation indicator target values contained in the document be more specific because, as it is currently written, the values are merely defined as an unknown target value. Mackey said that the Hatchery Committee will be creating new target values for the new Hatchery M&E Plan, and that the M&E Plan will be updated with those values. He said that Douglas PUD will add a footnote to the document
saying that the target values are pending approval of the Hatchery Committees (The HGMP references the M&E Plan, so updates to the Plan are automatically linked to HGMP).
Truscott proposed that he and Tonseth have an outside discussion about how these new sampling protocols will affect the CCT because there will be fish from CCT-ceded land.

Keely Murdoch requested additional time for review prior to approving the HGMP. Mackey said that he will revise the SOA and the HGMP, making the discussed changes, and he will provide the revised documents to Emily Pizzichemi for distribution to the Hatchery Committees no later than May 17, 2013. (*Note: the revised documents were received from Mackey and distributed to the Hatchery Committees by Pizzichemi on May 16, 2013). Hatchery Committees representatives will send their approval or requested changes to the Wells Summer Chinook HGMP to Schiewe (with copies to Pizzichemi, Geris, and Mackey) no later than May 22, 2013. (*Note: the revised HGMP and SOA were approved by email vote on May 22, 2013, with the YN, CCT, USFWS, WDFW, and Douglas PUD approving, and NMFS abstaining.)

B. Discussion: Wells Hatchery Modernization Master Plan (Greg Mackey)
Greg Mackey reminded the Hatchery Committees that Emily Pizzichemi sent an email to the Hatchery Committees on May 14, 2013, notifying them that the Wells Hatchery Modernization Master Plan is available for download from the ftp site and is available for 60-day review, with comments due to him no later than July 13, 2013. Mackey noted that the new Wells Hatchery design uses gravity feed to convey water and transfer fish as they transition through different life stages—a process which is more energy efficient for the facility and more beneficial for the fish. He provided a brief explanation of the bio-programming section, which contains calculations for estimating growth and size and required rearing volumes and flows. Mackey said that Douglas PUD plans to host a workshop for the Hatchery Committees and invite HDR Engineering, Inc. (HDR), the firm that designed the facility update, to field questions about the upgrades. Schiewe suggested holding the workshop in early July 2013, because June 2013 is typically a very busy month for the Committees.

Bill Gale asked if there were specific sections of the Master Plan that could be identified to make review by the Committee more efficient. Gale added that having a list of critical areas
for review will help focus and guide the review process on such a large document. Tonseth recommended a close review of the fish health section to ensure that details are consistent with previous Hatchery Committees discussions. Mackey said that he will provide a list of critical sections in the Wells Hatchery Modernization Master Plan to help guide review to Emily Pizzichemi for distribution to the Hatchery Committees. (*Note: the list was received from Mackey and distributed to the Hatchery Committees by Pizzichemi on May 20, 2013).

Gale asked if Hatchery Committees approval of the Master Plan is needed. Mackey said he was not sure at this point, and that the Federal Energy Regulatory Commission (FERC) may require agency approval, which would be in the form of a SOA from the Hatchery Committees. Gale suggested that the Hatchery Committees’ approval could be as simple as noting it in the meeting minutes. Schiewe asked Mackey when FERC needs the Hatchery Committees’ approval because that will influence when the Hatchery Committees workshop with HDR is held, as it may influence their decision. Mackey said at this time there is no established date.

V. USFWS

A. National Fish Hatchery Update (Bill Gale)

Bill Gale said that USFWS is behind schedule installing the water-reuse circular tanks at Leavenworth NFH due to construction problems. He said installation has been delayed by a leaky pipe, which remains unresolved. Gale said that some renovations are still moving forward; however, he estimated they are about a year behind schedule.

Gale said that WDFW approached USFWS about taking adult spring Chinook from TWD if the appropriate permitting is obtained. He said that Leavenworth NFH has agreed to house the adults for a 3-day AQUI-S® withdrawal period and that the two agencies are currently discussing logistics of the arrangement.

VI. HCP Administration

A. Next Meetings

Mike Schiewe said that Andy Chinn from the PRCC HSC contacted him about potentially sharing the Hatchery Committees meeting date and location on June 19, 2013. Schiewe said
that, if these plans are amenable, he proposed beginning at 9:00 am to accommodate the PRCC HSC meeting in the afternoon. The Hatchery Committees meeting on June 19, 2013 will be held at 9:00 am in the Chelan PUD Auditorium.

The next scheduled Hatchery Committees’ meetings are on June 19, 2013 (Chelan PUD Auditorium); July 17, 2013 (Douglas PUD office); and August 21, 2013 (Chelan PUD).

**List of Attachments**

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<thead>
<tr>
<th>Attachment</th>
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<tr>
<td>Attachment A</td>
<td>List of Attendees</td>
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<tr>
<td>Attachment B</td>
<td>General Management Framework for Methow Spring Chinook and Steelhead</td>
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### List of Attendees

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<tr>
<th>Name</th>
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<tr>
<td>Mike Schiewe</td>
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<td>Emily Pizzichemi</td>
<td>Anchor QEA, LLC</td>
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<td>Alene Underwood*</td>
<td>Chelan PUD</td>
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<td>Joe Miller</td>
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<td>Josh Murauskas*</td>
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<td>Greg Mackey*</td>
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<td>Tom Kahler*</td>
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<td>Peter Graf</td>
<td>Grant PUD</td>
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<td>Keely Murdoch*</td>
<td>Yakama Nation</td>
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<td>Kirk Truscott*</td>
<td>Colville Confederated Tribes</td>
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<td>Lynn Hatcher*</td>
<td>National Marine Fisheries Service</td>
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<tr>
<td>Craig Busack*†</td>
<td>National Marine Fisheries Service</td>
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<tr>
<td>Bill Gale*</td>
<td>U.S. Fish and Wildlife Service</td>
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<tr>
<td>Mike Tonseth*</td>
<td>Washington Department of Fish and Wildlife</td>
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</table>

**Notes:**

* Denotes Hatchery Committees member or alternate
† Joined by phone
EMAIL TO HCP HATCHERY COMMITTEE WITH SUGGESTED REVIEW SECTIONS FOR THE WELLS MASTER PLAN

MAY 17, 2013
Good morning HCP-HC! Please see the email below from Greg with the guide to sections of the Wells Master Plan to help direct your review. This fulfills an Action Item from the 5/15 meeting. Thanks! Happy Monday!

Emily Pizzichemi 😊

ANCHOR QEA, LLC
epizzichemi@anchorgrea.com
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From: Greg Mackey [mailto:gregm@dcpud.org]
Sent: Friday, May 17, 2013 4:59 PM
To: Emily Pizzichemi; Mike Schiewe
Subject: Suggested review sections for the Wells Master Plan

Dear HC: Here is the Cliff Notes version of the Master Plan so you can make your review more efficient. I have recommended skipping some sections, and also noted what some sections of interest contain. Obviously you can review sections I suggest to skip, but I tried to high-grade the most worthwhile sections for a Hatchery Committee review.

