# WDFW Touchet River Endemic Stock Summer Steelhead - Touchet River Release

## HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

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| **Hatchery Program:** | **Mid-Columbia Summer Steelhead –Touchet River Stock: Lyons Ferry Hatchery Complex** |
| **Species or Hatchery Stock:** | **Touchet River Endemic Summer Steelhead** |
| **Agency/Operator:** | **Washington Department of Fish and Wildlife** |
| **Watershed and Region:** | **Touchet River / Walla Walla River / Mid-Columbia Basin, Washington State** |
| **Date Submitted:** | **April 20, 2002; November 29, 2010** |
| **Date Last Updated:** | **November 6, 2015** |

# Executive Summary

**ESA Permit Status:**
In 2010 the Washington Department of Fish and Wildlife (WDFW) submitted a Hatchery Genetic Management Plan (HGMP) for the Lyons Ferry Hatchery (LFH) Touchet River Endemic Summer Steelhead 50,000 release of yearling smolts into the Touchet River program. The Washington Department of Fish and Wildlife (WDFW) and the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) are now re-submitting an HGMP for this yearling program to update the description of the current program.

Both the Touchet River Endemic Summer Steelhead *(O. Mykiss),* Mid-Columbia ESU summer steelhead population, listed as threatened under the ESA as part of the Mid-Columbia River ESU (March 25, 1999; FR 64 No. 57: 14517-14528) and Wallowa Stock summer steelhead *(O. Mykiss),* (not ESA-listed) are currently produced at WDFW's LFH and released into the Touchet River. This document covers only the Tucannon Endemic Steelhead program. The proposed hatchery program may slowly phase out the Wallowa stock from the Touchet River in the future. This will depend on the performance of the Touchet River endemic steelhead stock, and decisions reached with the co-managers for full implementation.

Actions described within this HGMP represent the development and assessment of a new hatchery broodstock for Touchet River summer steelhead. Assessment is a crucial first activity in a series of actions that may eventually constitute a re-direction of LSRCP mitigation, by reducing and/or replacing the current releases of Wallowa stock steelhead in the Touchet River. This is considered necessary to align the LSRCP mitigation program with recovery requirements of the ESA. That, coupled with the desire of WDFW to recover depressed Mid-Columbia natural steelhead stocks, prompted this new hatchery action. The purpose of the current program is to continue to examine ways to increase survival of the Touchet River stock by incorporation of returning F1 hatchery fish into the broodstock, and to provide acclimation at release. In the long-term, if implemented, this program would provide both harvest mitigation and conservation benefits to the Touchet River.

The LSRCP summer steelhead program in Washington has been operated since 1983 to provide harvest mitigation for the construction of the four lower Snake River dams. Prior to 2001, all hatchery steelhead production came from the use of LFH stock steelhead (Schuck et al 1998), which was replaced in 2013 with Wallowa stock, with releases in both the Walla Walla and Touchet rivers as off-site, out-of-basin harvest mitigation (see WDFW Wallowa Stock HGMP - 2013). Neither of these stocks are from the Walla Walla Basin. The April 2, 1999, Biological Opinion issued by NMFS on the LSRCP-produced hatchery steelhead determined that the continued use of non-endemic steelhead stocks (such as the LFH stock) in the Mid-Columbia appreciably reduced the likelihood of survival and recovery of natural steelhead populations within the Columbia River, and recommended investigations into the development of endemic stock programs to replace the use of non-endemic hatchery production. This program represents such an action.

The Lower Snake River Compensation Plan (LSRCP – US Fish and Wildlife Service) presently funds production of harvest mitigation fish (Wallowa stock summer steelhead established as a result of hydroelectric projects in the Snake River) that are released in the Touchet and Walla

Walla rivers. The LSRCP program is committed to funding actions that are responsive to ESA needs for listed Columbia River steelhead affected by LSRCP hatchery actions. While the Touchet and Walla Walla rivers empty into the Columbia River, and are not part of the Snake River, they were included as part of the mitigation responsibilities for LSRCP. Managers at the time believed that smolt survival for the LSRCP program might not be as high as proposed, and as some insurance, this off-site out-of-basin mitigation was put in place. To provide for this additional loss, and without exceeding the limits of the available habitat from Snake River tributaries, the management agencies at the time chose the Touchet and Walla Walla rivers as suitable outlets for the required mitigation, as they were geographically located near the Snake River.

The described program in this document is operated as an "integrated" program with the intent to minimize the genetic and reproductive fitness differences between the locally derived hatchery broodstock and the naturally spawning population. To achieve this, WDFW will use the FWC Policy C-3619 for guidance for hatchery reform actions while working with the co-managers/tribes and in a manner that is consistent with the U.S v. Oregon Agreement. HSRG recommendations are implemented to degree there is agreement among the parties.

Specific changes to this HGMP compared to previous submissions include:
Testing performance (survival), both in-hatchery and post-release on two groups of Touchet endemic stock steelhead. The two groups being tested are derived from either Wild x Wild (WxW) crosses, or Wild x Hatchery (WxH) crosses. For this program we desire the two groups to be relatively equal in size so rearing densities are similar for each group, as they will be reared in separate ponds. To accomplish this, we will collect 6-8 hatchery origin females (first generation returns) and 6-8 natural origin females for the broodstock. All males used in the broodstock will be natural origin. Overall, about 25% of the broodstock will consist of first generation hatchery origin fish from the Touchet endemic stock program.
Each study group will receive 5,000 PIT tags for monitoring juvenile downstream migration success, but will be primarily used to estimate adult returns to McNary Dam, or into the Touchet River.
In the past, all smolts from this program were released into the North Fork Touchet River. Beginning in 2016, all smolts (from each study group) will be released from the Dayton Acclimation Pond, immediately following the release of Wallowa stock steelhead. It is anticipated that the Touchet endemic stock will have about a 2-week acclimation period.

Risk control measures are also in place to address other potential hazards including genetic and ecological interactions with other ESA-listed and non-ESA-listed species, disease transmission, and facility effects.

## SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Hatchery: Lyons Ferry Hatchery Complex.
Program: Touchet River Endemic Summer Steelhead Broodstock Program

1.2) Species and population (or stocks) under propagation, and ESA status.

Summer Steelhead *(O. Mykiss),* Touchet River (Mid-Columbia ESU, Threatened). This summer steelhead population was listed as threatened under the ESA as part of the Mid-Columbia River ESU (March 25, 1999; FR 64 No. 57: 14517-14528).

**1.3) Responsible organization and individuals**


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**Other agencies, tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:**

- U. S. Fish and Wildlife Service – Lower Snake River Compensation Plan (LSRCP) – Provides Program funding/oversight and coordination responsibility between all LSRCP cooperators.
- Confederated Tribes of the Umatilla Indian Reservation – Co-manager, and provides partial funding (PIT tags) for the mating study being conducted.
- Oregon Department of Fish and Wildlife (ODFW) – Co-manager as it pertains in the state of Oregon since a portion of the Walla Walla Basin is within Oregon (This program is not directed at having fish return to the state of Oregon).

**1.4) Funding source, staffing level, and annual hatchery program operational costs.**

The Lower Snake River Compensation Plan (LSRCP – US Fish and Wildlife Service) presently funds production of harvest mitigation fish (Wallowa stock summer steelhead established as a result of hydroelectric projects in the Snake River) that are released in the Touchet and Walla Walla rivers. The LSRCP program is committed to funding actions that are responsive to ESA needs for listed Columbia River steelhead affected by LSRCP hatchery actions.

While both Operational and Evaluation costs are presently covered by LSRCP funding, with additional funds provide by CTUIR for PIT tags, additional funding will likely be required to fully develop the Touchet River endemic summer steelhead program.

The LFC staff includes the Hatchery Complex Manager, and 11 permanent fish hatchery specialists, 1 plant mechanic, and seasonal workers. Not all hatchery staff are needed for the Touchet Endemic Summer Steelhead Stock program on an annual basis, as other programs require staff time. Annual operation/maintenance costs and evaluation costs for the entire Touchet Endemic Summer Steelhead Stock program (not including the releases of Wallowa stock) are estimated at $133,000. A staff of 8-10 permanent and seasonal biologists and technicians conduct evaluations for each species produced at LFC.

**1.5) Location(s) of hatchery and associated facilities**.

**Broodstock Collection; Incubation; Rearing Locations: (See Figure 1 Below)**

Lyons Ferry Hatchery (LFH) – RM 58 (WRIA 35) on the Snake River in Franklin County, Washington.

Dayton Adult Trap (DAT) – RM 53.3 **(**WRIA 32) on the Touchet River (WRIA 32), City of Dayton, Columbia County, Washington.

**Acclimation and Release Locations: (See Figure 1 Below)**

Dayton Acclimation Pond (Dayton AP) – RM 53 (WRIA 32) on the Touchet River (WRIA 32), City of Dayton, Columbia County, Washington.

North Fork Touchet River – Baileysburg Bridge – Site of previous direct stream releases for endemic stock fish. Located about 2.5 miles above the adult trap in Dayton. Some releases may continue to occur here in the future.

**1.6) Type of program.**

Integrated Harvest

**1.7) Purpose (Goal) of program.**

The purpose of the current program is to continue to examine ways to increase survival of the Touchet River stock by incorporation of returning F1 hatchery fish into the broodstock, and to provide acclimation at release. In the long-term, if implemented, this program would provide both harvest mitigation and conservation benefits to the Touchet River.

**1.8) Justification for the program.**

The summer steelhead population was listed as threatened under the ESA as part of the Mid-Columbia River ESU (March 25, 1999; FR 64 No. 57: 14517-14528). The endemic population of summer steelhead in the Touchet River has remained relatively stable, though depressed, since 1984. The April 2, 1999, Biological Opinion issued by NMFS on the LSRCP-produced hatchery steelhead considered that the continued use of non-endemic steelhead stocks (such as the LFH stock) in the Mid-Columbia appreciably reduced the likelihood of survival and chance for recovery of natural steelhead populations within the Columbia River. WDFW staff developed this plan to evaluate the potential to successfully propagate an endemic-origin hatchery stock in the Touchet River basin. This program is also listed in the *U.S. v. Oregon* Management Plan for the Columbia River, Production Table. **See Sections 3.1 – 3.2.**

**Actions described within this HGMP represent the development and assessment of an endemic broodstock for Touchet River summer steelhead.** Assessment is a crucial first activity in a series of actions that may eventually constitute a re-direction of LSRCP mitigation, by reducing and/or replacing releases of LFH/Wallowa stock steelhead in the Touchet River and other basins. This is considered necessary to align the LSRCP mitigation program with recovery requirements of the ESA. That, coupled with the desire of WDFW to recover depressed Mid-Columbia natural steelhead stocks, has prompted these proposed new hatchery actions.

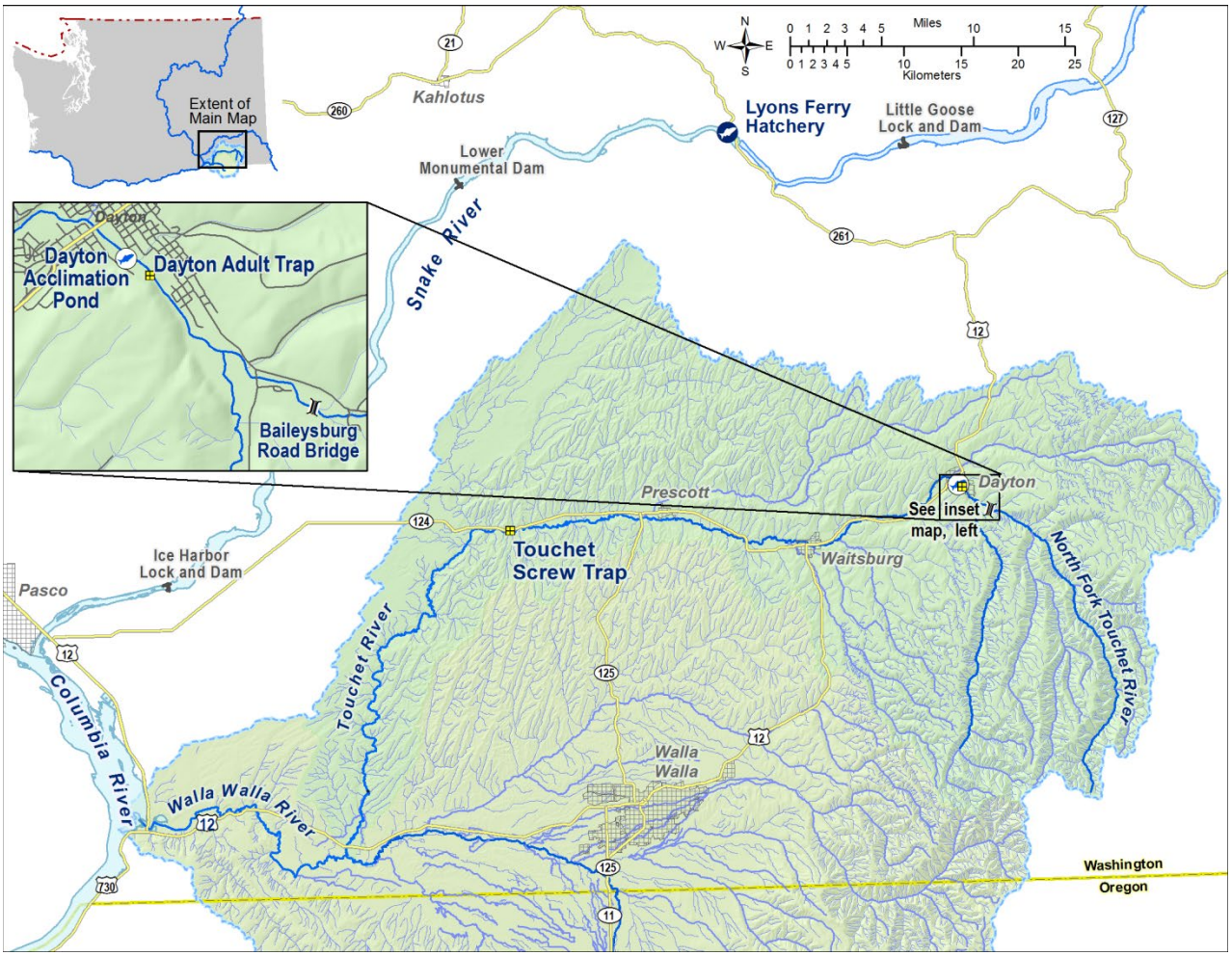


**Figure 1.** Map of the LFH Complex and Associated Broodstock Collection, Acclimation and Release Sites. Map Source: WDFW GIS Staff 2015.

In order to minimize impact on listed fish by WDFW facilities operation, the following Risk Aversion Measures are included in this HGMP (**Table 1**):

**Table 1. Summary of risk aversion measures for the LFH – Touchet Summer Steelhead program.**

| Potential Hazard | HGMP Reference | Risk Aversion Measures |
|---|---|---|
| Water Withdrawal | 4.2 | Water rights are formalized thru trust water right S3-28263-C for Dayton AP and G326147, G326489-C, and G322703- C for Lyons Ferry from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports. |
| Intake Screening | 4.2 | The river water intake on Touchet River at Dayton is screened to be in compliance with current NMFS guidelines (NMFS 2011c) to protect juvenile fishes. The Touchet River intake water supply has listed summer steelhead and bull trout in the system.<br><br>100% of the water supply at LFH comes from the Marmes Pumping Station located along the Palouse River, which pulls water from the underground aquifer. No listed fish species are impacted. |
| Effluent Discharge | 4.2 | This facility operates and complies with limits under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) administered by the Washington Department of Ecology (DOE) - WAG 13-7006 and IHOT 1995 which act to protect the quality of receiving waters adjacent to the hatchery. |
| Broodstock Collection & Adult Passage | 7.9 | At LFH, listed fish are not collected for this program, nor is broodstock collected at this facility. There are no adult passage issues with this program at LFH.<br><br>All broodstock collected for this program are collected at the DAT on Touchet River. Descriptions of the DAT are provided later in the document (Section 5). |
| Disease Transmission | 9.2.7, 10.11 | The *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006) details hatchery practices and operations designed to stop the introduction and/or spread of any diseases. Also, hatchery practices and operations specific to the Columbia Basin are described in the Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1995), and WDFW refers to the guidelines presented in that document. |

| Potential Hazard | HGMP Reference | Risk Aversion Measures |
|---|---|---|
| Competition & Predation | 2.2.3, 3.5, 10.11 | Hatchery fish are reared to meet Statewide Steelhead Rearing and Release Guidelines (Tipping 2001). Steelhead smolts are released in late April or early May and are very smolted at that time to foster rapid migration to marine waters lessening their time in the river which could lead to competition and/or predation on juvenile listed fish in the stream. |

**1.9) List of program "Performance Standards".**

(From NMFS *Artificial Propagation Performance Standards and Indicators*, October 24, 2000 Draft)

3.1 Legal mandates
3.2 Harvest
3.3 Conservation of natural spawning populations
3.4 Life History Characteristics
3.5 Genetic Characteristics
3.6 Research Activities
3.7 Operation of Artificial Production Facilities

**1.10) List of program "Performance Indicators", designated by "benefits" and "risks."**

**1.10.1) "Performance Indicators" addressing benefits**.

A NPCC "Artificial Production Review" document (2001) provides categories of standards for evaluating the effectiveness of hatchery programs and the risks they pose to associated natural populations. The categories are as follows: 1) legal mandates, 2) harvest, 3) conservation of wild/naturally produced spawning populations, 4) life history characteristics, 5) genetic characteristics, 6) quality of research activities, 7) artificial production facilities operations, and 8) socio-economic effectiveness. The NPCC standards represent the common knowledge up to 2001. Utilization of more recent reviews on the standardized methods for evaluation of hatcheries and supplementation at a basin wide ESU scale is warranted.

In a report prepared for Northwest Power and Conservation Council, the Independent Scientific Review Panel (ISRP) and the Independent Scientific Advisory Board (ISAB) reviewed the nature of the demographic, genetic and ecological risks that could be associated with supplementation, and concluded that the current information available was insufficient to provide an adequate assessment of the magnitude of these effects under alternative management scenarios (ISRP and ISAB 2005). The ISRP and ISAB recommended that an interagency working group be formed to produce a design(s) for an evaluation of hatchery supplementation applicable at a basin-wide scale. Following on this recommendation, the *Ad Hoc* Supplementation Workgroup (AHSWG) was created and produced a guiding document (Galbreath et al. 2008) that describes framework for integrated hatchery research, monitoring, and evaluation to be evaluated at a basin-wide ESU scale.

The AHSWG framework is structured around three categories of research monitoring and evaluation; 1) implementation and compliance monitoring, 2) hatchery effectiveness monitoring, and 3) uncertainty research. The hatchery effectiveness category addresses regional questions relative to both harvest augmentation and supplementation hatchery programs and defines a set of management objectives specific to supplementation projects. The framework utilizes a common set of standardized performance measures as established by the Collaborative System wide Monitoring and Evaluation Project (CSMEP). Adoption of this suite of performance measures and definitions across multiple study designs will facilitate coordinated analysis of findings from regional monitoring and evaluation efforts. This is needed to address management questions and critical uncertainties associated with the relationships between harvest augmentation and supplementation hatchery production, and ESA listed stock status/recovery.

The NPCC (2006) has called for integration of individual hatchery evaluations into a regional plan. While the RM&E framework in AHSWG document represents our current knowledge relative to monitoring hatchery programs to assess effects that they have on population and ESU productivity, it represents only a portion of the activities needed for how hatcheries are operated throughout the region. A union of the NPCC (2001) hatchery monitoring and evaluation standards and the AHSWG framework likely represents a larger scale more comprehensive set of assessment standards, legal mandates, production and harvest management processes, hatchery operations, and socio-economic standards addressed in the 2001 NPCC document (**Sections 3.1, 3.2, 3.7, and 3.8 respectively**). These are not addressed in the AHSWG framework and should be included in this document. NPCC standards for conservation of wild/natural populations, life history characteristics, genetic characteristics and research activities (**Sections 3.3, 3.4, 3.5, and 3.6 respectively**) are more thoroughly developed by the AHSWG, and the later standards should apply to this document. **Table 2** represents the union of performance standards described by the Northwest Power and Conservation Council (NPCC 2001), regional questions for monitoring and evaluation for harvest and supplementation programs, and performance standards and testable assumptions as described by the Ad Hoc Supplementation Work Group (Galbreath et al. 2008).

**Table 2. Compilation of performance standards described by the Northwest Power and Conservation Council (NPCC 2001), regional questions for monitoring and evaluation for harvest and supplementation programs, and performance standards and testable assumptions as described by the Ad Hoc Supplementation Work Group (2008).**

| Category | Standards | Indicators |
|---|---|---|
| 1. LEGAL MANDATES | 1.1. Program contributes to fulfilling tribal trust responsibility mandates and treaty rights, as described in applicable agreements such as under U.S. v. OR and U.S. v. Washington. | 1.1.1. Total number of fish harvested in Tribal fisheries targeting this program.<br>1.1.2. Total fisher days or proportion of harvestable returns taken in Tribal resident fisheries, by fishery.<br>1.1.3.Tribal acknowledgement regarding fulfillment of tribal treaty rights. |
| | 1.2. Program contributes to mitigation requirements. | 1.2.1.Number of fish released by program, returning, or caught, as applicable to given mitigation requirements. |

| Category | Standards | Indicators |
|---|---|---|
| | 1.3. Program addresses ESA responsibilities. | 1.3.1.Section 7, Section 10, 4d rule and annual consultation |
| 2. IMPLEMENTATION AND COMPLIANCE | 2.1. Program contributes to mitigation requirements. | 2.1.1.Hatchery is operated as a segregated program.<br>2.1.2.Hatchery is operated as an integrated program<br>2.1.3.Hatchery is operated as a conservation program |
| | 2.2. Program addresses ESA responsibilities. | 2.2.1.Hatchery fish can be distinguished from natural fish in the hatchery broodstock and among spawners in supplemented or hatchery influenced population(s) |
| | 2.3. Restore and maintain treaty-reserved tribal and non-treaty fisheries. | 2.3.1.Hatchery and natural-origin adult returns can be adequately forecasted to guide harvest opportunities.<br>2.3.2.Hatchery adult returns are produced at a level of abundance adequate to support fisheries in most years with an acceptably limited impact to natural-spawner escapement. |
| | 2.4. Fish for harvest are produced and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while avoiding over-harvest of non-target species. | 2.4.1.Number of fish release by location estimated and in compliance with AOPs and US vs. OR Management Agreement.<br>2.4.2.Number if adult returns by release group harvested<br>2.4.3.Number of non-target species encountered in fisheries for targeted release group. |
| | 2.5. Hatchery incubation, rearing, and release practices are consistent with current best management practices for the program type. | 2.5.1.Juvenile rearing densities and growth rates are monitored and reported.<br>2.5.2.Numbers of fish per release group are known and reported.<br>2.5.3.Average size, weight and condition of fish per release group are known and reported.<br>2.5.4.Date, acclimation period, and release location of each release group are known and reported. |
| | 2.6. Hatchery production, harvest management, and monitoring and evaluation of hatchery production are coordinated among affected co-managers. | 2.6.1.Production adheres to plans, documents developed by regional co-managers (e.g. US vs. OR Management agreement, AOPs etc.).<br>2.6.2.Harvest management, harvest sharing agreements, broodstock collection schedules, and disposition of fish trapped at hatcheries in excess of broodstock needs are coordinated among co-management agencies.<br>2.6.3.Co-managers react adaptively by consensus to monitoring and evaluation results.<br>2.6.4.Monitoring and evaluation results are reported to co-managers and regionally in a timely fashion. |

| Category | Standards | Indicators |
|---|---|---|
| 3. HATCHERY EFFECTIVENESS MONITORING REGIONAL FOR AUGMENTATION AND SUPPLEMENTATION PROGRAMS | 3.1. Release groups are marked in a manner consistent with information needs and protocols for monitoring impacts to natural- and hatchery-origin fish at the targeted life stage(s) (e.g. in juvenile migration corridor, in fisheries, etc.). | 3.1.1. All hatchery origin fish recognizable by mark or tag and representative known fraction of each release group marked or tagged uniquely.<br><br>3.1.2. Number of unique marks recovered per monitoring stratum sufficient to estimate number of unmarked fish from each release group with desired accuracy and precision. |
| | 3.2. The current status and trends of natural origin populations likely to be impacted by hatchery production are monitored. | 3.2.1. Abundance of fish by life stage is monitored annually.<br><br>3.2.2. Adult to adult or juvenile to adult survivals are estimated.<br><br>3.2.3. Temporal and spatial distribution of adult spawners and rearing juveniles in the freshwater spawning and rearing areas are monitored.<br><br>3.2.4. Timing of juvenile outmigration from rearing areas and adult returns to spawning areas are monitored.<br><br>3.2.5. Ne and patterns of genetic variability are frequently enough to detect changes across generations. |
| | 3.3. Fish for harvest are produced and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while avoiding over-harvest of non-target species. | 3.3.1. Number of fish release by location estimated and in compliance with AOPs and US vs. OR Management Agreement.<br><br>3.3.2. Number if adult returns by release group harvested<br><br>3.3.3. Number of non-target species encountered in fisheries for targeted release group. |
| | 3.4. Effects of strays from hatchery programs on non-target (unsupplemented and same species) populations remain within acceptable limits. | 3.4.1. Strays from a hatchery program (alone, or aggregated with strays from other hatcheries) do not comprise more than 10% of the naturally spawning fish in non-target populations.<br><br>3.4.2. Hatchery strays in non-target populations are predominately from in-subbasin releases.<br><br>3.4.3. Hatchery strays do not exceed 10% of the abundance of any out-of-basin natural population. |
| | 3.5. Habitat is not a limiting factor for the affected supplemented population at the targeted level of supplementation. | 3.5.1. Temporal and spatial trends in habitat capacity relative to spawning and rearing for target population.<br><br>3.5.2. Spatial and temporal trends among adult spawners and rearing juvenile fish in the available habitat. |
| | 3.6. Supplementation of natural population with hatchery origin production does not negatively impact the viability of the target population. | 3.6.1. Pre- and post-supplementation trend in abundance of fish by life stage is monitored annually.<br><br>3.6.2. Pre- and post-supplementation trends in adult-to-adult or juvenile to adult survivals are estimated.<br><br>3.6.3. Temporal and spatial distribution of natural origin and hatchery origin adult spawners and rearing juveniles in the freshwater spawning and rearing areas are monitored.<br><br>3.6.4. Timing of juvenile outmigration from rearing area and adult returns to spawning areas are monitored. |

| Category | Standards | Indicators |
|---|---|---|
| | 3.7. Natural production of target population is maintained or enhanced by supplementation. | 3.7.1. Adult progeny per parent (P:P) ratios for hatchery-produced fish significantly exceed those of natural-origin fish.<br><br>3.7.2. Natural spawning success of hatchery-origin fish must be similar to that of natural-origin fish.<br><br>3.7.3. Temporal and spatial distribution of hatchery-origin spawners in nature is similar to that of natural-origin fish.<br><br>3.7.4. Productivity of a supplemented population is similar to the natural productivity of the population had it not been supplemented (adjusted for density dependence).<br><br>3.7.5. Post-release life stage-specific survival is similar between hatchery and natural-origin population components. |
| | 3.8. Life history characteristics and patterns of genetic diversity and variation within and among natural populations are similar and do not change significantly as a result of hatchery augmentation or supplementation programs. | 3.8.1. Adult life history characteristics in supplemented or hatchery influenced populations remain similar to characteristics observed in the natural population prior to hatchery influence.<br><br>3.8.2. Juvenile life history characteristics in supplemented or hatchery influenced populations remain similar to characteristics in the natural population those prior to hatchery influence.<br><br>3.8.3. Genetic characteristics of the supplemented population remain similar (or improved) to the unsupplemented populations. |
| | 3.9. Operate hatchery programs so that life history characteristics and genetic diversity of hatchery fish mimic natural fish. | 3.9.1. Genetic characteristics of hatchery-origin fish are indistinguishable from natural-origin fish.<br><br>3.9.2. Life history characteristics of hatchery-origin adult fish are indistinguishable from natural-origin fish.<br><br>3.9.3. Juvenile emigration timing and survival differences between hatchery and natural-origin fish must be minimal. |
| | 3.10. The distribution and incidence of diseases, parasites and pathogens in natural populations and hatchery populations are known and releases of hatchery fish are designed to minimize potential spread or amplification of diseases, parasites, or pathogens among natural populations. | 3.10. Detectable changes in rate of occurrence and spatial distribution of disease, parasite or pathogen between the affected hatchery and natural populations. |
| **4. OPERATION OF ARTIFICIAL PRODUCTION FACILITIES** | 4.1. Artificial production facilities are operated in compliance with all applicable fish health guidelines and facility operation standards and protocols such as those described by IHOT, PNFHPC, the Co-Managers of Washington Fish Health Policy, INAD, and MDFWP. | 4.1.1. Annual reports indicating level of compliance with applicable standards and criteria.<br><br>4.1.2. Periodic audits indicating level of compliance with applicable standards and criteria. |

| Category | Standards | Indicators |
|---|---|---|
| | 4.2. Effluent from artificial production facility will not detrimentally affect natural populations. | 4.2.1. Discharge water quality compared to applicable water quality standards and guidelines, such as those described or required by NPDES, IHOT, PNFHPC, and Co-Managers of Washington Fish Health Policy tribal water quality plans, including those relating to temperature, nutrient loading, chemicals, etc. |
| | 4.3. Water withdrawals and instream water diversion structures for artificial production facility operation will not prevent access to natural spawning areas, affect spawning behavior of natural populations, or impact juvenile rearing environment. | 4.3.1. Water withdrawals compared to applicable passage criteria.<br><br>4.3.2. Water withdrawals compared to NMFS, USFWS, and WDFW juvenile screening criteria.<br><br>4.3.3. Number of adult fish aggregating and/or spawning immediately below water intake point.<br><br>4.3.4. Number of adult fish passing water intake point.<br><br>4.3.5. Proportion of diversion of total stream flow between intake and outfall. |
| | 4.4. Releases do not introduce pathogens not already existing in the local populations, and do not significantly increase the levels of existing pathogens. | 4.4.1. Certification of juvenile fish health immediately prior to release, including pathogens present and their virulence.<br><br>4.4.2. Juvenile densities during artificial rearing.<br><br>4.4.3. Samples of natural populations for disease occurrence before and after artificial production releases. |
| | 4.5. Any distribution of carcasses or other products for nutrient enhancement is accomplished in compliance with appropriate disease control regulations and guidelines, including state, tribal, and federal carcass distribution guidelines. | 4.5.1. Number and location(s) of carcasses or other products distributed for nutrient enrichment.<br><br>4.5.2. Statement of compliance with applicable regulations and guidelines. |
| | 4.6. Adult broodstock collection operation does not significantly alter spatial and temporal distribution of any naturally produced population. | 4.6.1. Spatial and temporal spawning distribution of natural population above and below weir/trap, currently and compared to historic distribution. |
| | 4.7. Weir/trap operations do not result in significant stress, injury, or mortality in natural populations. | 4.7.1. Mortality rates in trap.<br><br>4.7.2. Prespawning mortality rates of trapped fish in hatchery or after release. |
| | 4.8. Predation by artificially produced fish on naturally produced fish does not significantly reduce numbers of natural fish. | 4.8.1. Size at, and time of, release of juvenile fish, compared to size and timing of natural fish present.<br><br>4.8.2. Number of fish in stomachs of sampled artificially produced fish, with estimate of natural fish composition. |
| **5. SOCIO-ECONOMIC EFFECTIVENESS** | 5.1. Cost of program operation does not exceed the net economic value of fisheries in dollars per fish for all fisheries targeting this population. | 5.1.1. Total cost of program operation.<br><br>5.1.2. Sum of ex-vessel value of commercial catch adjusted appropriately, appropriate monetary value of recreational effort, and other fishery related financial benefits. |

| Category | Standards | Indicators |
|---|---|---|
| | 5.2. Juvenile production costs are comparable to or less than other regional programs designed for similar objectives. | 5.2.1.Total cost of program operation.<br><br>5.2.2.Average total cost of activities with similar objectives. |
| | 5.3. Non-monetary societal benefits for which the program is designed are achieved. | 5.3.1.Number of adult fish available for tribal ceremonial use.<br><br>5.3.2.Recreational fishery angler days, length of seasons, and number of licenses purchased. |

WDFW will use the above information to determine whether the population has declined, remained stable, or has been recovered to sustainable levels. The ability to estimate hatchery and natural proportions will be determined by implementation plans, budgets, and assessment priorities.

