Appendix H
Information Management Plan

1 Purpose of Information Management

The HSRG assembled and organized a large amount of information related to the management and operation of hatchery programs in the Columbia Basin. Some of this information has been identified and described in Appendix D of the Systemwide Report. The purpose of this section is to outline a plan for maintaining, updating and accessing this information to support implementation of hatchery reforms in accordance with the three HSRG principles: (1) clearly articulated goals for conservation and harvest, (2) scientifically defensible hatchery programs, and (3) a science-based decision making process that is responsive to new information.

As described below, information will be managed with a web-based system ("system") that will help managers assume ownership of the tools and information contained in the Hatchery Reform database. When implemented, the system will make it simple for managers to update goals and hatchery plans, using the HSRG work products as a starting point. Updating information and recording amendments to hatchery plans should be a reliable and efficient process. Once implemented, this system will streamline and simplify the process of amending and maintaining "living" planning documents, including population reports (see Appendix H-1 for an example) and Hatchery Genetic Management Plans (HGMPs). While the focus of this plan is to implement hatchery reform, as HSRG has concluded, hatchery programs must be managed within an "all H" context as a part of the Columbia River ecosystem, thus relevant information on harvest, habitat, and survival conditions in the mainstem Columbia/Snake as well as the estuary and ocean must also be covered. The purpose of this plan is not to develop an elaborate database management system, rather to make it simple and efficient for managers to keep key planning information up-to-date.

2 System Overview

The Information Management Plan will expand the current Hatchery Reform website (www.hatcheryreform.us) into a more complete hatchery reform decision support system. The intent is to coordinate it with other databases and websites developed for the Columbia Basin (e.g., Streamnet, NED, EDT, etc.), but also to be sufficiently independent to support the needs of hatchery reform.

The proposed web-based information system will provide easy access to current information that can support decision making at all levels (technical and policy). The content of this system is generally "processed information", e.g., annual spawning escapement estimates rather than spawner survey data; annual hatchery broodstock counts rather than daily hatchery spawning data; etc.

Updating information in the system will be the responsibility of managers and hatchery operators. Then a variety of users will be able to access the Hatchery Reform website and download the latest information and reports that will help answer questions about the current status and future plans for hatchery programs individually or in aggregate. These target users include policy and technical managers, hatchery operators, legislators, the public, project sponsors and funding agencies.

Once the plan is implemented, accessing and updating information will be accomplished with a combination of on-line and off-line tools. Information is stored in an on-line database that is accessible via the hatchery reform web site. This information will be revised or updated by using the off-line tools.

2.1 Off-Line Tools

To access and use the off-line tools, users will download them along with the data for populations of interest from the Hatchery Reform web site. The off-line tool will read the data file and allow the user to view and update the information. Saving updates from the off-line tool back to the system will be a simple two step process: 1) save a new data file from the offline tool and 2) upload the revised data file to the system via the web site.

The off-line tools include: the All H Analyzer, a Population Report editor/generator (see Appendix H-1), an HGMP report editor/generator, and a tool for updating and viewing hatchery operational information. These tools will allow the user to download current information from the on-line database, review and update that information, and generate a variety of reports, including an HGMP. Putting these tools into off-line applications rather than on the web will improve their accessibility to a variety of users, increase flexibility to modify applications, and allow users to more easily extract information and customize reports for their particular needs.

2.2 On-line Database

On-line utilities include a population editor that will be used to modify existing population definitions and to create new populations. The database is structured around a set of defined, distinct natural-origin and hatchery populations. All 351 currently defined salmon and steelhead populations in the Columbia Basin are included in the database. The HSRG recommends that initial updates to the database include verifying and correcting geographic references to spawning areas and other unique locations associated with each population. This could occur by coordinating population information in the hatchery reform database with other population databases in the region.