Here is a guide to sections of the Master Plan so you can more efficiently direct your review effort:

***Fish health issues and biosecurity were prominent in our planning, but they are discussed throughout the document, not in dedicated sections.***

Chapter 1: Can mostly skip – introductory material
   But, see 1.6 Approach to Biosecurity

Chapter 2: Skip – site background

Chapter 3: Of most interest to HC members- describes production numbers
Chapter 4: Skip – basic water supply flow description, but does discuss the relationship to bioprogramming. Also, make it clear that all program are flow-through programs (no recirculation).

Chapter 5: Skip – technical water supply analysis summary, but see 5.3 for interesting discussion on the use of effluent for attraction flows

Chapter 6: Rearing Technologies and Functions that are under consideration for the Wells Hatchery design. Incorporates some fish health and biosecurity ideas.

Chapter 7: Hatchery components that are under consideration for the Wells Hatchery design. Incorporates some fish health and biosecurity ideas. Mostly see parts of 7.2 that are of interest to you.

Chapter 8: Site layout – of general interest. Provides preliminary drawings of site layout and major new infrastructure. Biosecurity note: the new building will have separate incubation rooms for each stock/program. Conservation/NNI steelhead programs will be housed in circular tanks that allow segregation of stocks/programs. Figure 8.9 shopws the hydraulic profile where we will take advantage of gravity to move water, but more importantly, to move fish through the rearing stages to new vessels, downhill (no fish pumping, netting etc.). Improved fish health and quality. Same concept used for marking and loading onto trucks. Main ideas is to maximize water to water non-invasive movement of fish to the extent possible.

Chapter 9: Can skip, but discusses efficiency gains due to new design.

Chapter 10: Can skip, but interesting chapter on dealing with invasive mussels.

Chapter 11: skip

Chapter 12: Schedule – of general interest.

Appendix A: Can skip – useful life of facility assessment.

Appendix B: Can skip – well field analysis

Appendix C: Bioprogram – review

Appendix D: Fish production program reference table – you can probably skip this because it is captured in the earlier chapter. Informational table that was used to develop the master plan.

Appendix E: Monthly rearing allocation illustrations – of general interest to see how fish will cycle through the facility.

Appendix F: skip – surface water supply system
Gregory Mackey  
Fisheries Biologist  
Public Utility District No. 1 of Douglas County  
1151 Valley Mall Parkway  
East Wenatchee, WA, 98802-4497  
Main  509-884-7191  
Direct 509-881-2489  
Fax  509-884-0553  
www.douglaspud.org
The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees’ meeting was held at Chelan PUD headquarters in Wenatchee, Washington, on Wednesday, June 19, 2013, from 9:00 am to 11:30 am. Attendees are listed in Attachment A to these meeting minutes.

**ACTION ITEM SUMMARY**

- Mike Tonseth will consult with Ken Warheit (Washington Department of Fish and Wildlife [WDFW] geneticist) and then provide the Wenatchee spring Chinook trapping/sampling protocols, including the genetic inclusion/exclusion criteria, to Kristi Geris for distribution to the Hatchery Committees (action item carried forward from Hatchery Committees meeting on May 15, 2013).

- The National Marine Fisheries Service (NMFS) will provide a letter of concurrence for transport back to the river of Wenatchee spring Chinook adults collected for the Nason Creek and Chiwawa River programs that do not assign to either Nason Creek or Chiwawa River (Item II-A). *(Note: NMFS provided approval for transport back to the river of Wenatchee spring Chinook adults not assigning to either Nason Creek or Chiwawa River via email on June 19, 2013.)*

- Lynn Hatcher will distribute an update on the status of Wenatchee spring Chinook permitting to the Hatchery Committees prior to June 27, 2013 (Item II-A).

- Kristi Geris will arrange a conference line to review the status of Wenatchee spring Chinook permitting and potential paths forward, scheduled for June 27, 2013, at 10:00 am (Item II-A).

- Greg Mackey will arrange and distribute a date for the Wells Hatchery Master Plan Workshop, planned to discuss engineering aspects of the modernization with HDR
Engineering, Inc. (HDR) (Item IV-B).

• Greg Mackey will develop an agenda for the next Hatchery Monitoring and Evaluation (M&E) Workgroup meeting, to be attached to the doodle poll distributed to arrange the meeting (Item IV-C).

STATEMENT OF AGREEMENT DECISION SUMMARY

• No Statements of Agreement (SOAs) were approved at today’s meeting.

AGREEMENTS

• Hatchery Committees representative approved the Chelan PUD Methow Spring Chinook Hatchery and Genetic Management Plan (HGMP) Addendum via email on June 3, 2013.

• Hatchery Committees representatives present agreed to a shortened 14-day review period for Chelan PUD’s full Methow Spring Chinook HGMP (Item II-A).

• Grant PUD concurred with WDFW’s request to begin Wenatchee spring Chinook broodstock collection for the Nason Creek and Chiwawa River programs of up to 136 natural origin spring Chinook adults at Tumwater Dam, contingent on Chelan PUD’s concurrence, and NMFS’ approval for transport back to the river of adults not assigning to either Nason Creek or Chiwawa River (Item II-A).

• Hatchery Committees members present agreed with WDFW’s request to begin Wenatchee spring Chinook broodstock collection for the Nason Creek and Chiwawa River programs of up to 136 natural origin spring Chinook adults at Tumwater Dam, contingent on NMFS’ approval for transport back to the river of adults not assigning to either Nason Creek or Chiwawa River (Item II-A).

• NMFS approved via email on June 19, 2013, transport back to the river of Wenatchee spring Chinook adults collected for the Nason Creek and Chiwawa River programs not assigning to either Nason Creek or Chiwawa River (Item II-A).

• Hatchery Committees representatives present approved the Columbia River Inter-Tribal Fish Commission’s (CRITFC’s) request to collect tissue samples from broodstock for parentage-based tagging (PBT) of Columbia River hatchery programs. The Colville Confederated Tribes (CCT), although they approved the request, declined to participate in 2013 (Item III-A).
• Hatchery Committees representatives present approved Grant PUD’s request for Douglas PUD to produce 100,000 steelhead for release in the Okanogan at Wells Hatchery, and 134,126 Methow River spring Chinook at the Methow Fish Hatchery (FH), for Grant PUD’s respective programs (Item IV-A).

**REVIEW ITEMS**

- Emily Pizzichemi sent an email to the Hatchery Committees on May 14, 2013, notifying them that the Wells Hatchery Master Plan is available for download from the ftp site and is out for a 60-day review period, with comments due to Greg Mackey no later than July 13, 2013.

**FINALIZED REPORTS**

- The 2012 Annual Chelan PUD Hatchery M&E Report was finalized and posted to the ftp site on June 3, 2013.