### 1.10.2) "Performance Indicators" addressing risks.

The suite of performance measures developed by the CSMEP represents a crosswalk mechanism that is needed to quantitatively monitor and evaluate the standards and indicators listed in **Table 2**. The CSMEP measures have been adopted by the AHSWG (Galbreath et. al. 2008). The adoption of this regionally-applied means of assessment will facilitate coordinated analysis of findings from basin-wide M&E efforts and will provide the scientifically-based foundation to address the management questions and critical uncertainties associated with supplementation and ESA-listed stock status/recovery.

Listed below are the suite of Performance Measures (**Table 3**) (modified from the management objectives listed in Beasley et al. (2008), and the assumptions that need to be tested for each standard. WDFW has added in the far right column and made a qualitative assessment of where we are attempting to collect such data, and potential limitations (partials).

**Table 3. Standardized performance measures and definitions for status and trends and hatchery effectiveness monitoring and the associated performance indicator that it addresses. (Taken from Beasley et al. 2008).**

| Performance Measure | | Definition | Related Indicators per Table 2 | Performance Measure Currently Completed (Yes, No, or Partial) |
|---|---|---|---|---|
| Abundance | Adult Escapement to Tributary | Number of adults (including jacks) that have escaped to a certain point (i.e. - mouth of stream). Population based measure. Calculated with mark recapture methods from weir data adjusted for redds located downstream of weirs and in tributaries, and maximum net upstream approach for DIDSON and underwater video monitoring. Provides total escapement and wild only escapement. [Assumes tributary harvest is accounted for]. Uses TRT population definition where available | 2.3.2, 3.1.2, 3.2.1, 3.2.2, 3.2.4, 3.6.1, 3.7.1, 3.7.4, 5.3.1 | YES |

| Performance Measure | | Definition | Related Indicators per Table 2 | Performance Measure Currently Completed (Yes, No, or Partial) |
|---|---|---|---|---|
| | Fish per Redd | Number of fish divided by the total number of redds. Applied by: The population estimate at a weir site, minus broodstock and mortalities and harvest, divided by the total number of redds located upstream of the weir. | 3.2.1, 3.2.3, 3.2.4, 3.6.3, 3.7.3 | PARTIAL Above DAT only |
| | Female Spawner per Redd | Number of female spawners divided by the total number of redds above weir. Applied in 2 ways: 1) The population estimate at a weir site multiplied by the weir derived proportion of females, minus the number of female prespawn mortalities, divided by the total number of redds located upstream of the weir, and 2) DIDSON application calculated as in 1 above but with proportion females from carcass recoveries. Correct for mis-sexed fish at weir for 1 above. | 3.2.1, 3.2.3, 3.2.4, 3.6.3, 3.7.3 | PARTIAL Above DAT only |
| | Index of Spawner Abundance - redd counts | Counts of redds in spawning areas in index area(s) (trend), extensive areas, and supplemental areas. Reported as redds and/or redds/km. | 3.2.3, 3.2.4, 3.6.3, 3.7.3, 4.6.1 | YES When stream flows allow surveys |
| | Spawner Abundance | In-river: Estimated number of total spawners on the spawning ground. Calculated as the number of fish that return to an adult monitoring site, minus broodstock removals and weir mortalities and harvest if any, subtracts the number of female prespawning mortalities and expanded for redds located below weirs. Calculated in two ways: 1) total spawner abundance, and 2) wild spawner abundance which multiplies by the proportion of natural origin (wild) fish. Calculations include jack salmon. In-hatchery: Total number of fish actually used in hatchery production. Partitioned by gender and origin. | 3.2.1, 3.2.3, 3.2.4, 3.6.3, 3.7.3 | YES |
| | Hatchery Fraction | Percent of fish on the spawning ground that originated from a hatchery. Applied in two ways: 1) Number of hatchery carcasses divided by the total number of known origin carcasses sampled. Uses carcasses above and below weirs, 2) Uses weir data to determine number of fish released above weir and calculate as in 1 above, and 3) Use 2 above and carcasses above and below weir. | 2.2.1, 3.1.1, 3.4.1, 3.4.2, 3.4.3, 3.7.2, 3.7.4 | YES |
| | Ocean/Mainstem Harvest | Number of fish caught in ocean and mainstem (tribal, sport, or commercial) by hatchery and natural origin. | 1.1.1, 1.1.2, 2.3.1, 2.4.2, 2.6.2, 3.3.2, 3.3.3 | PARTIAL hatchery fish only |
| | Harvest Abundance in Tributary | Number of fish caught in ocean and mainstem (tribal, sport, or commercial) by hatchery and natural origin. | 1.1.1, 1.1.2, 2.3.1, 2.4.2, 2.6.2, 3.3.2, 3.3.3 | PARTIAL hatchery fish only |
| | Index of Juvenile Abundance (Density) | Parr abundance estimates using underwater survey methodology are made at pre-established transects. Densities (number per 100 m2) are recorded using protocol described in Thurow (1994). Hanken & Reeves estimator. | 3.2.1, 3.5.1, 3.5.2 | NO |
| | Juvenile Emigrant Abundance | Gauss software is (Aptech Systems, Maple Valley, Washington) issued to estimate emigration estimates. Estimates are given for parr, pre-smolts, smolts and the entire migration year. Calculations are completed using a Modified Bailey Method and bootstrapping for 95% CIs. Gauss program developed by the University of Idaho (Steinhorst 2000). | 3.2.1, 3.6.1, 3.7.4 | YES |

| Performance Measure | | Definition | Related Indicators per Table 2 | Performance Measure Currently Completed (Yes, No, or Partial) |
|---|---|---|---|---|
| | Smolts | Smolt estimates, which result from juvenile emigrant trapping and PIT tagging, are derived by estimating the proportion of the total juvenile abundance estimate at the tributary comprised of each juvenile life stage (parr, presmolt, smolt) that survive to first mainstem dam. It is calculated by multiplying the life stage specific abundance estimate (with standard error) by the life stage specific survival estimate to first mainstem dam (with standard error). The standard error around the smolt equivalent estimate is calculated using the following formula; where X = life stage specific juvenile abundance estimate and Y = life stage specific juvenile survival estimate: $\text{Var}(X \cdot Y) = E(X)^2 \cdot Var(Y) + E(Y)^2 \cdot Var(X) + Var(X) \cdot$ | 3.2.1, 3.6.1, 3.7.4 | YES |
| | Run Prediction | This will not be in the raw or summarized performance database. | 2.3.1, | NO |

| | | | | |
|---|---|---|---|---|
| Survival – Productivity | Smolt-to-Adult Return Rate | The number of adult returns from a given brood year returning to a point (stream mouth, weir) divided by the number of smolts that left this point 1-5 years prior. Calculated for wild and hatchery origin conventional and captive brood fish separately. Adult data applied in two ways: 1) SAR estimate to stream using population estimate to stream, 2) adult PIT tag SAR estimate to escapement monitoring site (weirs, LGR), and 3) SAR estimate with harvest. Accounts for all harvest below stream.<br><br>*Smolt-to-adult return rates* are generated for four performance periods; tributary to tributary, tributary to first mainstem dam, first mainstem dam to first mainstem dam, and first mainstem dam to tributary.<br><br>*First mainstem dam to first mainstem dam* SAR estimates are calculated by dividing the number of PIT tagged adults returning to first mainstem dam by the estimated number of PIT tagged juveniles at first mainstem dam. Variances around the point estimates are calculated as described above.<br><br>*Tributary to tributary* SAR estimates for natural and hatchery origin fish are calculated using PIT tag technology as well as direct counts of fish returning to the drainage. PIT tag SAR estimates are calculated by dividing the number of PIT tag adults returning to the tributary (by life stage and origin type) by the number of PIT tagged juvenile fish migrating from the tributary (by life stage and origin type). Overall PIT tag SAR estimates for natural fish are then calculated by averaging the individual life stage specific SAR's. Direct counts are calculated by dividing the estimated number of natural and hatchery-origin adults returning to the tributary (by length break-out for natural fish) by the estimated number of natural-origin fish and the known number of hatchery-origin fish leaving the tributary.<br><br>*Tributary to first mainstem dam* SAR estimates are calculated by dividing the number of PIT tagged adults returning to first mainstem dam by the number of PIT tagged juveniles tagged in the tributary. There is no associated variance around this estimate. The adult detection probabilities at first mainstem dam are near 100 percent.<br><br>*First mainstem dam to tributary* SAR estimates are calculated by dividing the number of PIT tagged adults returning to the tributary by the estimated number of PIT tagged juveniles at first mainstem dam. The estimated number of PIT tagged juveniles at first mainstem dam is calculated by multiplying life stage specific survival estimates (with standard errors) by the number of juveniles PIT tagged in the tributary. The variance for the estimated number of PIT tagged juveniles at first mainstem dam is calculated as follows, where X = the number of PIT tagged fish in the tributary and Y = the variance of the life stage specific survival estimate:<br>$Var\,(X \cdot Y) = X^2 \cdot Var(Y)$<br>The variance around the SAR estimate is calculated as follows, where X = the number of adult PIT tagged fish returning to the tributary and Y = the estimated number of juvenile PIT tagged fish at first mainstem dam:<br>$Var\left(\frac{X}{Y}\right) = \left(\frac{EX}{EY}\right)^2 \cdot \left(\frac{Var(Y)}{(EY)^2}\right)$ | 3.2.1, 3.2.2, 3.7.4 | YES |
| | Progeny-per- Parent Ratio | Adult to adult calculated for naturally spawning fish and hatchery fish separately as the brood year ratio of return adult to parent spawner abundance using data above weir. Two variants calculated: 1) escapement, and 2) spawners. | 3.2.1, 3.2.2, 3.7.4 | YES |

| Performance Measure | | Definition | Related Indicators per Table 2 | Performance Measure Currently Completed (Yes, No, or Partial) |
|---|---|---|---|---|
| | Recruit/spawner (R/S)(Smolt Equivalents per Redd or female) | Juvenile production to some life stage divided by adult spawner abundance. Derive adult escapement above juvenile trap multiplied by the prespawning mortality estimate. Adjusted for redds above juvenile Trap. *Recruit per spawner* estimates, or *juvenile abundance (can be various life stages or locations) per redd/female*, is used to index population productivity, since it represents the quantity of juvenile fish resulting from an average redd (total smolts divided by total redds) or female. Several forms of juvenile life stages are applicable. We utilize two measures: 1) juvenile abundance (parr, presmolt, smolt, total abundance) at the tributary mouth, and 2) smolt abundance at first mainstem dam . | 3.2.1, 3.2.2, 3.7.4 | YES |
| | Pre-spawn Mortality | Percent of female adults that die after reaching the spawning grounds but before spawning. Calculated as the proportion of "25% spawned" females among the total number of female carcasses sampled. ("25% spawned" = a female that contains 75% of her egg compliment]. | 3.2.3, 4.5.1 | NO |
| | Juvenile Survival to first mainstem dam | Life stage survival (parr, presmolt, smolt, subyearling) calculated by CJS Estimate (SURPH) produced by PITPRO 4.8+ (recapture file included), CI estimated as 1.96*SE. Apply survival by life stage to first mainstem dam to estimate of abundance by life stage at the tributary and the sum of those is total smolt abundance surviving to first mainstem dam . Juvenile survival to first mainstem dam = total estimated smolts surviving to first mainstem dam divided by the total estimated juveniles leaving tributary. | 3.2.2, 3.6.2, 3.7.5, 3.9.3, | PARTIAL relative survival only |
| | Juvenile Survival to all Mainstem Dams | *Juvenile survival to first mainstem dam and subsequent Mainstem Dam(s)*, which is estimated using PIT tag technology. Survival by life stage to and through the hydrosystem is possible if enough PIT tags are available from the stream. Using tags from all life stages combined we will calculate (SURPH) the survival to all mainstem dams. | 3.2.2, 3.6.2, 3.7.5, 3.9.3, | PARTIAL may not be possible based on PIT Tag Numbers |
| | Post-release Survival | Post-release survival of natural and hatchery-origin fish are calculated as described above in the performance measure "Survival to first mainstem dam and Mainstem Dams". No additional points of detection (i.e. screw traps) are used to calculate survival estimates. | 3.2.2, 3.6.2, 3.7.5, 3.9.3, | PARTIAL see comments above |
| Distribution | Adult Spawner Spatial Distribution | Extensive area tributary spawner distribution. Target GPS red locations or reach specific summaries, with information from carcass recoveries to identify hatchery-origin vs. natural-origin spawners across spawning areas within populations. | 3.2.3, 3.2.4, 3.6.3, 3.7.3, 4.3.3, 4.6.1 | YES |
| | Stray Rate (percentage) | Estimate of the number and percent of hatchery origin fish on the spawning grounds, as the percent within MPG, and percent out of ESU. Calculated from 1) total known origin carcasses, and 2) uses fish released above weir. Data adjusted for unmarked carcasses above and below weir. | 3.4.1, 3.4.2, 3.4.3 | YES |
| | Juvenile Rearing Distribution | Chinook rearing distribution observations are recorded using multiple divers who follow protocol described in Thurow (1994). | | NO |
| | Disease Frequency | Natural fish mortalities are provided to certified fish health lab for routine disease testing protocols. Hatcheries routinely samples fish for disease and will defer to then for sampling numbers and periodicity | 3.10, 4.4.3 | PARTIAL hatchery fish only |
| Genetic | Genetic Diversity | Indices of genetic diversity – measured within a tributary) heterozygosity – allozymes, microsatellites), or among tributaries across population aggregates (e.g., FST). | 3.2.5, 3.8.3, 3.9.1 | YES |
| | Reproductive Success (Nb/N) | Derived measure: determining hatchery: wild proportions, effective population size is modeled. | 3.7.2 | |

| Performance Measure | | Definition | Related Indicators per Table 2 | Performance Measure Currently Completed (Yes, No, or Partial) |
|---|---|---|---|---|
| | Relative Reproductive Success (Parentage) | Derived measure: the relative production of offspring by a particular genotype. Parentage analyses using multilocus genotypes are used to assess reproductive success, mating patterns, kinship, and fitness in natural populations and are gaining widespread use of with the development of highly polymorphic molecular markers. | 3.2.1, 3.2.2, 3.2.4, 3.6.1, 3.7.1, 3.7.2 3.7.4, 5.3.1 | NO |
| | Effective Population Size (Ne) | Derived measure: the number of breeding individuals in an idealized population that would show the same amount of dispersion of allele frequencies under random genetic drift or the same amount of inbreeding as the population under consideration. | 3.2.5 | NO |
| Life History | Age Structure | Proportion of escapement composed of adult individuals of different brood years. Calculated for wild and hatchery origin conventional and captive brood adult returns. Accessed via scale method, dorsal fin ray ageing, or mark recoveries. Juvenile Age is determined by brood year (year when eggs are placed in the gravel) Then Age is determined by life stage of that year. Methods to age Chinook captured in screw trap are by dates; fry – prior to July 1; parr – July 1-August 31; presmolt – September 1 – December 31; smolt – January 1 – June 30; yearlings – July 1 – with no migration until following spring. The age class structure of juveniles is determined using length frequency breakouts for natural-origin fish. Scales have been collected from natural-origin juveniles, however, analysis of the scales have never been completed. The age of hatchery-origin fish is determined through a VIE marking program which identifies fish by brood year. For steelhead we attempt to use length frequency but typically age of juvenile steelhead is not calculated. | 3.8.1, 3.8.2, 3.9.2 | YES |
| | Age–at–Return | Age distribution of spawners on spawning ground. Calculated for wild and hatchery conventional and captive brood adult returns. Accessed via scale method, dorsal fin ray ageing, or mark recoveries. | 3.8.1, 3.8.2, 3.9.2 | YES |
| | Age–at-Emigration | Juvenile Age is determined by brood year (year when eggs are placed in the gravel) Then Age is determined by life stage of that year. Methods to age Chinook captured in screw trap are by dates; fry – prior to July 1; parr – July 1-August 31; presmolt – September 1 – December 31; smolt – January 1 – June 30; yearlings – July 1 – with no migration until following spring. The age class structure of juveniles is determined using length frequency breakouts for natural-origin fish. Scales have been collected from natural-origin juveniles, however, analysis of the scales have never been completed. The age of hatchery-origin fish is determined through a VIE marking program which identifies fish by brood year. For steelhead we attempt to use length frequency but typically age of juvenile steelhead is not calculated. | 3.8.1, 3.8.2, 3.9.2 | YES |
| | Size-at-Return | Size distribution of spawners using fork length and mid-eye hypural length. Raw database measure only. | 3.8.1, 3.9.2 | YES |
| | Size-at-Emigration | Fork length (mm) and weight (g) are representatively collected weekly from natural juveniles captured in emigration traps. Mean fork length and variance for all samples within a life stage-specific emigration period are generated (mean length by week then averaged by life stage). For entire juvenile abundance leaving a weighted mean (by life stage) is calculated. Size-at-emigration for hatchery production is generated from pre release sampling of juveniles at the hatchery. | 3.8.2, 3.9.2 | YES |

| Performance Measure | | Definition | Related Indicators per Table 2 | Performance Measure Currently Completed (Yes, No, or Partial) |
|---|---|---|---|---|
| | Condition of Juveniles at Emigration | Condition factor by life stage of juveniles is generated using the formula: $K = (w/l^3)(10^4)$ where K is the condition factor, w is the weight in grams (g), and l is the length in millimeters (Everhart and Youngs 1992). | 3.8.2, 3.9.2 | YES |
| | Percent Females (adults) | The percentage of females in the spawning population. Calculated using 1) weir data, 2) total known origin carcass recoveries, and 3) weir data and unmarked carcasses above and below weir. Calculated for wild, hatchery, and total fish. | 3.8.1, 3.9.2 | PARTIAL<br>Above DAT only |
| | Adult Run-timing | Arrival timing of adults at adult monitoring sites (weir, DIDSON, video) calculated as range, 10%, median, 90% percentiles. Calculated for wild and hatchery origin fish separately, and total. | 3.2.4, 3.6.4, 3.8.1, 3.9.2 | YES |
| | Spawn-timing | This will be a raw database measure only. | 3.2.4, 3.6.4, 3.8.1, 3.9.2 | YES |
| | Juvenile Emigration Timing | Juvenile emigration timing is characterized by individual life stages at the rotary screw trap and Lower Granite Dam. Emigration timing at the rotary screw trap is expressed as the percent of total abundance over time while the median, 0%, 10, 50%, 90% and 100% detection dates are calculated for fish at first mainstem dam . | 3.2.4, 3.6.4, 3.8.2, 3.9.2, 3.9.3, 4.8.1 | YES |
| | Mainstem Arrival Timing (Lower Granite) | Unique detections of juvenile PIT-tagged fish at first mainstem dam are used to estimate migration timing for natural and hatchery origin tag groups by life stage. The actual Median, 0, 10%, 50%, 90% and 100% detection dates are reported for each tag group. Weighted detection dates are also calculated by multiplying unique PIT tag detection by a life stage specific correction factor (number fish PIT tagged by life stage divided by tributary abundance estimate by life stage). Daily products are added and rounded to the nearest integer to determine weighted median, 0%, 50%, 90% and 100% detection dates. | 3.2.4, 3.6.4, 3.8.2, 3.9.2, 3.9.3, 4.8.1 | YES |
| | Water Temperature | Various, mainly Hobo and other temp loggers at screw trap sights and spread out throughout the streams | | NO |
| | Fish and Amphibian Assemblage | Observations through rotary screw trap catch and while conducting snorkel surveys. | 2.4.3, 3.3.3, 3.4.1 | YES |
| In-Hatchery Measures | Hatchery Production Abundance | The number of hatchery juveniles of one cohort released into the receiving stream per year. Derived from census count minus prerelease mortalities or from sample fish- per-pound calculations minus mortalities. Method dependent upon marking program (census obtained when 100% are marked). | 2.5.2, 2.5.3, 2.6.1, 4.4.2 | YES |
| | In-hatchery Life Stage Survival | In-hatchery survival is calculated during early life history stages of hatchery-origin juvenile Chinook. Enumeration of individual female's live and dead eggs occurs when the eggs are picked. These numbers create the inventory with subsequent mortality subtracted. This inventory can be changed to the physical count of fish obtained during CWT or VIE tagging. These physical fish counts are the most accurate inventory method available. The inventory is checked throughout the year using 'fish-per-pound' counts.<br>Estimated survival of various in-hatchery juvenile stages (green egg to eyed egg, eyed egg to ponded fry, fry to parr, parr to smolt and overall green egg to release)<br>Derived from census count minus prerelease mortalities or from sample fish- per-pound calculations minus mortalities. Life stage at release varies (smolt, presmolt, parr, etc.). | | YES |

| Performance Measure | | Definition | Related Indicators per Table 2 | Performance Measure Currently Completed (Yes, No, or Partial) |
|---|---|---|---|---|
| | Size-at-Release | Mean fork length measured in millimeters and mean weight measured in grams of a hatchery release group. Measured during prerelease sampling. Sample size determined by individual facility and M&E staff. Life stage at release varies (smolt, presmolt, parr, etc.). | 2.5.1, 2.5.3 | YES |
| | Juvenile Condition Factor | Condition Factor (K) relating length to weight expressed as a ratio. Condition factor by life stage of juveniles is generated using the formula: $K = (w/l^3)(10^4)$ where K is the condition factor, w is the weight in grams (g), and l is the length in millimeters (Everhart and Youngs 1992). | 2.5.3,3.8.2, 3.9.2 | YES |
| | Fecundity by Age | The reproductive potential of an individual female. Estimated as the number of eggs in the ovaries of the individual female. Measured as the number of eggs per female calculated by weight or enumerated by egg counter. | 3.8.1, 3.8.2, 3.9.2 | YES |
| | Spawn Timing | Spawn date of broodstock spawners by age, sex and origin, Also reported as cumulative timing and median dates. | 3.2.4, 3.6.4, 3.8.1, 3.9.2 | YES |
| | Hatchery Broodstock Fraction | Percent of hatchery broodstock actually used to spawn the next generation of hatchery F1s. Does not include prespawning mortality. | 2.2.1 | YES |
| | Hatchery Broodstock Prespawning Mortality | Percent of adults that die while retained in the hatchery, but before spawning. | 4.7.2 | YES |
| | Female Spawner ELISA Values | Screening procedure for diagnosis and detection of BKD in adult female ovarian fluids. The enzyme linked immunosorbent assay (ELISA) detects antigen of *R. salmoninarum.* | 3.10, 4.4.3 | YES |
| | In-Hatchery Juvenile Disease Monitoring | Screening procedure for bacterial, viral and other diseases common to juvenile salmonids. Gill/skin/ kidney /spleen/skin/blood culture smears conducted monthly on 10 mortalities per stock | 3.10, 4.4.3 | YES |
| | Length of Broodstock Spawner | Mean fork length by age measured in millimeters of male and female broodstock spawners. Measured at spawning and/or at weir collection. Is used in conjunction with scale reading for aging. | 3.9.2 | YES |
| | Prerelease Mark Retention | Percentage of a hatchery group that have retained a mark up until release from the hatchery. Estimated from a sample of fish visually calculated as either "present" or "absent" | 3.1.1, 3.1.2 | YES |
| | Prerelease Tag Retention | Percentage of a hatchery group that have retained a tag up until release from the hatchery - estimated from a sample of fish passed as either "present" or "absent". ("Marks" refer to adipose fin clips or VIE batch marks). | 3.1.1, 3.1.2 | YES |
| | Hatchery Release Timing | Date and time of volitional or forced departure from the hatchery. Normally determined through PIT tag detections at facility exit (not all programs monitor volitional releases). | 2.5.4, 4.8.1 | YES |
| | Chemical Water Quality | Hatchery operational measures included: dissolved oxygen (DO) - measured with DO meters, continuously at the hatchery, and manually 3 times daily at acclimation facilities; ammonia ($NH_3$) nitrite ( $NO_2$), -measured weekly only at reuse facilities | 4.2.1 | PARTIAL |
| | Water Temperature | Hatchery operational measure (Celsius) - measured continuously at the hatchery with thermographs and 3 times daily at acclimation facilities with hand-held devices. | | PARTIAL |

WDFW will use the above indicators to determine whether the program has, or is, causing unacceptable risks to the listed natural populations within the Touchet River. The ability of the evaluation staff to estimate hatchery and natural proportions in the Touchet River and other basins will be determined by implementation plans, budgets, and assessment priorities.

## 1.11) Expected size of program.

### 1.11.1) Proposed annual broodstock collection level (maximum number of adult fish).

The current program level (production of 50,000 smolts on an annual basis) is to collect up to a total 36 fish (mixture of hatchery and natural origin) annually. Beginning with the 2015 brood, about 25% of the broodstock will consist of first generation hatchery endemic stock fish for a controlled matings study which will hopefully improve performance of this stock (see executive summary, and Sections 7-10).

### 1.11.2) Proposed annual fish release levels (maximum number) by life stage and location.

As the program is currently in the experimental/evaluation state, the goal is to produce 50,000 smolts, all released from Dayton AP. Because survival in the hatchery of the endemic population is variable, up to 75,000 smolts may be released annually. If greater than 75,000 smolts are to be released, then WDFW proposes that up to 25,000 sub-yearlings could be released into the upper Touchet River basin in the fall before normal migration (**Table 4**). To fulfill broodstock needs at the trap during this mating study, some future releases of smolts may have to be released upstream in the upper watershed.

**Table 4. Touchet River stock summer steelhead production from LFC destined for the Touchet River.**

| Life Stage | Release Location (release method) | Stock | Production Goal | Maximum Annual Release Level |
|---|---|---|---|---|
| Sub-yearling | Touchet River above RM 53 (direct) | Endemic | 0 | 25,000 |
| Yearling | Touchet River (acclimated) or above RM53 (direct stream) | Endemic | 50,000 | 75,000 |

### 1.12) Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

The Touchet River endemic hatchery broodstock smolt-to-adult returns (SARs) have averaged 0.60% since 2003 based on PIT tag returns (**Table 5**). Smolt-to-adult survival appeared to be improving, but has dropped again in the last few years. SARs to the LSRCP project area for LFH stock steelhead into the Touchet and Walla Walla rivers are considerably higher (about 2% SAR). One measure of success of the Touchet endemic hatchery stock was to have SARs that were equal to, or greater than, the LFH stock released into the Touchet River at Dayton AP. To date, Touchet endemic stock SAR's are over three times lower than LFH stock releases have been. We desire to have a program with survivals as successful as in the past. In order to potentially increase the performance of the Touchet endemic hatchery stock, we are conducted a test by incorporating some first generation hatchery fish into the broodstock which

may lead to some fish being more domesticated, but may also make them perform better within the hatchery and post-release.

**Table 5. Estimated smolt-to-adult survival rate of hatchery endemic summer steelhead smolts from the Touchet River based on adult PIT tag detections at Columbia and River dams.**

| Brood Year | Release Location | Number of PIT Tags | Bonneville Dam or above | Percent Survival | McNary Dam or above | Percent Survival |
|---|---|---|---|---|---|---|
| **Touchet River** | | | | | | |
| 2000 | N.F. Touchet | 507 | 1 | 0.20 | 1 | 0.20 |
| 2001 | N.F. Touchet | 800 | 0 | 0.00 | 0 | 0.00 |
| 2003 | N.F. Touchet | 9,920 | 44 | 0.44 | 35 | 0.35 |
| 2004 | N.F. Touchet | 9,993 | 26 | 0.26 | 22 | 0.22 |
| 2005 | N.F. Touchet | 8,987 | 39 | 0.43 | 31 | 0.34 |
| 2006 | N.F. Touchet | 8,495 | 83 | 0.98 | 65 | 0.77 |
| 2007 | N.F. Touchet | 7,919 | 107 | 1.35 | 85 | 1.07 |
| 2008 | N.F. Touchet | 8,000 | 31 | 0.39 | 24 | 0.30 |
| 2009 | N.F. Touchet | 7,971 | 86 | 1.08 | 72 | 0.90 |
| 2010 | N.F. Touchet | 4,997 | 13 | 0.26 | 7 | 0.14 |
| 2011 | N.F. Touchet | 7,500 | 32 | 0.43 | 20 | 0.27 |
| 2012 | N.F. Touchet | 5,000 | 20 | 0.40 | 17 | 0.34 |
| | | **Average (2003-2012)** | | **0.60** | | **0.47** |

Data Source: WDFW – Snake River Lab, Data Files 2015.

Estimated natural escapement into the Touchet River based on redd counts in index area (**Table 6, Figure 2**) appears to be relatively stable. The number of LFH stock and Touchet endemic stock hatchery-origin and natural-origin steelhead within the spawning ground survey index area have been estimated annually based on fish captured, handled and passed at the DAT (**Figure 3**). The recruit:spawner relationship derived from these index redd count data suggests that Touchet River summer steelhead is right at, or just above the replacement level (**Figure 4**). We originally expected survival of the endemic brood hatchery-reared fish to equal or exceed the SAR's documented for the LFH stock. However, SARs have fallen short of those expectations to date due to other factors. Early rearing survivals (i.e., egg-to-smolt) within the hatchery have been similar to other stocks reared at LFH (**Table 7**); however, the Touchet River endemic stock derived from wild brood has been difficult to rear in a hatchery setting. Fish in the hatchery exhibit a high fright response, which has greatly affected their hatchery rearing capabilities, as compared with stocks derived from broodstock which had hatchery-origin parents (WDFW R1 Hatchery Staff Personal Observations).

**1.13) Date program started (years in operation), or is expected to start.**

The broodstock program started in February 2000, with 2000 brood year fish collected from the Dayton trap and spawned at LFH. The endemic program has now been in operation for 15 years.

**Table 6. Standardized redd estimates and redds/kilometer within index reaches of the Touchet River in southeast Washington, 1987-2014. Total redds shown come from a combination of wild-origin, LFH stock hatchery-origin, and Touchet River endemic hatchery stock origin fish estimated to be on the spawning grounds.**

| Year | North Fork | | South Fork | | Wolf Fork | | Robinson Fork | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | Redds | Redds/km | Redds | Redds/km | Redds | Redds/km | Redds | Redds/km | Redds |
| 1987 | 99 | 5.2 | 147 | 5.5 | 100 | 5.7 | 34 | 3.8 | 380 |
| 1988 | 184 | 9.7 | 260 | 9.7 | 172 | 9.8 | 73 | 8.1 | 689 |
| 1989 | 65 | 3.4 | 71 | 2.7 | 42 | 2.4 | 20 | 2.3 | 198 |
| 1990 | 88 | 4.6 | 90 | 3.4 | 88 | 5 | 23 | 2.5 | 289 |
| 1991 | 66 | 3.5 | 61 | 2.3 | 72 | 4.1 | 14 | 1.6 | 213 |
| 1992 | 152 | 8 | 180 | 6.8 | 95 | 5.4 | 41 | 4.6 | 468 |
| 1993 | 65 | 3.4 | 107 | 4 | 36 | 2.1 | 20 | 2.2 | 228 |
| 1994 | 135 | 7.1 | 121 | 4.5 | 81 | 4.6 | 26 | 2.9 | 363 |
| 1995 | 98 | 4.6 | 116 | 4.3 | 83 | 4.8 | 17 | 1.9 | 314 |
| 1996 | 64 | 3.4 | 104 | 3.9 | 72 | 4.1 | 23 | 2.6 | 263 |
| 1997 | 56 | 2.9 | 39 | 1.4 | 65 | 3.7 | 16 | 1.8 | 176 |
| 1998 | 118 | 6.2 | 112 | 4.2 | 84 | 4.8 | 30 | 3.3 | 344 |
| 1999 | 82 | 4.3 | 131 | 4.9 | 49 | 2.8 | 19 | 2.1 | 281 |
| 2000 | 65 | 3.4 | 70 | 2.6 | 45 | 2.6 | 22 | 2.5 | 202 |
| 2001 | 55 | 2.9 | 84 | 3.1 | 57 | 3.3 | 17 | 1.9 | 213 |
| 2002 | 115 | 6 | 123 | 4.6 | 60 | 3.4 | 29 | 3.2 | 327 |
| 2003 | 160 | 8.4 | 125 | 4.7 | 100 | 5.7 | 37 | 4.1 | 422 |
| 2004 | 68 | 3.6 | 48 | 1.8 | 44 | 2.5 | 16 | 1.8 | 176 |

| Year | North Fork | | South Fork | | Wolf Fork | | Robinson Fork | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | Redds | Redds/km | Redds | Redds/km | Redds | Redds/km | Redds | Redds/km | Redds |
| 2005 | 116 | 6.1 | 94 | 3.5 | 91 | 5.2 | 28 | 3.1 | 329 |
| 2006 | 91 | 4.7 | 78 | 2.9 | 58 | 3.3 | 38 | 4.2 | 265 |
| 2007 | 160 | 8.4 | 133 | 5 | 97 | 5.5 | 32 | 3.5 | 422 |
| 2008 | 80 | 4.2 | 99 | 3.7 | 46 | 2.6 | 22 | 2.4 | 247 |
| 2009 | 88 | 4.6 | 102 | 3.8 | 56 | 3.2 | 25 | 2.8 | 271 |
| 2010 | 195 | 10.2 | 235 | 8.8 | 84 | 4.8 | 25 | 2.8 | 539 |
| 2011 | 140 | 7.4 | 146 | 5.5 | 88 | 5.0 | 34 | 3.8 | 408 |
| 2012 | 61 | 3.2 | 116 | 4.3 | 50 | 2.9 | 33 | 3.7 | 260 |
| 2013 | 174 | 9.1 | 144 | 5.4 | 139 | 8 | 44 | 4.9 | 501 |
| 2014 | 59 | 3.1 | 45 | 1.7 | 17 | 1.0 | 30 | 3.3 | 151 |

Data Source: WDFW – Snake River Lab, Data Files 2015.

