❖Stillaguamish/Snohomish

Overview

This region includes the watersheds contained by the Stillaguamish and Snohomish rivers and Tulalip Bay. For the purposes of this review, the Scientific Group and the regional managers divided the region into three sub-regions and then reviewed the hatchery programs involving each identified sub-regional salmonid stock (for example, North Fork Stillaguamish summer chinook). The review included a consideration of the program's effects on all other hatchery and naturally spawning sub-regional salmonid stocks. The sub-regions identified for this region include:

1. Stillaguamish River Watershed
2. Snohomish River Watershed
3. Tulalip Bay and Independent Tributaries

This chapter provides region-wide recommendations for the Stillaguamish/Snohomish region, a general overview of each sub-region, followed by reviews and recommendations for each salmonid stock that has an associated hatchery program.

FISHERIES

Chinook, coho and chum salmon harvest management in the Stillaguamish/Snohomish region is directed primarily towards the needs of natural production and secondarily for harvest of surplus hatchery production. Odd-year pink salmon harvest management is based on natural production; there is no hatchery production for pink salmon in this region. In addition to the normal odd-year pinks, the Snohomish supports an even-year run. Currently this population supports no directed fisheries. Winter steelhead harvest management is directed primarily towards the needs of natural production and secondarily for harvest of hatchery production. Summer steelhead harvest management is directed towards the needs of natural production and harvest of hatchery production. Sea-run cutthroat management is based entirely on natural production.

CONSERVATION

All Puget Sound chinook are currently managed under the *Puget Sound Comprehensive Chinook Management Plan: Harvest Management Component, March 23, 2001*. The intent of this plan is to maintain exploitation rates on natural chinook populations at or below levels that will allow them to rebuild as habitat conditions improve to allow greater production. Puget Sound coho salmon are currently managed under exploitation rate guidelines and escapement breakpoints being developed for the co-managers' *Comprehensive Coho Management Plan*. Natural origin chum salmon in the region have been managed for fixed escapement goals, with different goals set for odd- and even-year returns. Beginning with the 2000 management year, the management objectives were revised to add a harvest rate ceiling to these escapement goals. Odd-year pinks are managed so that the expected natural spawning escapement exceeds the goals for each of the rivers in the region. Even-year pink salmon are managed to allow the population to continue to expand. The goal of regional winter steelhead management is to consistently exceed the established escapement goal. The priority for regional summer steelhead is to place the needs of the naturally spawning fish first. Under the management strategy for sea-run cutthroat, minimum fish size limits were set so that the majority of

females (more than 50%) would be allowed to spawn at least once. Harvest under this scenario is allowed only where stocks are thought to be healthy and such harvest is consistent with management objectives.[61]

HABITAT

The geology of Stillaguamish basin is a complex combination of continental and alpine glacial material, and marine/non-marine interglacial deposits that have been influenced by volcanism, faulting and erosion. The upper North Fork Stillaguamish is dominated by Darrington Phyllite which is a metamorphic rock type that is particularly prone to erosion (a major problem in this watershed). Clay, silt and sand deposits of glacial and lake origin are the main source of significant sediment production in the watershed. In the steeper sloped areas, these deposits are particularly prone to landslides, which are a significant problem for salmonids living in this drainage. Over one third of the Stillaguamish watershed is in the rain-on-snow zone area (1,001–2,999 feet in elevation). As a result of the low elevation nature of this watershed and the extensive land use modifications, ten of the largest eleven annual peak flows on record occurred between 1980 and 1995.[62]

The future condition of habitat in this basin will depend primarily on social, political and economic factors, which are difficult to predict. Weather conditions will also influence habitat conditions. An optimistic forecast would assume that the general public and stakeholder groups would fully support salmon recovery goals and actions, and demand political action for implementation of recovery plans. There is reason to hope that we will be going down the optimistic road that will eventually lead to improved habitat quality, but that road will be slow and have lots of obstacles to overcome before we get to our destination. Ten years might not be long enough to see habitat improvement, but hopefully habitat improvement will not take much longer. In fifty years, the hope is the habitat will be in better shape than it is now.

Formal long-term habitat goals have not yet been established for the Stillaguamish Basin. The Stillaguamish Technical Advisory Group (STAG) published the Technical Assessment for Chinook Salmon Recovery in the Stillaguamish Watershed on July 12, 2000. This document contains three habitat recovery objectives for the Stillaguamish Watershed: 1) maintain and restore natural watershed processes; 2) maintain a dispersed and interconnected network of high quality habitat that addresses the needs of all life history stages of chinook; and 3) monitor and evaluate certain land use activities so that they can be adapted (where possible) to achieve specific objectives outlined in the document.

Long-term habitat goals for the Snohomish Basin are currently being developed. The *Initial Snohomish River Basin Chinook Salmon Conservation/Recovery Technical Work Plan* published October 6, 1999, by the Snohomish Basin Salmonid Recovery Technical Committee, recommends five habitat management concepts and principles that form the foundation of the work plan. These are: 1) emphasize protection and reconnection of habitat; 2) use historical information to guide today's decisions; 3) preserve and restore the natural ecosystem processes; 4) use monitoring and assessment to guide adaptive management; and 5) preserve options for the future.

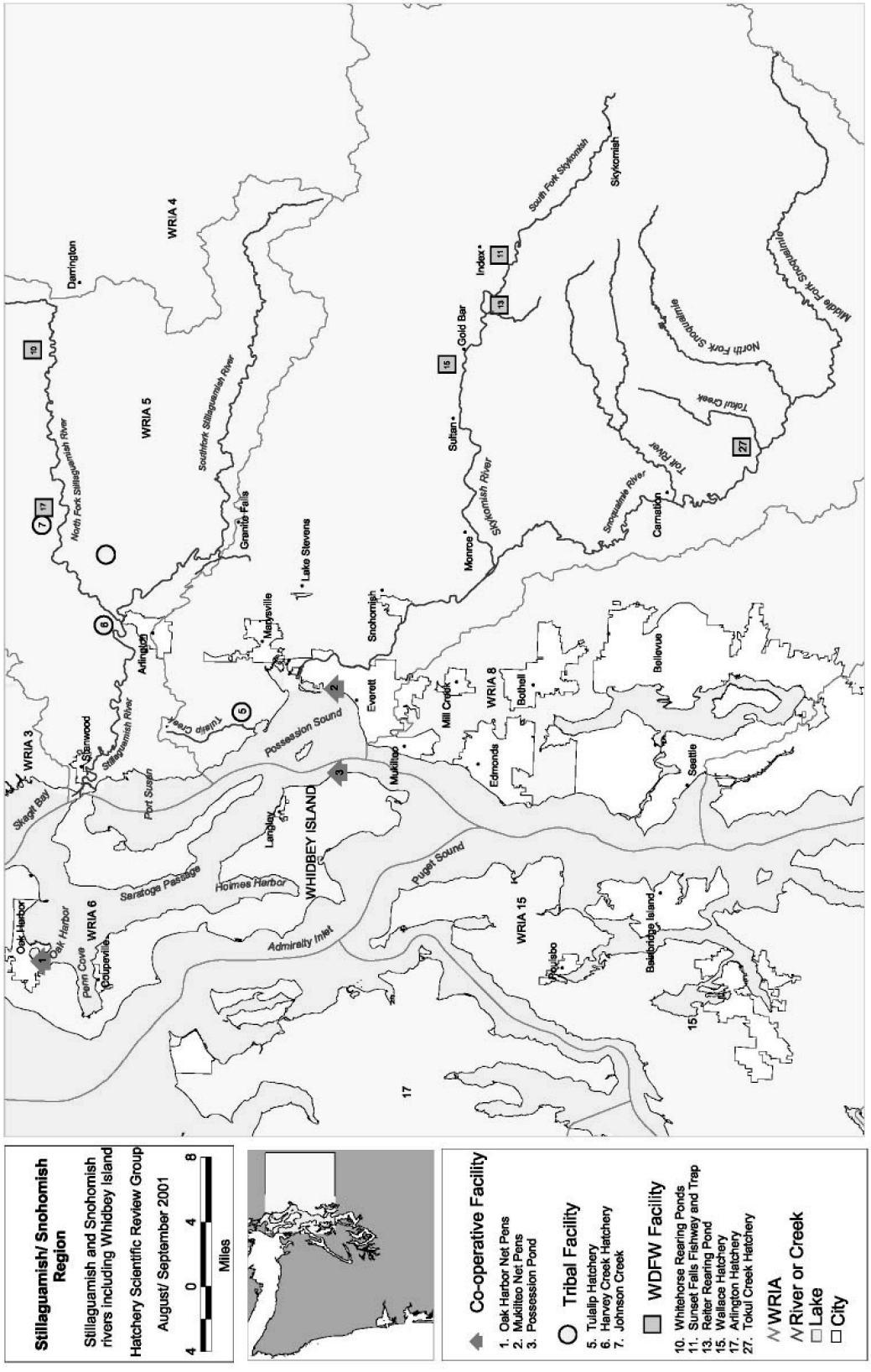
The work plan also identifies nine major habitat problems in the basin with recommended actions to address those problems. The Technical Committee has also produced the *Snohomish River Basin*

[61] *Kit Rawson, The Tulalip Tribes and Curt Kraemer, Washington State Department of Fish and Wildlife, September 2001.*

[62] *Kip Killebrew, Stillaguamish Tribe; includes citations of Thomas et al. 1997, 2496 Report, Perkins and Collins, 1997, STAG, 2000, and Collins, 1997.*

Chinook Salmon Habitat Evaluation Matrix. This report evaluated seven major habitat conditions within 62 sub-basins in the Snohomish Basin. Performance criteria and interim recovery goals were developed to establish three categories of habitat status: properly functioning, at risk, and not properly functioning. The Technical Committee is currently working on a similar project covering all salmonid species within the watershed. For chinook salmon, the habitat conditions in the majority of all sub-basins was considered to be at risk or not properly functioning.[63]

[63] *Mike Chamblin, Washington State Department of Fish and Wildlife, September 2001.*


Stillaguamish/ Snohomish Region
Stillaguamish and Snohomish rivers including Whidbey Island
Hatchery Scientific Review Group
August/ September 2001
4 0 4 8
Miles
Co-operative Facility
1. Oak Harbor Net Pens
2. Mukilteo Net Pens
3. Possession Pond
Tribal Facility
5. Tulalip Hatchery
6. Harvey Creek Hatchery
7. Johnson Creek
WDFW Facility
10. Whitehorse Rearing Ponds
11. Sunset Falls Fishway and Trap
13. Reiter Rearing Pond
15. Wallace Hatchery
17. Arlington Hatchery
27. Tokul Creek Hatchery
WRIA
River or Creek
Lake
City
WHIDBEY ISLAND
Possession Sound
Puget Sound
Admiralty Inlet
Saratoga Passage
Holmes Harbor
Port Susan
Skagit Bay
Oak Harbor
Penn Cove
Coupeville
Stanwood
Arlington
Marysville
Everett
Snohomish
Lake Stevens
Granite Falls
Darrington
Monroe
Sultan
Gold Bar
Index
Skykomish
Carnation
Duvall
Mukilteo
Mill Creek
Edmonds
Bothell
Bellevue
Seattle
Renton
Bainbridge Island
Langley
WRIA 3
WRIA 4
WRIA 5
WRIA 6
WRIA 8
WRIA 15
North Fork Stillaguamish River
Southfork Stillaguamish River
Stillaguamish River
Skykomish River
South Fork Skykomish
North Fork Snoqualmie
Middle Fork Snoqualmie
Tokul Creek
Tolt River
Snoqualmie River
Tulalip Creek