**I. Welcome, Agenda Review, Meeting Minutes, and Action Items**

Mike Schiewe welcomed the Hatchery Committees and asked for any additions or other changes to the agenda. The following revisions were requested:

- Mike Tonseth added a discussion of NMFS' HGMP update on spring Chinook permitting for the Nason Creek and Chiwawa River programs.
- Greg Mackey added a Grant PUD fish production request.
- Alene Underwood added an update on Chelan PUD’s Methow Spring Chinook HGMP.
- Kirk Truscott added an update on Chief Joseph Wenatchee spring Chinook brood collection at Leavenworth National Fish Hatchery (NFH).

The revised draft May 15, 2013 meeting minutes were reviewed. Three outstanding comments were discussed regarding NMFS' HGMP update:

- It was clarified that NMFS is focusing on approval of the Wenatchee spring Chinook biological opinion (BiOp)—not steelhead BiOp—before finalizing the Leavenworth NFH spring Chinook BiOp.
A statement made by Keely Murdoch was clarified to indicate that she considered hatchery outfall areas to be a place where wild fish and hatchery fish interaction is minimal—not that they do not interact at all.

A statement made by Craig Busack was clarified to indicate that, “natural production by hatchery fish, whether or not they mix with the wild fish when reproducing, is the issue, because such production ultimately introduces hatchery genetics into the natural population”—not that, “NMFS believes that any and all genetic mixing, no matter how unlikely, should be considered.”

Bill Gale also requested the following edits:

- Regarding U.S. Fish and Wildlife Service (USFWS) additions to the agenda, Gale clarified that he added a brief status update on Leavenworth NFH activities—not on permitting at Leavenworth NFH and Tumwater Dam.
- Regarding USFWS’ Leavenworth NFH update, Gale clarified that Leavenworth NFH has agreed to hold the adults for a 3-day AQUI-S® withdrawal period—not 30-day MS-222 withdrawal period.

Kristi Geris said that all other comments and revisions received on the draft meeting minutes were incorporated. The Hatchery Committees members present approved the May 15, 2013 meeting minutes as revised.

Action items from the last Hatchery Committees meeting on May 15, 2013, and follow-up discussions were as follows:

- **Mike Tonseth will consult with Ken Warheit (WDFW geneticist) and then provide the Wenatchee spring Chinook trapping/sampling protocols, including the genetic inclusion/exclusion criteria, to Emily Pizzichemi and Kristi Geris for distribution to the Hatchery Committees (Item II-A).**
  Tonseth said that he contacted Warheit and obtained the needed information; however, he has not yet amended the protocols. Tonseth requested that this action item be carried forward.

- **Lynn Hatcher will send a status update on Wenatchee spring Chinook permitting to Emily Pizzichemi and Kristi Geris for distribution to the Hatchery Committees no later than May 31, 2013 (Item II-A).**
Amilee Wilson provided a National Environmental Policy Act/Endangered Species Act (NEPA/ESA) Wenatchee hatchery program consultation update on May 31, 2013, and Geris distributed the update to the Hatchery Committees the same day.

- **Emily Pizzichemi and Kristi Geris will arrange a conference line and distribute details to the Hatchery Committees for a conference call to review the status of Wenatchee spring Chinook permitting, scheduled for June 3, 2013, at 10:00 am (Item II-A).**

  Geris arranged a conference line; however, the Hatchery Committees agreed that the conference call was not needed following receipt of Amilee Wilson’s NEPA/ESA Wenatchee hatchery program consultations update.

- **Hatchery Committees representatives will provide the names of recommended statisticians, salmon ecologists, and hatchery biologists to serve on a technical peer review panel to rank responses to the Chelan PUD Hatchery M&E Requests for Proposal (RFPs) to Mike Schiewe (with a copy to Kristi Geris) no later than June 3, 2013 (Item III-A).**

  Recommendations for potential peer reviewers were received from Hatchery Committees representatives.

- **Greg Mackey will revise the Wells Hatchery Summer Chinook Program HGMP and SOA accordingly, as requested by the Hatchery Committees, and Emily Pizzichemi will distribute the revised documents to the Hatchery Committees no later than May 17, 2013 (Item IV-A).**

  Mackey provided the revised documents on May 16, 2013, and Pizzichemi distributed them to the Hatchery Committees the same day.

- **Hatchery Committees representatives will send their approval or requested changes to the Wells Summer Chinook HGMP to Mike Schiewe (with copies to Emily Pizzichemi, Kristi Geris, and Greg Mackey) no later than May 22, 2013 (Item IV-A).**

  The revised HGMP and SOA were approved by email vote on May 22, 2013, with the Yakama Nation (YN), CCT, USFWS, WDFW, and Douglas PUD approving, and NMFS abstaining.

- **Greg Mackey will provide a list of critical sections in the Wells Hatchery Modernization Master Plan to help guide review to Emily Pizzichemi for distribution to the Hatchery Committees (Item IV-B).**

  Mackey provided the list on May 20, 2013, and Pizzichemi distributed it to the Hatchery Committees the same day.
II. NMFS

A. HGMP Update (Lynn Hatcher)

Okanogan Programs

Lynn Hatcher said that NMFS is continuing to work on the transfer of spring Chinook from Winthrop NFH to the CCT, and designation of this population as an ESA Section 10(j) experimental population. The Environmental Assessment (EA) will be available for a 60-day public review in July or August 2013, and then public meetings are planned for September or October 2013 to discuss the status of the EA. Hatcher said that BiOps are also planned to be completed no later than October 2013, which is a deadline that would allow the fall 2013 transfer of fish from Winthrop NFH to the acclimation ponds in the Okanogan and subsequent release in the spring of 2014 to initiate the experimental population. He said that in order to obtain permits, both the NEPA process and BiOps need to be complete; and the Section 10(j) designation finalized. Hatcher said that he expects no setbacks from the public meetings and that fish should be ready to transport come this fall. Kirk Truscott asked if the Section 10(j) permit could be issued before the NEPA. Mike Tonseth noted that WDFW was instructed that the BiOp and Section 10 permits may be issued prior to the EA; however, they are not effective until the EA is complete. Hatcher said that fish are not covered under Section 10(j) until they are released. Lastly, Hatcher said that NMFS is waiting for an Okanogan steelhead HGMP from the CCT.