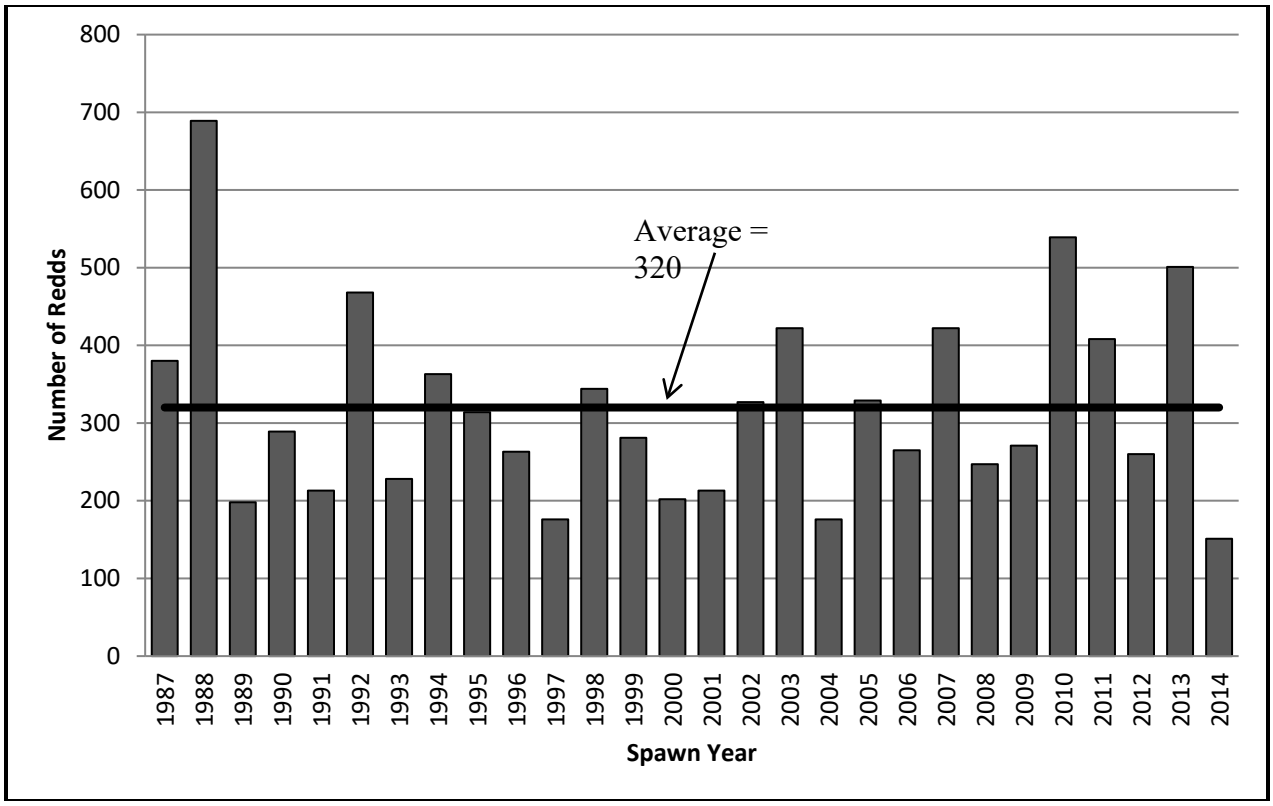


**Figure 2. Summer steelhead redds within the index area of the Touchet River from 1987-2014.**

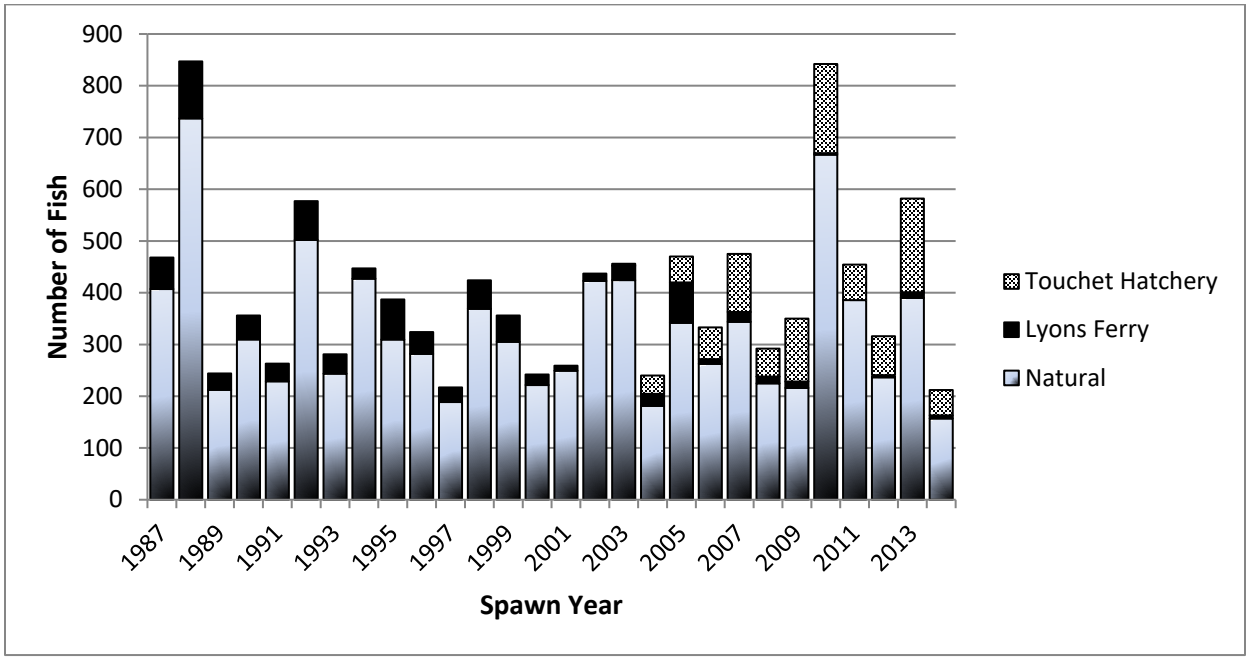


**Figure 3. Estimated natural-origin, LFH stock origin, and Touchet endemic hatchery-origin summer steelhead on the spawning grounds within the Touchet River Index Area (1987-2013) (Areas include the North Fork, South Fork, Wolf Fork, and Robinson Fork).**

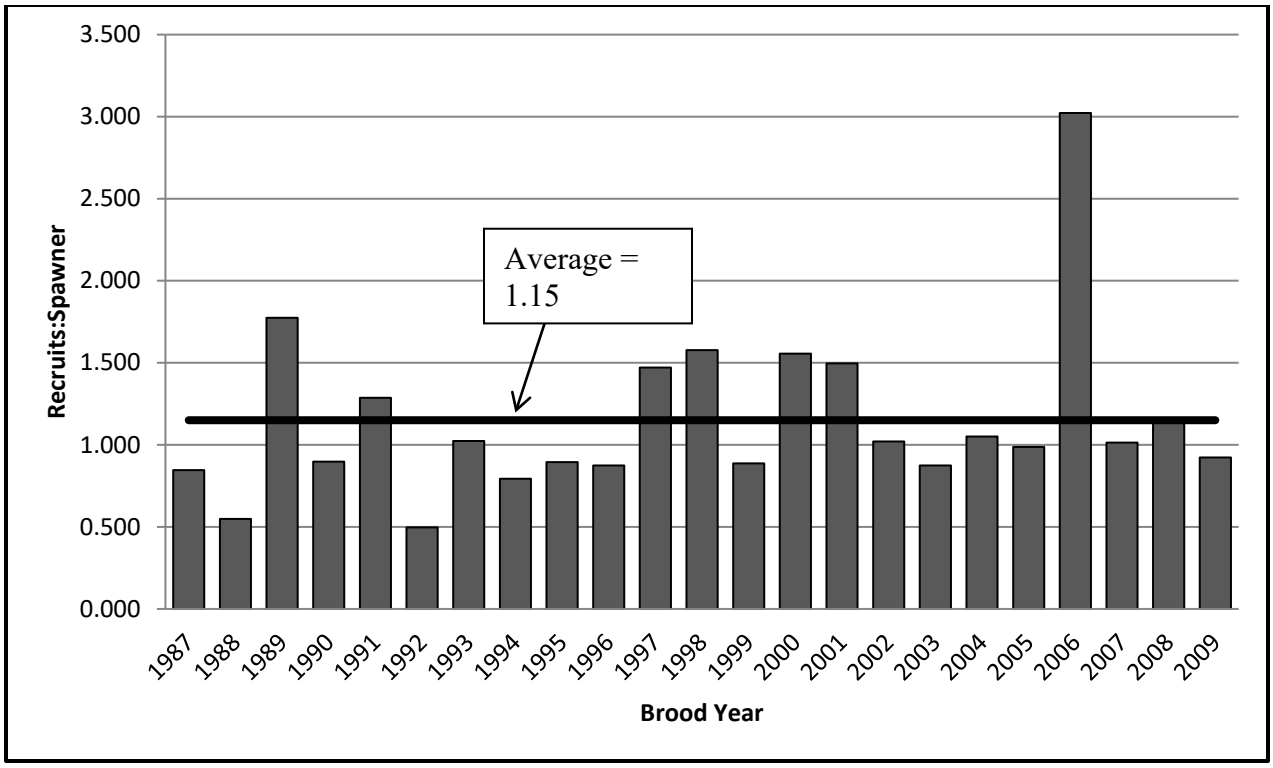


**Figure 4. Estimated recruits:spawner for natural-origin Touchet River summer steelhead, 1987-2009 brood years.**

**Table 7. Estimated in-hatchery survival (percent) of summer steelhead from the Touchet River, Tucannon River, LFH and Wallowa stocks, 2000-2012 brood years. Data Source: WDFW – Snake River Lab, Data Files 2015.**

| Brood Year | Touchet River Stock | | Tucannon River Stock | | LFH Stock | | Wallowa Stock [d] | |
|---|---|---|---|---|---|---|---|---|
| | Green Egg to Eyed Egg | Eyed Egg to Smolt | Green Egg to Eyed Egg | Eyed Egg to Smolt | Green Egg to Eyed Egg | Eyed Egg to Smolt | Green Egg to Eyed Egg | Eyed Egg to Smolt |
| 2000 | 82.0 | 83.7 | 89.0 | 83.4 | 79.5 | 61.3 | 61.6 | 82.5 |
| 2001 | 77.6 | 84.7 | 89.1 | 57.9 | 79.6 | 66.4 | 75.7 | 70.3 |
| 2002 [a] | 93.8 | 47.3 | 90.2 | 65.2 | 83.9 | 63.0 | 79.2 | 74.1 |
| 2003 | 90.9 | 78.3 | 62.7 | 93.1 | 86.9 | 64.9 | 96.4 | 85.9 |
| 2004 | 85.3 | 95.3 | 80.0 | 98.0 | 88.0 | 87.0 | 94.5 | 80.6 |
| 2005 | 96.4 | 97.7 | 93.3 | 90.7 | 87.6 | 87.6 | 97.1 | 61.7 |
| 2006 | 96.7 | 85.5 | 92.9 | 93.5 | 81.4 | 83.4 | 92.0 | 93.5 |
| 2007 | 95.2 | 69.4 | 93.5 | 95.4 | 91.2 | 84.6 | 91.2 | 72.5 |
| 2008 [b] | 93.6 | 97.4 | 83.1 | 0.0 | 90.1 | 72.1 | 87.6 | 79.3 |
| 2009 | 96.2 | 89.6 | 89.2 | 92.2 | 86.7 | 90.8 | 93.7 | 94.7 |
| 2010 | 86.1 | 95.4 | 90.3 | 95.8 | 86.8 | 77.9 | 87.0 | 81.5 |

| Brood Year | Touchet River Stock | | Tucannon River Stock | | LFH Stock | | Wallowa Stock [d] | |
|---|---|---|---|---|---|---|---|---|
| | Green Egg to Eyed Egg | Eyed Egg to Smolt | Green Egg to Eyed Egg | Eyed Egg to Smolt | Green Egg to Eyed Egg | Eyed Egg to Smolt | Green Egg to Eyed Egg | Eyed Egg to Smolt |
| 2011 | 87.2 | 83.9 | 97.0 | 81.7 | 77.3 | 80.7 | 78.6 | 91.6 |
| 2012 [c] | 55.7 | 85.3 | 77.7 | 80.7 | 68.8 | 80.2 | 77.5 | 85.8 |
| Average | 87.4 | 84.1 | 86.8 | 79.0 | 83.7 | 76.9 | 85.5 | 81.1 |

a high loss was experienced due to a failed screen. Juvenile fish were swept into a discharge pipe from the small rearing troughs and lost.
b Only a few fish were spawned this year, and it was decided to release the small production as fry, not smolts.
c A failed formalin treatment killed many of the eggs in the incubation system.
d Wallowa stock steelhead were not released into the Touchet River until 2014. These data are provided for reference only of what can probably be expected for in-hatchery performance. The data provided in these two columns were for fish released at Cottonwood AP in the Grande Ronde.

### 1.14) Expected duration of program.

Unknowns about the endemic program success have made us take a cautious approach in phasing out the current steelhead hatchery stock used for harvest mitigation in the basin. Over the next few years, WDFW will evaluate both in- and out- of hatchery performance to determine if the endemic program should be increased/continued in the future.

### 1.15) Watersheds targeted by program.

Touchet River (WRIA 32) only, which is a subbasin of the Walla Walla River.

### 1.16) Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

The LSRCP summer steelhead compensation program in the Touchet River has been active since 1983. Non-endemic hatchery-origin summer steelhead stocks have been used to date to fulfill harvest mitigation goals. Beginning in 2000, unmarked (presumed wild-origin) adults were trapped to begin development of a new endemic broodstock in the Touchet River. If successful, the endemic broodstock program would replace the out-of-basin stocks used for harvest mitigation in the future. See **Appendix B** for additional Alternatives discussed for the program over time.

#### 1.16.1) Potential Alternatives to the Current Program

Currently, the program is still in an experimental phase. We are currently testing the incorporation of some (25% pHOB) hatchery-origin returns in to the broodstock, and have changed the release location and strategy starting in 2016. Depending on the results of this study, two alternatives are provided for future consideration. Some additional historical alternatives which have provided in previous HGMP submissions are provided in Appendix 2.

Alternative 1: Increase the proportion of hatchery-origin fish in the broodstock to a 50% pHOB level

Alternative 2: If the results from the current study indicate the stock doesn't perform to expectations, recommend discontinuation of the program.

# SECTION 2. PROGRAM EFFECTS ON ESA-LISTED SALMONID POPULATIONS.

## 2.1) List all ESA permits or authorizations in hand for the hatchery program.

For the LFH LSRCP program, USFWS Section 7 Consultation with NMFS for LSRCP actions and the NMFS Biological Opinion; HGMP's (Summer Steelhead) for Wallowa stock in the Walla Walla/Touchet, and a statewide Section 6 Consultation with USFWS (Bull Trout). WDFW submitted the Touchet Endemic Summer Steelhead HGMP to NOAA Fisheries in 2010 for a Section 10(a)(1)(A) permit. However the HGMP was not acted upon by NOAA. This HGMP will again be resubmitted to NOAA Fisheries for ESA consultation under Section 10(a)(1)(A) and will discuss the program changes since the 2010 submission. WDFW received a letter of sufficiency from NOAA Fisheries on March 1, 2011, stating that this draft was sufficient to publish in the Federal Register for public comment.

## 2.2) Provide descriptions, status, and projected take actions and levels for ESA-listed natural populations in the target area.

### 2.2.1) Description of ESA-listed salmonid population(s) affected by the program.

WDFW has estimated natural and hatchery-origin summer steelhead escapement into the index areas of the Touchet River since 1987 (see **Table 8**). There is large yearly variation in escapement, but on average about 335 natural-origin spawners/year are believed to spawn in the upper basin. The average percent of LFH stock and hatchery endemic fish into the indexed areas has been estimated at about 4.5% and 21%, respectively, in more recent years.

Adult trapping data from the Touchet adult trap has shown the population to be made up of 3, 4, 5 and 6-year old individuals (primarily 2-year freshwater age and one or two year ocean age; **Table 9**). Touchet steelhead are typical of "A" run summer steelhead with more fish returning as 1-salt age (60%) than as 2-salt age (40%). One-salt age fish average 59.8 cm in length while two-salt age fish average 70.5 cm with individuals as large as 86 cm. Sex ratio varies between years (56%-79%), but has generally been heavily skewed to females (67.5%) on average. An estimated 5% of each year's annual return are repeat spawners (Bumgarner and Dedloff, 2015)

Fish enter the Touchet River as early as May in the year prior to spawning, and as late as the following April. Redds have been observed to as low as RM 45, with juveniles

documented from RM 40 (Mendel et al 1999) upstream, including numerous smaller forks and tributaries (North Fork, South Fork, Wolf Fork, Robinson Fork, Coppei Cr., Patit Cr., etc.). Spawning is believed to begin as early as late February and continues through May. While hatchery (LFH and Touchet River endemic program returns) and natural fish enter and spawn in the river at the same time, WDFW believes that spawning locations of the LFH/Wallowa stock steelhead are spatially separated, mainly due to the location of the Dayton AP. The number of hatchery fish (LFH stock) captured in the adult trap has varied over the years, but averaged about 10% each year (**Table 8**). However, in more recent years with returns of endemic stock fish increasing, hatchery-origin fish (LFH and TR endemic stock combined) at the adult trap has been as high as 29% (**Table 8**).

Juvenile summer steelhead rear successfully in the Touchet River above RM 40, and are widely spread throughout the upper mainstem, each of the major forks, and smaller tributaries. Rearing success appears to be dependent upon habitat and water quality, which is poor below RM 40, and only moderate between RM 40-53 (Mendel et al 1999). Above RM 53, rearing conditions are good for steelhead. Juveniles will typically spend from one to three (primarily two) years in the Touchet River before emigrating as smolts, though a few age four individuals have been identified from adult scale samples (Bumgarner and Dedloff, 2015).

Age of smoltification is likely determined by both genetic and environmental factors (growth and temperature). The Touchet River is productive and yearling smolts (Age 1; ~7%) are likely being produced from the lower reaches where summer water temperatures allow for accelerated growth (Joe Bumgarner – WDFW personal communication, ). A portion of the juveniles (non-migrants) and smolts leave the upper Touchet River primarily between early October-December, and again in April and May. Mean smolt size of natural steelhead is generally around 150mm. All hatchery LFH/Wallowa stock smolts have been released from Dayton AP (RM 53) since 1987. All hatchery TR endemic stock smolts have been released directly to the North Fork Touchet River at the Baileysburg Bridge (At RM 55.8 – **See Section 10.3 - Table 18**) through 2015. All hatchery smolts (all stocks) will be released from Dayton AP beginning in 2016.

**Table 8. Estimated number of redds, redds/km, total fish by origin, and percent hatchery fish on the spawning grounds in the index area of the Touchet River, 1987-2014.**

| Year | Redds | Redds per km | Total Fish | Natural | Hatchery | Endemic | % Natural Stock | % LFH Stock | % Endemic Stock |
|---|---|---|---|---|---|---|---|---|---|
| 1987 | 380 | 5.1 | 468 | 407 | 61 | 0 | 87.0 | 13.0 | 0 |
| 1988 | 689 | 9.3 | 847 | 737 | 110 | 0 | 87.0 | 13.0 | 0 |
| 1989 | 198 | 2.7 | 244 | 212 | 32 | 0 | 87.0 | 13.0 | 0 |
| 1990 | 289 | 3.9 | 356 | 310 | 46 | 0 | 87.0 | 13.0 | 0 |
| 1991 | 213 | 2.9 | 263 | 229 | 34 | 0 | 87.0 | 13.0 | 0 |
| 1992 | 468 | 6.2 | 577 | 502 | 75 | 0 | 87.0 | 13.0 | 0 |
| 1993 | 228 | 2.9 | 281 | 244 | 37 | 0 | 86.7 | 13.3 | 0 |
| 1994 | 363 | 4.8 | 447 | 427 | 20 | 0 | 95.6 | 4.4 | 0 |
| 1995 | 304 | 3.9 | 387 | 310 | 77 | 0 | 80.0 | 20.0 | 0 |
| 1996 | 263 | 3.5 | 324 | 282 | 42 | 0 | 87.0 | 13.0 | 0 |
| 1997 | 176 | 2.5 | 217 | 189 | 28 | 0 | 87.0 | 13.0 | 0 |
| 1998 | 344 | 4.6 | 424 | 369 | 55 | 0 | 87.0 | 13.0 | 0 |
| 1999 | 281 | 3.5 | 356 | 305 | 51 | 0 | 85.7 | 14.3 | 0 |
| 2000 | 202 | 2.8 | 242 | 222 | 20 | 0 | 91.6 | 8.4 | 0 |
| 2001 | 213 | 2.8 | 259 | 249 | 10 | 0 | 96.2 | 3.8 | 0 |
| 2002 | 327 | 4.3 | 437 | 423 | 14 | 0 | 96.8 | 3.2 | 0 |
| 2003 | 422 | 5.7 | 456 | 424 | 28 | 4 | 93.1 | 6.1 | 0.9 |
| 2004 | 176 | 2.4 | 240 | 181 | 23 | 35 | 75.6 | 9.7 | 14.8 |
| 2005 | 329 | 4.5 | 470 | 342 | 78 | 50 | 72.7 | 16.6 | 10.7 |
| 2006 | 265 | 3.8 | 333 | 263 | 9 | 61 | 78.9 | 2.7 | 18.4 |
| 2007 | 422 | 5.6 | 475 | 344 | 19 | 112 | 72.4 | 4 | 23.6 |
| 2008 | 247 | 3.2 | 292 | 225 | 13 | 54 | 77.0 | 4.5 | 18.5 |
| 2009 | 271 | 3.6 | 350 | 216 | 12 | 122 | 61.7 | 3.5 | 34.7 |
| 2010 | 539 | 6.7 | 842 | 667 | 3 | 172 | 79.2 | 0.3 | 20.5 |
| 2011 | 408 | 5.4 | 454 | 386 | 0 | 69 | 85.0 | -0.1 | 15.1 |
| 2012 | 260 | 3.5 | 316 | 237 | 4 | 75 | 74.9 | 1.3 | 23.8 |
| 2013 | 501 | 6.9 | 581 | 390 | 11 | 181 | 67.1 | 1.9 | 31.2 |
| 2014 | 151 | 2.1 | 212 | 157 | 6 | 49 | 74.1 | 2.8 | 23.1 |
| ***Mean 2004-2014*** | | | | | | | ***74.4*** | ***4.3*** | ***21.3*** |
| ***Mean 1987-2014*** | | | | | | | ***83.1*** | ***8.5*** | ***8.4*** |

Data Source: WDFW – Snake River Lab, Data Files 2015.

**- Identify the ESA-listed population(s) that will be directly affected by the program.**

Touchet River natural-origin steelhead population, listed as threatened under the ESA as part of the Mid-Columbia River ESU (March 25, 1999; FR 64 No. 57: 14517-14528).

‘‘Naturally spawned anadromous O. mykiss (steelhead) originating below natural and manmade impassable barriers from the Columbia River and its tributaries upstream of the

Wind and Hood Rivers (exclusive) to and including the Yakima River; excludes such fish originating from the Snake River basin. This DPS does include steelhead from seven artificial propagation programs: The Touchet River Endemic Program; Yakima River Kelt Reconditioning Program (in Satus Creek, Toppenish Creek, Naches River, and Upper Yakima River); Umatilla River Program (Oregon Department of Fish and Wildlife (ODFW) Stock #91); and the Deschutes River Program (ODFW Stock #66). Also, based on our recent 5- year review of ESA-listed salmonids (76 FR 50448; August 15, 2011), the following programs are now being included as part of this DPS: The Touchet River Endemic Program; (June 25, 2013: FR 78 No. 123: 2013-15015).

**Table 9. Summary of fresh and salt-water age composition of natural-origin adults from the Touchet River, 1994-1995 and 1999-2013 brood years.**

| BY | Age 1.1 | | Age 1.2 | | Age 2.1 | | Age 2.2 | | Age 3.1 | | Age 3.2 | | Age 4.1 | | Age 4.2 | | % Repeat spawners |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % | N | % | N | % | N | % | N | % | |
| 1994 | 0 | 0.0 | 0 | 0.0 | 6 | 28.6 | 8 | 38.1 | 3 | 14.3 | 3 | 14.3 | 0 | 0.0 | 0 | 0.0 | 4.8 |
| 1995 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 6 | 85.7 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 14.3 | 0.0 |
| 1999 | 0 | 0.0 | 1 | 3.2 | 18 | 58.1 | 9 | 29.0 | 2 | 6.5 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 3.2 |
| 2000 | 1 | 3.2 | 1 | 3.2 | 17 | 54.8 | 8 | 25.8 | 3 | 9.7 | 1 | 3.2 | 0 | 0.0 | 0 | 0.0 | 0.0 |
| 2001 | 1 | 0.6 | 14 | 8.0 | 84 | 48.3 | 40 | 23.0 | 15 | 8.6 | 9 | 5.2 | 1 | 0.6 | 0 | 0.0 | 5.7 |
| 2002 | 6 | 4.8 | 3 | 2.4 | 84 | 67.7 | 20 | 16.1 | 6 | 4.8 | 3 | 2.4 | 0 | 0.0 | 0 | 0.0 | 1.6 |
| 2003 | 0 | 0.0 | 8 | 6.7 | 20 | 16.7 | 73 | 60.8 | 2 | 1.7 | 10 | 8.3 | 0 | 0.0 | 0 | 0.0 | 5.8 |
| 2004 | 0 | 0.0 | 1 | 0.8 | 47 | 39.2 | 18 | 15.0 | 18 | 15.0 | 2 | 1.7 | 1 | 0.8 | 0 | 0.0 | 8.1 |
| 2005 | 0 | 0.0 | 0 | 0.0 | 37 | 44.0 | 21 | 25.0 | 15 | 17.9 | 8 | 9.5 | 0 | 0.0 | 0 | 0.0 | 3.6 |
| 2006 | 2 | 1.3 | 7 | 4.5 | 85 | 54.8 | 38 | 24.5 | 7 | 4.5 | 11 | 7.1 | 0 | 0.0 | 0 | 0.0 | 3.2 |
| 2007 | 2 | 1.4 | 11 | 7.9 | 46 | 32.9 | 54 | 38.6 | 7 | 5.0 | 14 | 10.0 | 1 | 0.7 | 0 | 0.0 | 2.8 |
| 2008 | 2 | 1.7 | 6 | 5.2 | 47 | 40.5 | 38 | 32.8 | 7 | 6.0 | 7 | 6.0 | 0 | 0.0 | 0 | 0.0 | 7.7 |
| 2009 | 3 | 2.1 | 0 | 0.0 | 81 | 56.3 | 21 | 14.6 | 19 | 13.2 | 8 | 5.6 | 0 | 0.0 | 0 | 0.0 | 8.3 |
| 2010 | 15 | 4.1 | 14 | 3.8 | 230 | 62.8 | 74 | 20.2 | 23 | 6.3 | 4 | 1.1 | 0 | 0.0 | 0 | 0.0 | 1.9 |
| 2011 | 3 | 1.4 | 9 | 4.3 | 54 | 25.6 | 11 | 54.0 | 16 | 7.6 | 10 | 4.7 | 0 | 0.0 | 0 | 0.0 | 2.6 |
| 2012 | 13 | 8.5 | 3 | 2.0 | 45 | 29.4 | 69 | 45.1 | 13 | 8.5 | 4 | 2.6 | 1 | 0.7 | 1 | 0.7 | 2.6 |
| 2013 | 3 | 2.1 | 37 | 25.9 | 32 | 22.4 | 53 | 37.1 | 0 | 0.0 | 14 | 9.8 | 0 | 0.0 | 0 | 0.0 | 3.3 |
| **Totals** | **51** | **2.7** | **115** | **6.1** | **933** | **49.2** | **664** | **35.0** | **156** | **8.2** | **108** | **5.7** | **4** | **0.2** | **2** | **0.1** | **4.0** |

Data Source: WDFW – Snake River Lab, Data Files 2015.

**- Identify the ESA-listed population(s) that may be <u>incidentally</u> affected by the program.**

All Mid-C and all Lower Columbia stocks, downstream of the release site, Dayton AP.

**Lower Columbia River steelhead (*Oncorhynchus mykiss*)**. Listed as a threatened species on March 19, 1998 (63FR13347); threatened status reaffirmed on January 5, 2006 (70FR37160); reaffirmed threatened by five-year status review, completed August 15, 2011 (76 FR 50448).

**Lower Columbia River Chinook (*Oncorhynchus tshawytscha*).** Listed as "threatened" on March 24, 1999 (64FR14308); threatened status reaffirmed on June 28, 2005 (70FR37160); reaffirmed threatened by five-year status review, completed August 15, 2011 (76 FR 50448).

**Lower Columbia River coho (*Oncorhynchus kisutch*)**. Identified as a candidate species on June 25, 1995 (60FR38011). Listed as threatened on June 28, 2005 (70FR37160); reaffirmed threatened by five-year status review, completed August 15, 2011 (76 FR 50448).

**Columbia River chum salmon (*Oncorhynchus keta*)**. Listed as threatened on March 25, 1999 (64FR14507); threatened status reaffirmed on June 28, 2005 (70FR37160); reaffirmed threatened by five-year status review, completed August 15, 2011 (76 FR 50448).

### 2.2.2) Status of ESA-listed salmonid population(s) affected by the program.

**- Describe the status of the listed natural population(s) relative to "critical" and "viable" population thresholds**.

Summer Steelhead – Natural-origin summer steelhead in the Touchet and Walla Walla rivers are listed as "threatened" under the ESA as part of the Mid-Columbia River ESU. Touchet and Walla Walla rivers summer steelhead were classified as depressed because of chronically low escapement by WDFW (SASSI 1992). The populations are likely at a "critical" population threshold because it has been chronically depressed. However, we believe the summer steelhead in the Touchet to be at, or slightly above, the replacement level (See **Figure 4** for the estimated recruit/spawner relationship of Touchet River summer steelhead). An interim escapement goal of 600 natural spawners in the Touchet River was previously established (1992 SASSI). Escapement documented for indexed areas of the Touchet River have been provided in **Table 8**. Average natural escapement has been about 335 spawners/year, and is based on indexed redd surveys only. Natural-origin spawners into other areas of the Touchet River basin that are not routinely surveyed may equate to another 100-200 natural-origin fish, which leaves the natural-origin status just below the management goal.

