❖South Sound

Overview

This region includes the portion of Puget Sound south of the Tacoma Narrows. For the purposes of this review, the Scientific Group and the regional managers divided the region into five sub-regions and then reviewed the hatchery programs involving each identified sub-regional salmonid stock (for example, Chambers Basin fall chinook). The review included a consideration of the program's effects on all other hatchery and naturally spawning sub-regional salmonid stocks (see table in sub-regional overviews). The sub-regions identified for this region include:

1. Chambers Creek Basin (Fort Lewis and north)
2. Nisqually River and Delta
3. Deschutes River
4. Squaxin/South Sound Net Pens and Independent Tributaries
5. Key Peninsula (including Fox Island Net Pens)

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

FISHERIES

Since 1977, South Sound salmon management has been directed by the Puget Sound Salmon Management Plan. Under that plan, South Sound chinook and coho stocks have been harvested at rates appropriate for hatchery stocks, with natural escapements being a secondary consideration. Unless there were specific accommodations made to protect natural stocks (e.g. Deschutes coho), natural escapements have been the result of whatever natural fish escaped fisheries designed to fully harvest the available hatchery stocks.[25]

CONSERVATION

Effort levels devoted to stock assessment of South Sound salmon stocks have been prioritized by the harvest management strategy outlined for this region by the Puget Sound Salmon Management Plan and other efforts pursued by the co-managers to increase understanding of salmon in the region. Emphasis has been given to species and stocks that have been managed for natural escapement goals (winter chum, fall chum, summer chum, pinks and winter steelhead). Conversely, natural stocks of species managed at a hatchery harvest rate in this region (coho and chinook) have been generally sampled at a lower rate than stocks of the same species in a region that managed them for natural escapement. The Comprehensive Coho planning process is providing a forum for discussion by the co-managers regarding means by which protection can be afforded South Sound coho natural stocks throughout the gauntlet of terminal and pre-terminal fisheries.[26]

[25] *Chuck Baranski, Washington State Department of Fish and Wildlife July 2001.*