Methow Programs

Hatcher said that agreement seems to have been reached among U.S. v. Oregon parties regarding Methow steelhead and spring Chinook. He said that the existing EA was determined sufficient, but a supplemental EA is still needed for the Chelan PUD spring Chinook program; Hatcher added that this supplemental EA is planned to be complete by October 2013. Bill Gale asked what discussions NMFS, Douglas PUD, or Grant PUD have had with Karl Halupka (USFWS) on program interactions with bull trout, and Hatcher replied that NMFS has been in constant communication with Halupka. Greg Mackey said that when Douglas PUD completed relicensing for Wells Dam, a full bull trout consultation
with USFWS was completed, which Douglas PUD supplied to NMFS. He added that Grant PUD programs at Douglas PUD facilities are also covered under Douglas PUD’s consultation, so long as they are tied to Douglas PUD’s facilities and operations. Hatcher said that the addendums for the approved Methow FH and Winthrop NFH HGMPs do not deviate significantly from what was already approved by the Hatchery Committees, and do not require an additional review by the Committees. He also said that the Methow Basin spring Chinook BiOp will include Chelan PUD’s 61,000 Methow spring Chinook obligation. However, Alene Underwood said that she had heard otherwise from Craig Busack. Underwood also said that although NMFS had already stated that an addendum would be acceptable for the Chelan PUD Methow spring Chinook program, as described in an email distributed to the Hatchery Committees by Busack on June 3, 2013, NMFS is now requesting a full HGMP. Hatcher explained that NMFS approved the Winthrop NFH spring Chinook HGMP and Methow FH spring Chinook HGMP, and their supplements, but had not yet approved (or received) Chelan PUD’s Carlton Rearing Pond spring Chinook HGMP. He said that Chelan PUD’s HGMP for the Carlton Rearing Pond is necessary before NMFS can complete the Methow Basin spring Chinook BiOp. She asked the Hatchery Committees if they would approve a shortened review period for the full Chelan PUD Methow Spring Chinook HGMP in consideration of the timeline. Hatchery Committees representatives present agreed to a shortened 14-day review period of Chelan PUD’s Methow Spring Chinook HGMP, and Underwood said that she hopes to get a draft out for review within the next 3 weeks.

Wenatchee Programs
Hatcher said that the existing NEPA documentation was determined sufficient for Wenatchee steelhead, but the Wenatchee steelhead BiOp will be on hold until after the spring Chinook BiOp is complete. He said that NMFS is currently working to complete the joint BiOp for the Chiwawa River, Nason Creek, and White River spring Chinook programs, along with the EA for Nason Creek. He said that once those are complete, NMFS will then focus on completing the Leavenworth spring Chinook BiOp. Hatcher said that signature pages will be needed from the PUDs and the State of Washington before permits are effective. Hatcher said that public comment on the Nason Creek spring Chinook EA ended on June 14, 2013, and the EA was sent to Washington D.C. for final review and signature. He also noted that about 30 pages of supporting information were added to the draft BiOp;
however, the analyses themselves were not changed. Underwood added that the BiOp format also changed, and additions were made to the sections on genetics, discussion of strays, and effects analysis. Tonseth asked that NMFS highlight the revisions to expedite a quicker final review.

Collection of Spring Chinook for Nason Creek and Chiwawa River Programs
Tonseth said that he recently distributed a revised spring Chinook adult return update that projected that approximately 40 percent of the run will pass Tumwater Dam by June 22, 2013. He said that, currently, the run is about 20 to 25 percent wild in composition; and that broodstock collection for the Nason Creek and Chiwawa River programs needs to begin as soon as possible. In light of this new information, as described in an email distributed to the Hatchery Committees by Kristi Geris on June 18, 2013, WDFW requested concurrence from NMFS to begin broodstock collection of up to 136 natural origin spring Chinook adults at Tumwater Dam, under and consistent with the current amended Section 10 Permit 1196. NMFS concurred that WDFW’s request was consistent with the current amended Section 10 Permit 1196 (NMFS 2004) which states that, “Of the combined total number of naturally produced spring Chinook salmon adults and jacks that return to the Chiwawa River and Nason Creek each year, WDFW may retain no more than 400 or one-third, whichever is less, for broodstock to meet the smolt production levels of the program. The ESA-listed adult Chinook salmon retained for broodstock may be transferred to transport vehicles and transported to holding/spawning facilities.”

Tonseth said that once new permits are obtained, collection will default to the original broodstock collection plan of 172 adults as described in the 2013 Broodstock Collection Protocols. Underwood said that although NMFS concurred with the collection and transport of broodstock, Chelan PUD’s concern is that the current permit does not cover transport back to the river of adults not assigning to either Nason Creek or Chiwawa River or fish in excess of Program needs. Tonseth noted that releasing unassigned fish back to the river is an activity that already has precedence; and said that WDFW is ready to assume liability for hauling unassigned fish back to the river. Underwood said that Chelan PUD appreciates the offer, but as co-signatories on the permit, Chelan PUD must also assume liability and potential take. Underwood requested that NMFS provide written confirmation that transport back to the river of adults not assigning to either Nason Creek or Chiwawa River is
covered under the current Section 10 Permit 1196. Underwood noted that Grant PUD also needs to approve the proposed path forward, and Shannon Lowry said that Grant PUD concurs with WDFW’s request to begin Wenatchee spring Chinook broodstock collection for the Nason Creek and Chiwawa River programs of up to 136 natural origin spring Chinook adults at Tumwater Dam, contingent on Chelan PUD’s concurrence, and NMFS’ approval for transport back to the river of adults not assigning to either Nason Creek or Chiwawa River.

Hatchery Committees members present also agreed with WDFW’s request to begin Wenatchee spring Chinook broodstock collection for the Nason Creek and Chiwawa River programs, contingent on NMFS’ approval for transport back to the river of adults not assigning to either Nason Creek or Chiwawa River. Hatcher said that NMFS will provide a letter of concurrence for transport back to the river of Wenatchee spring Chinook adults collected for the Nason Creek and Chiwawa River programs not assigning to either Nason Creek or Chiwawa River. (Note: NMFS provided approval for transport back to the river of Wenatchee spring Chinook adults not assigning to either Nason Creek or Chiwawa River via email on June 19, 2013.)

Gale asked if agreement is reached for spring Chinook brood collection for the Nason Creek and Chiwawa River programs, will the revision also be considered approved in the 2013 Broodstock Protocols. Tonseth replied that the protocols will still need to be revised; then reviewed and approved by the Hatchery Committees; and then sent to NMFS for final approval. With regards to a spring Chinook timeline, Hatcher will distribute an update on the status of Wenatchee spring Chinook permitting to the Hatchery Committees prior to June 27, 2013, and Geris will arrange a conference line to review the status of Wenatchee spring Chinook permitting and potential paths forward, scheduled for June 27, 2013, at 10:00 am.

III. WDFW

A. DECISION: CRITFC Request to Conduct Genetic Sampling for PBT of Columbia River Hatchery Programs (Mike Tonseth and Tom Scribner)

Mike Tonseth said that CRITFC’s 2013 request to conduct genetic sampling of broodstock for PBT of Columbia River hatchery programs is consistent with the 2012 request that was presented at the Hatchery Committees meeting on March 28, 2012; he added that, like last year, the request is a 1-year agreement. CRITFC’s proposal to conduct a second year of
genetic sampling (samples to be archived for possible future use) for PBT of Columbia River hatchery programs (Attachment B) and general tissue sampling protocol for PBT were distributed to the Hatchery Committees by Kristi Geris on June 11, 2013. Tom Scribner also provided additional background information that Geris distributed to the Hatchery Committees on June 12, 2013, including: a PBT geographic range graphic; a media release from the Canadian Journal of Fisheries and Aquatic Sciences (CJFAS) on technology used to genetically tag fish in the Snake River Basin titled, “It’s all in the genes — including the tracking device”; and a 2012 paper that was published in CJFAS titled, “Validation of Parentage-Based Tagging for hatchery steelhead in the Snake River basin” by Steele et al.