The Touchet River summer steelhead population has been identified as an intermediate population in the Umatilla/Walla Walla Major Population Group (MPG). It was identified as a higher risk population due to the lack of data available at time of determination. Since that time, WDFW has provided updated data on population status, productivity, and the percent hatchery influence as found through this HGMP document. Limiting factors to the MPG were related to passage (upstream and downstream through the hydrosystem), habitat (temperature, sediment, tributary passage, degraded channel structure), hatchery (non-endemic origin), and predation/competition with other species.

Key actions proposed in the plan call for protecting and improving the freshwater habitat, improve hatchery management to reduce non-DPS origin fish on the spawning grounds, and improve mainstem survival.

**- Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.**

The estimated recruits/spawner are provided in **Figure 4**. (WDFW – Snake River Lab, Data Files).

**- Provide the most recent 12 year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.**

Estimated natural and hatchery-origin (LFH and endemic hatchery stocks) spawning summer steelhead in indexed areas of the Touchet River upstream of Dayton from 1987-2013 are presented in **Table 8**. (WDFW – Snake River Lab, Data Files).

**- Provide the most recent 12 year (e.g. 1988-2000) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.**

See **Table 8** above.

**2.2.3) Describe hatchery activities, including associated monitoring and evaluation and research programs that may lead to the take of listed fish in the target area, and provide estimated annual levels of take.**

Broodstock Trapping: Summer steelhead adults (Touchet River origin) will be trapped, collected for broodstock, or passed upstream annually from January through May, which constitutes a direct take of listed fish (**Take Table A**). Human disturbance or poaching of summer steelhead has not been experienced in any years of trapping. The trap facility has security fencing to protect listed fish.

Spawning, Rearing and Releases: Spawning of the adults, egg incubation, and rearing/release of summer steelhead for 14 months from March through the following April has a potential for lethal take of these listed summer steelhead while in the hatchery. Mortality can occur in association with fish culture activities and conditions which affect fish health and development, from handling procedures, fertilization procedures, water temperature, water quality, water flow, feeding success, and transport. Further, the release of endemic origin hatchery-reared Touchet River summer steelhead may incidentally affect (take) other listed salmonids in the Mid and Lower Columbia River by displacement or competition, however as the current release size of the total program is 50,000 these affects are believed to be minimal.

Monitoring and Evaluation: Contact with listed summer steelhead during spawner escapement surveys (March through May), smolt trapping, and PIT tagging programs may potentially take listed summer steelhead. Each of these activities is described in more detail below. **Also See Section 11.**

**Spawning Ground Surveys:** "Take" associated with spawning ground surveys (**Take Table B**) will occur in the form of "observe/harass" and from occasional carcass recovery of kelts. Spawning surveys for listed steelhead are conducted from March through May, and generally conducted once every two weeks, with the intent to estimate spawning escapement into the Touchet River just above Dayton (does not include all tributaries of the Touchet River). Index sections, about 2-4 miles in length, are located in each of the major river forks (South, North, Robinson, and Wolf), and are surveyed multiple times throughout the season to document redds and how quickly redds fade from sight of the surveyors. During each survey, surveyors generally walk down the bank, and not in the water, when possible. Surveyors look for redds, record and mark their location, and look for live and dead fish. At the end of the season, more extensive areas of the river are walked (generally 50-70%). The "final survey" redd count and redd visibility/fading rates are then used to estimate spawning escapement to the system. Properly conducted surveys are not expected to result in any direct mortality to spawning steelhead.

**PIT Tagging:** "Take" of listed natural and hatchery-origin steelhead will occur during PIT tag studies (**Take Table B**). Tagging will occur at the hatchery prior to smolt release, and/or at the Touchet River Smolt trap (described in the next section). Tagging of listed hatchery-reared fish with PIT tags will provide information on downstream migration performance (relative survival, migration speed, and timing), and is also currently being used to estimate smolt-to-adult survival rates from the various release points in the Touchet River (Dayton AP, direct stream releases upstream), and to estimate adult returns to the basin. Tagging procedures follow established protocols (CBFWA and PIT Tag Steering Committee, 1999) used throughout the Columbia and Snake River basins by WDFW and other agencies when PIT tags are utilized.

**Smolt Trapping:** Smolt trapping on the Touchet River began in the fall of 2007. "Take" of out-migrating listed steelhead (natural and hatchery-origin) will occur at WDFW's smolt trap (**Take Table B**) located on the mainstem Touchet River. The trap has been operated each year from October - June to capture natural origin steelhead to enable WDFW staff to estimate natural smolt production from the upper basin, and to capture fish for PIT tagging to estimate adult returns and survival. All captured natural-origin fish will receive a PIT tag, with a portion transported back upstream about ¼ to ½ mile upstream, released to calculate trap efficiency. At certain times of year the trap may be checked only once a day. Delayed migration will result for fish captured in the trap, and delayed mortality as a result of injury may also result. Mortality of natural steelhead is expected to remain below 0.5% (based on smolt trapping in the Tucannon River since 1997-present).

**- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take**.

ESA-listed Mid-Columbia and Lower Columbia stocks are not known to occur at the DAT location in the Touchet River. The potential for take of these stocks during trapping operations is believed to be minimal to non-existent based on 19 years of trap operations.

- **Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish**.

WDFW has operated the current adult trap site (RM 53.3) during the springs of 1993, 1994, 1995, 1999-2014 (**WDFW Snake River Lab Data Files**). The previous trap facility (water diversion for the Dayton AP; 1993-2007) was not designed to trap adult fish, and therefore trapping has only provided a sub-sample of the run each year. The trap was heavily damaged following the 1996 flood on the Touchet River, and attempts to operate it again were not made until 1999, when it was apparent that an endemic broodstock would need to be developed for the future. Following the trapping in 1999, it appeared the existing trap could be used to start an endemic broodstock. In 2001, an additional trap was added within the intake structure to collect more fish. From 1993-2007, 25 mortalities (1.7%) occurred from trapping activities (**Table 10**). During 2007/2008, the adult fishway and fish trap were constructed at the original site. The trap configuration is better compared to previous years, and there has been only one natural-origin adult steelhead mortality in the trap since 2008. Overall trap mortality is <0.9% for all years, and 0.06% since 2008.

**Table 10. Number of natural and hatchery-origin adult steelhead captured at the Touchet River adult trap (RM 53.3) from 1993-1995, 1999-2014, and the percent natural mortalities from trapping operations.**

| Year | Total Steelhead | Natural | LFH Stock | Endemi Stock | Percent Hatchery SH | Natural Mortalities | % Natural Mortalities |
|---|---|---|---|---|---|---|---|
| 199 | 61 | 53 | 8 | 0 | 13.1% | 4 | 7.5% |
| 199 | 45 | 43 | 2 | 0 | 4.4% | 0 | 0.0% |
| 199 | 10 | 8 | 2 | 0 | 20.0% | 0 | 0.0% |
| 199 | --- | --- | --- | --- | --- | --- | --- |
| 199 | --- | --- | --- | --- | --- | --- | --- |
| 199 | --- | --- | --- | --- | --- | --- | --- |
| 199 | 49 | 42 | 7 | 0 | 14.3% | 0 | 0.0% |
| 200 | 34 | 31 | 3 | 0 | 8.8% | 1 | 3.2% |
| 200 | 217 | 180 | 36 | 0 | 16.6% | 4 | 2.2% |
| 200 | 193 | 174 | 19 | 0 | 9.8% | 3 | 1.7% |
| 200 | 131 | 118 | 10 | 1 | 8.4% | 1 | 0.8% |
| 200 | 145 | 101 | 28 | 16 | 30.3% | 3 | 2.9% |
| 200 | 143 | 86 | 46 | 11 | 39.9% | 6 | 6.9% |
| 200 | 211 | 161 | 15 | 35 | 23.7% | 2 | 1.2% |
| 200 | 216 | 145 | 27 | 44 | 32.9% | 1 | 0.7% |
| 200 | 165 | 119 | 19 | 27 | 27.9% | 0 | 0.0% |
| 200 | 248 | 148 | 26 | 75 | 40.7% | 0 | 0.0% |

| Year | Total Steelhead | Natural | LFH Stock | Endemi Stock | Percent Hatchery SH | Natural Mortalities | % Natural Mortalities |
|---|---|---|---|---|---|---|---|
| 201 | 833 | 601 | 82 | 150 | 27.9% | 1 | 0.2% |
| 201 | 456 | 334 | 66 | 56 | 26.8% | 0 | 0.0% |
| 201 | 234 | 175 | 10 | 49 | 25.2% | 0 | 0.0% |
| 201 | 300 | 194 | 21 | 85 | 35.3% | 0 | 0.0% |
| 201 | 182 | 143 | 4 | 35 | 21.4% | 0 | 0.0% |
| Tota | 3,691 | 2713 | 427 | 549 | 26.4% | 26 | 0.9% |

**-Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).**

See "**Take" Tables A** at back of document.

Pre-spawn mortality of those fish held for broodstock have been kept to a minimum once more aggressive formalin treatments were initiated (**Table 11**).

**Table11. Number of Touchet River endemic broodstock collected and mortalities experienced from 2000-2014. (Note: in some years we live spawned males at the adult trap on spawning days, these have been counted in the table as being collected for broodstock).**

| Year | Females Collected | Males Collected | Female Pre-Spawning Mortality | Male Pre-Spawning Mortality | Percent Pre-Spawning Mortality |
|---|---|---|---|---|---|
| 2000 | 13 | 7 | 1 | 0 | 5.0 |
| 2001 | 20 | 15 | 6 | 4 | 28.5 |
| 2002 [a] | 17 | 20 | 2 | 3 | 13.5 |
| 2003 [a] | 18 | 18 | 1 | 1 | 5.6 |
| 2004 | 16 | 14 | 1 | 1 | 6.7 |
| 2005 | 21 | 18 | 1 | 0 | 2.6 |
| 2006 | 20 | 19 | 1 | 0 | 2.6 |
| 2007 | 16 | 18 | 0 | 1 | 2.9 |
| 2008 | 14 | 14 | 0 | 0 | 0.0 |
| 2009 | 17 | 15 | 0 | 1 | 3.1 |
| 2010 | 18 | 16 | 1 | 2 | 8.8 |
| 2011 | 14 | 20 | 0 | 0 | 0.0 |
| 2012 | 18 | 14 | 1 | 0 | 3.1 |
| 2013 | 15 | 16 | 0 | 1 | 3.2 |
| 2014 | 16 | 16 | 1 | 0 | 3.1 |

[a] Two males were live spawned at the DAT and used during spawning. The males were released upstream of the trap so they could spawn.

**- Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.**

The adult trap is not 100% efficient at trapping steelhead. The current diversion design allows fish to pass over the structure during high spring flows. In cases where WDFW personnel are unable to check the trap daily, the trap area can be closed for entry, or opened for unrestricted passage through the ladder.

# SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

**3.1) Describe alignment of the hatchery program with any ESU-wide hatchery or other regionally accepted policies (e.g. the NPPC *Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.**

Depending on success of this stock and decisions to be made in the future the program may eventually drastically reduce, or eliminate, the current releases of LFH/Wallowa stock steelhead in the Touchet River. If that occurs, eventually all releases of hatchery-origin summer steelhead into the Touchet River will be derived from a combination of natural and hatchery origin (Touchet Stock) proposed within this HGMP.

**This hatchery program is consistent with the following:**

*Genetic Manual and Guidelines for Pacific Salmon Hatcheries in Washington*. These guidelines define practices that promote maintenance of genetic variability in propagated salmon. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).

*Spawning Guidelines for Washington Department of Fisheries Hatcheries*. Assembled to complement the above genetics manual, these guidelines define spawning criteria to be used to maintain genetic variability within the hatchery populations. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 7, IHOT 1995).

*Stock Transfer Guidelines*. This document provides guidance in determining allowable stocks for release for each hatchery. It is designed to foster development of locally-adapted broodstock and to minimize changes in stock characteristics brought on by transfer of non-local salmonids (WDF 1991).

The Washington Department of Fish and Wildlife *Statewide Steelhead Management Plan* (*SSMP*): *Statewide Policies, Strategies, and Actions,* (WDFW 2008), was adopted by Washington
Fish and Wildlife Commission on March 8, 2008.
http://wdfw.wa.gov/conservation/fisheries/steelhead/management_plan.html.

The SSMP states: “Integrated” conservation programs implemented to preserve and recover depleted wild stocks to minimize potential genetic divergence between the

hatchery broodstock and the wild populations. PNI will be determined by the status of the natural population, based on the goal of PNI being as high as practical.

The following definitions for Integrated Programs come from the SSMP:

Integrated Programs: Three key risk factors associated with integrated programs are a loss of diversity, loss of fitness, and a reduction in the number of wild spawners.

a. Use broodstock that originated from the stock that inhabits the area of the watershed in which the juveniles will be released or, if the wild stock has been extirpated, a stock with morphological, life history, and genetic characteristics similar to the extirpated stock.

b. Attempt to collect broodstock from the wild stock that is representative of their abundance, diversity, distribution, and run timing. Due to the relatively small size of this program over the next few years, it will not be possible to collect broodstock over the entire run.

c. Evaluate the PNI and the effect of annual variations in wild stock abundance, potential range of changes in productivity of wild spawners, and demographic risks and benefits. Where risks are shown to be inconsistent with watershed goals, modify the size, fish culture practices, release strategy, or other characteristics of the program. Increase fishery harvest rates on hatchery-origin steelhead, and/or enhance the productivity of the natural habitat.

*Washington Department of Fish and Wildlife Commission Policy C-3619.* WDFW adopted the Hatchery and Fishery Reform Policy C-3619 in 2009. Its purpose is to advance the conservation and recovery of natural origin salmon and steelhead by promoting and guiding the implementation of hatchery reform. The intent of hatchery reform is to improve hatchery effectiveness, ensure compatibility between hatchery production and salmon recovery plans and rebuilding programs, and support sustainable fisheries. WDFW Policy C-3619 works to promote the conservation and recovery of natural origin salmon and steelhead and provide fishery-related benefits by establishing clear goals for each state hatchery, conducting scientifically defensible-operations, and using informed decision making to improve management. It is recognized that many state operated hatcheries are subject to provisions under U.S. v. Washington (1974) and U.S. v. Oregon and that hatchery reform actions must be done in close coordination with tribal co-managers (available at http://wdfw.wa.gov/commission/policies/c3619.html).

*Hatchery Reform- Principles and Recommendations of the Hatchery Scientific Review Group:* WDFW programs have incorporated the suggestions this report provided, in a detailed description of the HSRG's scientific framework, tools and resources developed for evaluating hatchery programs, the processes used to apply these tools, and the resulting principles, system-wide recommendations, and program-specific recommendations to reform (HSRG 2004) (also see HGMP section 6.2.3).

### 3.1a) FCRPS BiOp Supplemental Comprehensive Analysis (SCA)

The FCRPS BiOp Hatchery Strategy 1, Action 40 call for the "Reform FCRPS Hatchery Operations to Reduce Genetic and Ecological Effects on ESA Listed Salmon and Steelhead". Specifically, it calls for direct funding of the Touchet River steelhead supplementation program to transition to local broodstock using BMP's (best management practices). **See Also Section 1.1.3.**

The SCA pulled the baseline and status information directly from the Mid-Columbia ICTRT reports. At the time of the original analysis, the Touchet River data was not available for population viability analysis, but has been completed since and presented within this HGMP (recruits/spawner estimate). Based on our current estimates, WDFW believes the Touchet River natural origin summer steelhead program to be just above the replacement level (**Figure 4**), and explains why redd counts (**Figure 2**) and estimated returns of adults (**Figure 3**) have been relatively stable for the last 25 years.

Appendix C of SCA does not cover the Touchet River summer steelhead population, but Appendix D (Hatchery Effects Report) does. Appendix D shows that there would be a negative effect on population viability because of hatchery fish on the spawning grounds. Hatchery actions stated in the document that could lessen the effects are 1) upgrade existing facilities to reduce the number of hatchery fish on the spawning grounds, 2) Improve the diversion dam curtain to reduce hatchery spawners. Other actions call for the continued monitoring of population genetics and to continue PIT tagging for program evaluation and monitoring or returns and distributions.

### 3.1b) Mid-Columbia River Steelhead DPS Recovery Plan (Draft)

The Touchet River summer steelhead population has been identified as an intermediate population in the Umatilla/Walla Walla MPG (see ICTRT Population Groupings). It was identified as a higher risk population due to the lack of data available at time of determination. Since that time, WDFW has provided updated data on population status, productivity, and the percent hatchery influence. An updated risk rating should be assessed by NOAA Fisheries with the most current data. Limiting factors to the MPG were related to passage (upstream and downstream through the hydrosystem), habitat (temperature, sediment, tributary passage, degraded channel structure), hatchery (non-endemic origin), and predation/competition/disease factors.

Key actions proposed in the plan call for protecting and improving the freshwater habitat, improve hatchery management to reduce non-DPS origin fish on the spawning grounds which has been reduced due to actions implemented at the adult trap, and improve mainstem survival. Actions proposed within this HGMP are consistent as applicable to the hatchery component. WDFW will continue to re-evaluate the alternatives discussed in Section 1.16 as more information becomes available.

### 3.1c) ICTRT Population and Viability Status Goals (2007)

The following was taken from the January 8th, 2007 ICTRT Scenarios for MPG and ESU viability consistent with TRT viability criteria memo to NOAA Fisheries. The descriptions of the MPGs for the Walla Walla are shown below, including the Touchet River. Proposed actions within this HGMP are consistent with the ICTRT recommendations for viability. If actions from this hatchery program aid in the recovery of the Touchet River population, it will assist in meeting the goals for the MPG.

Walla Walla-Umatilla MPG
Component populations:

| | Size Category | Life History Type |
|---|---|---|
| Willow Creek (extirpated) | | |
| Umatilla River | Large | Summer |
| Walla Walla River | Intermediate | Summer |
| Touchet River | Intermediate | Summer |

Basic application of TRT criteria:

- Two populations must meet viability criteria, one of which must meet high viability criteria
- One Large or Very Large Population (Umatilla River) must meet viability criteria

Considerations:

- Willow Creek population has been extirpated
- Some hatchery influence exists throughout the Walla Walla, Touchet and Umatilla populations.
- Current status suggests that the Walla Walla is closer to meeting viability criteria than the Touchet.

**TRT Recommendation for Walla Walla-Umatilla MPG:**

| Highly Viable and 1 Viable: | Maintained: |
|---|---|
| Umatilla River<br>Walla Walla River OR<br>Touchet River | All remaining extant populations |

### 3.1d) Hatchery Scientific Review Group (HSRG) Observation and Recommendations

The HSRG completed their review of the hatchery summer steelhead programs in the Walla Walla Basin in 2008. All recommendations provided were reviewed and responses by WDFW for all comments were provided to the LSRCP office on why recommendations were implemented or not. Responses provided are included in **Appendix A** of this HGMP.

### 3.1e) USFWS Hatchery Review Team (HRT) Observation and Recommendations

The Hatchery Review Team (HRT) provided 15 preliminary recommendations and 5 draft programmatic alternative actions. All recommendations provided were reviewed and responses by WDFW for all comments were provided to the LSRCP office on why recommendations were implemented or not. Responses provided are included in **Appendix A** of this HGMP.

### 3.1f) US v Oregon Production Agreement

*US v. Oregon* - The hatchery program outlined within this HGMP is consistent with US v OR management agreement (**See Table B6 below**), with the intent restore populations and to provide fish for harvest in tribal and sport fisheries into the future. Decisions to change this program from the current actions have been delayed while WDFW completes the Steelhead Management Plan for SE Washington. Further, the program has not moved forward due to disagreement of program intent with the co-manager, and adult return data has not been as positive as originally hoped.

### 3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

*Indicate whether this HGMP is consistent with these plans and commitments, and explain any discrepancies.*

Hatchery salmon and steelhead production levels at LFH Complex are described, reviewed, and approved in the Annual Operation Plan (AOP) document for LFH conducted annually with the co-managers (CTUIR and Nez Perce Tribe).

This HGMP is consistent with the AOP and with the following cooperative and legal management agreements. Where changes to agreements are likely to occur over the life of this HGMP, WDFW is committed to amending this plan to be consistent with the prevailing legal mandates.

- *U.S. v. Oregon* Management Plan for the Columbia River. The following was created directly from **Table B6** of the 2008 U.S. v Oregon Management Plan. This current HGMP is consistent with the hatchery production table presented in the 2008 Management Plan, where the Touchet River endemic stock is being evaluated, and may eventually replace the LFH/Wallowa stock.

**Table B6** - *U.S. v Oregon* Management Plan 2008

| Release Site | Rearing Facility | Stock | Life Stage | Target Release Number | Mark | Non-ad-Clipped | Primary Program Purpose | Funding |
|---|---|---|---|---|---|---|---|---|
| Walla Walla River | LFH | Wallowa A | Smolt | 100,000 | 100% AD-Clip, 20K LV CWT | 0 | Fishery | LSRCP |
| Touchet River @ Dayton AP | LFH | Wallowa A | Smolt | 85,000 | 100% AD-Clip, 20K LV CWT | 0 | Fishery | LSRCP |
| Touchet River | LFH | Touchet A | Smolt | 50,000 | 100% CWT | 50,000 | Broodstock Evaluation / Supplementation | LSRCP |
| Tucannon River | LFH | Lyons Ferry A | Smolt | 50,000 | 100% CWT | 50,000 | Broodstock Evaluation / Supplementation | LSRCP |

| Release Site | Rearing Facility | Stock | Life Stage | Target Release Number | Mark | Non-ad-Clipped | Primary Program Purpose | Funding |
|---|---|---|---|---|---|---|---|---|
| Tucannon River | LFH | Eliminated in 2010 | Smolt | 100,000 | 100% AD-Clip, 20K LV CWT | 0 | Fishery | LSRCP |
| Snake River @Lyons Ferry Hatchery | LFH | Wallowa A | Smolt | 60,000-160,000 | 100% AD-Clip, 20K LV CWT | 0 | Fishery | LSRCP |
| Grande Ronde River @ Cottonwood Acclimation Pond | LFH | Wallowa A | Smolt | 160,000 | 100% AD-Clip, 20K LV CWT | 0 | Fishery | LSRCP |

The Parties agree on current production levels to achieve mitigation objectives for the Walla Walla, Touchet, Tucannon, and lower Grande Ronde (Cottonwood) programs but not necessarily the stock used (non-local) or the release location. These steelhead programs may change during the period covered by this Agreement. To guide this change, the Parties commit to developing steelhead management plans for broodyear 2010, designed to transition to endemic stocks or segregated programs. The management plans will incorporate the hatchery mitigation requirement, timing of the 2008-2017 *United States v. Oregon* Management Agreement transition, fishery objectives, marking, supplementation component linked to passage improvements on Mill Creek (Walla Walla basin), release locations, criteria to be met for collecting natural-origin adults from the upper Walla Walla basin, marking, etc.

- Lower Snake River Compensation Plan goals as authorized by Congress direct actions to mitigate for losses that resulted from construction of the four Lower Snake River hydropower projects.
- Columbia Basin Fish Accords - The following excerpt is taken directly from the Columbia Basin Fish Accords.
  *"The parties to US v. Oregon have agreed to monitor the LFH production program over the term of the 10-year US v. Oregon management plan. Any US v. Oregon party may propose changes to that program by invoking the modification provisions of the US v. Oregon management plan. The Action Agencies understand that that Tribes' willingness to accept spill operations as outlined above is directly related to their expectation that the LFH production program remains stable and substantially unaltered than as currently designed for the term of this Agreement."*
  Per this language, and actions proposed within this HGMP, any changes to the current production of summer steelhead at LFH (endemic stock or Wallowa stock) will be taken to the *US v Oregon* process and discussed among the co-managers.
- Fisheries Management and Evaluation Plan (FMEP). Developed FMEP's for Mid-Columbia fisheries are completed. The FMEP will describe in detail the current fisheries management within the Walla Walla Basin, including the Touchet River summer steelhead. Fishery management objectives within the FMEP and this HGMP are consistent.

## 3.3) Relationship to harvest objectives.

As the program currently stands, overall harvest objectives as potentially envisioned for the future, don't yet apply since none of these fish are marked for fisheries.

### 3.3.1) Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

As the program currently stands, benefits to harvest program are minimal since none of the fish are marked for fisheries. However, some of this fish are likely taken in net fisheries of the Columbia River. If the program were to be expanded in the future, depending on marking plans which will be negotiated with the co-managers, the majority, if not all, would available for both mark selective and non-mark selective fisheries within the Columbia, Snake, Walla Walla, and Touchet Rivers.

**3.4) Relationship to habitat protection and recovery strategies.**

A comprehensive review of the ecological health of the Touchet River watershed in relation to salmonid population status and recovery has been completed (Kuttle, 2001). Limiting factors such as water temperature, channel stability, sediment, and instream habitat are known to exist in the basin (Kuttle, 2001), and the extent of these problems are being addresses as funds become available.

*Salmon Recovery Funding Board (SRFB):* Created by the Legislature in 1999, the SRFB is composed of five citizens appointed by the Governor and five state agency directors, the Board provides grant funds to protect or restore salmon habitat and assist related activities. It works closely with local watershed groups known as lead entities. The Board supports salmon recovery by funding habitat protection and restoration projects, and related programs and activities that produce sustainable and measurable benefits for fish and their habitat.

**3.5) Ecological interactions.**

Natural predators such as bull trout live sympatrically with Touchet River natural-origin steelhead, and may incidentally prey upon released hatchery-reared smolts of small size. Additionally, kingfishers, mergansers and other avian and mammal predators may prey on hatchery-reared juveniles/smolts as they migrate down the Touchet River.

The release, and subsequent return as adults, of endemic brood steelhead could affect existing ESA-listed populations of bull trout and summer steelhead. However, temporal and spatial overlap that could give rise to competitive or aggressive interactions for food and space will be minimized by the release of smolts near Dayton. Smolts are expected to quickly emigrate from the system. Also, they will be below bull trout spawning and juvenile rearing areas, but overlap with sub-adult and adult migratory habitat is likely. Some residualization of small juvenile fish, leading to their outmigration as a 2-year old smolt, may occur. Returning adults are expected to spawn concurrently with natural steelhead throughout their entire range in the Touchet River, increasing the abundance of juvenile steelhead throughout the basin and filling available habitat.

In the initial program phase, complete marking (100%) of hatchery-reared endemic brood juveniles will allow returning adults to be enumerated and their contribution to the escapement (in absolute numbers and as a proportion of the run) documented. In addition, a large portion of each years release will be PIT tagged for smolt-to-adult monitoring **(See Section 11**). Some studies suggest that domestication of hatchery-reared salmonids may

decrease their reproductive fitness. This loss of fitness could be transmitted to the offspring of these spawning adults. Life history characteristics of the hatchery-reared fish will be documented to compare their performance with the natural population. Size at migration, migration timing and performance, adult return timing and spawn timing will be documented and reported as part of the LSRCP Monitoring and Evaluation project.

For the first several years of hatchery endemic production, returning adults from the program will not be subject to harvest, but allowed to escape/spawn in the basin to contribute to the naturally produced steelhead.

(1) *Salmonid and non-salmonid fishes or other species that could negatively impact the program.* Negative impacts by fishes and other species on the LFH – Touchet Endemic summer steelhead program could occur directly through predation on program fish, or indirectly through food resource competition, genetic effects, or other ecological interactions. In particular, fishes and other species could negatively impact steelhead survival rates through predation on newly released, emigrating juvenile fish in the freshwater and marine areas. Certain avian and mammalian species may also prey on juvenile steelhead while the fish are rearing at the hatchery site, if these species are not excluded from the rearing areas. Species that could negatively impact juvenile steelhead through predation include the following:

- Avian predators, including mergansers, cormorants, osprey, belted kingfishers, great blue herons, and night herons
- Mammalian predators, including mink, river otters, harbor seals, and sea lions (Columbia corridor)
- Bull Trout/ Dolly Varden

Rearing and migrating adult steelhead originating through the program may also serve as prey for large, mammalian predators in marine areas, nearshore marine areas and in the Upper Columbia and Touchet Rivers to the detriment of population abundance and the program's success in harvest augmentation. Species that may negatively impact program fish through predation may include:

- Southern Resident Killer Whales
- Sea lions
- Harbor seals
- River otters

(2) *Salmonid and non-salmonid fishes or other species that could be negatively impacted by the program (focus is on listed and candidate salmonid species).*

- Snake, Upper and Mid-Columbia Chinook
- Snake, Upper and Mid-Columbia steelhead
- Snake River Sockeye

(3) *Salmonid and non-salmonid fishes or other species that could positively impact the program.* Fish species that could positively impact the program may include trout and other salmonid species present in the Touchet River watershed through natural production. Juvenile fish of these species may serve as prey items for the steelhead during their downstream migration in freshwater and into the marine area. Decaying carcasses of

spawned adult fish may contribute nutrients that increase productivity in the watershed, providing food resources for the emigrating steelhead. Salmonid adults that return to the river and any seeding efforts using adult salmon carcasses may provide a source of nutrients and stimulate stream productivity. Many watersheds in the Pacific Northwest appear to be nutrient-limited (Gregory et al. 1987; Kline et al. 1997) and salmonid carcasses can be an important source of marine derived nutrients (Levy 1997). Carcasses from returning adult salmon have been found to elevate stream productivity through several pathways, including: 1) the releases of nutrients from decaying carcasses has been observed to stimulate primary productivity (Wipfli et al. 1998); 2) the decaying carcasses have been found to enrich the food base of aquatic invertebrates (Mathisen et al. 1988); and 3) juvenile salmonids have been observed to feed directly on the carcasses (Bilby et al. 1996). Addition of nutrients has been observed to increase the production of salmonids (Slaney and Ward 1993; Slaney et al. 2003; Ward et al. 2003).

(4) *Salmonid and non-salmonid fishes or other species that could be positively impacted by the program.* The steelhead program could positively impact freshwater and marine fish species that prey on juvenile fish. Nutrients provided by decaying steelhead carcasses might also benefit fish in freshwater. These species include:

- Northern pikeminnow, smallmouth bass, and a host of other non-predatory freshwater species
- Bull trout/ Dolly Varden
- Steelhead

## SECTION 4. WATER SOURCE

**4.1) Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.**

Presently, LFH will be where adults are held and spawned, eggs hatched and juveniles reared through the sub-yearling or smolt stage. A total of nine production wells provide water to LFH with a maximum water right of up to 119.5 cfs or 53,300 gpm of nearly constant $52^0$ F, pathogen-free water. Discharge from LFH complies with all NPDES standards and enters the Snake River and will not affect Touchet River water quality. See **Table 12.**

For steelhead smolts acclimated at the Dayton AP, water is removed from the Touchet River under a permit for non-consumptive fish propagation purposes. The Touchet River is a productive watershed flowing from the Blue Mountains of southeast Washington. Temperatures approach freezing in winter and can rise to $80^0$ F or greater during the summer near the mouth of the river. Water temperatures while fish are acclimating range between 35-$60^0$ F.

**4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.**

The LFH Complex facilities currently operate under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) general permit which conducts effluent monitoring and reporting and operates within the limitations established in its permit administered by the Washington Department of Ecology (DOE), WAG 13-7006. Monthly and annual reports on water quality sampling, use of chemicals at this facility, compliance records are available from DOE. Water withdrawal at LFH is through wells, and effluent is discharged to the Snake River, complying with NPDES standards.

Discharges from the cleaning treatment system are monitored as follows:

 *Total Suspended Solids (TSS)* 1 to 2 times per month on composite effluent, maximum effluent and influent samples.

 *Settleable Solids (SS)* 1 to 2 times per week on effluent and influent samples.

 *In-hatchery Water Temperature* - daily maximum and minimum readings.

**Table 12.** Record of NPDES permit compliance at LFH.

| Facility | Reports Submitted? Y/N | | | Last Inspection Date | Violations Last 5 yrs? (list) | Corrective Actions? Y/N | Meets Compliance? Y/N |
|---|---|---|---|---|---|---|---|
| | Monthly | Qtrly | Annual | | | | |
| LFH WAG13-7006 | Y | Y | Y | * | 0 | N | Y |

Data Source: WDFW Headquarters Hatchery Records 2014.

Water intake screens at Dayton AP meet current NMFS 2011c screening guidelines, and effluent discharge is monitored, reported, and currently complies with NPDES standards. The permit administered by the Washington Department of Ecology (DOE), WAG 13-7004 for Dayton was no longer required as of 7/2006.