2.3 Database Updates

In order for the system to be useful, it must be kept up-to-date and well organized. It must be easy for managers and hatchery operators to update and document changes quickly. The on-line population editor will help to accomplish this goal. The off-line tools must be easily operated and provide the right information to support informed decision making. The system will include user guides for all on-line and off-line tools along with written procedures for system maintenance. Tools and procedures for updating and documenting information and tracking changes in the database and in the population reports will be provided.

2.4 Available and Proposed Reports and Tools

The off-line reports and tools available on the Hatchery Reform website will include:

- Population Reports. These reports provide a concise summary of relevant population information and specific hatchery programs affecting the population (Appendix B, or see Appendix H-1 below for an example). Reports are organized to summarize information for the three HSRG principles of 1) clearly articulated goals, 2) a scientifically defensible program, and 3) science-based decision making. Each

includes a brief description of population status and goals and a description and rationale for current and planned hatchery programs. The population reports can be aggregated into ESU and species-level reports and can be customized to serve the needs of the managers.

- All-H Analyzer (AHA). The purpose of AHA is to provide managers with an analytical tool to evaluate the existing program and program revisions in response to new information. This off-line tool will be improved in several ways. It will be made more user friendly by adding wizards and on-screen instruction. Features that allow the user to view and enter comments and documentation will be added. The AHA tool will display both empirical information and analytical results. In other words, AHA will display baseline information (where did we start), current information (where are we now), and short- and long-term plans (where do we expect to be in the future).
- Hatchery Program Viewer (HPV). This viewer provides managers with a tool to evaluate hatchery operations consistent with best management practices (BMPs). This is an existing tool that is used to view and edit operational information for each hatchery program using BMPs defined by the HSRG. This tool can capture and display the potential benefits of improvements in both hatchery facilities and operations.
- HGMP Text Editor. The system will include utilities to download existing HGMPs, update them and save a new draft, where changes are tracked and documented.

Information shared by all these reports and analytical tools will be simultaneously updated as new information is added via any pathway. In other words, new data need be entered just once and all reports generated from the system will be based on the same information.

Figure 1 illustrates the general design of the system. The web site components and offline AHA and HPV components of this system have already been implemented. The population report and HGMP report editors/viewers need to be developed.

3 Conclusion

Several key components of the system (Figure 1) have already been implemented. Population reports are available for viewing, but updating/editing capability is not. The AHA tool is available to download along with datasets for all Columbia River salmon and steelhead populations. Managers have full access to them and are using them for hatchery planning purposes. The HPV tool and associated data sets are also available. The intent is for the HPV to reflect best management practices for hatchery operations, but the HSRG has not completed its validation of these BMPs.

Managers can use, and several are already using these tools; however, important data documentation and reliability issues remain to be addressed along with improved usability.

