

2. GOALS

2.1. Watershed Vision

Quality of life is a major asset for Whatcom County, and protecting and restoring fish, their habitats, and the watershed processes that support them are essential to the long-term physical, cultural, and economic health of the community. Salmonids are indicators of the overall health of the natural environment, which attracts visitors and residents to the county. They are a cornerstone in the food web of terrestrial and aquatic ecosystems.

Additionally, restoring salmon runs to harvestable levels is vital to the culture and economy of the region. Western Washington Treaty Tribes, including the Nooksack Tribe and Lummi Nation, retain fishing rights to these fish as specifically described by the 1974 court case *U.S. v. Washington*. Protection of this treaty-guaranteed right is essential to preserving the cultural and economic center of tribal communities. Non-tribal harvest among commercial and recreational users is also an important element.

The local vision for salmon recovery in WRIA 1 is to recover self-sustaining salmonid runs to harvestable levels through the restoration of healthy rivers and natural stream processes, careful use of hatcheries, and responsible harvest, and with the active participation and support of local landowners, businesses, and the larger community. Achieving this vision will require: (1) a range of voluntary actions that will accommodate community needs and interests; (2) regulatory actions to ensure no net loss of properly functioning conditions in salmonid habitats; and (3) on-going public involvement and education, both to help policymakers understand community needs and balance competing interests, and to build public support for actions necessary to successfully recover salmon.

2.2. Near-Term Priorities

A more proximate goal, and one that underlies much of the federal and state funding allocated to salmon recovery in recent years, is the recovery and delisting of endangered and threatened species and the subsequent relief to local governments, businesses and citizens from the regulatory constraints of ESA. This goal necessitates prioritization of listed species in recovery planning efforts. Employing a process-oriented approach to restoration that is based on sound scientific understanding of the biological and physical processes limiting salmonid production, however, will ensure benefit to and facilitate recovery of multiple species, even while benefits to priority species are maximized. Such a watershed-based approach will also reduce the

likelihood for future salmonid listings, as well as facilitate conservation of the natural habitats and ecosystems valued by humans, wildlife, and other biota.

The approach to salmon recovery in the near-term (10-year time frame) is to:

- Focus and prioritize salmon recovery efforts to maximize benefit to the two independent chinook populations identified by the Technical Recovery Team (PSTRT 2001):
 - North Fork/Middle Fork Nooksack early chinook.
 - South Fork Nooksack early chinook.
- Address late-timed chinook through adaptive management, focusing in the near-term on identifying hatchery- versus naturally-produced population components.
- Facilitate recovery of WRIA 1 bull trout by:
 - Implementing actions with mutual benefit to both early chinook and bull trout .
 - Removing fish passage barriers in presumed bull trout spawning and rearing habitats in the upper Nooksack River watershed.
- Address other salmonid populations by:
 - Protecting and restoring salmonid habitats and habitat-forming processes throughout WRIA 1 through regulatory and incentive-based programs.
 - Encouraging and supporting voluntary actions that benefit other WRIA 1 salmonid populations without diverting attention from early chinook recovery.

2.3. Treaty Rights

In 1974, *U.S. vs. Washington* (the “Boldt decision”) reaffirmed the rights of the Point Elliot treaty tribes, which includes the Lummi Nation and Nooksack Indian Tribe, to their treaty-reserved fishing rights and established the tribes as co-managers of the resource entitled to 50% of the harvestable number of salmon and trout returning to Washington waters. Fishing is vital to the tribes for cultural, economic, and subsistence purposes, and both the Lummi Nation and Nooksack Indian Tribe will continue to exercise their legally established fishing rights as salmon recovery proceeds in WRIA 1.

To this end, the tribes’ goals with respect to fisheries harvest are as follows:

- Near-term (1 to 10 years)
 - Manage harvest to provide for exercise of treaty-reserved fishing rights while not impeding recovery of early chinook populations.
 - Protect current harvest levels for late-timed chinook, sockeye, pink, coho, steelhead and chum salmon.
- Intermediate time frame (11 to 25 years)

WRIA 1 SALMONID RECOVERY PLAN
SECTION 2: GOALS

- Expand harvest of early chinook to include more meaningful ceremonial and subsistence use and of other stocks.
- Long-term (25 to 100 years)
 - Expand fisheries further to sustainably harvest recovered, self-sustaining salmonid populations.

2.4. Biological Goals

The success of this Recovery Plan will be measured by the recovery of listed salmonid species, as well as the quantity and quality of the habitats upon which they depend. Biological goals in the form of species-specific targets are presented in the sections below for chinook and bull trout.