## SECTION 5. FACILITIES

### 5.1) Broodstock collection facilities (or methods).

Broodstock will be collected at an adult trap in the mainstem Touchet River within the city of Dayton **(Figure 1**, **Photos 1 and 2**). Routine maintenance may require the remove/sluicing of gravel or fine sediment that accumulates in the acclimation pond diversion, or within the fish ladder over the course of time. All removal of gravel/sediment will be by hand or hydraulic (pump) actions. Prior approval from WDFW Habitat Division will occur before any sediment is disturbed.

### 5.2) Fish transportation equipment (description of pen, tank truck, or container used).

Following sampling and origin determination, adults captured and identified as suitable for hatchery broodstock are netted into a plastic transport tub fitted with re-circulating water, and hauled in the back of a pickup truck to LFH (elapsed time 30-45 min.). A maximum of

six adults can be transported in the tub at one time. The tub holds approximately 16 $ft^3$ of water.

**5.3) Broodstock holding and spawning facilities.**

LFH Complex is part of the LSRCP program that is responsible for mitigation production within the Snake and Walla Walla basins. There are no other facilities for the production of Touchet River endemic stock steelhead, and offspring of all fish removed from the basin will be returned to the Touchet River. LFH Complex (LFH and Tucannon Fish hatcheries combined) are large facilities and rear spring and fall Chinook, multiple stocks of summer steelhead and rainbow trout for the LSRCP program. Ponds/raceways are utilized by multiple species with varying requirements for flow and density indexes. As such, we provide the following table to generally describe the number, size, and flow capabilities of the rearing vessels at LFH Complex (**See Table 13**). A reference number for each raceway/pond at each facility is provided and will be provided with the following process descriptions.

Broodstock are hauled to LFH where they are placed in a single adult holding raceway (Table 13 - #3) that receives constant temperature well water. Water flow to the adult raceway is about 3,000 gpm, and can hold over 2,500 adult steelhead if desired. Records of adults held for broodstock for this program indicate that hatchery staff has not held more than 40 adult Touchet steelhead in the holding pond at one time. Routine maintenance on broodstock holding facilities includes checking on water intake valves, gate valves at the lower end of the holding ponds, water alarms, disinfection and formalin treatment systems, and general condition of the holding ponds.

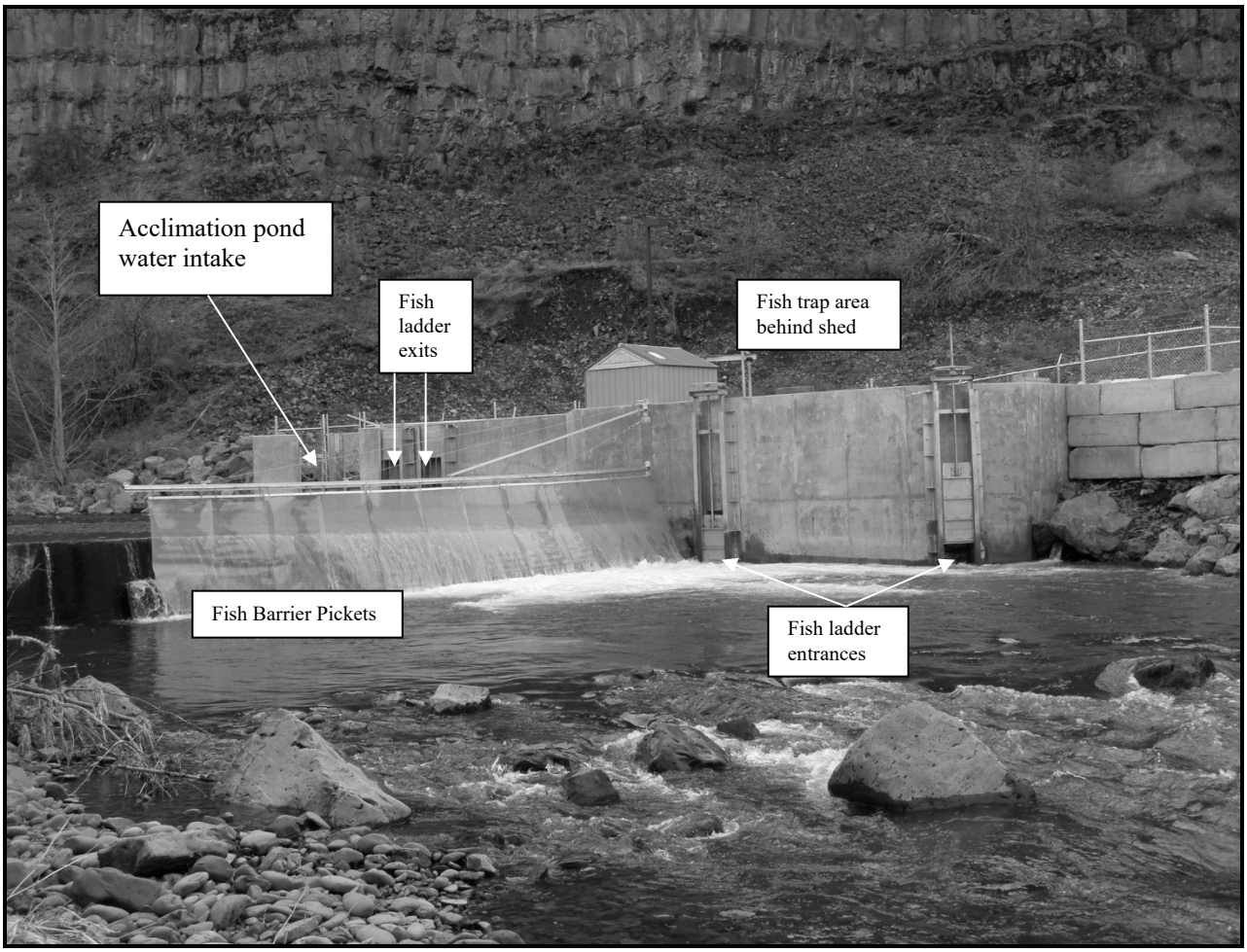


**Photo 1. View of Dayton Adult Trapping and Water Diversion Facility, Touchet River.**

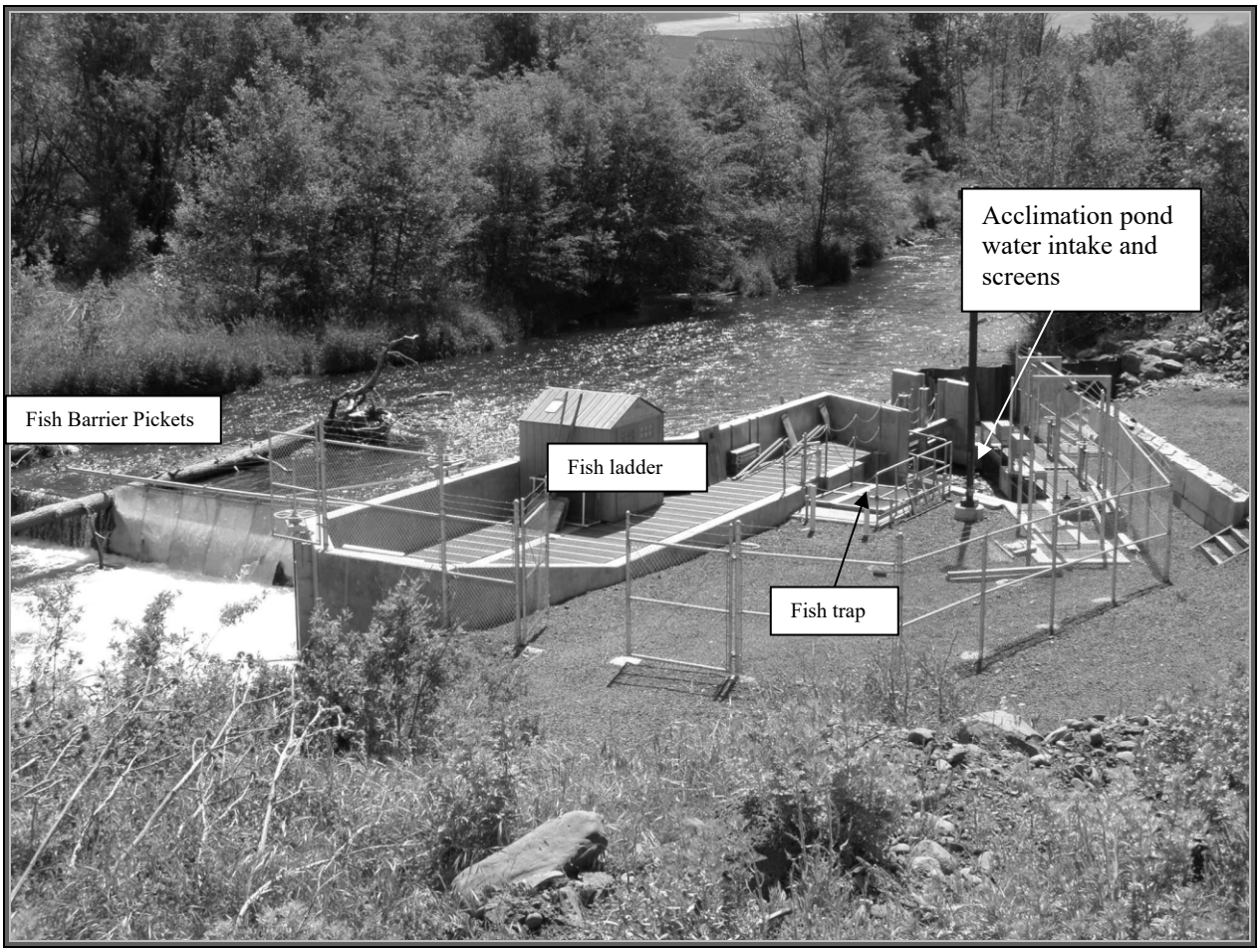


**Photo 2. View of Dayton Adult Trapping and Water Diversion Facility, Touchet River.**

## 5.4) Incubation facilities.

The incubation room at LFH is designed to accept and incubate eggs from individual females, through the eyed stage (Table 13 - #6). Two nested square buckets receive water via individual plastic tubes into the bottom of the first bucket, and then upwells into the second bucket through a screen where they eggs are placed, allowing even flow across all eggs. Routine maintenance in the incubation and early rearing facilities includes checking on water intake valves, water alarms, disinfection and formalin treatment systems, and general condition of the incubation room.

## 5.5) Rearing facilities.

Isolated incubation vessels allow for disease control. After eye-up is complete and virus results are received, eggs are consolidated into hatching baskets and transferred to shallow hatching troughs (Table 13 - #9). As the eggs hatch, fry fall through the basket screens, and settle to the bottom of the rearing troughs, absorbing their egg sacks to eventual feeding. After some growth they are then transferred to deep troughs (Table 13 - #10) or outside

raceways (Table 13 - #4). Routine maintenance includes checking on water intake valves, water alarms, seals around outlet screens, and general condition of the rearing raceways.

**Table 13.** LFH Complex Facility Descriptions

## LFH – Rearing Facilities Descriptions

| Ref # | Pond Type / Usage | Species Usage | | | | | # of Ponds/Trays | Dimensions | Volume (ft3) | Flow gpm or cfs | #'s | Temps |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Adult Ponds | FCH A | FCH SY | | | | 4 | 8.5 x 150 x 4.3 | 5,483 | 3,000 gpm | | 52 |
| 2 | Adult Ponds | FCH A | FCH SY | | | | 4 | 10 x 150 x 4.3 | 6,450 | 3,000 gpm | | 52 |
| 3 | Adult Ponds | SpCH A | SH A | | | | 3 | 10 x 5 x 83 | 4,150 | 3,000 gpm | | 52 |
| 4 | NS Raceways (Fall - Yearling) | FCH Y | FCH SY | SpCH Y | SH | RB | 19 | 10 x 3.5 x 88.5 | 3,098 | 1,000 gpm | | 52 |
| 5 | SS Raceways (Fall - Yearling) | FCH Y | FCH SY | | | | 28 | 10 x 2.8 x 100 | 2,800 | 750 gpm | | 52 |
| 6 | NS Incubation (Iso-buckets) | SH | | | | | 250 | 3 gallon nested bucket | NA | 2 gpm | Single Female | 52 |
| 7 | SS Incubation (heath stacks) | FCH | SpCH | | | | 1,792 | NA | NA | 3 gpm | 5,000 egg/tray | 52 |
| 8 | Rearing Lakes (Fall Chinook) | FCH Y | SH | | | | 3 | 1,100 x 90 x 6.5 | 643,500 | 3,500-5,000 gpm | | 52 |
| 9 | NS (shallow troughs) | SH | RB | | | | 88 | 1 x 15 x 0.5 | 7.5 | 3-8 gpm | | 52 |
| 10 | NS (Deep troughs) | SH | RB | | | | 4 | 3.75 x 2 x 27.5 | 206 | 35-75 gpm | | 52 |
| 11 | Dayton AP (Steelhead) | SH | | | | | 1 | NA | 200,000 | 2,694 gpm (6 cfs) | | 34-52 |
| 12 | Curl Lake AP (Spring Chinook) | SpCH | SH? | | | | 1 | NA | 784,000 | 2,694 gpm (6 cfs) | | 34-48 |
| 13 | Cottonwood AP (Steelhead) | SH | | | | | 1 | NA | 357,000 | 2,694 gpm (6 cfs) | | 34-52 |

LFH is 100% Well Water Source - Temperature is a constant 52.

## Tucannon Fish Hatchery - Rearing Facilities Descriptions

| Ref # | Pond Type / Usage | Species Usage | | | # of Ponds/Trays | Dimensions | Volume (ft3) | Flow gpm or cfs | #'s | Temps |
|---|---|---|---|---|---|---|---|---|---|---|
| A | Shallow troughs | RB | | | 40 | 1 x 15 x 0.5 | 7.5 | 3-8 gpm | | |
| B | Round Ponds (Rainbow/SpCH) | SpCH | RB | | 6 | 40 ft diameter | 2,660 | 216 gpm | | |
| C | Standard Raceway (Rainbow/Steelhead) | SpCH | SH | RB | 2 | 10 x 80 x 3 | 2,400 | 216 gpm | | |
| D | Large Raceway (Steelhead/SPCH) | SpCH | SH | | 1 | 15 x 136 x 5 | 10,200 | 1,300 gpm | | |
| E | Earthen Rearing Pond (Rainbow) | RB | | | 1 | 170 x 200 x 6.5 | 136,221 | 2,000 gpm | | |

River Water Source Temp - 33-60; Well #2 - 54-57; Well #3 - 61; Spring Water Collection - 51-52

**a. Acclimation/release facilities.**

Dayton AP (Table 13 - #11) has a volume of 348,000 $ft^3$, and is supplied with a maximum of six cfs ($ft^3$/sec) Touchet River water. Water withdrawal from the Touchet River is permitted through a non-consumptive permit issued by Washington Department of Ecology (see **Table 1**). Rotating screens adhering to NMFS screening guidelines (2011c) are in place to protect any listed species within the Touchet River. Any listed fish entering the water intake facility are allowed to freely exit the area through a bypass flume. WDFW hatchery staff conducts routine maintenance of the water intake screen during the acclimation season. Any sediment accumulation in the screen area will be removed by hand or hydraulic pump under approval from WDFW Habitat Division.

**5.7) Describe operational difficulties or disasters that led to significant fish mortality.**

Pre-spawning mortality on the broodstock at LFH has been documented (**Table 11**). Losses in more recent years have been curtailed due to more aggressive formalin treatments to control fungus outbreaks after weekly spawning activities have started.

Mortalities at the DAT have been very low. Mortalities in the past were generally due to fish getting behind racks or netting to that were in place to prevent the fish from escaping the holding area of the trap. The new trap is free of such entrapment areas, and mortalities have been considerably less since 2008 (**Table 10**).

**5.8) Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.**

Strict operational procedures as laid out by Integrated Hatchery Operation Team (IHOT 1993) are followed at LFH. Where possible, remedial actions identified in a 1996 IHOT compliance audit are implemented. Staff are available to respond to critical operational problems at all times. Water flow and low water alarm systems, and emergency generator power supply systems to provide incubation and rearing water to the facilities are installed at LFH. Fish health monitoring occurs monthly, or more often, as required in cases of disease epizootics. Fish health practices follow the Control Policy of the Fisheries Co-Managers of Washington State (WDFW and WWTIT 1998, updated 2006).

**5.9) Maintenance**

**Annual Maintenance**

- Annual water supply pump rehabilitation. (***Please reference Snake River Fall Chinook HGMP***).
- Rotating drum screen maintenance for rearing lakes ($1,000).
- Chemicals for egg disinfection and fungus control ($2,500)
- Vehicle maintenance ($500).

- Annual fish transportation; a total of 58,600 lbs. smolts hauled from LFH to Dayton AP and direct releases to Tucannon River and Walla Walla River ($7,500).
- Dredge intake at Touchet River/Dayton AF. ($3,500)
- Fire safety and maintenance service (***Please reference Snake River Fall Chinook HGMP***).

**Non-recurring Maintenance (next 5 years)**

- Stop log replacement for Lake # 1 ($1,500).
- Asphalt seal Dayton AF pond. ($5,000)
- New fish culture equipment; items such as crowders, dipnets, scales, shallow trough baffle plates etc. ($1,500).
- Increase intermediate rearing capacity (***Please reference Snake River Fall Chinook HGMP***).
- Develop increased water supply to meet program diversity requirements for "stepping stone" approach. (***Please reference Snake River Fall Chinook HGMP***).
- Replace formalin treatment pump ($1,200).
- Replace blower feeder motor ($1,500).

## SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

### 6.1) Source.

Natural-origin and hatchery-origin (Touchet Stock) steelhead captured in the Touchet River adult trap, or those captured hook and line above the city of Waitsburg will be used for broodstock.

### 6.2) Supporting information.

#### 6.2.1) History.

At the suggestion of the 1999 BiOp in 2000, natural-origin steelhead were collected at the DAT to pursue the development of an endemic stock. Genetic samples from the broodstock collected and other fish passed at the trap between 2000 and 2005, and from juvenile populations throughout the Touchet River drainage will serve as a baseline to measure potential future genetic changes (**See Section 6.2.4**). Beginning in 2015, we also collected some hatchery origin fish (Touchet stock) for the broodstock.

#### 6.2.2) Annual size.

Up to 36 adults (mixed hatchery and natural-origin).

#### 6.2.3) Past and proposed level of natural fish in broodstock.

In the years 2000-2014, 100% of the broodstock has consisted of natural-origin fish. Beginning with the 2015 Brood (and continuing for four years), up to 25% of the broodstock will consist of hatchery-origin returns from the endemic program (no adipose clip/CWT identifiable fish).

**6.2.4) Genetic or ecological differences**.

This hatchery stock was initially developed solely from natural-origin fish. Genetic samples (fin clips) have been collected from hatchery and natural-origin summer steelhead in the Touchet River in the past. Current plans are to collect samples for three years and then let three years pass. Samples may periodically be analyzed for population structure and genetic variation in the future. **See Monitoring - Section 11.**

In 2004, we had acquired multiple years of genetic data from the Touchet River endemic population, and from other areas in SE Washington, including the LFH stock. Presented in this next section is a genetic analysis summary report that was provided in 2004 by the WDFW Genetics Lab, Olympia Washington. This section was pulled from the LFH Complex Steelhead Evaluation Report for the 2003 run year (Bumgarner et al, 2004).

**Genetic Summary**

Since 1998, the Snake River Lab and WDFW's Fish Management staff have periodically collected samples from SE Washington summer steelhead populations (adult and juvenile) for genetic stock analysis. Samples have been collected from the Walla Walla, Touchet and Tucannon River basins, and LFH stock.

There is always the potential for genetic introgression of LFH steelhead into the Touchet and Walla Walla River populations. However, even with the large releases of LFH summer steelhead in the past, genetic introgression with Mid-Columbia River (MCR) steelhead has not been observed to a large degree in the Touchet and Walla Walla Rivers. Genetic samples collected in the Touchet and Walla Walla basins showed that there are still genetic differences between the natural and hatchery-origin summer steelhead (**Figures 4 and 5** - Bumgarner *et al*. 2007). Individual assignment tests were conducted on the genetic samples (**Table 13**). The LFH stock had a 46% self-assignment rate, approximately 10% assignment to Tucannon and Touchet, and 1% assignment to Walla Walla. The Touchet sample had 53% self-assignment, 6% assignment to Tucannon, 5% assignment to LFH, and 5% assignment to Walla Walla. The Walla Walla sample had the highest self-assignment rate, 56%, the fewest number of individuals assigning to LFH, 1%, and the lowest number of unassigned fish, 27%.

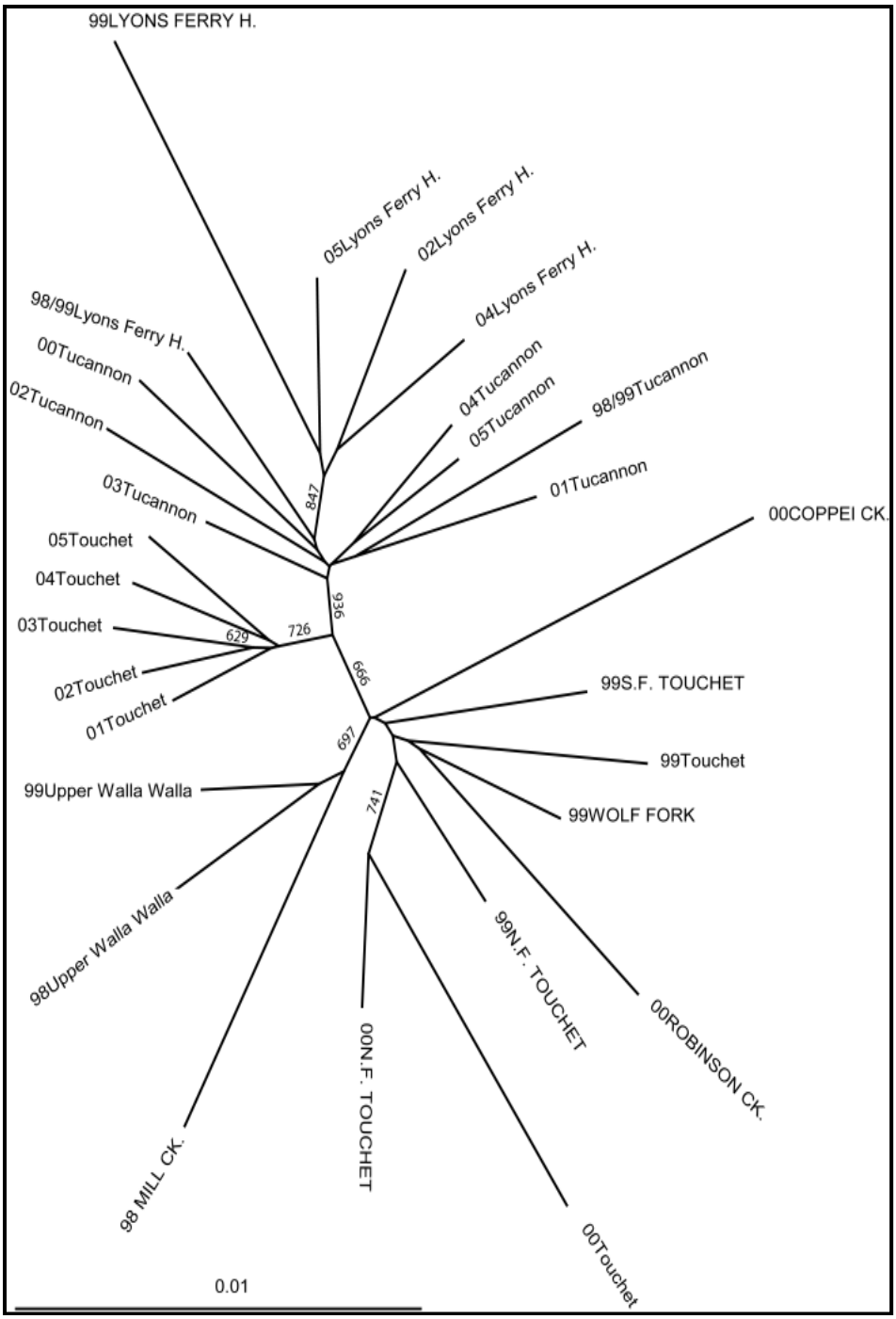


**Figure 4**. Chord distance tree that includes temporally stratified samples, plus samples from Touchet River tributaries, Mill Creek, and Walla Walla River. Sample labels with all letters capitalized are juvenile samples. Node support numbers are values from bootstrap analysis (1000 bootstraps).

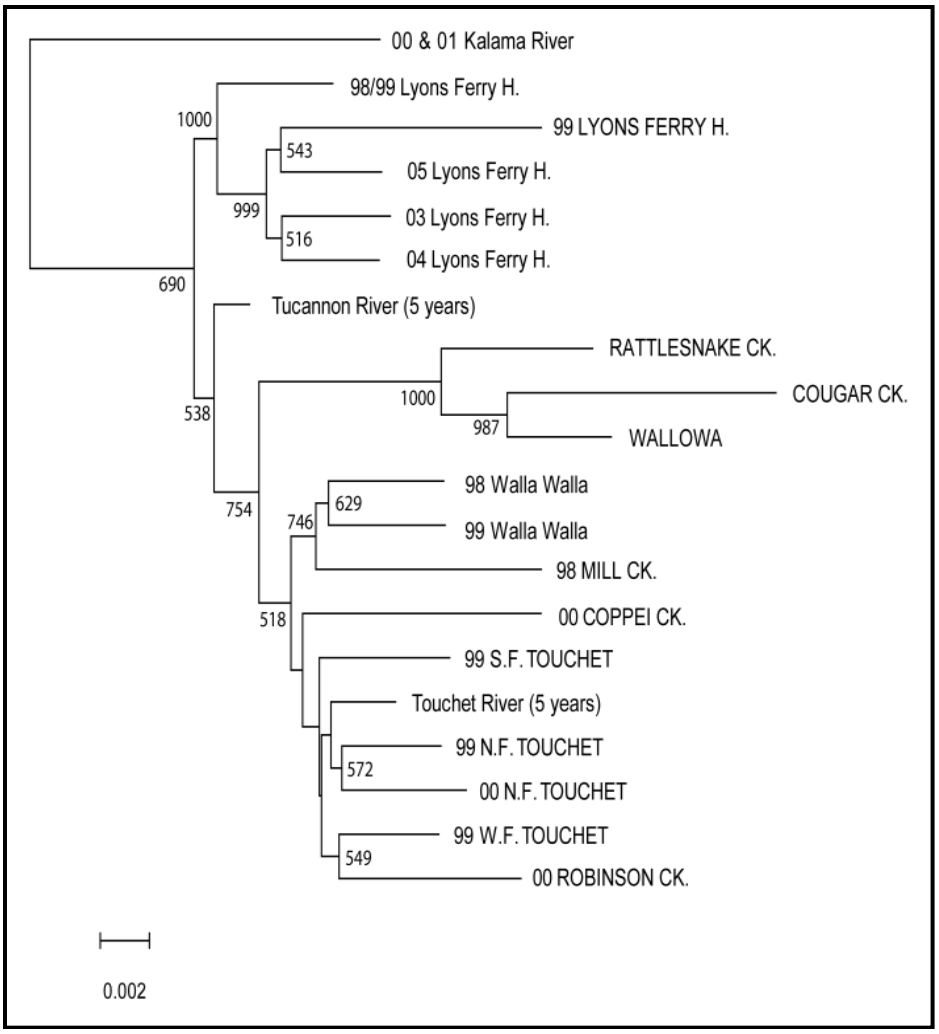


**Figure 5.** Chord distance tree from steelhead samples from Columbia River, Walla Walla River, and Snake River. Sample labels with all letters capitalized are juvenile samples. Node support numbers are values from bootstrap analysis (1000 bootstraps).

**Table 13**. Individual assignment results reported are the proportions of individuals assigned to each population category, given the assignment log of odds (LOD) was greater than one and the individual's likelihood resided within the 95% confidence interval for the estimated population of origin.

| | N | Tucannon | LFH | Touchet | Walla Walla | Unassigned |
|---|---|---|---|---|---|---|
| Tucannon River | 451 | 029 | 0.14 | 0.09 | 0.05 | 0.43 |
| LFH | 333 | 010 | 0.46 | 0.13 | 0.01 | 0.31 |
| Touchet River | 987 | 0.06 | 0.05 | 0.53 | 0.05 | 0.30 |
| Walla Walla | 177 | 0.04 | 0.12 | 0.12 | 0.56 | 0.27 |

### 6.2.5) Reasons for choosing.

The Touchet River endemic steelhead stock should, based on evolutionary biology concepts, such as those discussed in Ford 2002, be more optimally adapted for survival in the Touchet River, when compared to the LFH stock. Washington Department of Fish and Wildlife and the co-managers believe they will be most capable of surviving, returning to, and effectively spawning in the Touchet River. Also, ESA concerns will be satisfied because they are of Touchet River origin. However, due to environmental factors (water temperatures, mainstem dams), we know that a portion of the endemic stock fish will likely stray to areas outside the Touchet River Basin. This "straying" of summer steelhead is not a localized problem displayed by only Touchet River steelhead, but is observed by other Columbia River steelhead stocks in other basins as well (Jim Ruzicki, ODFW, personal communication).

**6.3) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.**

Use of natural-origin adult steelhead for broodstock will provide the greatest protection of the population's genetic structure in this integrated program.

## SECTION 7. BROODSTOCK COLLECTION

**7.1) Life-history stage to be collected (adults, eggs, or juveniles)**.

Adults (mixed hatchery (25%) and natural (75%) origin).

**7.2) Collection or sampling design.**

Adult trapping occurs at a new fishway/fish trap facility (DAT) constructed in 2007 (RM 53.3), located in the town of Dayton. The majority of the steelhead arrive back to the DAT between February and May. Fish are able to bypass the barrier dam associated with the fishway at virtually any springtime river flow, ensuring that a large percentage of the run is not delayed by trapping efforts. Because of the potential poor trapping efficiency, WDFW has constructed hanging PVC pickets across the face of the barrier dam to restrict passage, and encourage fish to use the fish ladder.

WDFW staff checks the trap daily for fish. The trap may be checked more than once a day if many fish are expected to be captured. Captured fish are crowded to one side of the holding area, netted and placed in 8in PVC pipe (top third cut away). Each end of the PVC pipe has been fitted with aluminum plates, which are provided with 60V max electrical current (electronarcosis). After origin has been determined (natural, endemic broodstock, or hatchery production-LFH stock), the fish are either collected for broodstock, or passed upstream. Some natural-origin returns may have scales and DNA samples collected from them before release. Fish collected for broodstock are PIT tagged in the dorsal sinus for identification and to assist in the tracking of matings in the broodstock, mainly because

there have been times when we have to use males multiple times (**Table 14).** PIT tagged fish allow us to track the number of times males are used in spawning real time (since they are typically live spawned), and also allows to examine spawn timing relative to when fish were trapped.

The program initially began with collection of fish throughout the run. However, it soon became apparent that the extended spawn timing, and late spawn timing was creating difficulties in the hatchery rearing cycle (one-year smolt program). Currently, the broodstock are collected over a three-week time period near the middle of the run (mid-March to first week in April).

**Table 14. Number of times each Touchet River male was spawned during a given spawn year (2000-2014).**

| Male | Spawn Year | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 |
| 1 | 4 | 1 | 1 | 1 | 5 | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 3 | 1 |
| 2 | 4 | 1 | 3 | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 |
| 3 | 3 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 |
| 4 | 3 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |
| 5 | 6 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 |
| 6 | 4 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 3 | 1 | 1 |
| 7 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |
| 8 | | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |
| 9 | | 2 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | | 2 |
| 10 | | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 2 |
| 11 | | 2 | 1 | 1 | | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | | 1 |
| 12 | | | 1 | 1 | | 2 | 1 | 1 | | 1 | 1 | 1 | 2 | | 1 |
| 13 | | | 1 | 1 | | 1 | 2 | 1 | | 1 | | 1 | 1 | | 1 |
| 14 | | | 1 | 1 | | 1 | 1 | 1 | | | | | | | 1 |
| 15 | | | 1 | 1 | | 1 | 1 | 1 | | | | | | | |
| 16 | | | 2 | 1 | | | 1 | 1 | | | | | | | |
| 17 | | | 1 | 1 | | | 1 | 1 | | | | | | | |
| 18 | | | 1 | | | | 1 | | | | | | | | |

Data Source: WDFW – Snake River Lab, Data Files 2015.