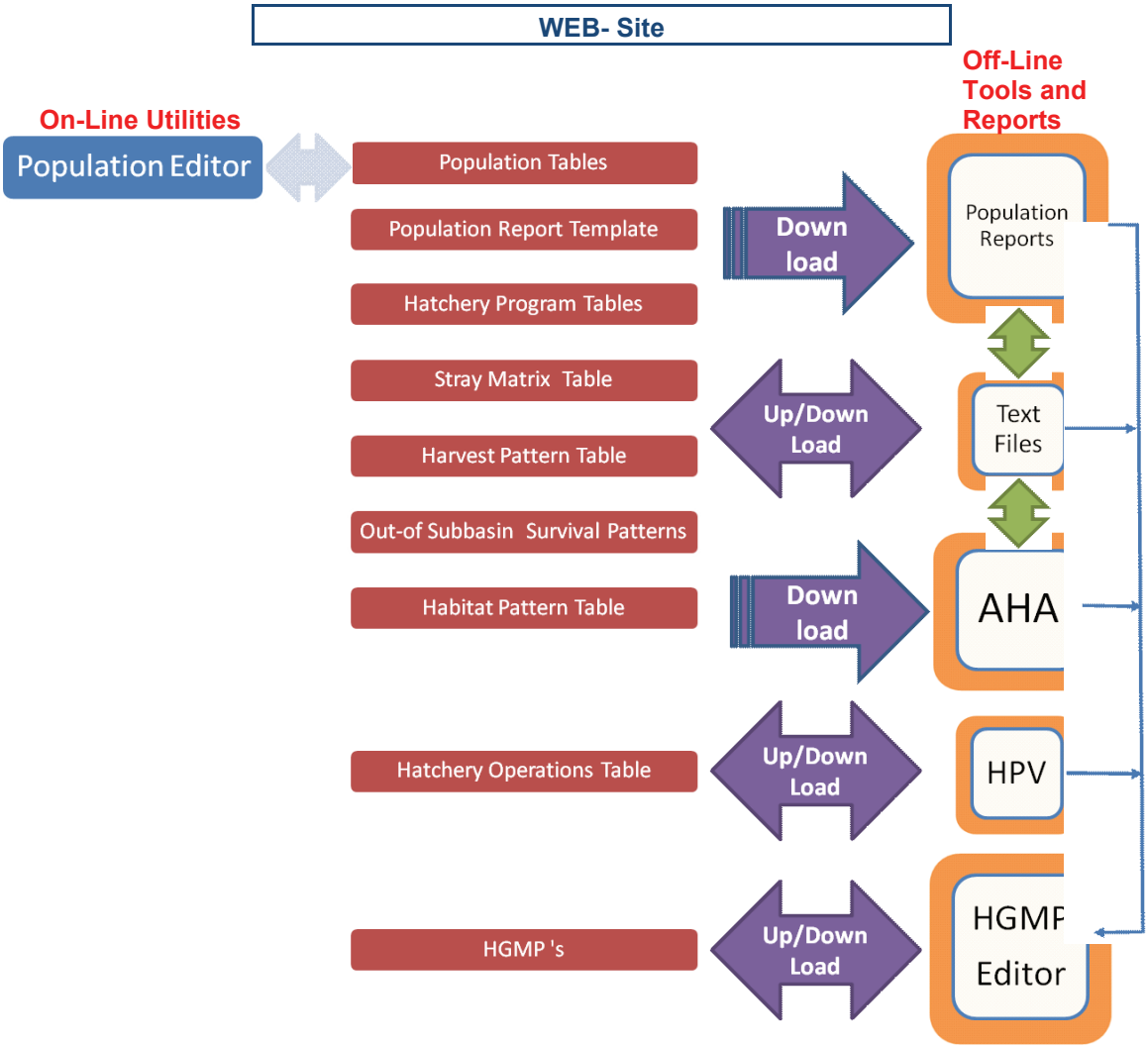
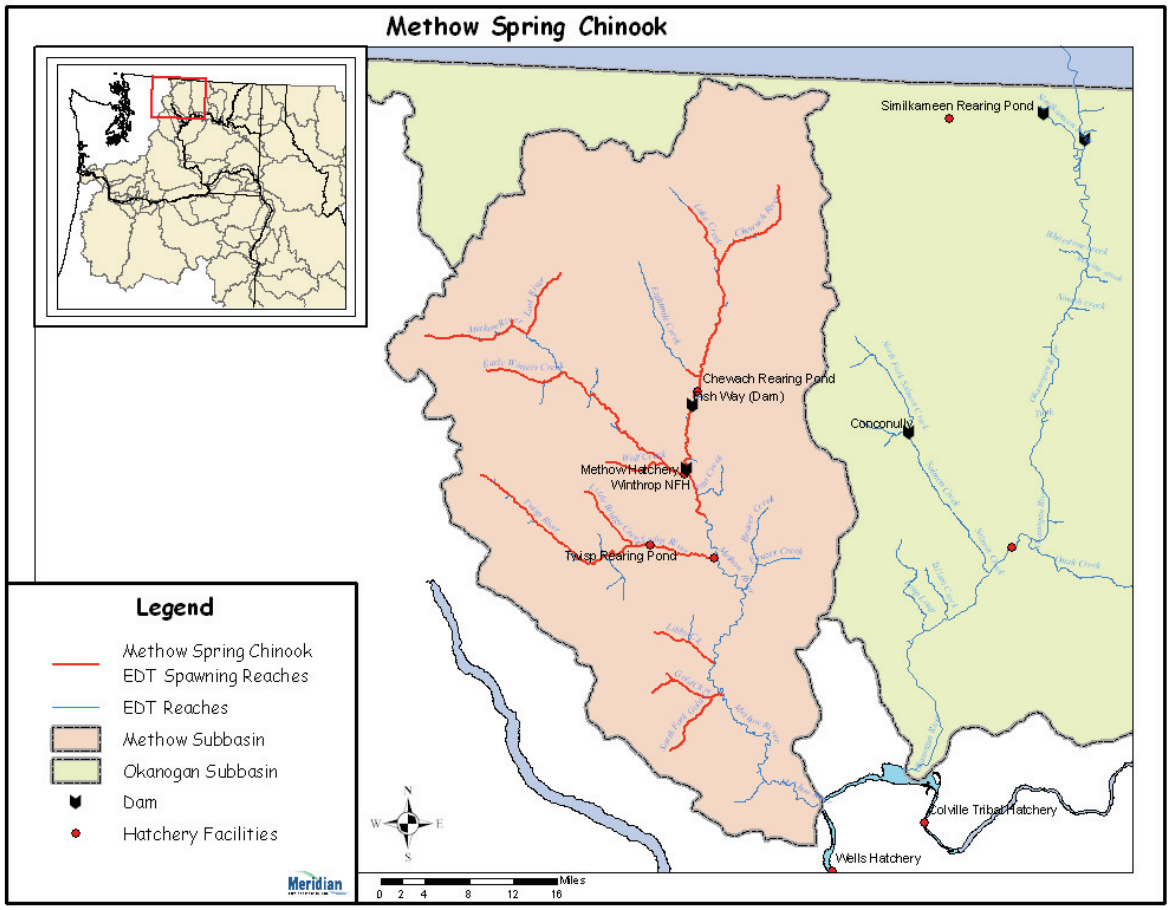


