

5.6 Integration of Actions

All H's in the Upper Columbia ESU

The *All H Analyzer* and its acronym AHA, as used in this recovery plan, describes the integration of *in and out-of-basin effects* to salmon and steelhead. The analysis conducted literally explains contributions of “harvest, hatcheries, hydropower and habitat data and strategies” to the recovery equation. The “ocean,” and its cyclical conditions supporting salmon and steelhead survival, is often termed the “fifth H” and is an important aspect of recovery; one that must be taken into consideration during analysis. However, the ocean is included as part of the total recovery risk and population viability discussion in this plan, and, therefore, is not a direct part of the AHA process.

This section briefly describes an analytical process to discuss and preliminary investigations of the “out-of-subbasin effects (harvest, hatcheries and hydro) within their context to tributary habitat improvements as a multivariate exercise.

The salient point for this plan section is that the *four* main “H” elements combine biologically and affect the full life history pathways salmon and steelhead must navigate to survive as juveniles and return to spawn as adults. If this plan is successful in applying integration design across the H's, adults returning to the ESU will form the basis for reclassification and recovery goals. Without sufficient and integrated actions across the H's, the recovery equation will possibly fail or at best, is questionable as a comprehensive and cost effective plan given the geographic position of the Upper Columbia ESU above 8-9 dams.

AHA, as used in this planning exercise, shows how milestones (reclassification and recovery) are reached and how recovery goals express themselves through time as actions between in-basin and out-of-basin effects. This process also allows transparent demonstration of available/allowable harvest, harvest regimes, (time, place and manner) and possible modifications to existing hatchery programs and planning for future production and program reforms as they relate to recovery goals. In the end, AHA provides a window through which to view the percentages of hatchery versus wild fish on the spawning grounds, escapement goals, requisite passage and habitat conditions, and a process for detailed stakeholder and scientific discussions across the H's.

At this time, other options and/or purported models are not available for use or review by the Upper Columbia recovery planners.

Preliminary Results from the Upper Columbia AHA workgroup.

See appendix X development of the AHA process and detailed spreadsheet results for each listed population.

Note: *Technical committees for the UCSRB have not reviewed these results and therefore, they do not constitute or condition recommendations in this plan. They are illustrative only at this time. However,*

these results and the AHA process can form the basis for more in-depth analyses for future and other management, recovery and reform plans.

Wenatchee Spring Chinook-- Integrated Program:

1. Test results of AHA analysis revealed that the hatchery environment maybe having a larger affect on the fitness of naturally spawning fish than the wild environment (e.g., the *proportion of natural introgression* [PNI], or generally “fitness”] below 0.5).
2. Higher level of integration is possible under “Current” scenario by reducing the number of hatchery origin fish on the spawning grounds either (i.e., removal at collection points or selective harvest).
3. Scenario 3 habitat improvements lead to a higher number of NORs, which allow integration level to be advance above PNI of 0.5, if coupled with removal of some hatchery origin fish; (see 2 above) additional advances in PNI are possible.
4. Scenario 1 habitat improvements (an their effect on the number of natural origin fish) will not have a large affect on the integration rate unless additional hatchery origin fish are removed. Note- (Scenario 3 and Scenario 1 habitat improvements produce very close to the same level of productivity due to near pristine conditions in the Upper Wenatchee.)
5. Hydro losses (SARs) remained constant throughout this exercise. Changes and/or hypothetical SARs in the hydro system can be analyzed to asses their affect and gauged within the context of fully attaining recovery plan goals.

Wenatchee Summer Steelhead—Integrated Program

1. Preliminary results of AHA analysis revealed that the hatchery environment might be having a larger affect on the fitness of naturally spawning fish than the wild environment and below preferred level of integration, but “Current” condition is an improvement from “Before Listing”.
2. Higher level of integration is possible by reducing the number of hatchery origin fish on the spawning grounds through either removal at collection points or selective harvest.
3. Scenario 1 habitat improvements (an their effect on the number of natural origin fish) will allow for advances in PNI.
4. Scenario 3 habitat improvements lead to a higher number of NORs, which allow integration level to advance to near PNI of 0.5. If combined with removal of some hatchery origin fish, either removal at collection points or selective harvest, advances in PNI are possible.

6. Hydro losses (SARs) remained constant throughout this exercise. Changes and/or hypothetical SAR's in the hydro system can be analyzed to assess their affect and gauged within the context of fully attaining recovery plan goals.

Methow Spring Chinook-- Integrated Program

1. Results of AHA analysis revealed that the hatchery environment maybe having a larger affect on the fitness of naturally spawning fish than the wild environment. (PNI below 0.5)
2. Higher level of integration is possible (increased PNI) by reducing the number of hatchery origin fish on the spawning grounds by either removal at collection points or selective harvest.
3. Scenario 3 habitat improvements lead to a higher number of NORs which, when combined with removal of some hatchery origin fish through either removal at collection points or selective harvest, allow integration level to be advanced, but still below 0.5
4. Scenario 1 habitat improvements (an their effect on the number of natural origin fish) will allow for additional advances in PNI.
7. Hydro losses (SARs) remained constant throughout this exercise. Changes and/or hypothetical SAR's in the hydro system can be analyzed to assess their affect and gauged within the context of fully attaining recovery plan goals.