Tonseth said that some agencies, including WDFW, still have some concerns about the project, such as long-term funding for genetic analyses, access to the database, and who maintains the database. However, he expected these issues will be resolved and WDFW supports collection of the sample for another year. He said that, as was the case last year, Maureen Hess, CRITFC, will provide the supplies needed to conduct sampling. Scribner said that genetic sampling for PBT is expanding rapidly. He acknowledged that there are some associated costs but he said that he sees no downside, conceptually, to participating.

Bill Gale said that USFWS has concerns similar to those of WDFW; however, they are supportive of the intent, and have agreed to collect samples at Leavenworth NFH and Winthrop NFH. He said that USFWS is not planning to sample summer Chinook at Entiat NFH, and added that it was his understanding that CRITFC was not focusing on non-listed species at this time. Tonseth clarified that CRITFC was initially only interested in listed species; however, based on those samples, they have decided to also include non-listed species. He said that, in 2012, samples of non-listed species were obtained from Priest Rapids Fish Hatchery, and added that Hess indicated very clearly that CRITFC will supply staff to collect samples, if needed. Charlie Snow said that, in 2012, summer Chinook at Wells Dam were also sampled. He said that Hess was on site for one day of sampling. Alene Underwood said that Chelan PUD is supportive of the proposal, and Tonseth said that samples were collected last year for Chelan PUD programs. Kirk Truscott said that the CCT supports the proposed sampling; however, the CCT will not participate in 2013. He said that the CCT would like to establish and refine Chief Joseph FH’s broodstock protocols before considering additional procedures. The Hatchery Committees representatives present approved
CRITFC’s request to conduct genetic sampling for PBT of Columbia River hatchery programs.

**IV. Douglas PUD**

**A. Grant PUD Fish Production Request (Greg Mackey)**

Greg Mackey said that each year, Grant PUD submits a request to Douglas PUD to produce fish for Grant PUD programs. He said that Hatchery Committees representatives have routinely approved the request as long as it does not impact Douglas PUD’s HCP production. Mackey said that this year, Grant PUD is requesting that Douglas PUD produce 100,000 steelhead for release in the Okanogan at Wells Hatchery, and 134,126 Methow River spring Chinook at the Methow FH. Mackey said that both requests can be comfortably accomplished without placing Douglas PUD programs at risk. Hatchery Committees representatives present approved Grant PUD’s request.

**B. Wells Hatchery Master Plan Workshop (Greg Mackey)**

Greg Mackey recalled that the Hatchery Committees had requested that Douglas PUD arrange a Wells Hatchery Master Plan Workshop to discuss design aspects of the modernization with HDR. He said that Douglas PUD still plans to hold a workshop; however, dates have not yet been solidified. He added that tentative dates are in early July or early August 2013, and that, ideally, Douglas PUD would like to hold the workshop early enough in the design process such that comments and revisions can be addressed and incorporated into the plans without setting back the schedule. Mackey said that the workshop would probably not be scheduled on a Hatchery Committees meeting date, and that the venue would likely be the Douglas PUD office—not Wells Hatchery. He said that comments on the Wells Hatchery Master Plan are due on July 13, 2013, and Bill Gale suggested holding the workshop prior to the comment deadline. Mackey said that he will arrange and distribute a date for the Wells Hatchery Master Plan Workshop. Gale asked if the comment deadline can be delayed in the event that the workshop cannot be scheduled before the July 13, 2013 comment deadline, and Mackey replied that the comment period will remain the same, and that any comments from the workshop will still be considered.
C. Hatchery M&E Plan Assessment Targets (Greg Mackey)

Greg Mackey said that two doodle polls have been distributed trying to reconvene a Hatchery M&E Workgroup. He said there are two issues that remain to be discussed: 1) layout of information in the appendices; and 2) content to be included in the appendices. Mike Tonseth noted that some content may remain blank for some time. Mike Schiewe also noted that if there are some appendices that are not common to all three HCPs and the Grant PUD Settlement Agreement, it would make sense to address those issues in separate meetings, so as to use everyone’s time more effectively. Mackey said that he will develop an agenda for the next Hatchery M&E Workgroup meeting. The agenda will be attached to a doodle poll that will be distributed to arrange the meeting.

V. Chelan PUD

A. Hatchery M&E RFP Technical Review Panel (Alene Underwood)

Alene Underwood said that recommendations for potential peer reviewers were received from Hatchery Committees representatives. She said that Chelan PUD plans to contact the recommended reviewers to see who is available and interested in participating on the panel. Underwood said that Chelan PUD also held a mandatory pre-proposal conference for interested proposers, which she reported had a good turnout. Underwood said that once a list of available reviewers is compiled, the list will be shared with the Hatchery Committees. She said that proposals are due on July 9, 2013, and she estimated that the technical review panel would begin reviews by July 15, 2013. She added that Chelan PUD and Grant PUD are still discussing how to facilitate the process.

B. Chelan PUD Methow Spring Chinook HGMP (Alene Underwood)

Alene Underwood said that this agenda item was adequately discussed during NMFS’ HGMP update.

VI. CCT

A. Chief Joseph Wenatchee Spring Chinook Brood Collection at Leavenworth NFH (Kirk Truscott)

Kirk Truscott said that USFWS, WDFW, and the CCT had been examining passive integrated transponder (PIT) tag data coming into Leavenworth NFH, and, due to low return projections, the CCT had recently decided to close the CCT spring Chinook fishery on the Icicle River.
He also noted that the YN had delayed expanding their fishery in Icicle Creek. Truscott said that to date, 132 adult females, 62 adult males, and 40 jacks have been obtained for CJH broodstock; and over the weekend, there was a pulse of water and a good number of additional Chinook have come in to Leavenworth NFH. Current projections are that a full broodstock for CJH is likely; therefore, the CCT is planning to reinitiate the CCT spring Chinook fishery on the Icicle River.

VII. HCP Administration

A. Chelan PUD Change in Hatchery Committee Representation

Mike Schiewe announced that Keith Truscott provided notification of a change in Chelan PUD HCP Hatchery Committee representation on June 14, 2013, designating Alene Underwood as the new Chelan PUD HCP Hatchery Committee lead representative.

B. Next Meetings

The next scheduled Hatchery Committees’ meetings are on July 17, 2013 (Douglas PUD office); August 21, 2013 (Chelan PUD); and September 18, 2013 (Douglas PUD).