Figure 1. General design of the system- much of which is already implemented.

Appendix H-1 Sample Population Report



1 Methow River Spring Chinook

The Methow River Spring Chinook natural population is part of the Upper Columbia ESU that currently contains three populations- Wenatchee, Entiat and Methow river spring Chinook- and one extinct population, the Okanogan River spring Chinook (ICTRT 2004). Upper Columbia River Spring Chinook are classified as endangered under the Endangered Species Act (ESA). Spawning areas are shown on the figure above.

The Interior Columbia Technical Recovery Team (ICTRT) has classified the Methow River spring Chinook as a "Very Large" population in size based on its historic habitat potential. A "Very Large" population is one that requires a minimum abundance of 2,000 wild spawners and an intrinsic productivity of greater than 1.75 spawner to spawner (S/S) to be viable.

According to the Upper Columbia Spring Chinook and Steelhead Recovery Plan (UCSSRP), spring Chinook have similar life-history characteristics as the spring/summer Chinook salmon runs originating in the Snake River system. In general, spring Chinook enter the tributaries of the upper Columbia River from April through July, with peak

passage in May. Spawning occurs in the late summer to early fall. Juveniles spend one year in freshwater before migrating to the ocean (UCSRB 2007).

Historical Chinook run size to the Methow River was estimated by Mullen et al. (1992) at about 24,000 fish (UCSRB 2007)[1]. Historically, Methow River spring Chinook were present in the mainstem Methow River and larger tributaries including the lower portion of the Twisp River, and mainstem Chewuch River up to Rkm 52 (UCSRB 2007). Methow spring Chinook may also have been present in Gold, Wolf and Early Winters creeks and the Lost River.