STILLAGUAMISH

Overview

STOCK STATUS[64]

Stocks	Hatchery Program?	Biological Significance (L= Low, M = Intermediate, H = High)			Population Viability (L= Critical, M = At Risk, H = Healthy)			Habitat (L = Inadequate, M = Limiting, H = Healthy)			Harvest Opportunity (0 = None, L = Occasional, M = Most years, H = Each year)		
			Goals			Goals			Goals			Goals	
		Now	Short-Term	Long-Term	Now	Short-Term	Long-Term	Now	Short-Term	Long-Term	Now	Short-Term	Long-Term
NF Stillaguamish Summer Chinook	Y	H	H	H	L/M	L/M	H	L	L	H	0	L	M
SF Stillaguamish Chinook	N	H	H	H	L	L	H	L	M	H	L	L	M
NF Stillaguamish Chum	Y	H	H	H	H	H	H	M	M	H	M	M	M
SF Stillaguamish Chum	Y	H	H	H	H	H	H	M	M	H	M	M	M
Stillaguamish Coho	Y	H	H	H	M	M	H	M	M	H	L	M	M
Deer Creek Stillaguamish Coho	N	H	H	H	L	M	H	L	M	H	L	L	M
NF Stillaguamish Pink	N	H	H	H	H	H	H	M	M	H	M	M	M
SF Stillaguamish Pink	N	H	H	H	H	H	H	M	M	H	M	M	M
NF Stillaguamish Hatchery Summer Steelhead	Y	L	L	L	L	L	L	L	L	L	H	H	H
NF Stillaguamish Deer Creek Summer Steelhead	N	H	H	H	M	M	H	L	M	H	0	L	M
SF Stillaguamish Hatchery Summer Steelhead	Y	L	L	M	L?	L?	L?	M	M	H	0	L	M
SF Stillaguamish Other Summer Steelhead	N	L	L	M	H	H	H	M	M	H	0	L	M
SF Stillaguamish Canyon Summer Steelhead	N	H	H	H	M	M	H	L	M	H	0	L	M
Stillaguamish Natural Winter Steelhead	N	H	H	H	M	M	H	M	M	H	L	M	M
Stillaguamish Hatchery Winter Steelhead	Y	L	L	L	L?	L?	L?	M	M	H	H	H	H
Stillaguamish Cutthroat	N	H	H	H	H	H	H	M	M	H	0	L	L
Stillaguamish Char	N	H	H	H	M	M	H	M	M	H	L	L	M

HABITAT

The Stillaguamish River drains an area of approximately 438,365 acres and includes more than 4,618 miles of streams and rivers. The river enters Puget Sound near the town of Stanwood, 16 miles north of Everett. This watershed includes more than 890 miles of anadromous stream habitat, just less than one-third of the total stream network. The headwaters are in the North Cascades, a topographically diverse area characterized by peaks and valleys carved by glacial activity. The South Fork Stillaguamish drainage begins at Three Fingers Peak (6,854 feet). Above the town of Silverton, the South Fork loses about 2,000 feet in elevation in three miles and then opens up to a valley floor. The river then flows 26 miles through this gradually widening valley, which is bordered by high mountains and ridges. Elevation drops 1,000 feet to the head of Robe Canyon, then another 600 feet in the eight miles to the mouth of Canyon Creek. Below Canyon Creek, the South Fork Stillaguamish flows an additional 12 miles northwesterly through a canyon and then over Granite Falls. The South Fork Stillaguamish continues an additional four miles through a narrow floodplain to its confluence with the North Fork.

[64] *This table contains ratings for all the salmonid stocks in the sub-region, as provided by the managers. For definitions of these ratings, see the* Components of This Report *section of the Introduction.*

The North Fork Stillaguamish headwaters form at an elevation of about 4,550 feet. The first 16 miles of the North Fork Stillaguamish, including the major tributaries of Squire, Boulder, French and Deer creeks, flows through narrow valleys with steep gradients. Near the present-day city of Darrington, the North Fork Stillaguamish emerges from the higher mountains and enters a wide valley characterized by braided channel, back channel sloughs, and ox-bow lakes. Its confluence with the South Fork Stillaguamish occurs at an elevation of 52 feet. The mainstem gradually slopes downward as it meanders through a wide floodplain to Port Susan.[65]

HATCHERIES

Whitehorse Ponds

Whitehorse Ponds are located 1.5 miles upstream of the mouth of Whitehorse Springs Creek, a tributary to the North Fork Stillaguamish River at river mile 28 from its confluence with the mainstem Stillaguamish River. The purpose of the facility is to produce winter and summer-run steelhead and rainbow trout for harvest. In addition, the facility works in cooperation with the Stillaguamish Tribe on a Stillaguamish summer chinook recovery program. The facility is closely linked with the WDFW Arlington Hatchery, on which it depends for incubation and initial rearing of steelhead and rainbow.[66]

Harvey Creek and Johnson Creek Hatcheries

The Stillaguamish Tribe's Harvey Creek Hatchery is located two miles upstream of the mouth of Harvey/Armstrong Creek, which is located 15.3 miles upstream of the mouth of the Stillaguamish mainstem. The Stillaguamish Tribe also has an acclimation pond located on Johnson Creek, which is a tributary of the North Fork Stillaguamish. The US Navy has a small hatchery located on Jim Creek, which is a tributary of the South Fork Stillaguamish. There are chinook, chum, steelhead and coho programs sited at these Stillaguamish Tribe hatcheries.[67]

Arlington Hatchery

The Arlington Hatchery was constructed by the WPA and started operating in 1939. It is located nine miles east of Arlington on Highway 530. It currently rears rainbow and cutthroat trout for inland recreational fisheries. In addition, it supports the winter and summer steelhead programs at Whitehorse Ponds, providing early rearing of these fish. Arlington Hatchery's major program is the hatching, rearing and planting of rainbow trout. The facility produces approximately 160,000 "legal" rainbow, 120,000 fingerling rainbow and 45,000 fingerling cutthroat trout. These fish are planted primarily in Snohomish and Island counties, but Skagit and King counties also get plants of these 8–13 inch rainbow trout.[68]

[65] *Mike Chamblin, Washington State Department of Fish and Wildlife, September 2001.*

[66] *Chuck Lavier, Washington State Department of Fish and Wildlife, September 2001.*

[67] *Kip Killebrew, Stillaguamish Tribe, September 2001.*

[68] *Darrell Mills, Washington State Department of Fish and Wildlife, September 2001.*

North Fork Stillaguamish Summer Chinook

Stillaguamish Tribe and Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	High	High	High
Population Viability	Critical/At Risk	Critical/At Risk	Healthy
Habitat	Inadequate	Inadequate	Healthy
Harvest Opportunity	None	Occasional	Most Years
Hatchery Program:			
Purpose	Conservation		
Type	Integrated		

PROGRAM DESCRIPTION

The North Fork Stillaguamish summer chinook stock derives from, and is maintained by, annual brood stock collection in the North Fork Stillaguamish River and adult returns to Whitehorse Hatchery. This program began in 1986 and is included in the Stillaguamish and Skagit Chinook GDU. This is an integrated conservation program with the goal of assisting with recovery of summer chinook salmon in the North Fork Stillaguamish River. To this end, 65 males and 65 females are collected for broodstock each year, and 220,000 smolts are released annually into the North Fork Stillaguamish River from Whitehorse Ponds. The long-term goal is to restore this population to a high level of viability so that it can support terminal fisheries in most years. This is a Pacific Salmon Treaty indicator stock.

OPERATIONAL CONSIDERATIONS

- The program attempts to achieve a natural origin recruit escapement of 700 fish for four consecutive years. If achieved, the managers will assess the ability of the natural population to rebuild itself without hatchery supplementation.
- Adult fish are collected for broodstock by small-mesh gill nets from the principal spawning areas of the North Fork of the Stillaguamish River. The proportion of natural-origin fish among the collected broodstock has ranged from 47.6% (1998) to 71.9% (1995) during the years 1993–98.
- Adult fish are spawned at the Harvey Creek Hatchery (HCH) in a five-by-five modified matrix.
- Fertilized eggs are incubated and hatched at the HCH, with initial rearing at Harvey Creek.
- Early rearing densities of juveniles at HCH exceed fish health guidelines.
- Pre-smolt juveniles are transferred to Whitehorse Ponds (WP) for tagging, acclimation and final rearing prior to release into the North Fork Stillaguamish River.
- Summer chinook pre-smolts are on reuse water at WP from ponds rearing steelhead. This is particularly a problem in low-flow, drought years.
- Summer chinook fingerlings at WP are transferred to ponds previously occupied by rainbow trout, but the gravel bottom of the pond precludes cleaning, drying, or disinfecting between transfers.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?

This program is consistent with short-term and long-term goals. The program appears to be reducing the risk of demographic extinction of summer chinook salmon in the North Fork Stillaguamish River. The demographic benefits of this program outweigh the risks. The greatest risk imposed by the program is the removal of natural-origin adults from their spawning areas. Recruits per spawner exceed 2.0 in most years, thus the program is conferring a net demographic benefit. The numbers of adults trapped in some years was lower than desired (11 and 44 females in 1995 and 1999, respectively), thus raising some concerns regarding a possible Ryman-Laikre[69] effect when the progeny representing those brood years returned and spawn naturally in the North Fork Stillaguamish.

B. Likelihood of attaining goals?

The program has a high likelihood of achieving its goals, particularly if pre-spawning mortality and disease transmission can be controlled, and potentially reduced, at HCH.

C. Consistent with goals for other stocks?

The program appears to be having little effect on other species in the Stillaguamish River.