WRIA 1 SALMONID RECOVERY PLAN
SECTION 2: GOALS

Table 2.1. Recovery Goals for WRIA 1 Chinook Populations by Viable Salmonid Population (VSP) parameter.
See text for description of how goals were derived.

Population	Spawner Abundance			Outmigrant Smolt Abundance		Diversity	Spatial Structure
	Low Productivity		High Productivity	Low Productivity	High Productivity		
	Planning Range for Abundance	Planning Targets for Abundance (productivity in parentheses)					
South Fork Nooksack Early Chinook	9,900 ¹ – 13,000 ² (1.0)	9,900 (1.0) ¹	2,300 (3.3) ¹	410,000 ¹	280,000 ¹	<i>To be established through adaptive management.</i>	
North Fork/Middle Fork Early Nooksack Chinook	14,000 ¹ – 22,000 ² (1.0)	14,000 (1.0) ¹	3,400 (3.1) ¹	610,000 ¹	410,000 ¹		

¹ Derived from EDT model, PFC+ scenario.

² Derived from EDT model, Historical Conditions scenario.

³ As depicted for the population in WRIA 1 Salmonid Distribution maps. Given interannual variation in environmental conditions and population abundances, a reach is considered occupied if a life stage is observed within the reach any time within a 10-year time frame.

2.4.1. Chinook

2.4.1.1. Recovery Goals

NOAA Fisheries has appointed a Puget Sound Technical Recovery Team (TRT) to assist in development and evaluation of the Puget Sound Chinook Recovery Plan. The TRT has developed planning ranges and preliminary guidance for the recovery and delisting of the Puget Sound Chinook ESU (PSTRT 2002). WRIA 1 constitutes one of five geographic regions in Puget Sound for the evaluation of ESU-wide recovery scenarios (Figure 1.1; PSTRT 2002). The TRT recommends “at least 2 to 4 viable chinook salmon populations in each of the 5 geographic regions” with “one or more viable populations from each major genetic and life history group historically present within that geographic region.” A salmonid population is considered viable if it “has a negligible risk of extinction due to threats from demographic variation, local environmental variation, and genetic diversity changes over a 100-year time frame” (McElhany et al. 2000); an acceptable risk of extinction is 5% or less (PSTRT 2002). Population viability will be evaluated in terms of the following Viable Salmonid Population (VSP) parameters: (1) abundance, the number of individuals in the population at a given life stage or time; (2) productivity/growth rate: the actual or expected ratio of abundance in the next generation to current abundance; (3) population spatial structure: how the abundance at any life stage is distributed among available or potentially available habitats; and (4) diversity: the variety of life histories, sizes, and other characteristics expressed by individuals within a population. (McElhany et al. 2000; PSTRT 2002).

Table 2.1 presents the planning ranges and targets for abundance and productivity for local chinook populations (Shared Strategy 2002), which were developed jointly by the TRT, WDFW, Lummi Nation, and Nooksack Tribe. Planning ranges were developed using several technical models and provide a broad estimate of the abundance needed for a population to be viable over time (Shared Strategy 2002). Planning targets reflect the acceptable trade-off between abundance and productivity, i.e. lower abundances are acceptable if a population is more productive. A more detailed explanation of how targets and ranges were derived is provided in *Planning Ranges and Preliminary Guidelines for the Delisting and Recovery of the Puget Sound Chinook Salmon Evolutionarily Significant Unit* (PSTRT 2002). Locally developed diversity and spatial structure goals are also presented.

Abundance and productivity targets were estimated using the Ecosystem Diagnosis and Treatment (EDT) model, which models chinook population performance based on different habitat conditions scenarios (see Section 4 *Limiting Factors* for a description of EDT). Targets and ranges presented for abundance, productivity, and diversity in Table 2.1 are derived as described below:

Planning Range for Abundance:

Minimum: Number of spawners at a point in spawner-recruit curve where one spawner produces only one adult fish in the subsequent generation (i.e. productivity of 1.0). Curve is modeled based on properly functioning conditions in the freshwater environment and historical conditions in the estuarine environment.

Maximum: As above, except curve is based on historical conditions in the freshwater and estuarine environments.

Planning Targets for Abundance:

Since EDT explicitly models survival by life stage, number of outmigrant smolts can also be modeled under different habitat conditions scenarios. For both spawner and smolt abundance, curves are based on properly functioning conditions in the freshwater environment and historical conditions in the estuarine environment.

Low Productivity: For spawners, same as Minimum of Planning Range. For smolts, the number of smolts expected to survive to outmigration based on that number of spawners. Both spawner and smolt number are based on properly functioning conditions in the freshwater environment and historical conditions in the estuarine environment.