2 Current Conditions

Methow spring Chinook spawn in the mainstem Methow River and the Twisp, Chewuch and Lost River drainages. A few spawners can be found in Gold, Wolf and Early Winters creeks. Population diversity has likely been reduced due to habitat degradation, harvest, and the release of out-of-basin stock (Carson) from the Winthrop National Fish Hatchery. These releases were eliminated in 2000 as the hatchery program transitioned to the listed stock.

The abundance of 3+ spring Chinook in this subbasin has ranged from 33 to 9,904 fish for the period 1960 to 2003. The 12-year geometric mean of spawners in the Methow River was estimated to be 480 fish at the time of ESA listing (range 480 to 2,231 spawners). The 12-year geometric mean for returns per spawner over this same time period was estimated to be 0.51 (range 0.31 to 1.19 returns per spawner).

2.1 Working Hypothesis

Information submitted by WDFW and used in the AHA analysis estimates current adult escapement and adjusted productivity for the natural-origin population at 933 adults and 0.9 returns per spawner, respectively in the Methow-Chewuch population component and 82 adults and 0.9 returns per spawner, respectively in the Twisp population component for a total abundance of 1,105 adults in the Methow River (Table 1).

The estimated hatchery influence was high in both population components with an average pHOS of approximately 75% (Table 1). Estimated PNI for the two integrated programs was less than 0.50.

2.2 Current Population Status and Goals

This section describes the current population, status, and goals for the natural population.

- ESA Status: Methow River Spring Chinook are part of the Upper Columbia River Spring Chinook Salmon ESU, which was listed as Endangered under the ESA on June 28, 2005 (70 CFR 37160).
- Population Biological Significance: The Methow River population is classified by the ICTRT as "Very Large". Manager's designation for this population is undetermined.
- Habitat Productivity and Capacity: EDT analysis completed by the managers to assess habitat potential and constraints reported a productivity of 1.9 returns per

[1] It is unclear whether summer Chinook occupied the Methow River; therefore, it is assumed that the majority of the 24,000 fish were spring Chinook.

spawner and a capacity: 900 adults for the Methow-Chewuch population component and a productivity of 1.9 returns per spawner and a capacity of 240 adults for the Twisp population component.

- Recovery Goal for Abundance: 2,000 wild spawners
- Productivity Improvement Expectation: The 8-year geometric mean for abundance and productivity (i.e. growth rate) of naturally-produced spring Chinook within the Methow River population will be improved to exceed the 10% extinction-risk (viability) curves developed by the ICTRT (e.g., ~ 2,000 spawners at a productivity of 1.2) (UCSRB 2007)[2].
- Hatchery Goals: The purpose of the hatchery programs are both conservation and harvest. The manager intent is to operate these programs such that hatchery influence on the natural population is low, i.e. a pHOS <0.05 or a PNI > 0.67 depending on the program.

2.3 Current Hatchery Programs Affecting this Population

Hatchery programs operate within the subbasin that may affect the Methow Spring Chinook population:

1. Methow Spring Chinook (Methow Hatchery): This integrated conservation program has release goals of 550,000 yearling (15 fpp) spring Chinook to the Methow subbasin in April each year (Methow composite and Twisp stocks combined). Juveniles are released into the Methow River (184,000 Methow composite stock smolts) (Rkm 72.5), Twisp River acclimation pond (184,000 Twisp River stock only) (Rkm 8.6), Chewuch River acclimation pond (Rkm 83.2) and in Lake Creek (Chewuch River, Rkm 104) (184,000 Methow composite smolts). Fish not leaving acclimation ponds volitionally are forced out in May. Juveniles are 100% mass-marked. Smolt production goals have not been met for the Twisp stock (currently a combination of captive brood and anadromous brood).