RECOMMENDATIONS

- Improve existing facilities at Harvey Creek Hatchery and Whitehorse Ponds to increase likelihood of success for this conservation program.
- Consider ways to reduce the ten percent pre-spawning mortality of adults held at HCH.
- Develop a complete program to control pathogen transmission at HCH during adult spawning.
- Provide additional rearing space at HCH to reduce juvenile densities.
- Address water quality and quantity problems at WRP via program re-prioritization and/or additional water supply and/or plumbing redesign. Summer chinook, because of their high biological significance, should have top priority for water at Whitehorse. Consequently, conflicts for space and water between summer chinook and other stocks (e.g. steelhead, rainbow trout) should be resolved. This could include a dedicated final rearing and acclimation pond for summer chinook at Whitehorse that mimics natural rearing characteristics.
- Increase security measures at HCH and WP, including improved predator control. These issues are particularly important because of the high biological significance of the North Fork Stillaguamish summer chinook stock.
- Address long-term habitat improvement issues. The hatchery program will be successful only if the post-release environment is able to support the population.
- Monitor juvenile growth, distribution, post-release survival, and the length-frequency/age-class distributions of hatchery- and natural-origin fish constituting adult recruits.

COMMENTS

- The “critical” to “at risk” viability of this stock is related to poor habitat conditions associated with landslides, siltation and flooding.
- This is a valuable program that has the potential to provide very important long-term conservation benefits.

[69] *Ryman, N. and L. Laikre. 1991. Effects of supportive breeding on the genetically effective population size. Conservation Biology 5: 325-3329.*

- The five-by-five modified factorial mating design is appropriate, because this method has the indirect effect of maximizing the genetic effective number of breeders for a given number of male and female spawners.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG but notes that:

- Additional funding will be required to improve the existing facilities at Harvey Creek Hatchery and Whitehorse Rearing ponds.
- Number of fish released should be carefully reviewed to assure the objectives of the program are achieved.

The Stillaguamish Tribe generally agrees with the recommendations of the HSRG (the Tribe's full comments are appended to this document) and has taken the following steps:

- Beginning in 2002, all adult broodstock will be inoculated to help reduce pre-spawning mortalities.
- During 2002, grant proposals will be submitted to both the BIA (cyclical maintenance and rehabilitation) and NWIFC (hatchery reform) to make significant improvements to the existing spawning shed location and reduce disease transmission risks.
- Funding has been secured through the HSRG hatchery reform grant process to expand early rearing capacity at the Stillaguamish Tribe's Harvey Creek Hatchery. Additional early rearing capacity should be online by the fall of 2002.
- The co-managers are working diligently towards acquiring additional first pass water and improved plumbing for summer chinook reared at the WDFW Whitehorse Hatchery, with the goal of having additional water available by the spring of 2003.
- The rearing ponds at both hatcheries have had recent upgrades to their predator control equipment. The WDFW Whitehorse rearing pond will have an electronic counter installed to accurately enumerate releases and losses of summer chinook as the fish leave the pond. Should predator losses continue to be significant, additional measures will be taken to further reduce predator access to the acclimation pond.
- The Stillaguamish Technical Advisory Group and Stillaguamish Implementation and Review Group are developing specific habitat improvement objectives and habitat restoration projects needed to recover natural chinook productivity throughout the Stillaguamish watershed.
- The Stillaguamish Tribe and WDFW are implementing monitoring and evaluation programs that include coded wire tagging, morphometric analysis, smolt trap outmigration characterizations, extensive spawning ground surveys and genetic analysis.

North Fork Stillaguamish Chum

Stillaguamish Tribe

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	High	High	High
Population Viability	Healthy	Healthy	Healthy
Habitat	Limiting	Limiting	Healthy
Harvest Opportunity	Most Years	Most Years	Most Years
Hatchery Program:			
Purpose	Harvest		
Type	Integrated		

PROGRAM DESCRIPTION

The Stillaguamish North Fork chum stock (hatchery run) derives from brood stock collected primarily from Squire and Ashton creeks on the North Fork Stillaguamish, with some introductions from Jim Creek on the South Fork Stillaguamish. This program began in 1979. Throughout the 1980s, there were intermittent additions of wild-origin fish. By 1987, this hatchery program was self-sustaining. Currently, this stock is maintained by adults returning annually to Harvey Creek Hatchery, and by naturally spawning broodstock, every three to five years. This stock belongs to the North Puget Sound Fall Chum GDU. There are eleven other chum stocks in this GDU. The objective of the program is to provide fish for harvest while minimizing the genetic divergence of the hatchery stock from that of the naturally spawning stock. Additional hatchery program objectives identified include: 1) Increase harvest opportunity using a native derived stock; 2) dilute the harvest impact of pre-terminal fisheries on natural Stillaguamish River spawners; 3) provide a stable source of eggs and fry for reseeding under-used tributary habitat. To these ends, 650,000 fed fry (500,000 at Harvey Creek; 25,000 at Eagle Creek; 50,000 at Maxwelton Creek; 50,000 at Church Creek) are released into the mainstem and North Fork Stillaguamish. All eggs are collected and eyed at Harvey Creek. Eggs are hatched and the hatch reared at Harvey, Eagle, Maxwelton and Church creeks.

OPERATIONAL CONSIDERATIONS

- The program is designed to collect natural broodstock every three to five years, but this has not been accomplished since the inception of the program.
- The program has been limited by high rearing densities and water quality problems contributing to cold water disease, and environmental and bacterial gill disease.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?

The harvest benefit from this program appears to be minimal, with the program contributing less than two percent of the overall harvest for the Stillaguamish sub-region. There was no apparent contribution of this program toward diluting pre-terminal harvest of the Stillaguamish natural origin chum. There is also a potential genetic risk to North and South Fork Stillaguamish chum salmon

populations, considering the manner in which broodstock is collected for supplementation of natural stock (no yearly infusion of genes from naturally spawning stock).

B. Likelihood of attaining goals?
Given the current healthy status of the natural chum runs and the relatively small size of this program, the likelihood of achieving a significant harvest benefit is low. The likelihood of contributing to dilution of pre-terminal harvest, given current harvest management approaches, also appears low.

C. Consistent with goals for other stocks?
No negative effects were noted on goals for other natural stocks in the basin. There is a concern that, because of facility limitations, there is a significant risk of pathogen transmission between stocks of fish on-site. There is also a concern about using the Stillaguamish stock for supplementation of Maxwelton Creek on Whidbey Island. No information was provided about stock status or goals in this area. This program may well provide some benefits to artificial and natural coho and steelhead populations as a food source.

RECOMMENDATIONS

- Suspend this program because of minimal harvest benefits and healthy natural stocks.
- Develop a plan to reinstate the program should the natural stock status change for the worse.
- Modify several operational procedures in the event the program is restarted:
    - Change the approach to maintaining integration with the natural chum stock to incorporate naturally spawning broodstock each year.
    - Collect stocks used for supplementation from either the North or South Fork, depending on the location of the tributary planned for supplementation.
    - Develop facilities and procedures to reduce the risk of pathogen transmission between stocks of fish on-site.
    - Improve facilities to reduce early rearing densities.
- Review stock status and goals for the recipient watershed prior to continuing the use of Stillaguamish stock outside the Stillaguamish watershed.

COMMENTS

- In recent years, the natural chum stocks have been at or above escapement goals, with harvest ranging from 20,000–100,000 fish annually.
- WDFW and the Tribes have communicated their decision to modify the North Fork Stillaguamish chum program in a manner consistent with the above recommendations. The program will be converted from an integrated harvest to an educational program. The details of this change will be provided in the Managers Response.

MANAGERS RESPONSE

The Tribes and WDFW have agreed with the HSRG that the North Fork Stillaguamish chum program as outlined in October is not meeting its goals as an integrated harvest program and we have taken the following steps:

- Program size reduced to 200,000 fry and goal changed to an integrated education program.
- HSRG recommendations for broodstock collection and reduced rearing densities have been incorporated into the new program.

- During 2002, grant proposals will be submitted to both the BIA (cyclical maintenance and rehabilitation) and NWIFC (hatchery reform) to make significant improvements to the existing spawning shed location and reduce disease transmission risks.
- The co-managers will again evaluate the appropriateness of using Stillaguamish chum for the Maxwelton supplementation program and discontinue the program if the stock is not appropriate.

South Fork Stillaguamish Chum

Stillaguamish Tribe

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	High	High	High
Population Viability	Healthy	Healthy	Healthy
Habitat	Limiting	Limiting	Healthy
Harvest Opportunity	Most Years	Most Years	Most Years
Hatchery Program:			
Purpose	Harvest and Education		
Type	Integrated		

PROGRAM DESCRIPTION

The Stillaguamish South Fork chum stock (wild run) derives from brood stock captured in Jim and Siberia creeks in the South Fork of the Stillaguamish River. This program began in 1984 and is maintained by adult brood stock, primarily from Jim Creek Hatchery, with periodic introductions from the Stillaguamish Hatchery chum stock. This stock belongs to the North Puget Sound Fall Chum GDU. There are eleven other chum salmon stocks in this GDU. The objective of the program is to provide fish for harvest while minimizing the genetic divergence of the hatchery stock from that of the naturally spawning stock. To this end, 25,000 unfed fry are released from the Indian Ridge egg box. Eggs are collected and eyed at the Harvey Creek Hatchery.

OPERATIONAL CONSIDERATIONS

None.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The primary benefit of this program appears to be its educational value, given the healthy status of the stock.

B. Likelihood of attaining goals?
See comments in A, above, relating to program benefits.

C. Consistent with goals for other stocks?
In general, the program appears to be too small to have any adverse impacts, but many of the concerns noted for the North Fork program also apply, including stock choice and risk of pathogen transmission between stocks of fish at Harvey Creek Hatchery.

RECOMMENDATIONS

- Evaluate this program principally as an education program.

COMMENTS

- In recent years the natural chum stocks have been at or above escapement goals, with harvest ranging from 20,000–100,000 fish annually.
- WDFW and the Tribe have communicated their decision to modify this program to address the concerns in Benefits and Risks, Part C, above.

MANAGERS RESPONSE

The Stillaguamish Tribe generally agrees with the recommendations of the HSRG and has taken the following steps:

- We will return to broodstocking 100% of the chum needed for the program from Jim and Siberia creeks, which run immediately adjacent to the Indian Ridge facility and are tributaries of the South Fork Stillaguamish.
- The eggs will be incubated at the Harvey Creek hatchery and then returned to the facility egg box for hatching and release.
- During 2002, grant proposals will be submitted to both the BIA (cyclical maintenance and rehabilitation) and NWIFC (hatchery reform) to make significant improvements to the existing spawning shed location and reduce disease transmission risks.
- Funding has been secured through the hatchery reform grant process to expand early rearing capacity at the Stillaguamish Tribe's Harvey Creek Hatchery. Additional early rearing capacity should be on line by the fall of 2002.