## 7.3) Identity.

From 2000 to 2014, only 100% unmarked and untagged natural-origin steelhead were selected for broodstock. Beginning in 2015, some first generation endemic stock hatchery origin fish (up to 25%) were collected for broodstock. For evaluation purposes, 100% of the endemic program hatchery smolts currently receive a CWT for positive identification upon recapture at the adult trap. However, we've found that the majority of the endemic steelhead also have visibly eroded dorsal fins (from being reared in raceways with high densities) that allow them to be identified as hatchery-origin.

**7.4) Proposed number to be collected:**

**7.4.1) Program goal (assuming 1:1 sex ratio for adults):**

36 adults (mixed hatchery endemic (25%) or natural origin (75%) to fulfill study needs. Equal sex ratios in the spawning population were originally identified as a goal for the program. However, having enough ripe males to spawn with ripe females was difficult. Further, fecundity has generally been greater than originally planned. As such current smolt program goals can be reached by spawning 13-14 females. Additional males are generally collected, or live spawned and released at the adult trap to ensure adequate males are available on spawning days.

**7.4.2) Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available:**

See **Table 15.**

**Table15. Number of females and males collected and spawned (kill and live combined) from 2000-2014 BY Touchet Endemic summer steelhead, and the number of eggs and smolts produced.**

| Brood Year | Collected Adults | | Spawned Adults | | Effective Population Size | Eggs Collected | Smolts Produced |
|---|---|---|---|---|---|---|---|
| | Female | Male | Female | Male | | | |
| 2000 | 13 | 7 | 12 | 7 | 17.7 | 53,139 | 36,487 |
| 2001 | 20 | 15 | 14 | 11 | 24.6 | 67,861 | 45,501 |
| 2002 | 17 | 20 | 14 | 9 | 21.9 | 70,843 | 31,440 |
| 2003 | 18 | 18 | 16 | 17 | 32.9 | 82,602 | 58,733 |
| 2004 | 16 | 14 | 15 | 10 | 24.0 | 66,125 | 55,706 |
| 2005 | 21 | 18 | 18 | 17 | 34.9 | 79,540 | 52,476 |
| 2006 | 20 | 19 | 18 | 18 | 36.0 | 88,668 | 58,989 |
| 2007 | 16 | 18 | 16 | 17 | 32.9 | 73,101 | 48,298 [a] |
| 2008 | 14 | 14 | 14 | 12 | 25.8 | 66,928 | 55,255 |
| 2009 | 16 | 15 | 13 | 13 | 26.0 | 72,668 | 62,517 |
| 2010 | 18 | 17 | 15 | 13 | 28 | 75,596 | 62,037 |
| 2011 | 14 | 20 | 12 | 13 | 25 | 74,408 | 54,386 |
| 2012 | 18 | 14 | 17 | 13 | 29 | 81,555 | 38,726 |
| 2013 | 15 | 15 | 10 | 8 | 18 | 65,469 | 49,523 |
| 2014 | 16 | 16 | 14 | 15 | 29 | 63,758 | NA |

[a] High fry-smolt loss was due to stress induced mortality of 20,389 fish caused by overcrowding during the PIT tagging operation.

Data Source: WDFW – Snake River Lab, Data Files 2015.

**7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.**

Between 2000 and 2014, no hatchery-origin fish (endemic or LFH stock) have been collected for broodstock. However, in 2015, 25% of the broodstock consisted of endemic

hatchery-origin returns for the mating study. All other returning endemic hatchery fish have been sampled and released upstream of the DAT for natural spawning.

**7.6) Fish transportation and holding methods.**

Adults are transported in plastic tubs (~16 $ft^3$) with re-circulation aeration. Hauling time from the DAT to LFH is approximately 30-45 minutes, depending on road conditions.

Touchet River adults will be held separately from other steelhead broodstock to prevent accidental cross spawning. The raceways are enclosed over the middle one-third of the raceway length by the spawning building, where spawning occurs. Fish may be treated with a suite of approved chemicals to control fungus, parasites and bacterial diseases, as prescribed by WDFW fish health specialist.

**7.7) Describe fish health maintenance and sanitation procedures applied**.

Monthly fish health inspections occur at LFH. Because of very low numbers and densities of adults held in the broodstock raceway (see prior description in **Section 5.3**), raceway cleaning is unnecessary. Treatments for fungal infections are applied as chemical flushes through the raceways.

All female steelhead broodstock will be tested for IHN virus via cell culture, and the IHN virus levels in the ovarian fluid will be determined. Eggs from the Touchet endemic program with high levels of IHN virus (>$10^3$) may be destroyed, reared separately, or planted into the Touchet River as fry, pending agreement among the co-managers. Eggs from negative and low IHN virus ($10^1$ to $10^3$) females will be reared separately.

If IHN outbreaks occur in any fish-rearing vessel, fish from the affected rearing container will be promptly isolated and may be destroyed. Broodstock held at LFH will be treated with formalin every other day to control external fungus. Steelhead egg treatments will stop when the eggs are transferred to baskets for hatching.

**7.8) Disposition of carcasses.**

All Touchet River broodstock carcasses will be returned to the Touchet River for nutrient enhancement after approval by WDFW fish health specialist, if such release of carcasses is determined not to pose a significant fish health risk for the natural population. Carcasses not deemed suitable for nutrient enhancement will be buried on-site at LFH.

**7.9) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.**

In the beginning, WDFW made every attempt to collect broodstock from throughout the natural run period to provide for random selection of adults from the entire adult population, which should have prevented run timing divergence of the hatchery-reared

population from the natural population. However, this method was not conducive to the program needs, and broodstock collection has been shifted to the middle portion of the run (**See Section 7.2**).

During broodstock trapping, measures will be taken to ensure the trap holding area is free of sharp objects that may cause injury to fish. The current trap is located behind a secure fenced area. All fish handled (either to be passed or collected) are first placed in an 8 inch PVC trough (top 1/3 removed) with caps on the ends to hold water. Electronarcosis (60V max) is used to calm the fish for handling and taking biological samples (scales, DNA, fork length, sex, external condition, identifying marks, etc.) without the use of anesthetic.

Disease control efforts at LFH (in accordance with PNWFHC and IHOT standards) will effectively control expansion of species specific or general salmonid diseases.

## SECTION 8. MATING

**Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously**.

### 8.1) Selection method.

All males and females that have been collected for broodstock are examined weekly during the spawning season to determine ripeness. All females and males are PIT tagged at trapping for identification during spawning. Males are live spawned, and the priority is to use any males that have not yet contributed in spawning.

### 8.2) Matings.

Mating typically occur using a 1x2 factorial cross (one female with the eggs split roughly in half) and then fertilized with two different males (one per half the eggs) to ensure the highest likelihood of fertilization, and to increase genetic variability in the program. After fertilization is complete, the two female halves are combined for incubation.

For the next few years, as we conduct the controlled matings study, the goal of the program is to have nearly equal sized groups of fish that come from WxW and WxH crosses, so some adjustments to the matings will likely have to occur just because of the small number of fish used in the program.

### 8.3) Fertilization.

After the semen and eggs have been mixed (about 30 seconds), ½ cup of water is added to enhance the fertilization process. Eggs are then water hardened for one hour in a buffered iodine solution (100 ppm) to control viral and bacterial disease.

### 8.4) Cryopreserved gametes.

Cryopreservation has not been used on any Touchet endemic stock males at this time, but may be used in future brood years to increase diversity. Currently, no semen from natural-origin males has been preserved for use in the program.

**8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.**

A 1x2 factorial mating scheme has been, and will continue to be, applied to reduce the risk of loss of within-population genetic diversity.

## SECTION 9. INCUBATION AND REARING

**Specify any management *goals* (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.**

**9.1) Incubation:**

**9.1.1) Number of eggs taken and survival rates to eye-up and/or ponding.**

Following is the egg survival information at LFC since the Touchet River endemic stock steelhead program started (**Table 16**).

**Table 16. Numbers of males (live spawned and kill spawned combined) and females spawned, eggs taken, and survival by life stage of Touchet River endemic stock summer steelhead spawned at LFH, 2000 to 2013 brood years.**

| BY | Spawned Female | Spawned Male | Green Eggs Taken | Eyed Eggs | % Green To Eyed Egg Survival | Eggs Retained For Program Needs | Smolts Released | % Retained Eggs to Smolt Survival |
|---|---|---|---|---|---|---|---|---|
| 2000 | 12 | 7 | 53,139 | 43,572 | 82.0 | 43,572 | 36,487 | 83.7 |
| 2001 | 14 | 11 | 69,269 | 53,750 | 77.6 | 53,750 | 45,501 | 84.7 |
| 2002 | 14 | 17 | 70,843 | 66,460 | 93.8 | 66,460 | 31,440 | 47.3 |
| 2003 | 16 | 17 | 82,602 | 75,059 | 90.9 | 75,059 | 58,733 | 78.3 |
| 2004 | 15 | 10 | 68,511 | 58,451 | 85.3 | 58,451 | 55,706 | 95.3 |
| 2005 | 18 | 15 | 78,813 | 75,991 | 96.4 | 75,991 | 52,476 [a] | 97.7 |
| 2006 | 18 | 18 | 88,668 | 85,730 | 96.7 | 85,730 | 58,989 [b] | 85.5 |
| 2007 | 16 | 17 | 73,101 | 69,626 | 95.2 | 69,626 | 48,298 [c] | 69.4 |
| 2008 | 13 | 11 | 66,520 | 62,279 | 93.6 | 62,279 | 55,255 [d] | 97.4 |
| 2009 | 15 | 13 | 72,543 | 69,801 | 96.2 | 69,801 | 62,517 [e] | 89.6 |
| 2010 | 15 | 13 | 75,596 | 65,055 | 86.1 | 65,055 | 62,037 | 95.4 |
| 2011 | 12 | 13 | 74,408 | 64,860 | 87.2 | 64,860 | 54,386 | 83.9 |
| 2012 | 17 | 13 | 81,555 | 45,418 | 55.7 | 45,418 | 38,726 | 85.3 |
| 2013 | 10 | 8 | 65,469 | 56,877 | 86.9 | 56,877 | 49,523 | 87.1 |
| Mean | | | | | 87.4 | | | 84.3 |
| SD | | | | | 10.8 | | | 13.1 |

[a] A total of 21,765 eggs/fry were planted into the Touchet River as these were high titer positive progeny for IHNV.

[b] A total of 14,276 eggs/fry were planted into the Touchet River as these were high titer positive progeny for IHNV.

| BY | Spawned Female | Spawned Male | Green Eggs Taken | Eyed Eggs | % Green To Eyed Egg Survival | Eggs Retained For Program Needs | Smolts Released | % Retained Eggs to Smolt Survival |
|---|---|---|---|---|---|---|---|---|

[c] High fry-smolt loss was due to stress induced mortality of 20,389 fish caused by overcrowding during the PIT tagging operation.

[d] A total of 5,400 eggs were planted into the Touchet River as these were high titer positive progeny for IHNV.

[e] A total of 5,345 fry were planted into the Touchet River as these were high titer positive progeny for IHNV.

### 9.1.2) Cause for, and disposition of surplus egg takes.

Estimated egg take and fecundity is based on thirteen years of spawning data. Egg survival to eye-up has been slightly higher than what we observe for the LFH stock. Eggs in excess of the program needs will be retained to ensure the goal is met in case of unexpected loss from IHNV or other unexpected circumstances. (Note: present disease control protocol requires the disposal of eggs from IHNV positive female to control outbreaks of the disease within the hatchery). Because of the limited supply of endemic Touchet River fish, an exception from that protocol is in effect. LFH staff will work with the WDFW fish health specialist to ensure appropriate measures are taken to disinfect eggs and isolate fish from known IHNV positive females. Excess sub-yearlings above the smolt production goal would eventually be released within the Touchet River basin in areas of underseeded habitat. Prior to any releases of sub-yearling plants outside the Touchet River (or its tributaries) this practice will be agreed to by the co-managers.

### 9.1.3) Loading densities applied during incubation.

Eggs from individual females are incubated individually in nested square buckets (~3 gallon) through eye-up. Water flow through each incubation bucket is ~2g/min. After eye-up, eggs are placed in hatching baskets with a capacity of 20,000 eggs each.

### 9.1.4) Incubation conditions.

Incubation occurs with pathogen free, sediment free, 52 $^{o}$F well water. The incubation building is fitted with back-up pumps to maintain flow through the incubators and troughs in emergency situations, and with secondary packed columns to maintain water oxygenation above 10 ppm. Flow monitors will sound an alarm if flow through the incubation troughs is interrupted.

### 9.1.5) Ponding.

Fish hatch from baskets and drop into indoor shallow troughs (**Table 13 - #9)** where they remain for 4-8 weeks after feeding commences. Fish are fed after all are buttoned up (usually 1-3 days post swimup). Fish are then moved to intermediate inside tanks (usually at about 800 fish/lb). Fish rear in intermediate tanks until August/September or when fish reach 100/lb, at which time they are transferred to a single outside, standard concrete raceway. Midway through the rearing cycle, they are split into an additional raceway to reduce densities.

For the course of the controlled matings study, progeny from the two matings groups will be kept separate throughout the rearing cycle until they are transferred to Dayton AP for final rearing/release.

**9.1.6) Fish health maintenance and monitoring.**

Eggs are examined daily by hatchery personnel. Prophylactic treatment of eggs for the control of fungus is prescribed by a WDFW fish health specialist, and may include treatment with formalin or other accepted fungicides. Non-viable eggs and sac-fry are removed.

While not documented for the Touchet River endemic stock, catastrophic losses have occurred in the LFH summer steelhead stock due to IHNV in the past (BY1989 100% loss). Following the loss in 1989, strict spawning protocols and procedures were implemented to prevent a similar event. These protocols and procedures will be strictly followed with the Touchet River endemic program.

Touchet River stock females have been detected with IHNV during virology screening of the eggs collected. Given the past history at the LFH, it has been decided by the managers to not rear any progeny where the females tested high for the IHN virus. Instead, these progeny have been reared in isolation at LFH, and then released into the Touchet River as fry. IHNV positive fish have been detected and released as fry in 2005 (5), 2006 (3), 2008 (1), and 2009 (1). (**See Table 18**).

**9.1.7) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.**

Eggs are incubated in pathogen and silt free, and relatively cool well water with high oxygen levels (10 ppm), which ensures maximum egg survival and minimizes the potential loss from disease. The hatchery incubation room is protected by a separate low water alarm system and an automatic water reuse pumping system. It is also equipped to pull in water from wells that are separate from the hatchery's main well field.

**9.2) <u>Rearing</u>:**

**9.2.1) Provide survival rate data by hatchery life stage for the most recent twelve years (1988-99), or for years where dependable data are available.**

See Table 16 Above.

**9.2.2) Density and loading criteria (goals and actual levels).**

LFH raceway rearing density index criteria for steelhead will not exceed 0.26 lbs fish/$ft^3$. Where steelhead are reared in acclimation ponds, densities can be 10% of the raceway maximum. Generally, endemic brood juveniles will rear in standard concrete raceways at densities less than 0.26 lbs fish/$ft^3$.

While fish are in the Dayton AP at the proposed release level (50,000), densities will be approximately 0.063 fish/lbs $ft^3$.

**9.2.3) Fish rearing conditions**

Raceways are supplied with oxygenated water from the hatchery's central degassing building. Approximately 1,000 gpm water enters each raceway through secondary degassing cans. Oxygen levels can range between 10-12 ppm entering, to 8-10 ppm leaving the raceway, depending on ambient air temperature and number of fish in the raceway. Flow index (FLI) is monitored monthly at all facilities and rarely exceeds 80% of the allowable loading. Feeding is by hand.

For the Touchet endemic program, we've tried overhead camouflage netting and in-raceway aqua-mats to reduce the fright response that is so prevalent in this stock of fish. Camouflage netting and/or aqua-mats are not currently used as we didn't see much of a benefit to overall fish quality.

**9.2.4) Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.**

Growth rate information for the Touchet River endemic stock steelhead is provided (**Table 17**).

**Table 17. Size of Touchet River Endemic stock steelhead at LFH for the 2007, 2008 Brood Years.**

| 2007 Brood Year | | | 2008 Brood Year | | |
|---|---|---|---|---|---|
| Month/Year | FPP | g/fish | Month/Year | FPP | g/fish |
| 3/07 | N/A | N/A | 3/08 | N/A | N/A |
| 4/07 | N/A | N/A | 4/08 | N/A | N/A |
| 5/07 | 882.8 | 0.5 | 5/08 | 1950.2 | 0.2 |
| 6/07 | 325.5 | 1.4 | 6/08 | 566.6 | 0.8 |
| 7/07 | 125.8 | 3.6 | 7/08 | 227.1 | 2.0 |
| 8/07 | 67.6 | 6.7 | 8/08 | 121.2 | 3.7 |
| 9/07 | 42.1 | 10.8 | 9/08 | 58.4 | 7.8 |
| 10/07 | 27.8 | 16.3 | 10/08 | 35.6 | 12.8 |
| 11/07 | 19.7 | 23.0 | 11/08 | 22.2 | 20.5 |
| 12/07 | 14.2 | 32.0 | 12/08 | 15.2 | 29.9 |
| 1/08 | 11.1 | 40.9 | 1/09 | 10.2 | 44.5 |
| 2/08 | 8.9 | 51.0 | 2/09 | 7.9 | 57.4 |
| 3/08 | 7.3 | 62.2 | 3/09 | 5.6 | 81.1 |
| 4/08 | 4.9 | 92.7 | 4/09 | 4.3 | 105.6 |
| 5/08 | 4.7 | 96.6 | 5/09 | N/A | N/A |

**9.2.5) Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available**.

See **Table 17** above for an example of past growth over two brood years.

**9.2.6) Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing .**

Fry/sub-yearling will be fed an appropriate commercial dry or semi-moist trout/salmon diet. Feeding occurs several times daily as necessary to provide the diet at a range of 0.7 – 1.1% B.W./day. Feed conversion is expected to fall in a range of 1.1 – 1.4 pounds fed to pounds produced. Due to the duration of spawning time from the natural steelhead, a variety of starter diets and feed schedules may be used to achieve a similar size among the fish before they are moved outside to the rearing raceways. This strategy is aimed to reduce the variation (CV's) in size of juveniles within the population, and may reduce the number of residuals observed when fish are eventually released as smolts.

**9.2.7) Fish health monitoring, disease treatment, and sanitation procedures**.

A WDFW fish health specialist monitors fish health at least monthly. More frequent care is provided as needed if disease is noted. Treatment for disease is provided by Hatchery Specialists under the direction of the Fish Health Specialist. Sanitation consists of raceway cleaning three times each week by lowering the level of the raceway (which increases the velocity) and the brushing the fecal material out. All water during the cleaning cycle is diverted to the hatchery abatement pond. In addition, all equipment is disinfected between raceways and/or between species on the hatchery site.

**9.2.8) Smolt development indices (e.g. gill ATPase activity), if applicable.**

Program goal for the endemic program will be to release fish between April 15-30 at 4.5 fish/lb. Pre-liberation samples will note smolt development visually based on degree of silvering, presence/absence of parr marks, fin clarity and banding of the caudal fin. No gill ATPase activity or blood chemistry samples to determine degree of smoltification, or to guide fish release timing is anticipated.

**9.2.9) Indicate the use of "natural" rearing methods as applied in the program.**

WDFW has tried camouflage covers over the outside raceways to help maintain the fright response. In addition, in-raceway aqua-mats were also installed to provide cover for the juveniles. Both have since been abandoned as no difference in fish quality was apparent. However, the raceways are old enough that the walls and bottoms are of nearly natural coloration, and tend to promote natural looking fish.

**9.2.10) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.**

Professional personnel trained in fish cultural procedures are present at LFH Complex facilities. Facilities are state-of-the-art to provide a safe and secure rearing environment through the use of alarm systems, backup generators, and water re-use pumping systems to prevent catastrophic fish losses.

## SECTION 10. RELEASE

**Describe fish release levels, and release practices applied through the hatchery program**.

### 10.1) Proposed fish release levels

**Table 4** shows the current WDFW endemic stock juvenile or smolt releases (goal and maximum) into the Touchet River while the program is being evaluated at initial production levels.

### 10.2) Specific location(s) of proposed release(s).

| | |
|---|---|
| **Stream, river, or watercourse:** | Touchet River (WRIA 32) |
| **Release point:** | RM 53 (Dayton AP, or RM 54-58) |
| **Major watershed:** | Touchet River |
| **Basin or Region:** | Walla Walla Basin, Mid - Columbia River |

Historically, fish have been reared at LFH through mid-April, and then all of the endemic progeny have been transported to the Touchet River upstream of Dayton and released directly to the NF Touchet River. Beginning in 2016, fish will be transported to Dayton AP for a two week acclimation period and volitionally released as part of the controlled matings study. Some releases may still occur upstream of the trap to ensure some hatchery origin fish return to the trap location.

### 10.3) Actual numbers and sizes of fish released by age class through the program.

(See **Figures 5A and 5B)**, and **Table 18**.

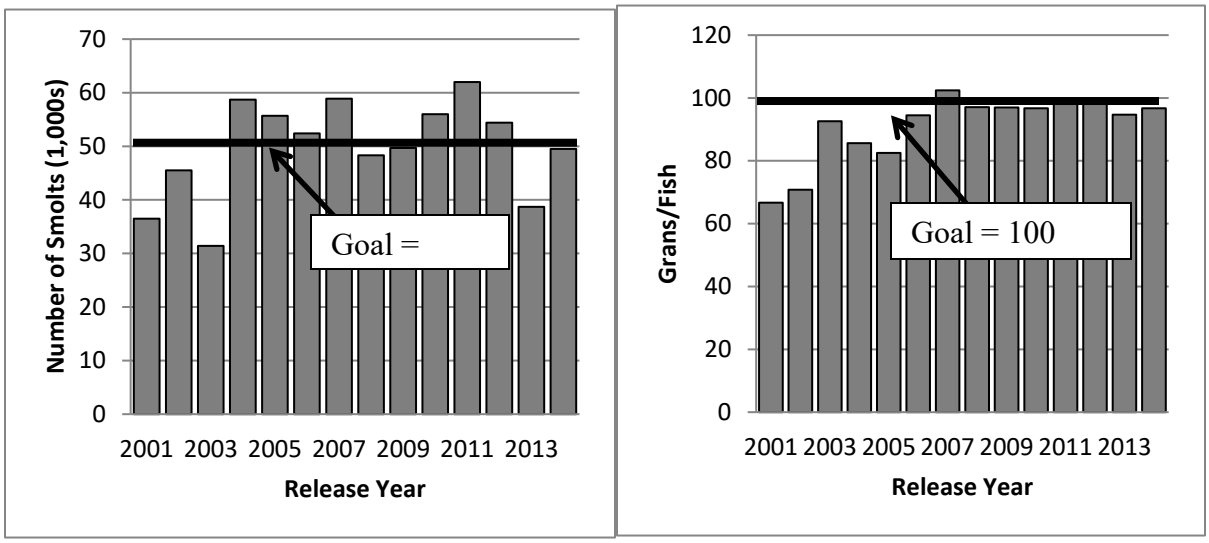


**Figure 5A and 5B. Touchet River endemic stock smolt production (A) and average size at release (B) from 2001-2014 release years.**

**Table 18. WDFW Hatchery Releases of Touchet Endemic Hatchery Stock Summer Steelhead into the Touchet River 2000-2014.**

| Brood Year | Release Year | Release Date(s) | Stage | Release Site | RM | Origin Type | Total Fish Planted | Mean Length (mm) | Size (g/fish) | Marks/Tags | PIT Tags |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2000 | 2001 | 5/01/01 | Smolt | NF Touchet | 55.8 | W | 36,487 | 174.9 | 66.7 | RY VIE, CWT | 500 |
| 2001 | 2002 | 4/02/02 | Smolt | NF Touchet | 55.8 | W | 45,501 | 185.3 | 70.8 | LR VIE, CWT | 0 |
| 2002 | 2003 | 4/21/03 | Smolt | NF Touchet | 55.8 | W | 31,440 | 199.0 | 92.6 | LG VIE, CWT | 0 |
| 2003 | 2004 | 4/5 to 4/15/04 | Smolt | NF Touchet | 55.8 | W | 58,733 | 200.8 | 85.6 | LR VIE, CWT | 10,000 |
| 2004 | 2005 | 3/29/05 | Smolt | NF Touchet | 55.8 | W | 55,706 | 184.8 | 82.5 | LG VIE, CWT | 10,000 |
| 2005 | 2006 | 4/13 to 5/03/06 | Smolt | NF Touchet | 55.8 | W | 52,476 | 205.4 | 94.5 | LR VIE | 9,000 |
| 2005 | 2005 | May/June, 2005 | Fry | NF Touchet | 55.8 | W | 24,437 | NA | NA | None | None |
| 2006 | 2007 | 4/19 to 4/30/07 | Smolt | NF Touchet | 55.8 | W | 58,989 | 205.5 | 102.4 | LP VIE | 9,000 |
| 2006 | 2006 | May/June, 2006 | Fry | NF Touchet | 55.8 | W | 13,847 | NA | NA | None | None |

| Brood Year | Release Year | Release Date(s) | Stage | Release Site | RM | Origin Type | Total Fish Planted | Mean Length (mm) | Size (g/fish) | Marks/Tags | PIT Tags |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2007 | 2008 | 4/22 to 5/14/08 | Smolt | NF Touchet | 55.8 | W | 48,298 | 206.7 | 97.1 | CWT | 8,000 |
| 2008 | 2009 | 4/27 to 4/28/09 | Smolt | NF Touchet | 55.8 | W | 49,656 | 205.5 | 97.0 | CWT | 8,000 |
| 2008 | 2010 | 4/12/10 | Smolt 2 | NF Touchet | 55.8 | W | 5,599 | 206.1 | 94.2 | CWT | 5,000 |
| 2009 | 2010 | 4/12 to 5/13/10 | Smolt | NF Touchet | 55.8 | W | 56,078 | 202.7 | 96.7 | CWT | 8,000 |
| 2009 | 2011 | 4/25/11 | Smolt 2 | NF Touchet | 55.8 | W | 6,439 | 212.6 | 109.5 | CWT | 5,000 |
| 2009 | 2009 | May, 2009 | Fry | NF Touchet | 55.8 | W | 5,238 | NA | NA | None | None |
| 2010 | 2011 | 4/25 to 4/27/11 | Smolt | NF Touchet | 55.8 | W | 62,037 | 207.0 | 98.2 | CWT | 5,000 |
| 2011 | 2012 | 4/23 to 4/25/12 | Smolt | NF Touchet | 55.8 | W | 54,386 | 201.5 | 98.8 | CWT | 7,500 |
| 2012 | 2013 | 4/22/13 | Smolt | NF Touchet | 55.8 | W | 38,726 | 198.1 | 94.7 | CWT | 5,000 |
| 2013 | 2014 | 4/23 to 4/24/14 | Smolt | NF Touchet | 55.8 | W | 49,523 | 198.0 | 96.7 | CWT | 5,000 |

Data from WDFW Headquarters Hatchery Database Fish Plants, 6/2015.

**10.4) Actual dates of release and description of release protocols.**

See **Table 18** above**.** Direct stream releases have occurred at RM 55.8 each year to date. Beginning in 2016, volitional releases will occur at the Dayton AP, during mid to late April.

**10.5) Fish transportation procedures, if applicable.**

Fish will be transported to Dayton AP using either a 1,500 or 2,500 tanker truck. Transportation time to Dayton AP can be up to one hour.

**10.6) Acclimation procedures.**

Beginning in 2016, a two week acclimation/volitional release period will be used on the Touchet endemic stock steelhead. Fish will be brought in immediately following the release of Wallowa stock smolts in mid-April. Because the release group is smaller, the pond will be filled to about ½ full. Depending on the size of the fish, and if they require some more growth prior to release, the screens at the outlet of the pond will either be in place or not.

1) Fish not at program goal size: Outlet screens will be installed and fish will be fed for about 10 days. After the 10 days of feeding, the screens will be pulled and fish will be volitionally/forced released over the next few days.

2) Fish up to program goal size: Outlet screens will not be installed and fish will be allowed leave immediately if they choose, or can remain in the pond for the next 10-14 days until they are forced out.

Acclimation occurs with Touchet River water, which will provide the chemistry and temperature regime of the Touchet basin prior to out-migration.

**10.7) Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.**

Under the current program, 100% of the smolts are coded-wire tagged, but none are externally marked. In addition, a portion (about 5,000) from each study group will be PIT tagged to evaluate downstream migrant success, but more importantly, adult returns from each group.

If the program is expanded in the future, WDFW would propose that 100% of these would be adipose fin clipped; with a portion of the annual release continuing to receive CWT's and PIT tags. Future marking and tagging levels will be negotiated with the co-managers.

**10.8) Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.**

Monitoring of fish numbers, growth and mortality at the hatcheries will provide reasonably accurate estimates of live fish throughout their rearing life. Because fish are of Touchet River origin, all fish will be released into the Touchet River as smolts or sub-yearlings. No excess fish surplus to program goals have occurred to date.

**10.0) Fish health certification procedures applied pre-release.**

Fish will be examined by a WDFW Fish Health Specialist and certified for release as required under the WDFW and WWTIT (2006), and PNWFHPC (1989) guidelines.

**Standard Fish Health Procedures performed at the facility:**

 *All fish health monitoring is conducted by a qualified WDFW Fish Health Specialist.*

 *Juvenile fish examinations are conducted at least monthly and more often if necessary*. A representative sample (at the discretion of the fish health specialist) of healthy and moribund fish from each lot is examined.

 *Abnormal levels of fish loss are investigated if they occur.*

 *Fish health status is determined prior to release or transfer to another facility*. The exam may occur during the regular monthly monitoring visit, i.e. within one month of release or transfer.

 *Appropriate actions, including drug or chemical treatments are recommended as necessary*. If a bacterial pathogen requires treatment with antibiotics a drug sensitivity profile is be generated when possible.

 *Findings and results of fish health monitoring are recorded on a standard fish health reporting form and maintained in a fish health database.*

 *Fish culture practices are reviewed as necessary with facility personnel*. Where pertinent; nutrition, water flow and chemistry, loading and density indices, handling, disinfecting procedures and treatments are discussed.

**10.10) Emergency release procedures in response to flooding or water system failure.**

Under conditions requiring release of fish at the Dayton acclimation pond in response to a water system failure (stream flooding or inoperable/plugged screens), the outlet screens would be pulled and/or the water would be drawn down quickly forcing all fish from pond before conditions within the pond (flow or oxygen) became critical. **See Section 9.2.10** for emergency procedures when fish are being held at LFH.

**10.11) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.**

Since the standard release strategy will consist of releasing smolts, most will orient to the river for a short time (1-10 days) and then emigrate. Some smaller fish may not be developmentally ready to emigrate and will assume residence in the river for up to another year. As this resident life history strategy is expressed naturally in steelhead populations, this behavior would be expected from this population even in the absence of the hatchery program.

Should the program increase to full program as outlined in **Table 4** of this HGMP, all or a large percentage of the fish will be released from Dayton AP as smolts. Residual fish from this program will likely be present in the river following the release at and around the release location and further downstream. Based on previous studies conducted at Curl Lake Acclimation Pond on the Tucannon River, we might expect to see anywhere from 3-18% of the fish to residualize (Viola and Schuck, 1995), with rates dependent on a variety of factors that can change annually. We do not anticipate these residual fish to represent a problem for juvenile steelhead in the system at this location as natural production in that area of the river is considered low. Further, there is a rainbow trout fishery in the same area through the town of Dayton that will remove many of hatchery stock residuals throughout the summer months. Based on creel surveys conducted during the summer of 1999, no wild origin steelhead/resident rainbow trout were found in the anglers' creel (WDFW unpublished data). What they did catch and retain were all hatchery-origin residuals. Hatchery reared steelhead residualized between 5.2% and 9.6% depending upon the angling method used in the estimate in 1999, similar to what was observed in the Tucannon River Curl Lake Acclimation Pond study.

While some residual fish may survive, we have observed thin, emaciated hatchery residuals captured during electrofishing surveys from 2001-2005 in the Touchet River, indicating the

many of the hatchery fish fail to convert over to natural food sources, and likely perish from starvation. Based on those electrofishing surveys (**Table 19**) conducted in late July or early August 2-3 months post release, residualism rates for the endemic stock program have varied from 6.0-9.9%, and residualism rates for LFH stock releases have varied from 0.3-0.9% (Bumgarner et al 2003, Bumgarner et al 2004, Bumgarner et al 2006, Bumgarner et al 2007). Higher residualism rates in the endemic stock was anticipated due to problems rearing these fish initially during the start-up of this program. Hatchery staff have revised rearing practices, and we would expect the rates of residuals observed to be lower than historically.