   Broodstock is collected at multiple trapping facilities in the subbasin: Methow Hatchery, Twisp River[3], and adults are also collected at Wells Dam. Managers use genetic stock identification techniques to identify Twisp from Methow composite stock. Data indicate that 93% of the spring Chinook trapped for the Methow program is of hatchery-origin. All incubation and rearing activities take place at the hatchery. Juvenile fish are acclimated at the Twisp, Methow, and Chewuch acclimation sites.

2. Winthrop National Fish Hatchery Spring Chinook: A total of 600,000 yearling smolts (15 fpp) may be released in the Methow River from this segregated program each year (currently uses Methow composite stock, HOR by HOR crosses, but used Carson stock prior to 2003). Yearling smolts are forced out of the Foster-Lucas ponds in April. The rearing units are not set up for the volitional release of juveniles and would require extensive modification to do so. Juvenile fish are exposed to river water in the October prior to their release in the spring. Broodstock for this program was switched from Carson stock to Methow River-origin fish in 1999. Adults needed for broodstock volunteer (mostly HOR) or are transported from the Methow Hatchery

[2] As productivity increases, abundance targets decrease. Thus, there are multiple combinations of productivity and abundance values that would achieve objectives. Additionally, the target improvement level is less than required for delisting under ESA.

[3] The Twisp River site was collecting fish for the captive brood program that was phased out some time ago.

(a rare event) and other locations. A future option is to use tributary traps to collect needed NOR broodstock. All incubation and juvenile rearing activities occur on-site.

3 Future Hatchery Program Management

Summary results of these analyses are presented in Table 1. The adjusted productivity values reported for each alternative incorporates all factors affecting productivity (i.e. habitat quality, hatchery fitness effects, and harvest rates).

3.1 Manager Strategies (Short-term and Long-term)

3.2 HSRG Observations/Recommendations

The HSRG completed an analysis of this natural population and the hatchery programs affecting this population in 2008 and prepared a report on their conclusions in early 2009. Below are their observations and recommendations based on hatchery operations, harvest, and subbasin, mainstem and ocean survival at that time. The observations describe elements of the situation at the time of the review that were important to evaluate the natural population and where applicable the hatchery program(s) affecting that population. The recommendations describe a solution that appeared to be consistent with manager's goals; however, this is not the only solution. In some cases more than one solution is described.

3.2.1 Observations

The Managers have stated their goals for this program as; "Supporting the recovery of ESA listed species by increasing the abundance of natural adult populations, while ensuring appropriate spatial distribution, genetic stock integrity, and adult spawner productivity." (Goal statement adopted by Habitat Conservation Plan Committee, Hatchery Sub-Committee) To achieve this end the managers have identified a current mitigation goal of approximately 550,000 smolts for release within the basin (see smolt production by stock below). In addition, the Winthrop National Fish Hatchery (NFH) produces up to 600,000 smolts as part of its mitigation responsibility. Managers have identified Methow spring Chinook as an important population with some substructure components. For the purposes of this analysis, the HSRG assumed this population should be considered a Primary population. As currently managed, it is not consistent with that designation, having a PNI less than 0.5.

Current habitat productivity and capacity are significantly less than the recovery objective for the population. The hatchery programs are providing a conservation demographic benefit to the population by reducing extinction risks, but they also pose increased ecological and genetic risks to the natural population because of their current size. Achieving long-term recovery objectives would require improvements to habitat in the tributaries or mainstem.

There currently are two programs in the subbasin. The Methow Hatchery operates as two separate integrated programs (Methow composite stock and the Twisp stock). The Winthrop National Fish Hatchery (NFH) is intended to be operated as an integrated program (since 2001) using Methow composite stock of in-basin hatchery fish.