Stillaguamish Coho

Stillaguamish Tribe

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	High	High	High
Population Viability	At Risk	At Risk	Healthy
Habitat	Limiting	Limiting	Healthy
Harvest Opportunity	Occasional	Most Years	Most Years
Hatchery Program:			
Purpose	Harvest and Conservation		
Type	Integrated		

PROGRAM DESCRIPTION

The Stillaguamish coho stock derives from hatchery and wild fish returning to Harvey and Jim creeks. This program began in 1986 and is maintained by adult returns to Harvey Creek Hatchery and Jim Creek. The Stillaguamish coho stock belongs to the Puget Sound/Strait of Georgia ESU. The objectives of the program are to provide fish for harvest and to aid in the recovery of the natural stock, while minimizing the genetic divergence of the hatchery stock from that of its naturally spawning counterparts. Eggs for both programs are collected, incubated, hatched and early-reared at Harvey Creek Hatchery. 25,000 yearlings are released from Johnson Creek Pond into the North Fork Stillaguamish or from Harvey Creek Hatchery into the mainstem. 20,000 yearlings are released from Jim Creek Hatchery into the South Fork Stillaguamish. This stock has been suggested as a candidate for use as an indicator stock for the Stillaguamish River.

OPERATIONAL CONSIDERATIONS

- Current broodstock collection methods involve mixing gametes from multiple stocks.
- The stock is tagged and marked.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
Conservation need and benefits are questionable under present operating conditions.

B. Likelihood of attaining goals?
Likelihood of achieving benefits in future could be increased with different broodstock selection methods, if the conservation need increased. The program is likely to meet modest harvest expectations.

C. Consistent with goals for other stocks?
The program appears to be consistent with goals for other stocks.

RECOMMENDATIONS

- Put the program on "standby" status, with a plan for how and when to restart if a conservation need is more clearly indicated.
- If the program is continued, increase the number of smolts released and introduce an average of 10% naturally spawning fish into the hatchery broodstock each year for on-station releases. Use a single source for broodstock and do not mix broodstock from multiple sub-stocks or drainages within the drainage.
- Evaluate whether an annual trapping and tagging operation on a naturally spawning stock would be less costly and more effective. There is some question about the efficiency of using this yearling smolt coho program as an indicator stock.
- Address long-term habitat improvement issues. The hatchery program will be successful only if the post-release environment is able to support the population.

COMMENTS

- The HSRG's preference is for the program to be placed on standby because the program is too small to provide a significant conservation or harvest benefit.
- WDFW and the Tribe have indicated that they will pursue a four-year program to assess the accuracy of using a naturally spawning stock as an indicator stock. However, this approach is not consistent with the above recommendation to trap and mark naturally-produced juveniles.

MANAGERS RESPONSE

Based on the recommendations of the HSRG, the Stillaguamish Tribe has taken the following steps to modify this program:

- Program goal has been modified from integrated recovery program to integrated harvest/recovery.
- HSRG recommendations regarding the size of the program, spawning protocols and broodstock source have been incorporated.
- Release location will be consistent with supporting sustainable fisheries.
- Program fish would be more representative of naturally spawning Stillaguamish coho than the current multi-generational hatchery stock.
- Program fish would be available to provide broodstock for reseeding under utilized or newly opened habitat.

North Fork Stillaguamish Hatchery Summer Steelhead

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[70]	Low	Low	Low
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The South Fork Stillaguamish hatchery summer steelhead program derives from Skamania Hatchery (lower Columbia River) fish transplants. This program began in 1959 and has been maintained for the past 20 years from adult returns to Reiter Ponds (Skykomish drainage). The objective of this program is to provide for harvest, while avoiding adverse interactions with other local stocks. To this end, 70,000 yearlings are released from Whitehorse Ponds into the North Fork of the Stillaguamish River. Eggs are collected and eyed at Reiter Pond on the Skykomish River. Eggs are hatched and early reared at Arlington Hatchery.

OPERATIONAL CONSIDERATIONS

- Releases are marked.
- Program requires inter-facility transfers of eggs and fish.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The Program is operated in a manner consistent with goals.

B. Likelihood of attaining goals?
Uncertain, no data on harvest provided.

C. Consistent with goals for other stocks?
There are potential genetic interactions (outbreeding depression), predation, and competition with other steelhead stocks, particularly naturally spawning stocks. There are also disease risks, due to the rearing environment.

[70] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

RECOMMENDATIONS

- Implement Area-Wide Recommendations regarding establishing a regional system of "wild steelhead management zones" where streams are not planted with hatchery fish and are instead managed for native stocks. Fishing for steelhead in these zones would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. Such zones would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- Select streams to represent a balance of large and small streams, productivity, etc. Hatchery production may need to be increased in streams selected for hatchery harvest. The HSRG encourages the use of locally-adapted stocks for those streams.
- Minimize interaction with naturally spawning steelhead when implementing a segregated steelhead program through such tools as differential timing and a decision on benefits versus risks on outplanting in freshwater habitat. In addition, adult collection procedures should be designed to capture as many adults from the returning segregated population as possible.
- Organize a workshop to develop this concept.
- Include monitoring and evaluation as a basic component of the concept, for both wild steelhead management zones and hatchery harvest streams.
- Focus on water quality and quantity, improving smolt quality, considering aspects of environmental enhancement in rearing units.
- Increase water flows at the Whitehorse Ponds.
- Revise spawning procedures to include single-family mating or five-by-five matrix spawning.
- Release hatchery yearling steelhead smolts between May 1 and May 15, at a target size of six to the pound, and at a condition factor of less than 1.0.

COMMENTS

- Data concerning harvest benefits are lacking. WDFW values the fishing opportunity created by this program.

MANAGERS RESPONSE

WDFW generally supports the recommendations of the HSRG but notes that:

- Implementing a regional system of wild steelhead management zones has a number of implications that will require discussion with the affected tribes and the Fish and Wildlife Commission.
- Proposed spawning protocol may be difficult to implement because sperm is collected for virology tests.

The Tulalip Tribes generally support the recommendations of the HSRG (the Tribes' full comments are appended to this document), but have the following to add:

- The Tulalip Tribes will want to review the concept of wild steelhead management zones and the selection of particular zones before this concept is implemented.

South Fork Stillaguamish Hatchery Summer Steelhead

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Medium
Population Viability[71]	Low?	Low?	Low?
Habitat	Limiting	Limiting	Healthy
Harvest Opportunity	None	Occasional	Most Years
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The South Fork Stillaguamish hatchery summer steelhead program derives from Skamania Hatchery (lower Columbia River) fish transplants. This program began in 1959 and has been maintained for the past 20 years from adult returns to Reiter Ponds (Skykomish drainage). The objective of this program is to provide for harvest while avoiding any adverse interactions with other local stocks. To this end, 20-30,000 yearlings are out-planted from Reiter Ponds into the South Fork above Granite Falls, and 10,000 are outplanted into Canyon Creek. Eggs are collected and eyed at Reiter Pond on the Skykomish River. Eggs are hatched and early-reared at Arlington Hatchery.

OPERATIONAL CONSIDERATIONS

- Releases are marked.
- The program requires inter-facility transfers of eggs and fish.
- The program uses an HSRG-approved steelhead rearing and release process (hatchery yearling steelhead smolts are released between May 1 and May 15, at a target size of six to the pound, and have a condition factor of less than 1.0).

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is operated in a manner consistent with goals.

B. Likelihood of attaining goals?
Uncertain, no data on harvest provided.

[71] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

C. Consistent with goals for other stocks?
There are potential genetic interactions (outbreeding depression), predation, and competition with other steelhead stocks, particularly naturally spawning stocks. There are also disease risks, due to the rearing environment. There are particular concerns regarding the outplanting of hatchery fish in Canyon Creek.

RECOMMENDATIONS

- Implement Area-Wide Recommendations regarding establishing a regional system of "wild steelhead management zones" where streams are not planted with hatchery fish and are instead managed for native stocks. Fishing for steelhead in these zones would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. Such zones would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- Select streams to represent a balance of large and small streams, productivity, etc. Hatchery production may need to be increased in streams selected for hatchery harvest. The HSRG encourages the use of locally-adapted stocks for those streams.
- Minimize interaction with naturally spawning steelhead when implementing a segregated steelhead program through such tools as differential timing and a decision on benefits versus risks on outplanting in freshwater habitat. In addition, adult collection procedures should be designed to capture as many adults from the returning segregated population as possible.
- Organize a workshop to develop this concept.
- Include monitoring and evaluation as a basic component of the concept, for both wild steelhead management zones and hatchery harvest streams.
- Focus on water quality and quantity, improving smolt quality, considering aspects of environmental enhancement in rearing units.
- Increase water flows at the Whitehorse Ponds.
- Revise spawning procedures to include single-family mating or five-by-five matrix spawning.
- Consider alternative strategy focused on colonization of the upper watershed.

COMMENTS

- Data concerning harvest benefits are lacking. WDFW values the fishing opportunity created by this program.

MANAGERS RESPONSE

WDFW generally supports the recommendations of the HSRG but notes that:
- Implementing a regional system of wild steelhead management zones has a number of implications that will require discussion with the affected tribes and the Fish and Wildlife Commission.
- Additional funds will be required to increase water flows at Whitehorse Hatchery.
- Proposed spawning protocol may be difficult to implement because sperm is collected for virology tests.

The Tulalip Tribes generally support the recommendations of the HSRG (the Tribes' full comments are appended to this document), but have the following to add:
- The Tulalip Tribes will want to review the concept of wild steelhead management zones and the selection of particular zones before this concept is implemented.

Stillaguamish Hatchery Winter Steelhead

Washington Department of Fish and Wildlife and Stillaguamish Tribe

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[72]	Low?	Low?	Low?
Habitat	Limiting	Limiting	Healthy
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Stillaguamish hatchery winter steelhead program derives from transplants from South Tacoma Hatchery (Chambers Creek stock) in the 1960s. Since the 1980s, this stock has been maintained from returnees to Whitehorse Pond on the Stillaguamish River and supplemented with primarily Tokul Creek Hatchery (Snohomish drainage) or Reiter Pond winter steelhead (Skykomish drainage). The objective of this program is to provide for harvest, while avoiding any adverse interactions with other local stocks. To this end, eggs are collected and eyed at Whitehorse Ponds, and then hatched and early reared at Arlington Hatchery (for Whitehorse Ponds release) and Harvey Creek Hatchery (for Johnson Creek release). 130,000 yearlings (115,000 at Whitehorse Ponds, 15,000 at Johnson Creek Hatchery) are released into the North Fork Stillaguamish. Releases of up to 25,000 Snohomish River winter steelhead stock from Reiter Pond are outplanted into the Stillaguamish (Pilchuck Creek and Canyon Creek). 15,000 yearlings are released from the Masonic Park acclimation pond into the South Fork Stillaguamish.

OPERATIONAL CONSIDERATIONS

- All releases are marked.
- The program requires inter-facility transfers of eggs and fish.
- The program uses an HSRG-approved steelhead rearing and release process (hatchery yearling steelhead smolts are released between May 1 and May 15, at a target size of six to the pound, and have a condition factor of less than 1.0).

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is operated in a manner consistent with goals.