High Productivity: For spawners, number of spawners at a point in spawner-recruit curve where the population provides the highest sustainable yield for every spawner. For smolts, the number of smolts expected to survive to outmigration based on that number of spawners. The productivity ratio associated with this point is the number of recruits (returning adults) per spawner (e.g. 3.6 for South Fork Nooksack Early Chinook, Table 2.1).

Diversity and Spatial Structure

The goals for chinook diversity and spatial structure will be developed at a later date as part of the adaptive management framework.

2.4.1.2. Interim Benchmarks

Even with implementation of actions recommended in this Plan, accomplishment of the chinook recovery goals listed above is expected to take at least 100 years. Establishment of interim targets is necessary to ensure that consistent and measurable progress is made towards chinook recovery. Additional objectives are provided below as interim benchmarks for recovery:

- June 2015: Full implementation of Early Actions list (see Appendix B).
- June 2030:
 - North/Middle Fork Nooksack early chinook
 - Abundance: 3,283
 - Productivity: 3.4
 - Diversity Index: 77%
 - South Fork Nooksack early chinook

WRIA 1 SALMONID RECOVERY PLAN
SECTION 2: GOALS

- Abundance: 1,562
- Productivity: 2.9
- Diversity Index: 79%

The June 2030 interim benchmarks were developed using the Ecosystem Diagnosis and Treatment (EDT) model, which integrates the effects of multiple reach-level habitat attributes on chinook population performance. The benchmarks represent the population performance associated with an estimate of habitat potential after 25 years, assuming that the 10-year actions presented in Appendix B are implemented, in addition to similar actions that can be implemented over the longer time scale of 25 years (i.e., year 11 to year 25). The modeled scenario assumes no degradation of existing function. Further, the scenario does not incorporate the benefits of either actions to be implemented in the nearshore environment or additional actions to be implemented from year 11-25 in the lower Nooksack River tributaries and in the estuary. Accordingly, the benchmarks should be considered conservative in terms of possible restoration actions, and may be optimistic in terms of protection.

It is anticipated that these benchmarks will be refined and more time scales added as more information becomes available and further analysis and modeling are conducted.

2.4.2. Bull Trout

The Puget Sound Bull Trout Recovery Unit Team (PSRUT) has also provided recovery planning guidance for the Puget Sound bull trout recovery unit (PSRUT 2002). In evaluating recovery for delisting, the PSRUT will consider the following characteristics within each core area population: (1) abundance, the number of adult spawners; (2) distribution, measured by the number of local populations and their spatial structure; (3) trend, (productivity or the reproductive rate of the population as measured by population trend and variability); and (4) connectivity (the diversity of the population as measured by the persistence of the migratory life history forms and of the supporting functional habitat) within the core area.

Table 2.2 presents the bull trout recovery goals for WRIA 1. Goals are derived from the *Draft Recovery Plan for the Coastal-Puget Sound Distinct Population Segment of Bull Trout* (USFWS 2004). A timeframe of at least 3 to 5 bull trout generations (15 to 25 years), or longer, is expected to achieve recovery, depending on the extent of and timeline for implementation of bull trout recovery actions (USFWS 2004).

The proposed goals for the respective core areas are based on minimum effective population sizes for the respective local population groups that comprise the core areas (USFWS 2004). The Nooksack core area has 10 local populations tentatively identified, and Chilliwack has three, with a fourth potential local population in Depot Creek (if use is confirmed on the U.S. side of the border). The three Chilliwack local populations are

WRIA 1 SALMONID RECOVERY PLAN
SECTION 2: GOALS

upper Chilliwack River, Little Chilliwack River, and Silesia Creek. See Section 4.1.5.1 for a listing of the Nooksack local populations.

Local populations are groupings of bull trout that are thought to represent reproductively interactive units. The combination these locally reproductive populations make up core population areas, and occasional gene flow may occur between local populations. The recovered abundance targets for each core area were proposed with consideration for the minimum number of adult spawners needed to avoid deleterious effects of genetic drift, and the recovery team selected 1,000 spawners as the general minimum for a core population. Additionally, each local population was recommended to have a minimum population of 200 spawners. This number was chosen as data from the Skagit River indicate that only 50% of spawners are first time spawners (reducing effective population size), to avoid inbreeding depression.

Table 2.2. Recovery Goals for WRIA 1 Bull Trout Populations by core population and population parameter.

Core Area	Abundance	Distribution	Trend	Connectivity
Nooksack	2000	Maintain or expand the current distribution	Stable or increasing trends in abundance at or above the recovered abundance target level in each core area, based on 10- to 15-year time frame.	Restore connectivity by identifying and addressing specific existing and potential barriers to bull trout movement in each core area.
Chilliwack	600	Maintain or expand the current distribution		