List of Attachments

Attachment A     List of Attendees
Attachment B     CRITFC’s proposal to conduct a second year of genetic sampling for PBT of Columbia River hatchery programs
# Attachment A
## List of Attendees

<table>
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<td>Tom Kahler*</td>
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<td>Todd Pearson</td>
<td>Grant PUD</td>
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<td>Grant PUD</td>
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<td>Shannon Lowry</td>
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<td>Peter Graf</td>
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**Notes:**

* Denotes Hatchery Committees member or alternate
† Joined by phone
FINAL MEMORANDUM

To: Wells, Rocky Reach, and Rock Island HCPs Hatchery Committees

From: Mike Schiewe, Chair

Cc: Kristi Geris

Re: Final Minutes of the July 17, 2013 HCP Hatchery Committees Conference Call

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees’ meeting was held by conference call, on Wednesday, July 17, 2013, from 9:00 am to 11:00 am. Attendees are listed in Attachment A to these meeting minutes.

ACTION ITEM SUMMARY

- Mike Tonseth will consult with Ken Warheit (Washington Department of Fish and Wildlife [WDFW] geneticist) and provide the Wenatchee spring Chinook trapping and sampling protocols, including the criteria for genetic inclusion or exclusion, to Kristi Geris for distribution to the Hatchery Committees (action item carried forward from the Hatchery Committees meeting on June 19, 2013) (Item I).

- Chelan PUD will provide a schedule and timeline outlining their Hatchery Monitoring and Evaluation (M&E) Request for Proposal (RFP) and 2014 Hatchery M&E Implementation Plan processes, to Kristi Geris for distribution to the Hatchery Committees (Item II-A).

- Chelan PUD will provide an update regarding when their draft Spring Chinook Hatchery and Genetic Management Plan (HGMP) will be available for review, to Kristi Geris for distribution to the Hatchery Committees (Item II-B).

- Mike Tonseth will provide a summary of the genetic assignments of the spring Chinook broodstock that were collected at Tumwater Dam (TWD), to Kristi Geris for distribution to the Hatchery Committees (Item II-C).

- Keely Murdoch will update the Hatchery Committees on potential co-acclimation of Chelan PUD’s spring Chinook Methow production and the Yakama Nation’s (YN’s) coho salmon production at the Chewuch Pond (Item III-A).
• The Hatchery Committees’ meeting on August 21, 2013 will be held at Douglas PUD, with the Wells Hatchery Master Plan Workshop in the afternoon (Item IV-A).

STATEMENT OF AGREEMENT DECISION SUMMARY

• No Statements of Agreement (SOAs) were approved at today’s meeting.

AGREEMENTS

• Hatchery Committees representatives present agreed to Chelan PUD’s proposed schedule to provide their draft 2014 Hatchery M&E Implementation Plan for Hatchery Committees review as early as September 2013, and no later than October 2013 (Item II-A).

• Hatchery Committees representatives present agreed to the YN’s request to continue planning for co-acclimation of Chelan PUD’s Methow spring Chinook production with the YN coho salmon production at the Chewuch Pond in 2015 (Item III-A).

REVIEW ITEMS

• There are no items that are currently out for review.

FINALIZED REPORTS

• Kristi Geris sent an email to the Hatchery Committees on August 2, 2013, notifying them that the Wells Hatchery Master Plan was finalized following a 60-day review period, which ended on July 13, 2013. As noted in the email, no comments were received from Hatchery Committees members on the draft plan.

I. Welcome, Agenda Review, Meeting Minutes, and Action Items

Mike Schiewe welcomed the Hatchery Committees and asked for any additions or other changes to the agenda. Schiewe requested that Chelan PUD provide an update on spring Chinook broodstock collection at TWD. No other additions or changes were requested.

Action items from the last Hatchery Committees meeting on June 19, 2013, and follow-up discussions were as follows:

• Mike Tonseth will consult with Ken Warheit (WDFW geneticist) and provide the
Wenatchee spring Chinook trapping and sampling protocols, including the criteria for genetic inclusion or exclusion, to Kristi Geris for distribution to the Hatchery Committees (action item carried forward from Hatchery Committees meeting on May 15, 2013).

Tonseth requested that this action item be carried forward.

- **The National Marine Fisheries Service (NMFS) will provide a letter of concurrence for transport back to the river of Wenatchee spring Chinook adults collected for the Nason Creek and Chiwawa River programs that do not assign to either Nason Creek or Chiwawa River (Item II-A).**
  
  NMFS provided approval for transport back to the river of Wenatchee spring Chinook adults not assigning to either Nason Creek or Chiwawa River via email on June 19, 2013.

- **Lynn Hatcher will distribute an update on the status of Wenatchee spring Chinook permitting to the Hatchery Committees prior to June 27, 2013 (Item II-A).**
  
  Craig Busack provided an update on the status of Wenatchee spring Chinook permitting that Kristi Geris distributed to the Hatchery Committees on June 26, 2013.

- **Kristi Geris will arrange a conference line to review the status of Wenatchee spring Chinook permitting and potential paths forward, scheduled for June 27, 2013, at 10:00 am (Item II-A).**
  
  Kristi Geris arranged a conference line; however, the Hatchery Committees agreed that the conference call was not needed following receipt of Craig Busack’s update on the status of Wenatchee spring Chinook permitting.

- **Greg Mackey will arrange and distribute a date for the Wells Hatchery Master Plan Workshop, planned to discuss engineering aspects of the modernization with HDR Engineering, Inc. (HDR) (Item IV-B).**
  
  Greg Mackey scheduled the Wells Hatchery Master Plan Workshop on the afternoon of August 21, 2013, as Kristi Geris informed the Hatchery Committees on July 8, 2013.

- **Greg Mackey will develop an agenda for the next Hatchery M&E Workgroup meeting, to be attached to the doodle poll distributed to arrange the meeting (Item IV-C).**
  
  Greg Mackey developed an agenda for the next Hatchery M&E Workgroup meeting that was attached to the doodle poll distributed to arrange the meeting, as the Hatchery Committees were notified by Kristi Geris on July 5, 2013.
The Hatchery Committees reviewed the revised draft June 19, 2013 meeting minutes. Kristi Geris said that a second draft of the revised minutes was distributed to the Hatchery Committees today, prior to the call. She said that the second draft incorporated additional edits, which are tracked in redline in the meeting minutes; these edits are as follows:

- Regarding the NMFS’ HGMP update, Bill Gale clarified that the October 2013 deadline for submitting Biological Opinions (BiOps) would allow the fall 2013 transfer of fish from Winthrop National Fish Hatchery (NFH) to the acclimation ponds in the Okanogan and subsequent release in the spring of 2014 to initiate the experimental population.
- Regarding WDFW’s decision item about Columbia River Inter-Tribal Fish Commission’s (CRITFC’s) request, it was clarified that, in 2012, samples of non-listed species were obtained from Priest Rapids Fish Hatchery (FH)—not from Spring Creek NFH.
- Regarding the Colville Confederated Tribe’s (CCT’s) discussion on Chief Joseph Wenatchee spring Chinook brood collection at Leavenworth NFH, Truscott clarified the sequence of events and reasoning surrounding the decision to close—and the subsequent decision to reinitiate—the CCT spring Chinook fishery on the Icicle River.