[72] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

B. Likelihood of attaining goals?
This program provides one of a few reliable harvest opportunities for tribal and sport fishers in the region. Harvest catch is low (<0.4%) relative to the size of the program, even though opportunity for harvest is high (60–70% of the winter run steelhead harvest).

C. Consistent with goals for other stocks?
There are potential genetic interactions (outbreeding depression), predation, and competition with other steelhead stocks, particularly naturally spawning stocks. There are also disease risks, due to the rearing environment.

RECOMMENDATIONS

- Implement Area-Wide Recommendations regarding establishing a regional system of "wild steelhead management zones" where streams are not planted with hatchery fish and are instead managed for native stocks. Fishing for steelhead in these zones would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. Such zones would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- Select streams to represent a balance of large and small streams, productivity, etc. Hatchery production may need to be increased in streams selected for hatchery harvest. The HSRG encourages the use of locally-adapted stocks for those streams.
- Minimize interaction with naturally spawning steelhead when implementing a segregated steelhead program through such tools as differential timing and a decision on benefits versus risks on outplanting in freshwater habitat. In addition, adult collection procedures should be designed to capture as many adults from the returning segregated population as possible.
- Organize a workshop to develop this concept.
- Include monitoring and evaluation as a basic component of the concept, for both wild steelhead management zones and hatchery harvest streams.
- Two potential wild steelhead management zones are above Granite Falls and Deer Creek.
- Focus on water quality and quantity, improving smolt quality, considering aspects of environmental enhancement in rearing units.
- Increase water flows at the Whitehorse Ponds.
- Revise spawning procedures to include single-family mating or five-by-five matrix spawning.
- Resize this program to reduce fish densities during early rearing until rearing conditions at the hatchery can be improved.
- Focus on smolt quality and eliminating disease problems to improve survival and better achieve harvest goals.

COMMENTS

None.

MANAGERS RESPONSE

WDFW generally supports the recommendations of the HSRG but notes that:

- Implementing a regional system of wild steelhead management zones has a number of implications that will require discussion with the affected tribes and the Fish and Wildlife Commission.
- Additional funds will be required to increase water flows at Whitehorse Hatchery.

- Implementing the proposed spawning protocol may be difficult because sperm is collected for virology tests.
- The portion of this winter run steelhead program conducted by the Stillaguamish Tribe has been officially terminated.

The Tulalip Tribes generally support the recommendations of the HSRG (the Tribes' full comments are appended to this document), but have the following to add:

- The Tulalip Tribes will want to review the concept of wild steelhead management zones and the selection of particular zones before this concept is implemented.

SNOHOMISH

Overview

STOCK STATUS[73]

Stocks	Hatchery Program?	Biological Significance (L=Low, M =Intermediate, H =High)			Population Viability (L=Critical, M = At Risk, H = Healthy)			Habitat (L = Inadequate, M = Limiting, H = Healthy)			Harvest Opportunity (0 = None, L = Occasional, M = Most years, H = Each year)		
		Now	Goals		Now	Goals		Now	Goals		Now	Goals	
			Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term
Snohomish/Snoqalmie Chinook	N	H	H	H	M	M	H	M	M	H	L	L	M
Snohomish/Skykomish Summer Chinook	Y	H	H	H	L/M	L/M	M	M	M	M	L	L	M
Snohomish Coho	N	H	H	H	M	H	H	M	M	M	M	M	M
Snohomish/Skykomish Hatchery Coho	Y	H	H	H	M	H	H	M	M	M	M	M	M
Snohomish/SF Skykomish Coho	N	M	M	M	H	H	H	M	M	H	M	M	M
Snohomish/Snoqalmie Coho	N	H	H	H	H	H	H	H	H	H	M	M	M
Snohomish Odd Pink	N	H	H	H	H	H	H	H	H	H	M	M	M
Snohomish Even Pink	N	H	H	H	H	H	H	M	M	H	0	L	M
Snohomish/Skykomish Fall Chum	N	H	H	H	H	H	H	H	H	H	M	M	M
Snohomish/Snoqualmie Fall Chum	N	H?	H	H	H?	H	H	M?	M	H	M	M	M
Snohomish/Wallace Fall Chum	N	H	H	H	H	H	H	H	H	H	M	M	M
Snohomish/Skykomish Winter Steelhead	N	H	H	H	H	H	H	M	M	H	L	M	M
Snohomish/Pilchuck Winter Steelhead	N	H	H	H	H	H	H	M	M	H	L	M	M
Snohomish/Snoqualmie Winter Steelhead	N	H	H	H	H	H	H	M	M	H	L	M	M
Snohomish Hatchery Winter Steelhead	Y	L	L	L	L?	L?	L?	M	M	H	H	H	H
Snohomish/Tolt Summer Steelhead	N	H	H	H	H	H	H	M	M	H	0	L	L
Snohomish/NF Skykomish Summer Steelhead	N	H	H	H	M	M	H	M	M	H	0	L	L
Snohomish/SF Skykomish Summer Steelhead	N	M	M	M	H	H	H	M	M	H	0	L	L
Snohomish Hatchery Summer Steelhead	Y	L	L	L	L?	L?	L?	M	M	H	H	H	H
Snohomish Cutthroat	N	H	H	H	H	H	H	M	H	H	M	M	M
Snohomish Char	N	H	H	H	H	H	H	M	M	H	M	M	M

HABITAT

The Snohomish River basin drains a 1,780 square mile area and is the second largest watershed draining into Puget Sound. The basin has three distinct physiographic regions: the Skykomish River Basin, the Snoqualmie River Basin and the Snohomish River Valley. Over 1,730 tributary rivers and streams have been identified in the basin, providing over 2,718 linear miles of drainage.

The South Fork Skykomish River originates near the summit of Stevens Pass and flows west and northwest some 32 miles through mountainous terrain, to its confluence with the North Fork Skykomish near the town of Index. The Beckler, Foss and Miller Rivers, Money and Index creeks are some of the larger tributaries of the South Fork. The mainstem Skykomish River continues generally west for about 30 miles, to its junction with the Snoqualmie River. From the Skykomish Forks downstream for about six miles, the channel is confined, with a relatively steep gradient. From the

[73] *This table contains ratings for all salmonid stocks in the sub-region, as provided by the managers. For definitions of these ratings, see the* Components of This Report *section of the Introduction.*

vicinity of Gold Bar downstream to Sultan, the channel widens and the gradient decreases, forming numerous gravel bars and side channels in this braided reach. Major tributaries of this section include the Wallace and Sultan rivers. Downstream from Sultan, the river meanders some 14 miles through a wide floodplain with a moderate to gentle gradient, where it meets the Snoqualmie River to form the Snohomish River. Woods, Elwell and McCoy creeks are the larger tributaries in this section.

The Snoqualmie River originates in the high cascades and consists of three forks; the South, Middle and North Forks. Approximately five miles above Snoqualmie Falls, the combined North and Middle Fork have their confluence with the South Fork. From Snoqualmie Falls, plunging 268 feet, the Snoqualmie River travels 36 miles northwest through a broad and flat valley to the confluence of the Skykomish River. The Tolt and Raging rivers, Tokul, Patterson, Griffin, Harris, and Cherry creeks are main tributaries to the Snoqualmie River.

The mainstem Snohomish River meanders 20.5 miles through a broad valley floor, where it enters Puget Sound at Everett. The Pilchuck River is the largest tributary, entering the river at the town of Snohomish. Three major sloughs—Ebey, Union and Steamboat—diverge from the main Snohomish channel in the lower eight miles. The Snohomish River is tidally influenced upstream to about river mile 14.[74]

HATCHERIES

Wallace River Hatchery

The Wallace River Hatchery is located between the confluence of May Creek and the Wallace River, near the town of Startup. The hatchery was originally known as the Skykomish Hatchery and dates back to 1907. It is the only hatchery facility rearing chinook within the Snohomish River Basin. The Wallace River Hatchery rears both summer chinook, for local release, and fall chinook in support of the Tumwater Falls program (see South Sound, Deschutes River sub-region). Both of these programs are harvest-oriented. During the 1970s, three chum salmon spawning channels were installed at this hatchery. Sediment and disease issues eventually caused the channels to fail as spawning and initial-rearing habitat. They were asphalted and converted into rearing ponds, which remain in use today. The 1980s saw the construction of a bank of concrete raceways, a bank of standard ponds, and an adult trapping facility on the Wallace River side of the hatchery. The hatchery incubates and rears Reiter Ponds summer steelhead production from the time the eggs are eyed until the fish reach a size of 70 fish per pound, at which time they are transferred back to Reiter Ponds for final rearing. In addition, Wallace River Hatchery receives winter steelhead fingerlings from Tokul Creek Hatchery, at 150 fish per pound that are eventually destined for Reiter Ponds. These fish are transferred to Reiter Ponds at the same time as summer steelhead, usually in October when the fish are approximately 70 fish per pound.

Reiter Ponds Hatchery

The Reiter Ponds Hatchery is located on the main stem of the Skykomish River at river mile 46, just east of the town of Gold Bar. Original construction took place in 1973–74 and included the rearing ponds, migrant fish traps and residence. Additional construction in 1988 included an incubation building, adult holding pond and fish ladder. The purpose of the facility is to provide winter- and summer-run steelhead for harvest. The operation of the hatchery is closely linked to WDFW's Wallace River and Tokul Creek hatcheries, because Reiter Ponds is limited in its ability to incubate

[74] *Mike Chamblin, Washington State Department of Fish and Wildlife, September 2001.*

eggs, having only eight shallow troughs and no intermediate starting ponds. Typically, eggs are eyed at Reiter Ponds and then shipped to either Tokul Creek Hatchery (if winter-run eggs are taken) or Wallace River Hatchery (summer-run) for final incubation and initial fry rearing. The fish then return to Reiter Ponds in the fall (October) for final rearing and spring release.

Tokul Creek Hatchery

Tokul Creek Hatchery is situated 2.5 miles east of Fall City and 2.5 miles west of the town of Snoqualmie. The hatchery is adjacent to Tokul Creek, a tributary of the Snoqualmie River. Tokul Creek enters the Snoqualmie River immediately below Snoqualmie Falls, the upper limit for anadromous salmonids. Tokul Creek Hatchery is a harvest-oriented facility that produces winter-run steelhead and various trout species for the local fisheries. The facility was constructed in the early 1900s.[75]

[75] *Doug Hatfield, Washington State Department of Fish and Wildlife, September 2001.*

Snohomish/Skykomish Summer Chinook

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	High	High	High
Population Viability	Critical/At Risk	Critical/At Risk	At Risk
Habitat	Limiting	Limiting	Limiting
Harvest Opportunity	Occasional	Occasional	Most Years
Hatchery Program:			
Purpose	Harvest		
Type	Integrated		

PROGRAM DESCRIPTION

The Snohomish/Skykomish summer chinook stock derives from wild fish collected at Sunset Falls on the Skykomish River in the early 1970s. This stock is maintained by adult returns to Wallace River Hatchery (on the Wallace River, a tributary to the Skykomish River). The Snohomish/Skykomish summer chinook stock belongs to the South Puget Sound, Hood Canal, and Snohomish Summer+Fall GDU. This GDU is composed of multiple stocks from throughout Puget Sound and Hood Canal. This program's objectives include providing for harvest, while avoiding adverse interactions with other stocks in the watershed. A second objective is to provide 200,000 eyed summer chinook eggs annually to the Tulalip summer chinook program. To this end, one million fingerlings and 250,000 yearlings are released annually into the Wallace River. The eggs are incubated at the Wallace River Hatchery and the resulting progeny are reared at and released from the hatchery as fingerlings and yearlings. This stock is an indicator stock for Puget Sound summer chinook.