**Table 19. Mid-summer residualism rates observed on the Touchet River for both endemic stock and LFH stock releases.**

| Year | Endemic Stock | LFH Stock |
|---|---|---|
| 2001 | 7.4 | 0.3 |
| 2002 | 9.9 | 0.3 |
| 2003 | 8.2 | 0.9 |
| 2004 | 6.9 | 0.4 |
| 2005 | 6.0 | 0.7 |

Predation by hatchery fish on natural-origin smolts is less likely to occur than predation on fry (NMFS 1995). Salmonid predators are generally thought to prey on fish 1/3 or less their length (CBFWA 1996). Witty et al. (1995) concluded that predation by hatchery production on wild salmonids does not significantly impact naturally produced fish survival in the Columbia River migration corridor.

The Species Interaction Work Group (SIWG;1984) reported that potential impacts from competition between hatchery and natural fish are assumed to be greatest in the spawning and nursery areas and at release locations where fish densities are highest (NMFS 1995). These impacts likely diminish as hatchery smolts disperse, but resource competition may continue to occur at some unknown, but lower, level as smolts move downstream through the migration corridor. Steward and Bjornn (1990), however, concluded that hatchery fish kept in the hatchery for extended periods before release as smolts (e.g. yearling salmonids) may have different food and habitat preferences than natural fish, and that hatchery fish will be unlikely to out-compete natural fish. Hatchery-produced smolts emigrate seaward soon after liberation, minimizing the potential for competition with natural fish (Steward and Bjornn 1990). Competition between hatchery-origin salmonids with wild salmonids, including steelhead, in the mainstem corridor was judged not to be a significant factor (Witty et al. 1995).

# SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

## 11.1) Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

### 11.1.1) Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

See Section 1, **Table 3** for performance indicators that WDFW can or will be attempting to monitor for this program. In addition, we provide the following with a little more detail were available.

The DAT operations/broodstock collections/sampling has been thoroughly described in previous sections of this HGMP (**Sections 2, 5-8**). In addition to the DAT, WDFW will install a temporary adult trap in Coppei Creek, a smaller tributary to the Touchet River that runs through the city of Waitsburg, about 10 miles below the city of Dayton. In addition, spawning ground surveys from WDFW Fish Management Staff has documented summer steelhead spawning in Coppei Creek. Based on Coppei Creek trap data, the percent of hatchery fish in Coppei Creek is very low (<5%).

All fish captured in the Coppei Creek trap will be sampled for origin, sex, fork length, any marks/tags, and scanned for PIT tags. Scales will be collected from all fish that appear to natural origin. Any ADLV +CWT fish (most likely LFH Stock) will be immediately sacrificed for retrieval of the coded wire tag information. Based on previous spawning ground surveys, WDFW fish management staff anticipates that up to 200 fish may return to Coppei Creek annually. Depending on stream flows, the trap may be disabled for periods of the trapping season, hence it will be unlikely that all returning steelhead to Coppei Creek will be trapped/handled.

WDFW will conduct spawning ground surveys to estimate spawners, and use trapping data to estimate the proportions of natural, endemic brood hatchery, and other hatchery-origin steelhead in the spawning population. WDFW will operate a smolt trap on the Touchet River to: 1) Estimate the number, timing, and age composition of natural-origin steelhead smolts from the river, 2) estimate the migration success to the smolt trap from releases of endemic stock hatchery steelhead in the upper basin, and 3) allow downriver migration comparison between natural and hatchery propagated by PIT tagging at the smolt trap. Estimated SARs by brood year to determine if fish are surviving – escapement to hatchery, spawning grounds and harvest.

***Monitor and evaluate any changes in the genetic, phenotypic, or ecological characteristics of the populations potentially affected by the program.***

Collect additional GSI data (DNA-based) from regional summer steelhead adult populations to determine the degree to which discrete populations persist in the individual watersheds. Collect length and scale samples from all adults (natural and hatchery) returning to the trap on the Touchet River. Assess age structure of returning hatchery-origin fish and compare with natural fish. Compare length at age of natural and hatchery-reared returning adults.

***Assess the need and methods for improvement of mitigation / conservation activities in order to meet program objectives, or the need to discontinue the program because of failure to meet objectives.***

Beginning in 2015, a matings study was initiated for this program. About ¼ of the broodstock collected were hatchery (Touchet stock - F1returns) origin. Crosses were conducted to produce about 50% HxW crosses, with other half being WxW crosses. Groups will be reared separately (though in identical raceways) until transfer to the Dayton AP. Growth and survival of the two groups will monitored through the rearing cycle.

***Collect and evaluate information on adult returns***.

For the matings study groups, all fish will be coded-wire tagged so they can be identified as hatchery origin fish upon return. In addition, each of the study groups will receive 5,000 PIT tags each to monitor juvenile out-migration success, but more importantly adult return success. Results from adult return estimates, along with other information on the natural origin status and returns in the Touchet River will be used to make decisions about implementing or stopping this program in the future.

**11.1.2) Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.**

Funding for most of the Monitoring and Evaluation will be provided by the LSRCP program as part of the ongoing mitigation program. Expanded Monitoring and Evaluation requires additional funding (e.g. smolt trapping), which to date has been provided by WDFW Fish-In/Fish-Out monitoring, and from Bonneville Power Administration from the Walla Walla River Basin Assessment Program.

**11.2) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.**

1. Juvenile sampling at hatchery facilities will be conducted with accepted procedures to minimize stress and mortality from sampling. Sample sizes will be the minimum necessary to achieve statistically valid results for growth, tag retention and fish health.
2. Smolt trapping operations will ensure that holding time, stress and potential for injury of captured migrants is minimized. Marked groups for assessing trap efficiency will be the minimum necessary to achieve statistically valid results.
3. Adult trapping facilities will be monitored daily, or more often as necessary to prevent injury and unnecessary delay.

## SECTION 12. RESEARCH

**12.1) Objective or purpose.**

The ongoing LSRCP monitoring program is designed to:

***- Determine the feasibility of an endemic stock program on the Touchet River to replace the existing harvest mitigation program from the basin.***

– Document hatchery rearing and release activities and subsequent adult returns.

- Determine success of the program in meeting mitigation goals and adult returns to the Touchet River, or the Snake River Basin.
- Provide management recommendations aimed at improving program effectiveness and efficiency.
- Provide management recommendations aimed at reducing program impacts on listed fish.

**12.2) Cooperating and funding agencies**.

Lower Snake River Compensation Program – Funding Agency
Confederated Tribes of the Umatilla Indian Reservation – Co-manager and funding agency

**12.3) Principle investigator or project supervisor and staff.**

Joe Bumgarner Jeremy Trump Todd Miller
Jerry Dedloff Mike Gembala Temporary field technicians
Michael Gallinat Lance Ross

**12.4) Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.**

Same as described in Section 2.

**12.5) Techniques: include capture methods, drugs, samples collected, tags applied**.

Capture methods include smolt trapping (rotary screw trap), adult trap (Touchet Adult Trap, Coppei Creek Adult Trap, Patit Creek Adult Trap). Samples collected include scales from adults and juveniles. PIT tags are used in smolts migrating to the ocean, estimating adult returns for program evaluation, and for tracking adult broodstock during spawning procedures.

**12.6) Dates or time period in which research activity occurs.**

Year Round. Endemic stock fish are present in the hatchery during all times of the year due to the overlap or juvenile rearing/release and adult collection time for broodstock. Specific times for activities conducted under research and monitoring are described below.

Broodstock Trapping – January through May
Spawning – March through May
Juvenile Rearing – March though following April
Smolt Trapping – October -June
Spawning Ground Surveys – March through May
PIT Tagging – January/February at LFH, October-June at Touchet River Smolt Trap

**12.7) Care and maintenance of live fish or eggs, holding duration, transport methods.**

Handling of listed fish will generally be restricted to enumeration and sampling at the site of capture (DAT, Coppei Creek Adult Trap, Patit Creek Adult Trap, Touchet River smolt trap). Listed fish will generally be anesthetized prior to human handling, except at the adult trap where electronarcosis troughs or V-troughs are used.

**12.8) Expected type and effects of take and potential for injury or mortality.**

Injury due to capture and sampling is inevitable. However, precautions have been taken during all activities to make sure that mortalities are kept to a minimum.

**12.9) Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table".**

See attached **"take" Table B** for anticipated mortalities to listed fish that could occur from monitoring and evaluation activities.

**12.10) Alternative methods to achieve project objectives.**

Alternatives to the current program were described in Section 1.16.

**12.11) List species similar or related to the threatened species; provide number and causes of mortality related to this research project.**

Other listed species that may be potentially affected by this program have been described in **Section 15**.

**12.12) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.**

WDFW and the other co-managers within the basin, along with NOAA Fisheries have taken all known necessary steps to eliminate and/or minimize ecological effects, injury, and mortality to listed fish as part of this hatchery program. Any specific research conducted on listed fish will be approved by NOAA fisheries before proceeding.

## SECTION 13. ATTACHMENTS AND CITATIONS


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## SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

## SECTION 15. PROGRAM EFFECTS ON OTHER (NON-ANADROMOUS SALMONID) ESA-LISTED POPULATIONS. Species List Attached (Anadromous salmonid effects are addressed in Section 2).

**Bull Trout** *Salvelinus confluentus*
The distinct population segments of bull trout were listed as threatened in the Columbia and Klamath River basins (63 FR 31647, June 10, 1998 - Columbia/Klamath final rule; 63 FR 42757). Bull trout in the coterminous United States were listed as threatened on November 1, 1999 (64 FR 58910).

**Table 20. Summary Table of Core Area Rankings for Population Abundance, Distribution, Trend, Threat, and Final Rank.**

| Core Area | Population Abundance Category (individuals) | Distribution Range Rank (stream length miles) | Short-term Trend Rank | Threat Rank | Final Rank |
|---|---|---|---|---|---|
| Touchet River | 50-250 | 25-125 | Stable | Moderate, imminent | High Risk |

Source: USFWS 2008 Status Report.

Similarity of appearance is an issue in the Coastal-Puget Sound population area. Bull trout are sympatric with Dolly Varden (*Salvelinus malma*) in some of the drainages where they occur. Because the two species are virtually impossible to visually differentiate, the Washington Department of Fish and Wildlife (WDFW) currently manages bull trout and Dolly Varden together as "native char."

Bull trout are indigenous to Touchet River, and indirect "take" of bull trout will occur during the brood stock trapping season in the early spring. Bull trout encountered at the adult trap will be sampled (i.e., length, PIT tagged) and then passed immediately upstream, with minimal delay. Trapping and sampling of bull trout has been authorized by USFWS in accordance with a Section 6 Cooperative Agreement for the Endangered and Threatened Fish and Wildlife Program – Washington.

Current trap operations may prevent or delay upstream migration of a small number of bull trout that approach the weir/fish ladder. However, the current weir/trap is estimated to be only 50-75% efficient, depending on stream flows.

As a positive benefit to bull trout, any sub-yearling steelhead that may be released into the system from the hatchery program, or additional natural production of juvenile steelhead in the Touchet River from the hatchery program, may serve as prey for bull trout. Between 1999 and 2013, WDFW captured a total of 1,039 bull trout (included within year and multi-year recaptures) in the Touchet Adult Trap. Of that total, eight (0.8%) mortalities have occurred that were directly related to the trapping activities.

The proposed program may incidentally affect Touchet River summer steelhead and Touchet River bull trout. Juvenile hatchery steelhead (either smolts or sub-yearlings) may compete for food and space with naturally rearing bull trout, as some degree of extended rearing by hatchery steelhead smolts is expected.

All plant species currently listed for Federal protection as an endangered/threatened species within the State of Washington are listed below (**Table 21**), with their current status ratings. Of the following species listed, only the plant species Spalding's Catchfly is suspected to be found in the area where the Touchet River Endemic Stock production program occurs (i.e. LFH, Dayton AP, DAT). Species such as the Gray Wolf, the Grizzly Bear, the Canadian Lynx, and the northern spotted owl were once likely found occasionally in the Touchet and Walla Walla River basins, but their current existence is unlikely. The geographic distributions of the other listed species were generally limited to the Cascade Mountain Range, the Selkirk Mountains in NE Washington, the Willamette Valley (Oregon), Puget Sound and Coastal areas.

**Table 21. List of current ESA-listed species plant within the State of Washington.**

| Status Rating | Species |
|---|---|
| **PLANTS** | |
| Endangered | Sandwort, Marsh (*Arenaria paludicola*) |
| Threatened | Paintbrush, golden (*Castilleja levisecta*) |
| Endangered | Stickseed, showy (*Hackelia venusta*) |
| Threatened | Howellia, water (*Howellia aquatilis*) |
| Endangered | Desert-parsley, Bradshaw's (*Lomatium bradshawii*) |
| Threatened | Lupine, Kincaid's ( *Lupinus sulphureus (=oreganus) ssp. Kincaidii (=var. kincaidii*)) |
| Threatened | Checker-mallow, Nelson's (*Sidalcea nelsoniana*) |
| Endangered | Checkermallow, Wenatchee Mountains (*Sidalcea oregana var. calva*) |
| Threatened | Catchfly, Spalding's (*Silene spaldingii*) |
| Threatened | Ladies'-tresses, Ute (*Spiranthes diluvialis*) |

**15.1) <u>List all ESA permits or authorizations for all non-anadromous salmonid programs associated with the hatchery program.</u>**

The WDFW and the USFWS have a Cooperative Agreement pursuant to section 6(c) of the Endangered Species Act that covers the majority of the WDFW actions, including hatchery operations.
"*The department is authorized by the USFWS for certain activities that may result in the "take" of bull trout, including salmon/steelhead hatchery broodstocking, hatchery monitoring and evaluation activities and conservation activities such as adult traps, juvenile monitoring, spawning ground surveys...*"

Trapping and sampling of bull trout has been authorized by USFWS in accordance with a Section 6 Cooperative Agreement for the Endangered and Threatened Fish and Wildlife Program – Washington.

Section 10 permits, 4(d) rules, etc. for other programs associated with hatchery program.
Section 7 biological opinions for other programs associated with hatchery program.

**15.2) <u>Description of non-anadromous salmonid species and habitat that may be affected by hatchery program.</u>**

**Bull Trout**
**Spalding's Catchfly**

*General species description and habitat requirements (citations).*

Citation: Hitchcock, C.L., A. Cronquist, M. Ownbey, and J.W. Thompson. 1964. Vascular Plants of the Pacific Northwest, Part 2: *Salicaceae to Saxifragaceae*. University of Washington Press, Seattle. 597 pp.

The Spalding's Catchfly is a long-lived, herbaceous perennial, 8-24 inches tall, typically with one stem, but can have several. Each stem bears 4-7 pairs of lance shaped leaves 2 to 3 inches in length. The light green foliage and stem are lightly to more typically densely covered with sticky hairs. The cream-colored flowers are arranged in a spiral at that top of the stem. The outer, green portion of the flower forms a tube, ~1/2 inch long with ten distinct veins running its length. The flower consists of 5 petals, each with a long narrow "claw" that is largely concealed by the calyx tube and a very short "blade", or flared portion at the summit of the claw. Four (sometimes as many as 6) short petal-like appendages are attached inside and just below each blade.

The species begins to flower in mid- to late July, with some individuals still flowering by early September. Most other forbs within its habitat have finished flowering when *S. spaldingii* is just hitting its peak. A majority of individuals have developed young fruits by mid- to late August.

*S. spaldingii* occurs primarily within open grasslands with a minor shrub component and occasionally with in a mosaic of grassland and ponderosa pines. It is most commonly found at elevations of 1900-3050 feet, near lower tree line, with a preference for northerly-facing aspects. The species is primarily restricted to mesic (not extremely wet nor extremely dry) prairie or steppe vegetation that makes up the Palouse Region in SE Washington.

*Local population status and habitat use (citations).*

Within the State of Washington, *S. spaldingii*, has been confirmed to be found in Asotin, Lincoln, Spokane and Whitman counties, with a status listing of 'threatened". A total of 28 populations have been identified (FR# 1018-AF79, Vol 66, No. 196, p. 51598). This plant is threatened by a variety of factors including habitat destruction and fragmentation resulting from agricultural and urban development, grazing and trampling by domestic livestock and native herbivores, herbicide treatment and competition from nonnative plant species (Gamon 1991; Schassberger 1988). It is currently estimated that 98% of the

original Palouse prairie habitat has been lost to the mentioned activities (Gamon 1991). Each of the populations documented are generally very small, and are currently quite fragmented, raising questions about their long-term viability.

*Site-specific inventories, surveys, etc. (citations).*

Site-specific findings in Columbia and Walla Walla counties are not available. However, it's possible that portions of the Walla Walla River Basin could contain the listed species. But it is not expected that the current steelhead program as described would affect the listed species.

## 15.3) Analysis of effects.

**Bull Trout**

*Identify potential direct, indirect, and cumulative effects of hatchery program on species and habitat (immediate and future effects).*

To the best of our knowledge, the program as described in this HGMP will have minimal direct, indirect, or cumulative effects on the listed species. Bull trout are indigenous to Touchet River, and indirect "take" of bull trout will occur during the trapping season. Bull trout encountered at the adult trap will be sampled (i.e., length, PIT tagged) and then passed immediately upstream, with minimal delay.

Current trap operations may prevent or delay upstream migration of a small number of bull trout that approach the weir/fish ladder. However, the current weir/trap is estimated to be only 50-75% efficient, depending on stream flows. Trapping for bull trout has been authorized by USFWS through a Section 6 Cooperative Agreement. Between 1999 and 2013, WDFW staff has captured a total of 1,036 bull trout (included within year and multi-year recaptures) in the Touchet Adult Trap. Mortalities from the trap operations to bull trout have been low (0.8%).

*Identify potential level of take (past and projected future).*

Mortalities from the trap operations to bull trout have been low (0.8%) to date. Between 1999 and 2013, WDFW staff has captured a total of 1,036 bull trout (included within year and multi-year recaptures) in the Touchet Adult Trap (**Table 22**). The ESA Response Unit at WDFW has provided an annual report to USFWS with data on direct and indirect take during trapping operations since the beginning of this hatchery program.

**Table 22. Number of bull trout captured, mortalities and in-year recaptures at the Dayton Adult Trap (DAT), 1999-2013.**

| Year | Number Captured | Mortalities | In-Year Recaptures |
|---|---|---|---|
| 1999 | 20 | 2 | 0 |
| 2000 | 31 | 0 | 9 |
| 2001 | 43 | 0 | 0 |
| 2002 | 22 | 1 | 0 |
| 2003 | 60 | 1 | 15 |
| 2004 | 87 | 0 | 17 |
| 2005 | 60 | 0 | 11 |
| 2006 | 84 | 2 | 22 |
| 2007 | 43 | 0 | 11 |
| 2008 | 35 | 1 | 1 |
| 2009 | 116 | 0 | 6 |
| 2010 | 143 | 1 | 19 |
| 2011 | 162 | 0 | 29 |
| 2012 | 70 | 0 | 9 |
| 2013 | 60 | 0 | 3 |
| ***Totals*** | ***1,036*** | ***8*** | ***152*** |
| ***Percent*** | | ***0.8%*** | ***14.7%*** |

*Hatchery operations - water withdrawals, effluent, trapping, releases, routine operations and maintenance activities, non-routine operations and maintenance activities (e.g. intake excavation, construction, emergency operations, etc.)*

Activities at LFH all take place on existing hatchery grounds. No new construction activities are planned for the program in either location that could impact the listed species. Effluent from LFH falls below state water quality standards guidelines, and is therefore not a concern. Operation of the DAT during early spring to collect endemic broodstock may indirectly take listed bull trout. Current trap operations may prevent or delay upstream migration of a small number of bull trout that approach the weir/fish ladder. However, the current weir/trap is estimated to be only 50-75% efficient, depending on stream flows.

*Fish health - pathogen transmission, therapeutics, chemicals.*

Pathogens would not be transmitted between the species, as therapeutics and chemicals are used as needed at LFH.

*Ecological/biological - competition, behavioral, etc.*

The proposed program may incidentally affect Touchet River bull trout. Juvenile hatchery steelhead (either smolts or sub-yearlings) may compete for food and space with naturally

rearing bull trout, as some small degree of extended rearing by hatchery steelhead smolts is expected.

*Predation* -

Any sub-yearling steelhead that may be released into the system from the hatchery program, or additional natural production of juvenile steelhead in the Touchet River from the hatchery program, may serve as prey for bull trout. Bull trout live sympatrically with Touchet River natural-origin steelhead, and may benefit positively through incidental predation of released hatchery-reared smolts of small size.

*Monitoring and evaluations* - *surveys (trap, seine, electrofish, snorkel, spawning, carcass, boat, etc.).*

Not Applicable.

*Habitat* - *modifications, impacts, quality, blockage, de-watering, etc.*

Modifications to the surrounding hatchery and release site are not planned at this time, so no loss of potential habitat to the listed species is expected.

**Spalding's Catchfly**
*Identify potential direct, indirect, and cumulative effects of hatchery program on species and habitat (immediate and future effects).*

To the best of our knowledge, the program as described in this HGMP will not have direct, indirect, or cumulative effects on the listed species. The surrounding habitat associated with this hatchery compensation program will not be altered, which would be the only source of "take" possible to the listed species. Interactions with the summer steelhead will not occur.

*Identify potential level of take (past and projected future).*

None (past or projected future)

*Hatchery operations* - *water withdrawals, effluent, trapping, releases, routine operations and maintenance activities, non-routine operations and maintenance activities (e.g. intake excavation, construction, emergency operations, etc.)*

Operation of the DAT will not affect (directly or indirectly) the existence of the listed species in the area. Habitat requirements for the species do not seem to apply at DAT or at LFH. Activities at LFH all take place on existing hatchery grounds. No new construction activities are planned for the program in either location that could impact the listed species. Effluent from LFH falls below state water quality standards guidelines, and is therefore not a concern.

*Fish health - pathogen transmission, therapeutics, chemicals.*

Not Applicable – pathogens would not be transmitted between the species, therapeutics and chemicals are not used.

*Ecological/biological - competition, behavioral, etc.*

Not Applicable - Non-overlapping habitats between the summer steelhead and the flower.

*Predation -*

Not Applicable - Hatchery summer steelhead do not prey on the flower.

*Monitoring and evaluations - surveys (trap, seine, electrofish, snorkel, spawning, carcass, boat, etc.).*

Not Applicable.

*Habitat - modifications, impacts, quality, blockage, de-watering, etc.*

Modifications to the surrounding hatchery areas are not planned at this time, so no loss of potential habitat to the listed species is expected.

## 15.4 Actions taken to mitigate for potential effects.

*Identify actions taken to mitigate for potential effects to listed species and their habitat.*

No actions are considered necessary at this time. Land disturbance where Bull Trout and Spalding's Catchfly may habitat will not occur over the course of the program.

## 15.5 References

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WDFW (Washington State Department of Fish and Wildlife). 2004. Washington State salmonid stock inventory bull trout/ Dolly Varden. Washington State Department of Fish and Wildlife. Olympia, Washington.

**"Take" Table A. Estimated listed salmonid take levels of by hatchery activity.**

| **Listed species affected: Summer Steelhead ESU/Population: Mid-Columbia/Touchet River Activity: Broodstock Collection, spawning, rearing and releases** | | | | |
|---|---|---|---|---|
| **Location of hatchery activity: Lyons Ferry Complex Dates of activity: Year Round Hatchery program operator: Ace Trump, Joe Bumgarner, Todd Miller, Jerry Dedloff** | | | | |
| **Type of Take** | **Annual Take of Listed Fish By Life Stage *(Number of Fish)*** | | | |
| | Egg/Fry | Juvenile/Smolt | Adult | Carcass |
| **Observe or harass a)** | 0 | 0 | 0 | 0 |
| **Collect for transport b)** | 0 | 0 | 20 | 0 |
| **Capture, handle, and release c)** | 0 | 0 | 500 | 0 |
| **Capture, handle, tag/mark/tissue sample, and released d)** | 0 | 10,000 | 500 | 100 |
| **Removal (e.g. broodstock) e)** | 0 | 0 | 88 | 0 |
| **Intentional lethal take f)** | 0 | 0 | 88 | 0 |
| **Unintentional lethal take g)** | 65,000 | 50,000 | 20 | 0 |
| **Other Take (specify) h)** | 0 | 0 | 0 | 0 |

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release (i.e. radio tagging study to assess weir effects).
c. Take associated with weir or trapping operations where listed fish are captured, handled, and released upstream or downstream. Includes trapping at the DAT, Coppei Creek Trap, and Patit Creek Trap.
d. Take occurring due to PIT tagging at the hatchery and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs. Includes trapping at the DAT, Coppei Creek Trap, and Patit Creek Trap.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other "take" not identified above as a category.

***Instructions:***

1. *An entry for a fish to be taken should be in the take category that describes the greatest impact.*
2. *Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).*
3. *If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.*

**"Take" Table B. Estimated listed salmonid take levels of by Research/Monitoring/Evaluation activity.**

| **Listed species affected: Summer Steelhead ESU/Population: Mid-Columbia/Touchet River Activity: Spawning surveys and smolt trapping** | | | | |
|---|---|---|---|---|
| **Location of hatchery activity: Touchet River Dates of activity: Year Round Research/Monitoring/Evaluation program operator: Joe Bumgarner, Todd Miller, Jeremy Trump, Jerry Dedloff, Michael Gallinat, Lance Ross, Mike Gembala, Ali Fitzgerald and temporary field technicians** | | | | |
| **Type of Take** | **Annual Take of Listed Fish By Life Stage *(Number of Fish)*** | | | |
| | Egg/Fry | Juvenile/Smolt | Adult | Carcass |
| **Observe or harass a)** | 0 | 0 | 200 | 0 |
| **Collect for transport b)** | 0 | 3,000 | 0 | 0 |
| **Capture, handle, and release c)** | 0 | 3,000 | 20 (kelts in smolt trap) | 0 |
| **Capture, handle, tag/mark/tissue sample, and released d)** | 0 | 8,000 | 50 (i) | 0 |
| **Removal (e.g. broodstock) e)** | 0 | 0 | 0 | 0 |
| **Intentional lethal take f)** | 0 | 0 | 0 | 0 |
| **Unintentional lethal take g)** | 0 | 200 | 0 | 0 |
| **Other Take (specify) h)** | 0 | 0 | 0 | 0 |

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs, and /or snorkeling activities.
b. Take (non-lethal) of juveniles/smolts (natural and endemic hatchery stock origin) captured and marked for smolt trap efficiency tests.
c. Take associated with smolt trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to PIT tagging and/or bio-sampling (length/weight and scales) of fish collected through smolt trapping operations prior to release.
e. Listed fish removed from the wild and collected for use as broodstock
f. Intentional mortality of listed fish during smolt trapping.
g. Unintentional mortality of listed fish, including loss of fish during transport during smolt trapping.
h. Other "take" not identified above as a category.
i. Rainbow trout mature

***Instructions:***

*1. An entry for a fish to be taken should be in the take category that describes the greatest impact.*

*2. Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).*

*3. If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.*

# Appendix A: HSRG and HRT Reviews and WDFW Responses

## 2008 Hatchery Scientific Review Group (HSRG) Observation and Recommendations

The HSRG completed their review of the hatchery summer steelhead programs in the Walla Walla Basin in 2008. All recommendations provided were reviewed and responses by WDFW for all comments were provided to the LSRCP office on why recommendations were implemented or not.

**HSRG Observations:** The WDFW operates both an integrated conservation and segregated harvest program within the Touchet sub-basin. Releases for the segregated program are imported annually from LFH (85,000 smolts acclimated at the Dayton AP). Smolt releases from the segregated program occur below primary rearing and spawning reaches of the Touchet River. The existing integrated program (50,000 smolts with a 100% pNOB are hauled and planted directly from LFH) is operated consistent with the criteria for a Primary population; however, strays from the segregated harvest program constitute more than 10% of the effective natural spawners (basin-wide) and likely pose an ecological and genetic risk to the population. This is not consistent with the standards for a Primary population. An adult trap is located within the city of Dayton; however, it has limited potential for controlling hatchery fish since adult steelhead can pass without entering the trap. A new facility was constructed in 2008, but fish can still pass the barrier dam under certain flow conditions. Comments on smolt quality (size, size variation, degree of smoltification) by managers indicate it may be affecting SAR of the integrated conservation program. Adults from both LFH and the endemic stock also appear in the Snake River above Ice Harbor Dam, and some travel above Lower Granite Dam. Apparent low natural productivity in the Touchet limits abundance and management options for the population.

**HSRG Recommendations:** The HSRG solution transitions the broodstock collection of LFH stock to sites within the Walla Walla and Touchet in place of current broodstock collection at LFH to aid in local adaptation. The solution maintains the current release numbers in the Walla Walla but reduces them in the Touchet River. In addition to the integrated program (49,000 smolts), a segregated program of approximately 20,000 smolts could be operated consistent with the designation of a Primary population if 90% of the returning unharvested adults were removed. Smolts from the integrated program should be acclimated in areas of their intended return. A single integrated program of approximately 70,000 smolts could be managed consistent with a Primary population designation. Expanding the program beyond this level would require habitat enhancements to improve productivity and the development of facilities to trap and control adults on the spawning ground.

In regards to the Touchet River endemic stock summer steelhead, we provide the following:

1. Beginning in 2009, all LFH stock steelhead captured at the Dayton Dam trap were removed and placed in a nearby pond for fishing. In 2009 we attempted a barrier on the dam/weir to force all returning fish through the fish ladder and trap. It was partially successful, but high stream flows limited its effectiveness and eventually caused it to fail. Additional hanging

barrier pickets were installed in 2010, but is limited in overall span of the river. Under certain flow conditions fish are still able to pass upstream.

2. Smolts for the endemic program will be acclimated if we expand the program and replace the LFH stock, otherwise, they will not.

3. The recommendations provided are very limited for options to operate a segregated program and the recommendations presume the endemic program can meet our ESA AND LSRCP goals. A segregated program of 20,000 smolts (LFH stock) would return ~400 fish at a 2% survival rate over McNary Dam. An integrated program of 70,000 smolts would return ~350 adults based on the current SAR of ~ 0.5% . Those two program combined would return 750 fish (total to the Columbia River system). In addition, adult return PIT tag information suggests that ~40% of the endemic stock, and 80% of the LFH stock enter the Snake River system, and never return to the Walla Walla basin (**Appendix A, Table 1**). To be fair, this information is relatively new, and was perhaps not made clear enough to the HSRG during their review process.

4. Use of local returning hatchery fish for broodstock does not address some of the major causes for straying such as lack of water or suitable habitat in the lower Walla Walla and lower Touchet in fall and early winter (See #3 above for effects).

5. A 20,000 local returning LFH stock program would require the spawning of ~5 females/year. The genetic risks from such a small founding populations size appears to great. Further, rearing space at LFH to maintain these multiple small groups is currently not feasible without major modifications to the hatchery.

6. Use of an endemic or integrated option would reduce wild fish spawning naturally, at least in the short-term, and it may reduce or eliminate non-tribal harvest because harvest would have to shift to ESA listed hatchery fish. This would not likely achieve LSRCP mitigation goals.

7. The HSRG review is step 1 of our expected review for steelhead hatchery programs in SE WA. The USFWS hatchery review for LSRCP facilities is step 2. The completion of the regional (SE WA) steelhead management plan (as part of the WA State steelhead management planning process) is step 3 in our review of steelhead hatchery and management actions for SE WA.

## USFWS Hatchery Review Team (HRT) Observation and Recommendations

The Hatchery Review Team (HRT) provided 15 preliminary recommendations and 5 draft programmatic alternative actions. The draft recommendation proposed by the HRT is Alternative 2, and calls for addressing the recommendations provided, along with removal of the LFH stock releases. Individual recommendations on the Facility, RM&E, Management, or Education and Outreach. All recommendations provided were reviewed and responses by WDFW for all comments were provided to the LSRCP office on why recommendations were implemented or not.