Methow Summer Steelhead-- Integrated Program

1. Results of AHA analysis revealed that the hatchery environment maybe having a larger affect on the fitness of naturally spawning fish than the wild environment. Below preferred level of integration, but "Current" condition is an improvement from "Before Listing".
2. Higher level of integration is possible by reducing the number of hatchery origin fish on the spawning grounds through either removal at collection points or selective harvest.
3. Scenario 3 habitat improvements lead to a higher number of NORs that allow integration level to be advance above PNI of 0.5, if coupled with removal of some hatchery origin fish; (see 2 above) additional advances in PNI are possible.
4. Scenario 1 habitat improvements (an their effect on the number of natural origin fish) will allow for additional advances in PNI.

8. Hydro losses (SARs) remained constant throughout this exercise. Changes and/or hypothetical SAR's in the hydro system can be analyzed to asses their affect and gauged within the context of fully attaining recovery plan goals.

Okanogan Summer Steelhead—Segregated Program transition to Integrated Program

1. Poor productivity of natural environment prevents many natural origin fish from being present. In addition, results of AHA analysis revealed that the hatchery environment maybe having a larger affect on the fitness of naturally spawning fish than the wild environment. Potential habitat improvements show increased survival for both NOR and HOR's however and thus, support the transition to an integrated program.
2. Under "Current "column (see appendix X), additional natural origin fish are incorporated as broodstock, which improves integration rate. Higher level of integration is possible by reducing the number of hatchery origin fish on the spawning grounds through either removal at collection points or selective harvest.
3. Scenario 3 habitat improvements lead to a higher number of NORs which, when combined with removal of some hatchery origin fish through either removal at collection points or selective harvest, allow integration level to be advanced, but still below 0.5
4. Scenario 1 habitat improvements (and their effect on the number of natural origin fish) will allow for 100% use of natural origin fish for hatchery broodstock and increases in PNI value above 0.5.
9. Hydro losses (SARs) remained constant throughout this exercise. Changes and/or hypothetical SAR's in the hydro system can be analyzed to asses their affect and gauged within the context of fully attaining recovery plan goals.

Appendix X Background on the development of the AHA process

In 2000, when the US Congress tasked the Hatchery Scientific Review Group (HSRG) with reviewing the Puget Sound and coastal Washington hatchery system, the general discussion about hatcheries debated whether hatcheries were “good” or “bad.” The HSRG chose a more scientifically sound approach—applying science to assess the benefits and risks from hatchery (and other “H” programs), and using this science to make recommendations that increase the likelihood of improving benefits and reducing risks, on a program specific basis.

The HSRG also determined that management decisions about hatchery programs must be made in the context of the particular circumstances in a given watershed. This approach requires an understanding of the current and expected future status of all natural and hatchery stocks in an ecosystem—along with the habitat on which they depend—as well as harvest and conservation goals. Recently, the Northwest Power and Conservation Council (NPCC), with recommendations from Council staff, NOAA, the Colville and Yakama Tribes, USFWS, WDFW and ODFW recommended expanded use of the AHA process and analyzer for the Columbia basin and that the results be used to inform management decisions and provide the opportunity for comparative studies.

In 2004, AHA was used in a series of HSRG/co-manager technical workshops held in ten regions. The purpose of the workshops was to apply the guidelines for integrated and segregated hatchery programs to regional case studies, preparing the co-managers for decision-making meetings about implementing reform. AHA is a management decision-making tool, built on recent work by HSRG, WDFW, NWIFC, NOAA Fisheries and other scientists, that allows the user to:

- Use current habitat productivity/capacity, harvest rates and hatchery operations in a watershed and consider what will result from that set of factors, in terms of the number of fish returning to the habitat, harvest and hatchery, and the amount of influence the natural environment should have on integrated natural/hatchery populations.
- Examine how these results can be modified in the short- and long-terms if habitat, harvest and/or hatchery programs are changed.
- Confirm current conditions, describe a goal for the long-term future of the population, and develop one or more scenarios for achieving or moving toward that goal.
- Apply a scientific approach in the face of the uncertainty always present in natural resource management.
- Move from general management guidelines to strategies specifically tailored to unique watershed conditions and circumstances.

Example model results—see attached spreadsheets

Referene for background material: 2005. The Hatchery Scientific Review Group. The “All H” Analyser (AHA) Management Tool.

Reference for the Upper Columbia Recovery Plan: 2005: Upper Columbia AHA workgroup. Initial and preliminary results for the Upper Columbia Spring Chinook and steelhead populations.

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