OPERATIONAL CONSIDERATIONS

- Broodstock used is native to the Skykomish River.
- Fingerling and yearling releases mimic the life history strategies exhibited by naturally spawning Skykomish summer chinook.
- Releases are non–volitional.
- Fingerlings are double-index tagged, consistent with the role of a US/Canada indicator stock (200,000 fingerlings receive a coded-wire tag and adipose clip; another 200,000 receive only a coded-wire tag).
- Adults surplus to program needs are allowed to spawn naturally in the Wallace River, or used for other purposes.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?

The program is generally consistent with the goals for the stock. However, current broodstock management creates a risk of domestication.

B. Likelihood of attaining goals?
The program is meeting its goals by providing modest but important harvest in pre-terminal and terminal fisheries. It is useful as an indicator stock for summer chinook and is successfully providing eyed eggs for Tulalip Hatchery.

C. Consistent with goals for other stocks?
Evidence indicates that the program results in minimal interaction with Snoqualmie fall chinook, but straying into the Skykomish River may have an adverse effect on Bridal Veil and Sultan River chinook stocks.

RECOMMENDATIONS

- Improve broodstock management to ensure that the hatchery stock remains truly integrated with the naturally spawning stock. Introduce an average of 10% naturally spawning fish into the hatchery broodstock each year for on-station releases. Sunset Falls currently appears to be the best choice for this broodstock source.
- Use a spawning protocol involving single pair matings or five-by-five matrix matings to maximize the effective population size.
- Consider environmental enhancement to improve the adult return rate.
- Eliminate the rearing of fall chinook for the Deschutes program in South Sound, in coordination with changes proposed for southern Puget Sound region (program contravenes existing policy on fish transfers between fish health management zones).
- Eliminate the rearing of steelhead in river water at Wallace River Hatchery as soon as possible (losses, particularly with summer steelhead, are unacceptably high).
- Consider providing ground water for incubation and early rearing at Wallace River Hatchery.
- Upgrade rearing ponds at Wallace River Hatchery to permit volitional releases.
- Upgrade the broodstock collection facility to facilitate sorting of naturally spawning and hatchery adults at Wallace River Hatchery.
- Upgrade the pollution abatement facility at Wallace River Hatchery.

COMMENTS

- Better integration of the hatchery summer chinook population with its naturally spawning counterparts will mean that hatchery strays will pose a reduced risk to natural chinook populations in the Skykomish River (e.g., Bridal Veil and Sultan Creek populations).
- Elimination of fall chinook and steelhead rearing at Wallace River Hatchery should allow available hatchery facilities and staff to be used more effectively on remaining programs, or may permit other needed programs to be conducted at the hatchery.
- Upgrading facilities at the hatchery will provide for future flexibility.
- If and when the Tulalip program is switched to summer chinook, this program will provide 1.5 million eggs annually for that program.

MANAGERS RESPONSE

WDFW generally supports the recommendations and has taken the following actions:
- Reduced by 40% the rearing of fall chinook for the Deschutes program in South Sound.
- Prioritized upgrading the pollution abatement facility.

WDFW notes that:

- Identification of the number of naturally origin spawners incorporated in the hatchery broodstock is a complex topic that will require additional analysis and discussion;
- Additional funding will be required to upgrade the facilities as recommended.

Snohomish/Skykomish Hatchery Coho

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	High	High	High
Population Viability[76]	Medium	High	High
Habitat	Limiting	Limiting	Limiting
Harvest Opportunity	Most Years	Most Years	Most Years
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Snohomish/Skykomish hatchery coho program derives from wild fish trapped in the lower Snohomish basin, with supplementation from the Wallace River Hatchery (on the Wallace River, a tributary to the Skykomish River). The stock has been maintained from returnees to the Wallace River Hatchery on the Skykomish River since the early 1900s. The goal of this program is segregated harvest augmentation. A secondary goal is to provide a tagged index stock for assessment of regional contribution to distant (Canadian) fisheries. To this end, 4.3 million eggs are collected. Smolts sufficient to sustain broodstock at Wallace River Hatchery are released. Harvest augmentation at Tulalip Bay and at South Sound is supported. Tulalip Tribal Hatchery receives 1.3 million eggs annually for fishery augmentation program at Tulalip Bay. Marblemount Hatchery receives 1.7 million annually for South Sound harvest augmentation. The South Sound Net Pens receive 400,000 yearling coho annually for harvest augmentation. Other small programs are also supported, in addition to 150,000 smolt releases at Wallace.

OPERATIONAL CONSIDERATIONS

- The surplus hatchery production is provided for harvest in Tulalip Bay and in the South Sound, in isolation from harvest of naturally spawning stock.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?

This program is consistent with goals and objectives. The conservation risks posed by this program to naturally-spawning salmon in the region are relatively small. Evidence from spawning ground surveys in which marked fish were counted and from surveys in which scales were collected (allowing discernment from pattern analysis of hatchery-origin fish) suggests that straying outside the Wallace River is relatively small and that inter-crossing with naturally spawning-spawning coho is minimal. In addition, the size of the program is small relative to the size of the stock.

[76] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

B. Likelihood of attaining goals?
Historical success suggests strong likelihood of meeting objectives.

C. Consistent with goals for other stocks?
Transfers of this stock to South Sound programs are not consistent with conservation goals, as Skykomish coho are not locally adapted to the South Sound.

RECOMMENDATIONS

- Maintain a large effective population size in the Skykomish coho broodstock. The rationale for this recommendation includes: 1) the sustained protection of the productivity of the Skykomish coho program; and 2) amelioration of any risk posed by inter-crossing of program coho with naturally spawning coho in the basin. Gametes taken for support of the broodstock, for release at Wallace, should be a representative sample of the entire return and include equal representation of 500 or more spawners.
- Consider converting this program from a segregated to an integrated program, to address concerns about natural spawning.

COMMENTS

None.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG.

Snohomish Hatchery Winter Steelhead

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[77]	Low?	Low?	Low?
Habitat	Limiting	Limiting	Healthy
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Snohomish hatchery winter steelhead stock derives from Chambers Creek origin winter steelhead that came from Tokul Creek Hatchery (Snohomish drainage) and Reiter Ponds (Skykomish drainage) around the time of World War II. This stock has been maintained from adult returns to Tokul Creek Hatchery and Whitehorse Pond on the Stillaguamish River since the late 1970s. The purpose of this three-faceted program is to provide for harvest, while avoiding adverse interactions with other stocks in the watershed. To this end:

1. 270,000 yearlings are released into the Skykomish River (80–110,000 at Reiter Ponds, 20,000 at Wallace River Hatchery, and the remainder at various other Skykomish River release sites). Eggs for this purpose are collected from adults returning to Tokul Creek Hatchery, where they are also incubated and the hatch early reared. Wallace River Hatchery provides intermediate and final rearing for the group released into Wallace River and intermediate rearing for the group released from Reiter Ponds.
2. 185,000 yearlings are released into the Snohomish basin (80-90,000 from Tokul Creek Hatchery and the remainder from various other release sites). Eggs for this purpose are collected and incubated at Tokul Creek Hatchery, where the resulting progeny are reared until release.
3. 15,000 yearlings are released into the Pilchuck River. Eggs for this purpose are collected and eyed at Whitehorse Ponds, hatched and early reared at Arlington Hatchery, then reared to release at Whitehorse Ponds.

OPERATIONAL CONSIDERATIONS

- Released fish are marked.
- Returning adults surplus to broodstock needs are forced to remain in the river at Tokul Creek and Reiter Ponds, to provide for sports fishing.

[77] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

- Early spawn timing of the hatchery stock minimizes genetic interaction with naturally spawning winter steelhead.
- The program requires inter-facility transfers of eggs and fish.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is being operated in a manner consistent with its short- and long-term goals. It is providing for valuable harvest. Interbreeding of the hatchery stock with the naturally spawning stock is minimized by the differences in spawn timing.

B. Likelihood of attaining goals?
There is a strong likelihood that program goals will continue to be met, although recent trends in adult returns have shown an unexplained decline.

C. Consistent with goals for other stocks?
There is the potential for genetic interaction with naturally spawning winter steelhead, but this is likely to be insignificant for the reason stated in A, above.

RECOMMENDATIONS

- Implement Area-Wide Recommendations regarding establishing a regional system of "wild steelhead management zones" where streams are not planted with hatchery fish and are instead managed for native stocks. Fishing for steelhead in these zones would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. Such zones would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- Select streams to represent a balance of large and small streams, productivity, etc. Hatchery production may need to be increased in streams selected for hatchery harvest. The HSRG encourages the use of locally-adapted stocks for those streams.
- Minimize interaction with naturally spawning steelhead when implementing a segregated steelhead program through such tools as differential timing and a decision on benefits versus risks on outplanting in freshwater habitat. In addition, adult collection procedures should be designed to capture as many adults from the returning segregated population as possible.
- Organize a workshop to develop this concept.
- Include monitoring and evaluation as a basic component of the concept, for both wild steelhead management zones and hatchery harvest streams.
- Manage the hatchery stock to maintain its current spawn timing.
- Revise the spawning protocol to use single pair matings or five-by-five matings, to help ensure an effective-size spawning population.
- Release hatchery yearling steelhead smolts between May 1 and May 15, at a target size of six to the pound, and a condition factor of less than 1.0.
- Continue to use the weir at Tokul Creek Hatchery to trap all salmonids and transport naturally spawning salmonids above the weir, so that these fish can take advantage of existing spawning habitat (an exception to the upstream transport would be naturally spawning salmonids deemed by the managers to pose an unacceptable risk to fish stocks held at Tokul Creek hatchery).
- Obtain an additional one cubic foot per second of spring water at Tokul Creek Hatchery for incubation and early rearing.

- Expand the Reiter Ponds facility to provide for incubation and early rearing of winter and summer steelhead, so that the need for rearing at Wallace River Hatchery is eliminated.