Geris said that all other comments and revisions received from members of the Committees were incorporated in the revised minutes. The Hatchery Committees members present approved the June 19, 2013 meeting minutes as revised. Keely Murdoch confirmed Tom Scribner’s approval of the revised minutes, and Lynn Hatcher provided NMFS approval of the revised minutes via email on July 26, 2013. Geris will finalize the meeting minutes and distribute them to the Committees.

II. Chelan PUD

A. Hatchery M&E RFP Update and 2014 Hatchery M&E Implementation Plan Schedule (Alene Underwood)

Alene Underwood said that the Chelan PUD Hatchery M&E RFP closed on July 8, 2013. She said that three proposals were received, which are currently being reviewed for completeness. She said that Grant PUD and Chelan PUD have a call scheduled for July 30,
2013, to discuss which proposals qualify as “complete,” and also to determine a path forward for interviews. Once it is determined which proposals are complete, those proposals will be provided for review to those Hatchery Committees members who do not have a conflict of interest.

Mike Tonseth asked what assurances the Hatchery Committees would have, as a whole, that what is being proposed meets program needs—specifically as related to aspects of proposals that may be different from past Hatchery M&E Implementation Plans. Underwood replied that it is up to the proposer to demonstrate how objectives will be met. Where different methods are proposed, the proposer will be required to show congruence with past data collection, with no data gaps. She said that if alternative methods are proposed, they will be included in the draft 2014 Hatchery M&E Implementation Plan that will be available for review by the entire Hatchery Committees. Tonseth recalled that, last year, the Hatchery Committees agreed that the draft Hatchery M&E Implementation Plans were to be available for review no later than July 1. (*Note: this agreement was made at the Hatchery Committees’ meeting on December 12, 2012.*) Underwood acknowledged that although the draft Implementation Plan was originally scheduled for review in July, the RFP review process has affected the schedule; and she proposed that the draft Implementation Plan instead be submitted to the Hatchery Committees for review in September or October 2013. Tonseth said that, in order to remain consistent with that agreement, as long as the draft Implementation Plan is a precursor to contracting, there should be no issues with submitting the draft plan at a later date. Underwood clarified that developing the draft Implementation Plan and contracting will be completed on parallel paths because contracting cannot happen without knowing the scope of work. Keely Murdoch said that her main concern in reviewing the Implementation Plan before contracting is to make sure the plan is consistent with the M&E Plan. Underwood said that Chelan PUD is also committed to meeting the objectives outlined in the M&E Plan. She added that even if contracts are in place in general terms, they can be adjusted as needed to meet M&E objectives. Hatchery Committees representatives present agreed to Chelan PUD’s proposed schedule of providing their draft 2014 Hatchery M&E Implementation Plan for Hatchery Committees review as early as September 2013, and no later than October 2013.
Underwood said that if interviews with the proposers were judged necessary, they will likely be conducted around the first part of August 2013. She noted that the interviews are separate from the RFP review panel, and both are likely to occur in parallel. She said that about 10 scientists had been recommended by Hatchery Committees representatives for the RFP review panel, and that those recommended will be contacted regarding their availability. She said she expects that 3 to 5, out of the 10 total, may be available; however, she also has no plans to exclude recommended reviewers if they are available. She said that she will have a better idea of what the RFP review panel will look like following Chelan PUD and Grant PUD’s coordination call on July 30, 2013. Underwood also said that she will provide a schedule and timeline outlining Chelan PUD’s Hatchery M&E RFP and 2014 Hatchery M&E Implementation Plan processes, to Kristi Geris for distribution to the Hatchery Committees.

Tonseth asked if Hatchery Committees representatives with a conflict of interest would still be allowed to review the proposals, but just not comment or participate in the decision-making. Underwood said that she was uncertain about the benefits of including such a step. Schiewe said that it would be highly unusual for a conflicted person to review the proposal at all; and added that there is a certain level of confidentiality with these proposals. Tonseth asked which Hatchery Committees members were not conflicted, and Underwood replied that they include U.S. Fish and Wildlife Service (USFWS), the CCT, and NMFS. Kirk Truscott suggested that, although conflicted parties are not participating in the selection of a contractor, the Hatchery Committees and the RFP review panel may still benefit from a conflicted party’s review of the proposals. Schiewe said that if a non-conflicted party decides to seek input from conflicted parties outside of the Hatchery Committees venue, then that is up to them. However, he said that the Conflict of Interest Policy clearly establishes a protocol for review that puts conflicted parties at arm’s length in the review process; he added that this is a traditional thing to do.

B. Methow Spring Chinook HGMP Update (Alene Underwood)

Alene Underwood said that, as discussed at the Hatchery Committee’s meeting on June 19, 2013, Chelan PUD has been asked to submit a full Methow Spring Chinook HGMP. She said that Chelan PUD planned to have a draft ready for Hatchery Committees review by July 22, 2013; however, the draft may not be ready until July 26, 2013. Underwood said that she will
provide an update regarding when the draft HGMP will be available for review, to Kristi Geris for distribution to the Hatchery Committees.

C. Spring Chinook Broodstock Collection at Tumwater Dam (Alene Underwood)

Alene Underwood said that after the Hatchery Committees meeting on June 19, 2013, WDFW commenced collection of spring Chinook broodstock at TWD; and as of July 12, 2013, Grant PUD, Chelan PUD, and WDFW have obtained Section 10 permits for Wenatchee spring Chinook. Mike Tonseth said that 172 adult spring Chinook were collected at TWD as described in the 2013 Broodstock Collection Protocols, and that genetic assignments for a full Chiwawa River spring Chinook program were obtained; however, they were not obtained for Nason Creek. He added that the majority of fish trapped at TWD assigned to the Chiwawa River, followed by White River, Leavenworth, and then Nason Creek. Bill Gale asked how many adults assigned to Leavenworth, and Tonseth replied that about 10 assigned as having originated at Leavenworth NFH; however, only four or five assigned given the broodstock criteria. Tonseth said that assignments will be confirmed once scale analyses are available, and he added that he will provide a summary of the genetic assignments of the spring Chinook broodstock that were collected at TWD, to Kristi Geris for distribution to the Hatchery Committees. Tonseth said that the 55 of 172 adults that did not assign were returned to the Wenatchee River at Swiftwater. He said that fish were sorted in the morning, then trucked to the release location, and released in the afternoon. He said that there were two releases, which were both water-to-water transfers. Tonseth said that he was present for the first transfer, which went well. Fish were released in deep pools so they could become oriented and gain their bearings; and after a short while, they swam into deeper water. He added that, currently, water temperature at the release location is slightly warmer than that at Eastbank.

Underwood said that spring Chinook collection at TWD is now complete, and that high numbers of sockeye are now passing TWD. She said that, as of July 12, 2013, TWD switched to a 3-day trapping schedule, and that weekly monitoring for potential delays associated with
trapping has been ongoing. She said that no delays in excess of the criteria previously agreed to by the Hatchery Committees have been observed.