There are three components of the Methow Hatchery programs: Twisp River (release goal of 184,000 yearling smolts), Chewuch River (release goal of 184,000 yearling smolts) and the upper mainstem Methow River (release goal of 184,000 smolts). The

Winthrop NFH program has an on-station release goal of 600,000 smolts. Currently, the Winthrop NFH release goal is achieved in most years. Smolt releases into the Twisp River have averaged approximately 50,000 smolts. We note that the smolt-to-adult survival rate in the Twisp is lower than in the Chewuch.

There are insufficient natural-origin fish in the basin to properly integrate the current Winthrop and Methow combined production.

For the Twisp population component, the HSRG was unable to craft a strategy that would meet the standards for a Primary or a Contributing population and still provide a demographic benefit to the population component within the constraints of the existing habitat (increase of NORs). This is because of the low productivity and capacity. Patterns of population abundance suggest a significant demographic risk to this component.

For the composite Methow-Chewuch population component, the HSRG was unable to craft a strategy that would meet the standards for a Primary population and provide a demographic benefit within the constraints of the existing habitat. The HSRG was, however, able to develop a solution that could provide a demographic benefit as well as be consistent with the standards for a Contributing population.

If adult trapping facilities were made available on the mainstem Methow, a number of other options would be available.

3.2.2 *Recommendations*

The HSRG looked at various hatchery scenarios that could improve productivity, but could not significantly increase natural-origin spawning under current habitat conditions. Changes to the current program described below could be implemented to provide additional harvest opportunities and maintain the abundance of natural-origin spawners. The HSRG-suggested solution resulted in approximately the same number of natural-origin spawners as the No Hatchery scenario.

Production from either Methow or Winthrop facilities is capable of meeting the conservation needs for spring Chinook in the Methow. Managers should consider using excess hatchery capacity to achieve other conservation and/or harvest goals. As an example, Winthrop Hatchery could be managed to provide additional harvest opportunities for marked spring Chinook (in the Methow and/or below Chief Joseph Dam); or as a production facility for coho reintroduction in the upper Columbia; or to provide spring Chinook for reintroduction into the Okanogan River. Finally, Winthrop could be used to achieve any combination of the above programs.

The recommendations described below for the Twisp and Methow composite populations are meant to provide a short-term conservation strategy. When population productivity and capacity has increased, the managers should transition these programs to meet the standards of a Primary population (PNI greater than 0.67).

Composite Chewuch-Methow and Twisp population components: The HSRG recommends that managers continue to operate the programs as currently planned in the near term. The HSRG acknowledges that managing for the recommended PNI values for a Primary population may not be possible or appropriate when abundance levels are low. Managers should consider demographic risks to the population and modify their protocols during these periods. Managers also should develop a variable sliding scale for

abundance so that in low abundance years, more of the appropriate stock is allowed to reach the spawning grounds.

An example of such a sliding scale would look like this:

Each year, depending on NOR run size, pNOB and pHOS are allowed to "float" or slide. The HSRG assumes managers will establish an acceptable level of removal of NORs for use in the hatchery brood. This will be a fixed percentage of the total NOR return (say 40%) and will not change, regardless of NOR return. In years of high NOR abundance, this 40% could make up 100% of the needed hatchery brood (pNOB= 100%). In that case, no HORs would be used in the hatchery brood. Hatchery fish can be allowed to reach the spawning ground (pHOS) if needed to achieve an appropriate number of fish spawning naturally (demographic benefit and use of available habitat). This however, would not be required during years of very high NOR returns as both objectives (pNOB and natural spawning) may be met with NORs.

In years of low NOR abundance, the same 40% of the NOR return would be removed for use in the hatchery brood (pNOB). However, in these years, that 40% may make up only a small part of the needed brood (i.e. pNOB 10%). In these years, enough HORs should be used to achieve needed hatchery brood and additional HORs should be allowed to spawn naturally (pHOS) to achieve the minimum acceptable level of naturally spawning.