COMMENTS

- Reasons for the decline in adult winter steelhead returns should be investigated if this decline continues.
- Establishment of wild steelhead management zones should reduce the chances of ecological and genetic interactions with hatchery steelhead and help to ensure the availability of founding stocks for hatchery purposes should the need for such stocks arise.
- Upgrade the water supply at Tokul Creek Hatchery and expand rearing capabilities at Reiter Ponds, for more efficient production of steelhead.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG but notes that:

- Implementing the proposed spawning protocol may be difficult because sperm is collected for virology tests.
- Additional funding will be required to upgrade the facilities as recommended.
- Implementing a regional system of wild steelhead management zones has a number of implications that will require discussion with the affected tribes and the Fish and Wildlife Commission.

The Tulalip Tribes generally support the recommendations of the HSRG (the Tribes' full comments are appended to this document), but have the following to add:

- The Tulalip Tribes will want to review the concept of wild steelhead management zones and the selection of particular zones before this concept is implemented.

Snohomish Hatchery Summer Steelhead

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[78]	Low?	Low?	Low?
Habitat	Limiting	Limiting	Healthy
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Snohomish hatchery summer steelhead stock derives from Reiter Ponds (Skamania origin) along with an unknown contribution of indigenous stock. This program began in 1974. Since the 1980s, this stock has been maintained from adult returns to Reiter Ponds (on the Skykomish River). The purpose of this program is to provide for harvest, while avoiding adverse interactions with other stocks in the watershed. To this end, 250,000 yearlings are released annually into the Skykomish River (80–110,000 at Reiter Ponds, the remainder at various other release sites along the Skykomish River). The eggs are incubated at Wallace River Hatchery, and the resulting progeny early reared there. Final rearing and release are at Reiter Ponds.

OPERATIONAL CONSIDERATIONS

- Yearlings are marked prior to release.
- Adults surplus to broodstock needs are forced to remain in the river to provide a recreational fishery.
- Spawn timing of the hatchery stock overlaps that of naturally spawning summer steelhead, but the overlap is apparently decreasing because of current hatchery broodstock collection practices.
- Interactions with naturally spawning summer steelhead are minimized by releasing hatchery fish in the mainstem, well downstream of areas in the basin typically used by naturally spawning summer steelhead.
- Properly timed hatchery releases appear to be vacating the basin rapidly (within a week of release).
- The program requires inter-facility transfers of eggs and fish.

[78] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is being operated in a manner consistent with short- and long-term goals. It is providing a high contribution to harvest, and precautions mentioned above are being taken to minimize interactions with naturally spawning summer steelhead.

B. Likelihood of attaining goals?
There is a strong likelihood that the program will continue to meet its goals. Its contributions to harvest show no tendency to decline and spawn timing overlaps with naturally spawning summer steelhead have been substantially reduced.

C. Consistent with goals for other stocks?
The program appears to be operating in a manner consistent with the goals for other stocks.

RECOMMENDATIONS

- Implement Area-Wide Recommendations regarding establishing a regional system of "wild steelhead management zones" where streams are not planted with hatchery fish and are instead managed for native stocks. Fishing for steelhead in these zones would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. Such zones would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- Select streams to represent a balance of large and small streams, productivity, etc. Hatchery production may need to be increased in streams selected for hatchery harvest. The HSRG encourages the use of locally-adapted stocks for those streams.
- Minimize interaction with naturally spawning steelhead when implementing a segregated steelhead program through such tools as differential timing and a decision on benefits versus risks on outplanting in freshwater habitat. In addition, adult collection procedures should be designed to capture as many adults from the returning segregated population as possible.
- Organize a workshop to develop this concept.
- Include monitoring and evaluation as a basic component of the concept, for both wild steelhead management zones and hatchery harvest streams.
- Maintain current broodstock collection practice, as it will help to further reduce overlaps in spawn timing with naturally spawning summer steelhead.
- Revise the spawning protocol to use single pair matings or five-by-five matings, to help ensure an effective-size spawning population.
- Release hatchery yearling steelhead smolts between May 1 and May 15, at a target size of six to the pound, and a condition factor of less than 1.0.
- Continue to use the weir at Tokul Creek Hatchery to trap all salmonids and transport naturally spawning salmonids above the weir, so that these fish can take advantage of existing spawning habitat (an exception to the upstream transport would be naturally spawning salmonids deemed by the managers to pose an unacceptable risk to fish stocks held at Tokul Creek hatchery).
- Obtain an additional one cubic foot per second of spring water at Tokul Creek Hatchery for incubation and early rearing.
- Expand the Reiter Ponds facility to provide for incubation and early rearing of winter and summer steelhead, so that the need for rearing at Wallace River Hatchery is eliminated.
- Upgrade facilities for spawning and handling of adult steelhead.

- Provide improved predator control at rearing ponds.

COMMENTS

- Currently, summer steelhead broodstock collection at Reiter Ponds uses only the first 500 fish that return, a procedure that likely accounts for the decreasing overlap in spawn timing with that of naturally spawning summer steelhead.
- Establishment of the wild steelhead management zones should reduce the chances of ecological and genetic interactions with hatchery steelhead and should help to ensure the availability of founding stocks for hatchery purposes should the need for such stocks arise.
- Upgrading facilities at Reiter Ponds should result in more efficient production of steelhead.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG but notes that:

- Implementing the proposed spawning protocol may be difficult because sperm is collected for virology tests.
- Additional funding will be required to upgrade the facilities as recommended.
- Implementing a regional system of wild steelhead management zones has a number of implications that will require discussion with the affected tribes and the Fish and Wildlife Commission.

The Tulalip Tribes generally support the recommendations of the HSRG (the Tribes' full comments are appended to this document), but have the following to add:

- The Tulalip Tribes will want to review the concept of wild steelhead management zones and the selection of particular zones before this concept is implemented.

TULALIP BAY AND INDEPENDENT TRIBUTARIES

Overview

STOCK STATUS[79]

Stocks	Hatchery Program?	Biological Significance (L=Low, M =Intermediate, H =High)			Population Viability (L=Critical, M = At Risk, H = Healthy)			Habitat (L = Inadequate, M = Limiting, H = Healthy)			Harvest Opportunity (0 = None, L = Occasional, M = Most years, H = Each year)		
		Now	Goals		Now	Goals		Now	Goals		Now	Goals	
			Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term		Short-Term	Long-Term
Tulalip Bay Hatchery Spring Chinook	Y	L	L	L	L	L	L	L	L	L	H	H	H
Tulalip Bay Hatchery Summer Chinook	Y	L	L	L	L	L	L	L	L	L	H	H	H
Tulalip Bay Hatchery Fall Chinook	Y	L	L	L	L	L	L	L	L	L	H	H	H
Tulalip Bay hatchery Coho	Y	L	L	L	L	L	L	L	L	L	H	H	H
Tulalip Bay Hatchery Chum	Y	L	L	L	L	L	L	L	L	L	H	H	H
Other Cutthroat	N	H	H	H	L	L	L	L	M	M	0	0	L
Other Hatchery Coho	Y	L	L	L	L	L	L	L	L	L	H	H	H

HABITAT

No information provided.

HATCHERIES

Tulalip Bay (Bernie Kai-Kai Gobin) Hatchery

The Tulalip (Bernie Gobin) Salmon Hatchery is located at the north end of Tony's Marsh on the Tulalip Indian Reservation, near the point where the East and West forks of Tulalip Creek meet. The pond is created by a large dam near Tulalip Bay and is several acres in size. It drains to Tulalip Bay via the lower facility pond and a series of valves, raceways, pipes and a fish ladder. The hatchery rears and releases spring, summer and fall chinook, as well as coho and chum to provide commercial and ceremonial opportunity for tribal members. The hatchery also provides commercial and recreational opportunity in non-Indian fisheries.

Everett Net Pens

Community volunteers, in cooperation with WDFW, operate a marine coho net pen in the City of Everett to provide recreational fishing opportunity and to keep the local community engaged in state and regional fishery matters.[80]

[79] *This table contains ratings for all salmonid stocks in the sub-region, as provided by the managers. For definitions of these ratings, see the* Components of This Report *section of the Introduction.*

[80] *Darrell Mills, Washington State Department of Fish and Wildlife, September 2001.*

Tulalip Bay Hatchery Spring Chinook

Tulalip Tribes

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[81]	Low	Low	Low
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Tulalip Bay hatchery spring chinook program relied on annual outplants from adult returns to the Marblemount Hatchery (on the Skagit River). This stock originates from the Sauk River tributary (on the Skagit River). This program began with brood year 1993 and was suspended in brood year 1999. The purpose of the program was to provide for harvest while avoiding adverse interactions with other local stocks. To this end. 40,000 yearlings were released at Bernie Kai-Kai Gobin Salmon Hatchery into Tulalip Bay. Eggs were collected and eyed at Marblemount Hatchery. Eggs were hatched, and the hatch reared and released at the Bernie Kai-Kai Gobin Salmon Hatchery.

OPERATIONAL CONSIDERATIONS

- Tulalip Bay has no habitat for natural salmon production. It is strictly a terminal area for harvest of hatchery produced salmon.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
This program is consistent with the goals.

B. Likelihood of attaining goals?
The likelihood of attaining goals is low, since Tulalip Bay facilities currently lack rearing space and sufficient cold water to rear spring chinook successfully.

C. Consistent with goals for other stocks?
This program may affect other stocks through genetic or ecological interactions.

[81] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

RECOMMENDATIONS

- Determine whether returns from the summer chinook program are sufficient to meet the ceremonial purposes. If not, facilities at Tulalip Bay must be upgraded to provide appropriate rearing conditions for spring chinook.

COMMENTS

None.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG.

The Tulalip Tribes support the recommendations of the HSRG.

Tulalip Bay Hatchery Summer Chinook

Tulalip Tribes and Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[82]	Low	Low	Low
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Tulalip Bay hatchery summer chinook program relies on annual outplants from adult returns to the Wallace River Hatchery on the Skykomish River. This stock originates from the Skykomish River. The Tulalip Bay hatchery summer chinook program is a two generation trial to determine if program goals can be met by switching from fall to summer chinook and basing the program on an in-region stock. The summer chinook salmon program began in brood year 1998. The purpose of this program is to provide for harvest, while avoiding adverse interactions with other local stocks. To this end, 200,000 eggs are obtained from the integrated broodstock program at the Wallace River Hatchery. Incubation, rearing and release as sub-yearlings occur at the Bernie Kai-Kai Gobin Salmon Hatchery.

OPERATIONAL CONSIDERATIONS

- Tulalip Bay has no habitat for natural salmon production. It is strictly a terminal area for harvest of hatchery produced salmon.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
B. Likelihood of attaining goals?
C. Consistent with goals for other stocks?

As this is a new program, harvest benefits and potential straying risks cannot yet be evaluated. The most significant potential risk is the effect of introgression of hatchery strays on the distinct and relatively small naturally spawning Snoqualmie fall chinook population. The opportunity for non-treaty harvest could be increased through adipose fin clip mass marking.