III. Yakama Nation

A. *Potential Acclimation Locations for Chelan PUD Methow Spring Chinook (specifically as it relates to the Chewuch River) (Keely Murdoch)*

Keely Murdoch said that an agreement is being explored between the YN and Douglas PUD for use of the Chewuch Pond for the YN’s coho salmon production and acclimation, and she added that there has been discussion about possibly co-acclimating Chelan PUD’s spring Chinook Methow production at the site as well. Mike Tonseth said that the proposal was worth considering; however, he said, additional discussion of long-term adult management would be required. He asked what is known about past acclimation at that location, and he noted that when Douglas PUD’s program operated out of the Methow Hatchery, about 40 percent of returning adults did not return to the Chewuch. Murdoch agreed that additional discussion of adult management was appropriate; she also noted that she was uncertain about what effect acclimation at the Chewuch Ponds would have on percent hatchery-origin spawners (pHOS) in the Chewuch. She noted that the Chewuch Pond is also a secure facility, which is advantageous when dealing with listed fish. With regards to previous data, Murdoch said that it was her understanding that closer to 50 percent of Douglas PUD’s program did not return to the Chewuch while operating out of the Methow Hatchery. She speculated that this may have been because the fish were homing to the Methow Hatchery. Murdoch said, however, that since Chelan PUD’s spring Chinook will be overwintered at Carlton, they may exhibit a higher fidelity to home back to the Chewuch, as opposed to the Methow. She added that depending on how they are marked, options for removal could include Wells Dam.

Tonseth suggested that, in order to evaluate this option, the Hatchery Committees should consider what the expectations are for the program in terms of overwintering at Carlton and spring acclimating in the Chewuch. Bill Gale said that he is more interested in how Chelan PUD is going to collect broodstock than in how they are going to release them. He also said that he is not opposed to the idea, and added that he agrees with Tonseth that NMFS will
want to see data that demonstrate that fish will return to the Chewuch. Kirk Truscott noted that he is unaware of options other than what the YN is suggesting; and asked if coho and spring Chinook have been co-acclimated before. Murdoch replied that coho and spring Chinook have been co-acclimated in the back-channel at Winthrop, and she added that fish at Chewuch Pond could either be commingled or be separated by a net. Truscott asked what the capacity is at Chewuch Pond, and Tom Kahler replied that he believes the design capacity is 223,000 fish. Tonseth noted that spring Chinook have lower bacterial kidney disease (BKD) rearing density requirements than coho; and Alene Underwood said that, as described in their Methow Spring Chinook HGMP Addendum, Chelan PUD is not anticipating density issues with regards to their Methow spring Chinook obligation. Tonseth said that it is not Chelan PUD’s program that will cause the density issue, but combining the YN’s 180,000 coho is what will increase the density. He asked how many coho the YN planned to acclimate in the Chewuch Pond, and Murdoch replied that those figures depend on what other acclimation options are agreed upon in the Methow and Chewuch. She added that the YN is cognizant of keeping densities low with commingled acclimation—they do not intend to acclimate an unhealthy number of fish in one location.

Truscott asked if there are fish health concerns with commingling coho and spring Chinook, and Gale replied that he did not recall any concerns with commingling them in the back-channel at Winthrop. Gale added that there is a correlation between a fish’s condition when transferred and subsequent fish health problems. He said that in the past, minor fish health issues arose when fish arrived and the stress of transfer triggered secondary fish health issues. Tonseth said that he has observed behavioral issues among commingled steelhead and spring Chinook, such as fin nipping, and asked if anything of that nature was observed at Winthrop. Gale replied that he had not observed that at Winthrop.

Murdoch noted that the commingled acclimation would be short-term, and she said that, at this point, the YN just wanted to share the concept with the Hatchery Committees to make sure there were no red flags before the YN continues investigating this option. Hatchery Committees representatives present agreed to the YN’s request to continue planning for co-
acclimation of Chelan PUD’s Methow spring Chinook production with the YN coho salmon production at the Chewuch Pond in 2015. Murdoch said that she will update the Hatchery Committees as plans solidify.

IV. HCP Administration

A. Next Meetings

Mike Schiewe reminded the Hatchery Committees that the next meeting on August 21, 2013, will be held at Douglas PUD, with the Wells Hatchery Master Plan Workshop to follow in the afternoon. Alene Underwood added that Chelan PUD and Grant PUD have been discussing inviting Dr. Kim Hyatt of Fisheries and Oceans, Canada (DFO), to provide an update on the Sockeye Reintroduction Program on the morning following the meeting (August 22, 2013). Tom Kahler said that Douglas PUD would be fine with that arrangement, but that they would want Hyatt to also include information on the implementation of the Douglas PUD-funded Fish Water Management Tool (FWMT). Underwood said that she would finalize the arrangements with Grant PUD.

The next scheduled Hatchery Committees’ meetings are on August 21, 2013 (Douglas PUD); September 18, 2013 (Douglas PUD); and October 16, 2013 (Chelan PUD).

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EMAIL NOTIFICATION TO HCP HATCHERY COMMITTEE THAT THE MASTER PLAN WAS FINALIZED WITH NO COMMENTS RECEIVED

AUGUST 2, 2013
Hi HCP-HC: please see the email below from Greg regarding the Wells Hatchery Master Plan.

Thanks!
Kristi 😊

Kristi Geris
ANCHOR QEA, LLC
kgeris@anchorqea.com
T  509.491.3151 x104
C  360.220.3988

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From: Greg Mackey [mailto:gregm@dcpud.org]
Sent: Friday, August 02, 2013 10:31 AM
To: Kristi Geris
Cc: Mike Schiewe; Shane Bickford; Tom Kahler
Subject: Wells Hatchery Master Plan review conclusion

Dear Hatchery Committee Representatives:

We did not receive any comments from the HCP Hatchery Committee on the Wells Hatchery Modernization Master Plan by July 13, 2013, the deadline for the 60 day review. Therefore, Douglas PUD will be submitting the Master Plan to FERC with documentation that no comments were received on the Master Plan from the Hatchery Committee. This will enable us to start FERC review of the Master Plan to keep us on track for our design and construction schedule.

As we discussed in the past, you will have opportunity to comment on the project during the Wells Modernization Workshop on August 21, 2013.

Thank you,

Greg

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EMAIL NOTIFICATION TO HCP HATCHERY COMMITTEE – APPROVAL OF THE FINAL SUMMARY FOR WELLS HATCHERY MODERNIZATION WORKSHOP MEETING MINUTES

SEPTEMBER 17, 2013
Hi HCP-HC: attached is the final memo from the Wells Hatchery Modernization Workshop on August 21, 2013, which includes Douglas PUD's minor edits. Thanks! –kristi 😊

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Thanks!
Kristi 😊

Kristi Geris
Scientist

ANCHOR QEA, LLC
kgeris@anchorqea.com
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