The goal of this sliding scale is to achieve an "average" PNI over time of the desired level (0.67 or 0.5) depending on the population designation even though it may not be achieved in any one year. A good way to determine the level of NORs that should be removed each year (see above) is to review the return of NORs over a long time frame and iterate what level (30, 40, 50%) are needed, on average, to achieve the desired PNI.

Winthrop National Fish Hatchery: If managers decide to keep the existing on-station program at Winthrop for harvest objectives, it will require; (1) adipose fin-clipping the entire production; (2) removal of 80% of the unharvested returning adults. The HSRG encourages managers to develop a terminal selective fishery to assist in this removal and develop additional uses for the excess hatchery fish removed (food bank donations, stream nutrification).

The HSRG recommends that managers implement a BKD control strategy for their spring and summer/fall Chinook hatchery programs where BKD has proved a recurring problem. Ideally, the strategy should include culling (destroying) eggs/progeny from hatchery- and natural-origin brood that are found to be infected with the BKD agent. However, because brood fish with high levels of the BKD agent are more likely to transmit the agent to their progeny than brood with lesser levels of the agent, the culling of eggs/progeny from infected brood fish, should, at the very least, be applied to those with high levels of the BKD agent (e.g., ELISA OD value of 0.4 and above when broodstock are not in short supply and ELISA OD value of 0.6 and above when broodstock are in short supply). In addition, in programs using ESA-listed natural-origin brood fish, the culling of their eggs/progeny may, at the managers' discretion, be dispensed with. However, the ESA-listed broodstock should be injected, pre-spawning, with an appropriate antibiotic (preferably, azithromycin at 40 mg/kg fish), and the resulting eggs should be surface-disinfected with an iodophor. All pre-spawning brood injections may be limited to females, ESA-listed or otherwise.

Finally, eggs and hatchlings derived from broodstock found to be heavily infected with the BKD agent should be incubated/reared in isolation from those obtained from

broodstock with no or lesser levels of the BKD agent. In addition, the hatchlings should be reared at the lowest possible densities (below current standards), and, at the first signs of infection with the BKD agent, they should be treated with orally administered erythromycin (100 mg/kg fish) for 28 days. The treatment should be repeated if there is evidence that the BKD agent has persisted in the hatchlings.

Table 1. Results of AHA analysis for Methow Spring Chinook. The light green row indicates the natural population and yellow indicates the segregated hatchery population, if applicable.

Alternative	Type and Purpose	Prog Size (/1000)	HOR Recapture	Additional Weir Efficiency	Effective pHOS	PNI	NOS Esc	Adj Prod	Harvest	Hatchery Surplus
Baseline	Methow - Chewuch Int Cons	359.1	40%	0%	72%	0.06	433	0.9	255	284
	Twisp Int Cons	183.0	40%	0%	78%	0.29	82	0.9	57	33
	Winthrop Seg Harv	601.5	40%						233	260
Current	Methow - Chewuch Int Cons	359.1	40%	0%	72%	0.06	433	0.9	255	284
	Twisp Int Cons	183.0	40%	0%	78%	0.29	82	0.9	57	33
	Winthrop Seg Harv	601.5	40%						233	260
Manager Short-Term Strategies	Methow - Chewuch Int Cons	359.1	40%	0%	72%	0.06	433	0.9	255	284
	Twisp Int Cons	183.0	40%	0%	78%	0.29	82	0.9	57	33
	Winthrop Seg Harv	601.5	40%						233	260
Manager Long-term strategies	Methow - Chewuch Int Cons	359.1	40%	0%	61%	0.08	406	0.9	604	205
	Twisp Int Cons	183.0	40%	0%	69%	0.31	72	1.0	131	21
	Winthrop Seg Harv	601.5	80%						671	657
HSRG Solution	Methow - Chewuch Int Cons	359.1	40%	0%	61%	0.08	406	0.9	604	205
	Twisp Int Cons	183.0	40%	0%	69%	0.31	72	1.0	131	21
	Winthrop Seg Harv	601.5	80%						671	657