[82] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

RECOMMENDATIONS

- Design studies that evaluate different approaches to manage potential straying problems, while proceeding with the evaluation of the summer chinook program. Such approaches might include (but not be limited to): reducing straying to areas other than the Skykomish, for example, by incubating and initial rearing of Tulalip bound fish at Wallace, and/or through the use of morpholine drip at Tulalip and at Skykomish to improve homing to these destinations. It is also possible that habitat in the Snoqualmie is unsuitable for the summer chinook life history pattern and/or that separation in spawning timing and location prohibits introgression with Snoqualmie fall chinook. Evaluation of the current program should continue, so that more information about the magnitude and consequences of straying can be obtained.
- Include adipose fin clip mass marking to help this program achieve the goal of maximizing harvest rate and to assess straying.
- Implement a Skykomish brood stock program consistent with the goals of the Snohomish summer chinook population. Introduce an average of 10% naturally spawning fish into the hatchery broodstock each year for on-station releases.

COMMENTS

- The HSRG commends the managers in this region for recognizing the potential risks due to straying and for conducting well designed studies to evaluate them.

MANAGERS RESPONSE

The Tulalip Tribes generally support the recommendations of the HSRG (the Tribes' full comments are appended to this document), but have the following to add:

- The co-managers believe that the otolith mark is the only type of mass mark suitable for assessing straying when the simultaneous contribution of several different hatchery stocks to natural spawning areas is of interest and the hatchery stocks must therefore receive a unique mark.
- During the period of feasibility testing for the suitability of the summer chinook stock for rearing at Tulalip, 100,000 fish per year are receiving a coded wire tag and adipose fin clip. During this period, the co-managers believe the otolith mark is the only mass mark this group should receive, not additional adipose fin clips.
- If and when the summer chinook become the broodstock of choice at Tulalip Hatchery, then the co-managers believe it would be appropriate to discuss whether to mass mark all or part of the production with an adipose fin clip.

WDFW generally supports the recommendations and notes that:

- Identification of the number of naturally origin spawners incorporated in the hatchery broodstock is a complex topic that will require additional analysis and discussion.

Tulalip Bay Hatchery Fall Chinook

Tulalip Tribes and Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[83]	Low	Low	Low
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Tulalip Bay hatchery fall chinook program relied on annual outplants from adult returns to the Wallace River Hatchery on the Skykomish River. This stock originates from Green River. Currently this program is supported by Green River-origin fish returning to Samish Hatchery on the Samish River and from adults returning to Wallace River Hatchery after August 15. This program began in the mid-1970s.The purpose of this program is to provide for harvest while avoiding adverse interactions with other local stocks. To this end, the program releases 1.5 million fingerlings annually into Tulalip Bay. Eggs are eyed, hatched, and the hatch reared and released at Bernie Kai-Kai Gobin Salmon Hatchery.

OPERATIONAL CONSIDERATIONS

- Tulalip Bay has no habitat for natural salmon production. It is strictly a terminal area for harvest of hatchery produced salmon.
- Since the fall chinook program at Wallace is discontinued, this source of brood stock is no longer available.
- The agreement between the co-managers states that if not enough eggs can be collected at Wallace, eggs will come from another Green River stock.
- Skykomish summer chinook is also being studied as a possible alternative brood for this program.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
This program is consistent with the goals for this stock.

[83] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

B. Likelihood of attaining goals?
The program has provided reliable harvest opportunities each year. The Tulalip Bay fall chinook program has provided valued harvest opportunities in particular by providing access to harvestable hatchery fish when other marine fisheries must remain closed to protect depressed natural populations. The opportunity for non-treaty harvest opportunity could be increased through adipose fin clip mass marking.

C. Consistent with goals for other stocks?
The primary concern with this program is the straying of fall chinook that escape fisheries in Tulalip Bay (and elsewhere) and migrate into the Snohomish River. Preliminary study results suggest that straying into the Snoqualmie River may be significant. The Snoqualmie fall chinook is a genetically distinct population which, although relatively stable, is of low enough abundance to warrant concern about the rate of contribution of hatchery fish to the spawning population.

RECOMMENDATIONS

- Consider summer chinook as a substitute for out-of-basin-origin fall chinook as a brood stock choice for this program.
- Reduce or suspend the program pending the outcome of the ongoing straying study, to avoid potential impacts on the Snoqualmie fall chinook population.
- Include adipose fin clip mass marking, to help this program achieve the goal of maximizing harvest rate and to assess straying.

COMMENTS

- The managers in this region are commended for recognizing the potential risks due to straying, for conducting well designed studies to evaluate these risks, and for developing potential alternative programs.

MANAGERS RESPONSE

The Tulalip Tribes generally support the recommendations of the HSRG (the Tribes' full comments are appended to this document), but have the following to add:

- During the period of feasibility testing for the suitability of the summer chinook stock for rearing at Tulalip, 100,000 fall chinook per year are receiving a coded wire tag and adipose fin clip. During this period, the co-managers believe the otolith mark is the only mark this group should receive, not additional adipose fin clips.
- The co-managers believe that the program should continue at current levels until such time as data from the summer chinook evaluation indicates otherwise. Some mixture of summers and falls may be used to achieve program goals in the interim, based on discussions and agreement between the Tulalip Tribes and WDFW.

WDFW generally supports the recommendations and notes that:

- The co-managers believe that the program should continue at current levels until such time as data from the summer chinook evaluation indicates otherwise. Some mixture of summers and falls may be used to achieve program goals in the interim, based on discussions and agreement between the Tulalip Tribes and WDFW.

Tulalip Bay Hatchery Coho

Tulalip Tribes

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[84]	Low	Low	Low
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Tulalip Bay hatchery coho program relies on annual outplants from adult returns to the Wallace River Hatchery (on the Skykomish River). This stock originates from the Skykomish River. This program began in the mid 1970s. The purpose of this program is to provide for harvest while avoiding adverse interactions with other local stocks. To this end, the program releases one million yearling smolts each year into Tulalip Bay, where returning adults are harvested at the highest possible rate. Incubation, rearing and release occur at the Bernie Kai-Kai Gobin Salmon Hatchery.

OPERATIONAL CONSIDERATIONS

- Tulalip Bay has no habitat for natural salmon production. It is strictly a terminal area for harvest of hatchery produced salmon.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
This program is consistent with harvest goals.

B. Likelihood of attaining goals?
The program has provided harvest opportunities each year and is likely to continue to do so. The opportunity for non-treaty harvest opportunity could be increased through adipose fin clip mass marking.

C. Consistent with goals for other stocks?
Information about straying is sparse, however even with a moderate straying rate, the contribution of Tulalip hatchery coho to naturally spawning escapement would be small, due to the low abundance of hatchery fish relative to the natural escapement.

[84] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

RECOMMENDATIONS

- Investigate the contribution of hatchery fish to natural spawning.
- Manage the brood stock maintenance program at Wallace River Hatchery consistent with the goals for the Skykomish coho population.
- Consider integrating naturally spawning fish into the brood stock.
- Include adipose fin clip mass marking to help this program achieve the goal of maximizing harvest rate and to assess straying.
- Design and implement a study to assess the contribution of hatchery fish to natural spawning populations.

COMMENTS

None.

MANAGERS RESPONSE

The Tulalip Tribes generally support the recommendations of the HSRG (the Tribes' full comments are appended to this document), but have the following to add:

- This program currently includes coded wire tags and adipose fin clips on 50,000 smolts per year and mass marking of an additional 250,000–300,000 smolts per year with adipose fin clips subject to agreement between Tulalip and WDFW.

WDFW generally supports the recommendations and notes that:

- Identification of the number of naturally origin spawners incorporated in the hatchery broodstock is a complex topic that will require additional analysis and discussion.

Tulalip Bay Hatchery Chum

Tulalip Tribes

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[85]	Low	Low	Low
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Tulalip Bay hatchery chum stock derives from Quilcene Hatchery plants (Walcott Slough stock on Hood Canal) from 1975–78. This stock was genetically marked through selective breeding of individuals with particular allelic genotypes, resulting in progeny with elevated frequencies of rare genotypes. Genotypic marking took place over a complete generation cycle and was completed in the mid 1990s. This stock is maintained by genetically marked adult returns to Tulalip Hatchery on Tulalip Creek. The purpose of this program is to provide for harvest while avoiding adverse interactions with other local stocks. To this end, eggs are incubated, hatched, reared and released at Bernie Kai-Kai Gobin Salmon Hatchery. The annual egg take goal is eight million, with a release goal of 7.5 million smolts.

OPERATIONAL CONSIDERATIONS

- Tulalip Bay has no habitat for natural salmon production. It is strictly a terminal area for harvest of hatchery produced salmon.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
This program is consistent with harvest goals.

B. Likelihood of attaining goals?
This program meets its goals with no apparent adverse impact, although evaluation of straying into natural populations should continue so that this potential risk can be properly managed.

C. Consistent with goals for other stocks?
The Tulalip chum population is genetically mass marked. Study results so far indicate no significant straying of these fish into the Stillaguamish or Snohomish basins.

[85] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

RECOMMENDATIONS

- Resume allozyme genetic analysis for this program for the purpose of monitoring contribution of hatchery fish to harvest (i.e. monitoring benefits), and naturally spawning populations (potential effects on naturally spawning stocks).

COMMENTS

- This is an example of a successful program that meets its goals, while effectively managing potential risks.
- The managers in this region are commended for recognizing the potential risks due to straying and for conducting well designed studies to evaluate them.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG. No response yet received from the Tulalip Tribes.

The Tulalip Tribes support the recommendations of the HSRG.

Other Hatchery Coho

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[86]	Low	Low	Low
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Other hatchery coho program is used for a cooperative project and relies on annual outplants from Wallace River Hatchery on the Skykomish River. This stock originates from the Skykomish River. The purpose of this program is to provide for harvest while avoiding adverse interactions with other local stocks. To this end, 70,000 yearlings are released into Puget Sound (50,000 at Possession Point; 20,000 at Port Gardner Bay, Snohomish River mouth). Eggs are collected and incubated at Wallace River Hatchery, where they are reared prior to final rearing and release into saltwater.

OPERATIONAL CONSIDERATIONS

- The net pen consists of one deep net pen where coho are acclimated, reared and released. Smolts are transferred from the Wallace River Hatchery.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
This program is consistent with the goals.

B. Likelihood of attaining goals?
Continued harvest opportunity is expected from this program. There is also an education benefit.

C. Consistent with goals for other stocks?
Straying from net pens can pose genetic risks to adjacent native stocks. However, there is a low risk here because of the source of the broodstock, the relatively small release numbers, and the viability or health of the adjacent native population to which straying may occur.

[86] *In the case of a segregated harvest program, population viability ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment.*

RECOMMENDATIONS

- Do not significantly increase release numbers.

COMMENTS

None.

MANAGERS RESPONSE

WDFW supports the recommendation of the HSRG.