***Issue TT-SS1: The Review Team understands that the short-term goal of the program is to "evaluate the capability of developing an endemic Touchet River hatchery stock that can replace the LFH stock for meeting harvest mitigation goals while, at the same time, reducing genetic and demographic risks to the natural population of steelhead in the Touchet River**." The Team further understands that the purpose of the endemic broodstock program is NOT, at the present time, to restore or rebuild the naturally spawning population in the upper Touchet River via natural spawning supplementation by hatchery-origin fish. This latter goal could be a FUTURE purpose of the program but only if the CURRENT research goal of the program is first achieved and the capability to expand the program demonstrated. If this desired outcome is achieved, then the endemic program could be expanded with new long-term goals (e.g., harvest, conservation, or both) and new operational objectives for achieving them. The Team concluded that the current size and scope of the program are consistent with the research goal of the program but not with the goal of rebuilding a natural population via natural spawning supplementation by hatchery-origin fish (see Issues that follow). Management actions and operations inconsistent with the scope and goal of any hatchery program can pose significant risks to natural populations with little likelihood of achieving the intended benefits in most cases. Consequently, the deliberate passage of hatchery-origin fish upstream to spawn naturally and/or the direct release of hatchery-origin fry and smolts upstream of the weir would appear to directly conflict with the Team's understood purpose of the current program.*

**Appendix A, Table 1**. Adult PIT tag detections of Touchet River endemic stock and LFH stock summer steelhead.

| Run Year | Number of PITs Past McNary | Number of PITs that Overshoot past Walla Walla Basin | Percent of Fish that overshoot the Walla Walla | Total Number of PITs detected in Walla Walla | Percent Back to Walla Walla | Percent Believed to be Upstream of Walla Walla Basin |
|---|---|---|---|---|---|---|
| **LFH Stock releases into the Walla Walla River** | | | | | | |
| 2008 | 76 | 67 | 88.2% | 1 | 1.3% | 88.2% |
| 2009 | 82 | 77 | 93.9% | 11 | 13.4% | 85.4% |
| 2010 | 64 | 55 | 85.9% | 11 | 17.2% | 78.1% |
| 2011 | 86 | 79 | 91.9% | 8 | 9.3% | 87.2% |
| 2012 | 29 | 24 | 82.8% | 5 | 17.2% | 72.4% |
| 2013 | 23 | 18 | 78.3% | 8 | 34.8% | 60.9% |
| ***'08-'13*** | ***360*** | ***320*** | ***88.9%*** | ***44*** | ***12.2%*** | ***82.5%*** |
| **LFH Stock releases from the Dayton AP** | | | | | | |
| 2008 | 95 | 81 | 85.3% | 9 | 9.5% | 80.0% |
| 2009 | 150 | 136 | 90.7% | 16 | 10.7% | 83.3% |
| 2010 | 80 | 55 | 68.8% | 13 | 16.3% | 63.8% |
| 2011 | 81 | 70 | 86.4% | 9 | 11.1% | 79.0% |
| 2012 | 31 | 25 | 80.6% | 4 | 12.9% | 71.0% |
| 2013 | 49 | 44 | 89.8% | 11 | 22.4% | 73.5% |
| ***'08-'13*** | ***486*** | ***411*** | ***84.6%*** | ***62*** | ***12.8%*** | ***77.2%*** |
| **Touchet Endemic Stock releases into the Touchet River** | | | | | | |

| Run Year | Number of PITs Past McNary | Number of PITs that Overshoot past Walla Walla Basin | Percent of Fish that overshoot the Walla Walla | Total Number of PITs detected in Walla Walla | Percent Back to Walla Walla | Percent Believed to be Upstream of Walla Walla Basin |
|---|---|---|---|---|---|---|
| 2005 | 29 | 11 | 37.9% | 1 | 3.4% | 37.9% |
| 2006 | 26 | 12 | 46.2% | 10 | 38.5% | 46.2% |
| 2007 | 18 | 10 | 55.6% | 6 | 33.3% | 50.0% |
| 2008 | 59 | 30 | 50.8% | 22 | 37.3% | 37.3% |
| 2009 | 74 | 37 | 50.0% | 33 | 44.6% | 39.2% |
| 2010 | 47 | 29 | 61.7% | 12 | 25.5% | 57.4% |
| 2011 | 49 | 15 | 30.6% | 28 | 57.1% | 24.5% |
| 2012 | 40 | 10 | 25.0% | 33 | 82.5% | 15.0% |
| 2013 | 9 | 4 | 44.4% | 6 | 66.7% | 33.3% |
| ***'05-'13*** | ***351*** | ***158*** | ***45.0%*** | ***151*** | ***43.0%*** | ***37.3%*** |
| **Natural Origin Touchet River Steelhead** | | | | | | |
| 2009 | 11 | 3 | 27.3% | 7 | 63.6% | 27.3% |
| 2010 | 21 | 7 | 33.3% | 3 | 14.3% | 33.3% |
| 2011 | 15 | 8 | 53.3% | 7 | 46.7% | 46.7% |
| 2012 | 22 | 5 | 22.7% | 19 | 86.4% | 13.6% |
| 2013 | 24 | 13 | 54.2% | 15 | 62.5% | 41.7% |
| ***'09-'13*** | ***93*** | ***36*** | ***38.7%*** | ***51*** | ***54.8%*** | ***32.3%*** |

**Recommendation TT-SS1:** Clearly define the specific goal and purpose of the current endemic broodstock program and restrict management actions to only those operations that directly support that specific goal**.** New goals can be established after the current short-term research goals are achieved. **Response: WDFW and the co-managers have yet to agree to implement expansion of the endemic stock program for supplementation or mitigation within the Touchet River. Decisions will be made following the development of the SE Washington Steelhead Management Plan.**

*Broodstock Choice and Collection*

***Issue TT-SS2: Utilizing only the early portion of the Touchet River run for broodstock, then allowing the hatchery progeny of those steelhead passage upstream to spawn naturally may, over the long term, impose artificial selection for earlier run timing in the natural population****. Touchet River steelhead return from late February through May; however, only adults trapped during February through mid-April are used for broodstock. Collecting only the early portion of the run is performed so that the progeny can be reared and released as one-year-old smolts.*

**Recommendation TT-SS2:** Collect steelhead for broodstock from the entire spectrum of the run and adjust culture protocols accordingly (see below). **Response: WDFW has developed run timing curves based on previous years trapping efforts. Beginning in 2011, a formalized**

**trapping protocol to collect broodstock from the central part of the run was developed (over a compressed 3-4 week time period). This new protocol was agreed to by the managers.**

*Hatchery and Natural Spawning, Adult Returns*
***Issue TT-SS3. The genetic effective number of breeders for the broodstock is too low to support a natural spawning supplementation program under the current research goals of the program.*** *Hatchery-origin steelhead of the endemic Touchet River stock are passed upstream to spawn naturally in the Touchet River because NOAA Fisheries includes those fish with the ESA listed Snake River Summer Steelhead DPS. However, the deliberate release of those fish upstream to spawn naturally is not consistent with the research goals of the program. The deliberate release of hatchery-origin fish upstream also poses a genetic risk to the natural population because the mean effective number of breeders (parents) per year is only Ne = 28.3 adults, and hatchery-origin fish compose up to 20% of the naturally spawning population upstream of the weir.*

**Recommendation TT-SS3**: Discontinue passing hatchery-origin steelhead upstream to spawn naturally. Increase the number of steelhead collected for broodstock to yield a minimum effective number of breeders each year of Nb > 50. This could be accomplished by spawning equal numbers of endemic hatchery and natural-origin fish pairwise within each of the 2x2 spawning matrices: HxW and WxH, respectively. This would yield a value of *pNOB* = 50%. **Response: This recommendation would be fine depending on program intent in the future. Currently there is no agreed upon program, and the disposition of passing hatchery origin (Touchet endemic stock) fish above the weir has yet to be decided. In the interim, WDFW will continue to pass Touchet River hatchery origin fish above the DAT. All returning LFH stock steelhead are removed from the river upon capture and the weir and are either sacrificed or placed in the Dayton Juvenile Fishing Pond.**

***Issue TT-SS4: Spawning early returning steelhead may increase stray rates due to the amplification of an early return time of their progeny, when access to the Touchet River is limited (lower sections of the Walla Walla River may be impassable in August and September).*** *This poses genetic and ecological risks to other steelhead stocks.*

**Recommendation TT-SS4:** Collect steelhead for broodstock from the entire spectrum of the run. **Response: WDFW has developed run timing curves based on previous years trapping efforts. Beginning in 2011, a formalized trapping protocol to collect broodstock from the central part of the run (over a compressed 3-4 week time period) will be established and agreed upon by all parties.**

***Issue TT-SS5a: Adult male steelhead held for broodstock and returned to the Touchet River may transmit diseases from LFH to the natural population in the Touchet River****. Of special concern is the transmission of the IHN virus.*

***Issue TT-SS5b: Adult male steelhead transported and utilized multiple times during spawning, then returned to the Touchet River experience excessive stress, increasing the potential for fish health issues.*** *Males returned to the Touchet River likely die shortly after release.*

**Recommendation TT-SS5:** Discontinue the return and release of adult male steelhead into the Touchet River. **WDFW Response: WDFW will examine the risks of this practice. Many of the males have been in good shape when returned to the river. We believed that they should be given the opportunity to contribute to natural spawning, though their success at this was never confirmed. Further, WDFW did not believe the likelihood of introducing or enhancing IHNV is a valid issue as natural origin Touchet River steelhead have been confirmed to carry the virus already.**

***Issue TT-SS6: Rearing densities in the indoor nursery tanks "shallow troughs" (1.15 max DI) exceed culture guidelines for steelhead, thus increasing fish health risks.*** *Due to space limitations in the intermediate and outdoor raceways, steelhead are held in the troughs beyond recommended rearing densities for steelhead. This protocol results in density indexes attaining D.I. = 1.15 in the indoor nursery tanks prior to transfer to the outdoor raceways.*

**Recommendation TT-SS6:** Reduce rearing densities in the shallow troughs to a maximum D.I. = 0.5 by increasing the number of nursery rearing or intermediate rearing tanks (see LF-SS12), by reducing the total number of LFH steelhead reared, by reducing the number of fish reared in other programs, or by reducing the total number of stocks reared at LFH. **WDFW Response: This problem was identified a few years ago. WDFW has proposed to increase the rearing capacity by utilizing the area where the spring Chinook captive broodstock program took place. The large 20' circular ponds are proposed for removal and replacement with shallow rearing tanks. It is also desired to have the area covered and, if possible, to be enclosed.**

***Issue TT-SS7: Outplanting fry that are progeny of IHN virus positive females may pose fish health risks to the Touchet River natural population.*** *Although the risk of the IHN virus being transferred to the progeny is considered low due to egg disinfection, the release of those fish still poses fish health risks to natural populations of steelhead populations compared to the expected very low if any benefits. Studies indicate that outplants at the subyearling fry stage have shown extremely low survivals to adulthood and may actually pose significant ecological risks by displacing natural-origin fry which are generally smaller at the time of outplanting.*

**Recommendation TT-SS7:** Discontinue outplanting fry. If the program size is increased, consider sampling the fry for viruses and retain and rear the group to smolt-stage only if they are IHN virus negative. **WDFW Response: all co-managers and NOAA fisheries selected fry release of the IHNV females as the preferred alternative. WDFW believes this was a relatively neutral action, with minimal risk to the natural population, while reducing the risk in the hatchery to all other steelhead stocks present. IHNV is present in the basin and out-plants occurred into habitat that had experienced low natural spawning, thus minimizing the ecological interaction between hatchery and natural fry. This practice will likely continue.**

***Issue TT-SS8: Pre-release exams which include testing for virus, bacteria and parasites are not done at the LFH Complex and associated acclimation sites.*** *There is a potential risk that endemic or vertically transmitted diseases might be undetected in released juveniles. This could affect their future survival and/or infected fish could serve as vectors in infecting other aquatic animals. Pre-*

*release inspections, done 4-6 weeks before release or transfer are required by USFWS fish health policy FW 713 713.*

**Recommendation TT-SS8:** Sample 60 fish for pre-release inspections to meet the American Fisheries Society – Fish Health Section Blue Book requirements to ensure a 95% confidence in detecting pathogens at the minimum assumed pathogen prevalence level of 5%. Additional testing for non-reportable pathogens, such as *Flavobacterium psychrophilum* and *Nucleospora salmonis*, may be informative for co-managers. **WDFW response: Additional testing for other pathogens such as *Nucleospora sp.* should be accomplished since past efforts have been sporadic and localized. However, *Nucleospora sp*. surveillance using PCR testing is expensive with cost of $30.00 per sample and may be limited. WDFW fish health staff questions the value of testing all fish for selected pathogens before release. If IHN virus (or other pathogens) were detected, we would be strongly hesitant to destroy these ESA listed fish. Testing will simply document the infection, and the cost raises the question of the value of such actions.**

***Issue TT-SS9: SAR's for progeny of larger-sized Touchet steelhead at release are higher than those for smaller sized (0.7% versus 0.2%).*** *Additionally, steelhead of smaller size at release may increase the potential for those steelhead to residualize. Current hatchery practices are to utilize only broodstock from the earlier portion of the run in order to increase size at release; however, this practice poses genetic and ecological risks (see recommendation TT-SS4).*

**Recommendation TT-SS9:** Continue to investigate the production of two-year-old smolts and/or the use of heated water to accelerate incubation growth rates for progeny of later-spawned individuals. **WDFW response: We continue to evaluate the two-year smolt program, with the second release of two-years smolts to occur in 2011. Initial results indicated that two-year smolts had similar migration success (based on PIT tags) as the "large" size smolts, and both out-performed the "small" sized smolts. However, rates of precocial males and females prior to release was high (15%); these fish did not migrate from the system and could pose unwanted risks if planted in the river. Future of two-years smolts would have to address this problem in a more aggressive manner.**

***Issue TT-SS10a: Periodic high flows that occur when Touchet steelhead are returning may limit broodstock collection throughout the run.*** *Modifications to the Touchet weir have improved but not resolved trapping capabilities but limitations remain.*

***Issue TT-SS10b: Limited control of upstream passage of adult hatchery-origin steelhead (both Touchet and LFH stock) during high flows poses genetic and ecological risks to the natural-origin Touchet River steelhead population.***

**Recommendation TT-SS10:** Continue to work to modify the weir to improve trapping efficiency and control of upstream passage. **WDFW response: We continue to modify the weir facility to control the number of hatchery origin fish. Our latest system appears to work effectively, but high stream flows can still disable the weir for short periods of time. However, the new ladder system appears to be preferred by steelhead, and it appears based on mark/site recap**

**observations from floy tagged fish that about 25% of the fish appear to bypass the weir by jumping when the weir is disabled.**

***Issue TT-SS11: Tucannon and Touchet steelhead stocks are held in the same adult holding pond at LFH.*** *The two stocks are separated by a grated partition that splits the pond. Holding two stocks of steelhead in the same pond increases the potential for disease transmission between the stocks.*

**Recommendation TT-SS11:** Modify existing holding facilities or build new holding ponds so that the stocks can be held separately on first pass water. **WDFW will examine the possibility of using a different holding pond for the different stocks.**

***Issue TT-SS12: Touchet steelhead have a high degree of straying upstream of Ice Harbor dam.*** *Off-site releases (regardless as to whether they were acclimated or direct stream releases) of hatchery reared salmon and steelhead have consistently demonstrated reduced homing abilities in returning adults (Evenson 1992, Vander Haegen 1995, Johnson 1990). Current hatchery practices may be contributing to these stray rates, including the practice of rearing the fish to smolt stage at LFH, then transporting them and direct-stream releasing them in the Touchet River. Facilities at mainstem dams to accommodate passage of migrating adults both upstream and downstream may also be inadequate.*

**Recommendation TT-SS12a:** Continue to investigate the degree of homing and straying and experiment with rearing and release strategies to reduce straying. Investigate the feasibility of building a small steelhead incubation and rearing facility (hatchery) on the Touchet River to increase homing and reduce straying. **WDFW Response: Should this program be expanded, one option would be to acclimate the fish in the Dayton AP prior to release. Additional facilities on the upper Touchet River are not very likely. Further, warm water temperatures in the Lower Walla Walla Basin may be the most contributing factor to those fish that return to the Snake River Basin. WDFW has observed this same pattern in other stocks of fish.**

**Recommendation TT-SS12b**: Continue to investigate safe passage of adult steelhead, both upstream and downstream of mainstem dams. **WDFW Response: The WDFW agrees, however WDFW has little, if any control, at the mainstem dams to improve upstream/downstream passage of steelhead adults. A study to determine the potential causes of their behavior is needed and could be included with ongoing COE migration studies through the University of Idaho, which attempt to evaluate adult salmon migration behavior through the Hydrosystem. Short of removing the dams, we are unaware of an immediate action to improve this situation.**

***Issue TT-SS13: Releasing Touchet stock steelhead and LFH steelhead in different manners complicates comparison of the performance of the two stocks.*** *The LFH program may be benefiting from increased survival over the endemic Touchet stock due to larger size at release and acclimation prior to release.*

**Recommendation TT-SS13:** Evaluate rearing and release strategies to maximize the return of the endemic stock (e.g. acclimation, volitional release, size-at-release). If necessary, discontinue the use of the Dayton AP for releasing LFH steelhead and use the pond for acclimating Touchet River steelhead prior to release. LFH steelhead can be directly released downstream from the Dayton AP if those releases continue. **WDFW Response: We agree that this might be an alternative release strategy in the future. WDFW and the co-managers will have to agree on which stock(s) will be used and where the releases should occur based on management goals.**

***Issue TT-SS14: Current marking and tagging practices are suitable for achieving current program objectives.*** *Touchet stock are coded-wire tagged so that the hatchery fish can be distinguished from natural-origin fish when they return to the trap. 8,000-10,000 steelhead are PIT tagged to provide survival and stray data.*
**Recommendation TT-SS14:** Continue the current marking and tagging practices. Consider increasing the number of steelhead PIT tagged to 10,000-15,000 so that smolt-to-adult survival can be estimated, given that survival rates associated with this endemic program currently vary and are at times low. **WDFW Response: We believe the current tagging levels are adequate. Survival in some years was low, but has been associated with the first years of the programs where the hatchery experienced difficulty in rearing fish up to the appropriate release size. Since release size goals have been met, survival has improved, and the current number of PIT tags is adequate for the monitoring needed.**

**HRT Alternatives to Current Program**

**Alternative 1:** Current program with recommendations

**Alternative 2:** Expand the Touchet endemic steelhead program by creating a stepping-stone program for harvest and conservation

**Alternative 3:** Expand the Touchet endemic steelhead program by creating a segregated, for harvest program downstream of the weir and manage the population upstream of the weir for natural production only

**Alternative 4.** Establish a rearing facility on the Touchet River (this alternative is tentative until further investigation by the Review Team)

**Alternative 5:** Terminate the Touchet endemic steelhead program

*Recommended Alternatives*
The Team recommends Alternative 2: phase-out or terminate the release of LFH steelhead in the Touchet River and expand the current integrated endemic program for steelhead to a two-stage, stepping-stone program. Alternative 2 is intended to be implemented consistent with all the recommendations in Alternative 1. The intent of Alternative 2 is to address both conservation and harvest goals for steelhead in the Touchet River. The Review Team understands that the primary purpose of the current endemic program is research; to determine the potential efficacy of developing a localized integrated hatchery program as an alternative to the continued outplanting

of non-native LFH steelhead. The Review Team concluded that adult return rates back to the Touchet River from the current endemic program were sufficient to expand the program for the immediate purpose of addressing conservation needs for steelhead in the Touchet River, largely because hatchery-origin adults in excess potential broodstock needs are currently being trapped and passed upstream. A second broodstock could be developed, based on adult returns from the first broodstock, to support Tribal and recreational fisheries. However, continued improvements in smolt-to-adult return rates (SARs) for the endemic program in the Touchet River may be necessary before this latter second stage broodstock can be developed. Adult returns from both broodstocks would contribute to the overall LSRCP mitigation goal for steelhead in the Snake River, while fish from the second segregated‖ broodstock would contribute exclusively to the mitigation goal of 750 hatchery-origin steelhead available for harvest in the Touchet River.

The size of the integrated conservation component of the program would be based annually on the returning natural population. The current endemic (*integrated*) program could be expanded to approximately 50 adults (25 females) without increasing the number of natural-origin adults used for broodstock by retaining equal numbers of F1 hatchery-origin and natural-origin adults and crossing the two groups of fish pairwise ( ♀-nat. x ♂-hat., and ♀-nat. x ♂-hat.) in each of the spawning matrices so that all progeny had at least one natural-origin parent. This spawning protocol would result in a value of *pNOB* = 50% for the first broodstock. Returning F1 hatchery-origin adults (tagged but not fin-clipped) surplus to the needs of the integrated broodstock would not be passed upstream but would be retained and spawned as a second broodstock to produce fish for harvest. These latter F2 hatchery-origin progeny would be given an adipose fin clip and - as returning adults - could be included in the second broodstock as needed by directly crossing them with returning adults resulting from the first broodstock (e.g., ♀-F1-hat. x ♂-F2-hat., and ♀-F2-hat. x ♂-F1-hat). This cross-breeding of natural-origin fish with F1 hatchery fish in the first broodstock, and F1 x F2 hatchery fish for the second broodstock would ensure (a) continuous gene flow from the natural population to the 2nd broodstock, thereby reducing genetic risks to the natural population, and (b) the absence of sibling matings. Surplus hatchery-origin adults produced from the first broodstock would, in general, not be passed upstream unless doing so was necessary to prevent extirpation or to maintain a viable natural population.

The number of adults spawned for the second broodstock would be based on the 750-adult mitigation goal and the expected or predicted smolt-to-adult return rates back to the Touchet River. For example, assuming a 0.30% smolt-to-adult return rate (SAR) back to the Touchet River (unpublished data, WDFW), approximately 250,000 smolts from the second broodstock would need to be released into the Touchet River to achieve the mitigation return goal of 750 adult steelhead, and approximately 80 females (160 adults total) would need to be retained for broodstock to produce 250,000 smolts. These latter broodstock and smolt release numbers may exceed culture facilities currently available at LFH and may create concerns regarding ecological (competition) risks to natural origin smolts in the Touchet River. Consequently, the Team recommends implementation of modified culture protocols that are expected to increase smolt-to-adult return rates from the current average of 0.30% (most recent estimated rates are approximately 0.5%), including the use of heated water during egg incubation or early rearing to increase mean size at release. As smolt-to-adult return rates increase and a second broodstock and the proposed stepping stone‖ program develop, a greater proportion of the second broodstock could

be composed of F1-hatchery fish from the first broodstock. No F2 hatchery-origin adults would be passed upstream to spawn naturally unless absolutely necessary as an emergency conservation measure.

Both components of the stepping stone program could be accomplished at LFH by differentially marking broodstock where the integrated conservation component would be coded-wire tag-only and the harvest component would be 100% adipose-fin clipped with only a portion tagged for monitoring and evaluation purposes. The harvest component could be direct released while the integrated component could be released from the acclimated pond if the pond was not of sufficient size to acclimate both groups of fish simultaneously.

The Team's recommendation is intended to meet near-term conservation goals for the Touchet River population, while developing a harvest component to meet harvest and fishery management goals in the area. The Team's recommended alternative is also meant to be consistent with the intent of the current *US v. Oregon* agreement and LSRCP mitigation obligations. The Team also felt that our recommended alternative would be consistent with any potential actions that may be taken in the future to address ICTRT recovery recommendations.

The Team recognizes that Alternative 2 will require a significant investment to expand or modify culture facilities at LFH to accelerate the growth of Touchet River steelhead or rear a portion of each brood year for two years to achieve the desired size at release. On the other hand, the Team's recommendation could be initiated at a smaller scale than currently required to meet the 750 adult-return mitigation goal for steelhead in the Touchet River.

If co-managers conclude that implementing Alternative 2 is premature at this time, then the Team recommends implementation of Alternative 1 and Alternative 4: continuation of the current research program with implementation of all program specific recommendations and potential development of a rearing facility on the Touchet River to improve SARs. Currently, LFH steelhead are acclimated and released from the acclimation pond in Dayton and the endemic steelhead are direct released upstream of the weir. The Team believes that, as part of the continued research program, the release of LFH steelhead in the Touchet River should be suspended and the acclimation pond used to acclimate steelhead smolts from the endemic program to determine if that simple change will result in an increase in SARs. The Teams recommendations also include termination of the passage of hatchery-origin adults upstream of the weir because doing so creates genetic risks and is superfluous to the research goal of the program. Instead, those hatchery-origin fish should be crossed with natural-origin adults to further test the efficacy of the current program.

The Team did not support development of a new, segregated hatchery program for steelhead in the Touchet River (Alternative 3), largely because it would inevitably create risks similar to the current program after many generations and would not – in the long term – provide conservation benefits for a natural population that may not be viable. The Team also believed that termination of the current endemic program (Alternative 5) was premature from a research perspective because many options for potentially improving SARs had not been tested.

**WDFW Response: As WDFW completes the SE Washington Steelhead Management Plan, these and other discussed alternative will be considered for program development. At this time, WDFW preferred alternative is to continue the program as it has been for the last 10 years.**

# Appendix B: Alternatives to Current Program

The following represent other program alternatives that have been discussed and considered over the years for this program. None of these are being seriously being considered at this time as the program continues to be evaluated with the most recent controlled matings study that will occur for the next 4 years. Following those study results, WDFW and CTUIR will decide which direction this program will go in the future.

Alternative 2: Slight modification of the Current Program– This could entail modifying release numbers or location as well as removal of returning Wallowa stock steelhead at traps. Release of Wallowa stock steelhead in the Touchet River could be located further downstream by direct stream release method. WDFW has not pursued this alternative because returns from this alternative would likely create a shift in the return distribution of harvestable adults to the lower reaches of the Touchet River. Adult hatchery origin steelhead of LFH or Wallowa stock origin are currently removed from the system when trapped at the DAT. The first action would reduce potential impacts to the remaining natural population from further introgression, though their effects on the mitigation fishery could be detrimental to harvest opportunity thus WDFW has not pursued this alternative. Additionally modification of the existing dam/weir on the Touchet River would be needed under this alternative, to improve trapping, allow for better adult enumeration, and improve removal of non-native hatchery steelhead. A new fish ladder and trap has been completed at the Dayton Dam as of 2007, although under normal and even low flow conditions, steelhead continue to jump the barrier dam and bypass the fish ladder/trap. Upstream migration of steelhead is currently limited by installing temporary pickets/panels across the face of the dam. However, their effectiveness is reduced under higher flow conditions due to physical constraints of the pickets, and fish can escape upstream. Modification of the existing dam/weir on the Touchet River should improve trapping, allow for better adult enumeration, and improve removal of non-native hatchery steelhead. Estimated cost for completion could be $$$ **(See cost estimate legend below).**

Alternative 3: Eliminate the releases of Wallowa stock in the Touchet River, and change to an integrated harvest program. This was the original proposal idea from WDFW. However, stock performance from the endemic program has not met adult return expectations, and it would greatly diminish the harvest opportunities in the Touchet/Walla Walla Basin, which is not preferred at this time.

Alternative 4: Eliminate the releases of Wallowa stock in the Touchet River, and change to a supplementation program. This alternative has been recommended by the Umatilla Tribe, but is not supported by WDFW.

Alternative 5: Increase the endemic stock program in the Touchet River to a specified production level, and maintain some level of production of the Wallowa stock steelhead for harvest mitigation. This action would continue the popular and economically important sport fisheries within each of these rivers, yet would increase the number of endemic hatchery fish returning. Modifications to the existing Wallowa stock program could include decreased releases into the

rivers and modified release locations and removal of Wallowa stock returns at a lower river weir to reduce the potential interaction of these fish with the ESA listed population.
This alternative will require an increase to the LFH water supply and rearing space. Development of the current endemic programs (Touchet and Tucannon) have left the LF Hatchery short on rearing space during some times of the year. Any expansion of this program will require hatchery modifications. The existing water supply might have to be expanded, and additional raceway or circular tank space will be necessary. The current large rearing lakes at LFH are being underutilized given their capacity, and rearing endemic stocks in the lakes could potentially increase their survival, however they are not designed for small groups of fish or to be partitioned into multiple containers. The cost to perform such modifications is currently estimated to be in the range of $1,000,000 to over $5,000,000.

Alternative 6: Recondition endemic kelts after spawning. Steelhead have the ability to spawn more than once, given the proper survival conditions. Other projects in the Columbia River basin have successfully reconditioned post-spawned fish, and released them back into the natural stream for additional spawning (Hatch et al, 2003). This management alternative provides an option to increase natural spawning in the river, and maintain genetic diversity. However, WDFW attempted kelt reconditioning on this stock many years ago. It was unsuccessful and all the fish died. It was determined that a much greater effort would be needed in the future to make this successful, and would require additional staff time and space. The costs of such was deemed too high. This alternative will require further investigation and the acquisition of funding to implement. Implementing kelt reconditioning for the endemic broodstock program would allow endemic fish used for broodstock to contribute to the genetic diversity in their natal streams, with a life history that was expressed more prevalent prior to habitat destruction and mainstem dams. This alternative will require additional investments, and an estimated annual cost for reconditioning is estimated between $100,000-$500,000 a year mainly for feed and care of fish while at the hatchery. This action would also require more space and water at LFH. (See Alt. 6 ).

Reform/Investment 1: Increased Hatchery Operational Costs: LFH was originally designed and built for specific fish mitigation production programs. Continued production changes, including the development and rearing of newly developed endemic stocks in order to meet recovery goals in addition to original mitigation and fishery goals at this facilities will continue to increase operational costs. Permitting, domestic and production water system monitoring, safety, and other requirements are increasing in complexity, number and cost. Increases in the cost of fuel, power, fish food, labor, steel and other expenses, coupled with the associated indirect, will continue to have a significant fiscal impact. Finally, both facilities are aging, and maintenance costs are increasing as pumps, motors, buildings, operational and other systems wear out and require replacement. Use of additional steelhead stocks will increase staff, water and power costs, as well as transportation costs. We expect these increased costs to be approximately $$$ per year.

Further, in addition to the above challenges, the Touchet Endemic stock program has been difficult to rear in the hatchery, with many of the fish not obtaining size at release goals within the first year. WDFW tested rearing a small part of the population in a two-year rearing cycle. Results from that study are now complete but have yet to be presented (Joe Bumgarner, WDFW personal communication). For the two years of the study, about 20% of the two year smolts were precocial

males (and some females) at release. Returns to adult were also poor, but were mixed in performance compared to the one-year program. Smolt-to-adult survival to Bonneville Dam based on PIT Tags was 0.30% and 0.04% for the 2010 and 2011 release years of two-year old smolts, respectively, compared to 0.26% and 0.43% for one year smolts. A two-year program would require additional raceways at LFH for rearing two brood years of steelhead simultaneously, but this is no longer being pursued due to funding needed for such implementation.

Reform/Investment 2: Monitoring and evaluation of endemic stock and non-native stock summer steelhead programs in SE Washington. Prior to the initiation of the endemic stock programs, natural-origin summer steelhead monitoring in SE Washington was limited to spawning ground surveys to estimate adult returns and distribution, juvenile abundance estimates through electrofishing or snorkeling, and smolt trapping (Tucannon River). Endemic stock program monitoring to date has been focused on broodstock collection, hatchery rearing performance, adult returns and genetic stock structure in relation to the LFH stock. Hatchery-origin summer steelhead monitoring has been limited to creel surveys to recover coded-wire tags, spawning ground and juvenile surveys (to look for impacts that hatchery fish might have on natural-origin populations), and estimating the percentage of strays at adult traps. If the Touchet program is changed to eliminate LFH/Wallowa stock releases in the Touchet River, a more complete monitoring and evaluation program should be developed to track the success/failure of the program in meeting recovery and mitigation goals, and impacts (positive or negative) to the natural populations remaining in the stream. Monitoring and evaluation may include more traps to monitor adult returns and straying, more PIT tagging and PIT tag arrays, smolt traps to monitor natural production, and genetic pedigree studies to determine impacts to the natural populations. Monitoring and evaluation will be a long-term investment and will require many years of dedicated funding ($$$/annually). **See Section 11**.

For reference

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|---|---|
| $ | <$50,000 |
| $$ | $50,000-<$100,000 |
| $$$ | $100,000-<$500,000 |
| $$$$ | $500,000-<$1,000,000 |
| $$$$$ | $1,000,000-<$5,000,000 |
| $$$$$$ | Over $5,000,000 |