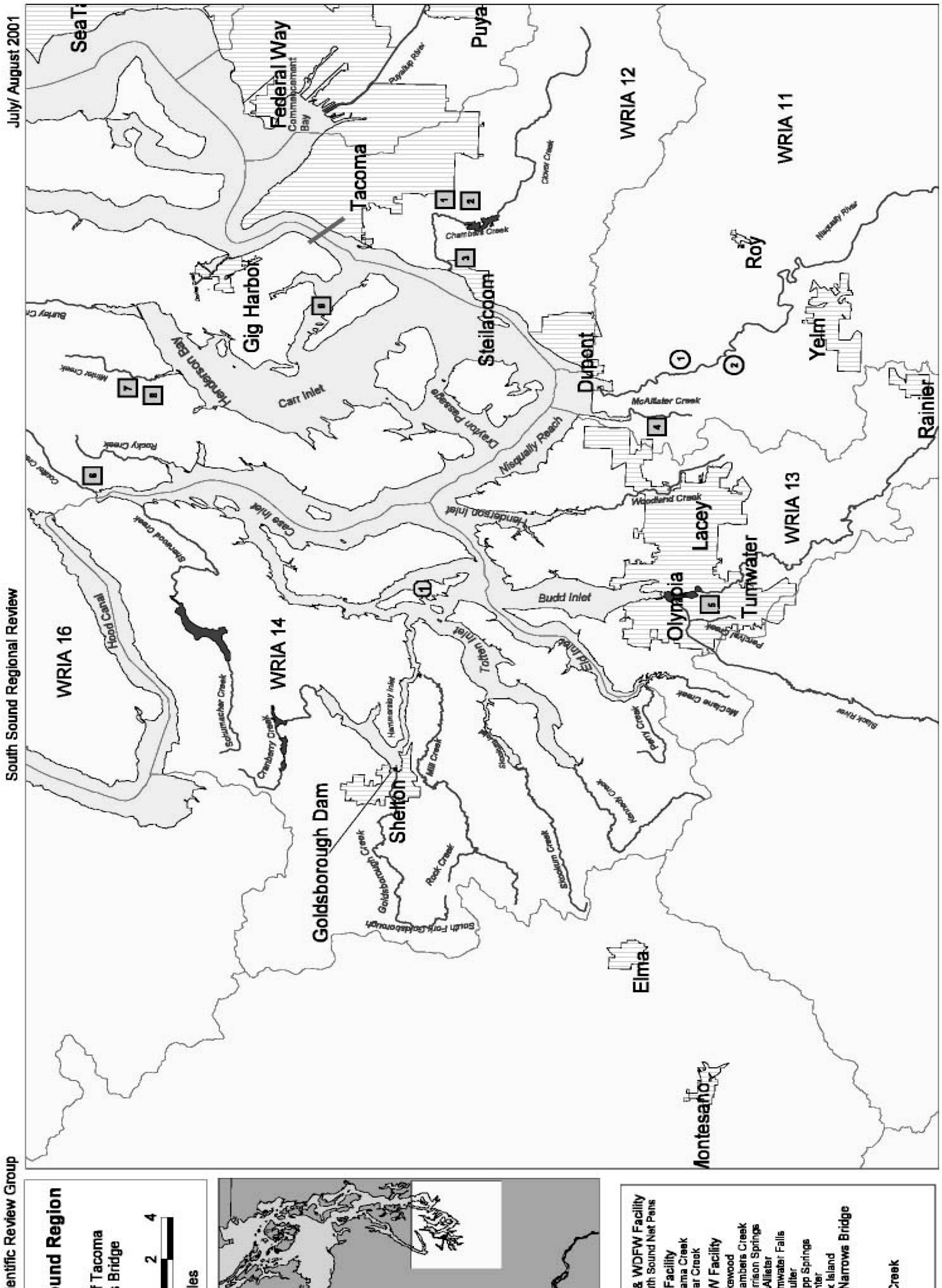
[26] *Ibid*

HABITAT

South Puget Sound future fish habitat expectations are directly correlated to the effects of human population growth and development, and aquatic and land use regulations intended to mitigate their adverse effects. Growth-planning projections indicate continued growth expansion in the South Sound region. Major employers, state government and federal military, are relatively stable. Other businesses and industries are diversified. The Growth Management Act (GMA) and Shoreline Management Act (SMA) have required local governments to provide improved aquatic area protection, including increased aquatic buffers. Instream flows are expected to be minimally affected by development water use and only in selected sub-watersheds, because of generally good watershed hydrographs. Storm water, development sedimentation, and beach and stream bank channelization impacts are expected to still be significant in the future, although improved local regulations, facility upgrades, and Best Management Practices (BMPs) should lessen, but not prevent, such impacts. The cumulative consequences of the projected population and development expansion are expected to have some degree of negative effect on aquatic fish habitats. Nonetheless, the long-term goal for South Sound is for healthy, protected habitat for fish and wildlife.

The most notable South Sound watershed-scale restoration effort is on the Nisqually River main stem, where the Nisqually Tribe and the Nisqually Land Trust are purchasing sensitive floodplain and estuarine land and using conservation easements to retain estuarine and riparian habitat. Other stream restoration efforts exist for South Puget Sound watersheds, although most are only selected reach-scale restoration efforts, such as the Goldsborough Dam Removal and Stream Restoration Project, Kennedy Creek watershed planning, Woodland Creek watershed planning, and the Capitol Lake and Dam Fish Passage and Estuary Review. Numerous small projects (primarily fish passage corrections) are being conducted by a variety of local governments, county conservation districts, and regional fish enhancement groups with technical assistance from WDFW. These projects are not long-term, with dedicated funds. Most are supported by the Salmon Recovery Funding Board (SRFB).[27]

[27] *Jim Frasier, Washington State Department of Fish and Wildlife, July 2001.*


Hatchery Scientific Review Group
South Sound Regional Review
July/ August 2001
South Sound Region
South of Tacoma Narrows Bridge
2 0 2 4
Miles
Tribal & WDFW Facility
1. South Sound Net Pens
Tribal Facility
1. Kalama Creek
2. Clear Creek
WDFW Facility
1. Lakewood
2. Chambers Creek
3. Garrison Springs
4. McAllister
5. Tumwater Falls
6. Coulter
7. Hupp Springs
8. Minter
9. Fox Island
Tacoma Narrows Bridge
Dam
WRIA
River or Creek
Lake
City
WRIA 16
WRIA 14
WRIA 13
WRIA 12
WRIA 11
Federal Way
Tacoma
Gig Harbor
Steilacoom
Dupont
Roy
Yelm
Rainier
Lacey
Olympia
Tumwater
Shelton
Goldsborough Dam
Elma
Hood Canal
Carr Inlet
Henderson Bay
Drayton Passage
Nisqually Reach
Case Inlet
Budd Inlet
Totten Inlet
Eld Inlet
Henderson Inlet
Hammersley Inlet
McAllister Creek
Woodland Creek
Chambers Creek
Clover Creek
Nisqually River
Puyallup River
Commencement Bay
Minter Creek
Rocky Creek
Sherwood Creek
Schumocher Creek
Cranberry Creek
Mill Creek
Skookum Creek
Kennedy Creek
Perry Creek
McLane Creek
Black River
Percival Creek
Goldsborough Creek
Rock Creek
South Fork Goldsborough

CHAMBERS CREEK BASIN

Overview

STOCK STATUS[28]

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
Chambers Basin Hatchery Fall Chinook	Y	L	L	L	L	L	L	L	L	L	H	H	H
Chambers Basin Coho	N	L	M	M	L	L	M	L	M	M	L	L	M
Garrison Springs Chum	Y	H	H	H	M	M	H	L	L	M	0	0	L
Chambers Basin Steelhead	N	L	L	L/M	L	L	M	L	M	M	0	0	0

HABITAT

Although Chambers Creek still has some good habitat in the lower end, it suffers from water quality problems, including high copper levels resulting from ongoing algae control efforts in Steilacoom Lake. Some excellent spawning and rearing habitat exists in the upper end but passage problems preclude access to it by anadromous fish in most years. Some of the blockages are scheduled to be modified to allow passage. WDFW transports several hundred adult coho salmon above the blockages each fall.[29]

This watershed currently supports runs of winter chum, coho, coastal cutthroat and winter steelhead trout. Salmonid habitat conditions in the mainstem Chambers and Clover Creeks can be described as fair to poor in the lower reaches and as fair with increasing pressure from urbanization in the upper reaches.

The major habitat concerns associated with the mainstem Chambers-Clover Creek and tributaries include: 1) the tidal headwater dam where historically all migrating anadromous adults were handled prior to either being incorporated into a hatchery broodstock or released upstream; 2) the loss of functional floodplain due to extensive channel relocations, channelization, and tight-lining (pipes); 3) the alteration to stream hydrology due to high levels of impervious surfaces; 4) a lack of properly functioning riparian habitats; 5) impacts to smoltification through the application of pesticides and in particular the herbicides used to treat algae in Steilacoom Lake; and 6) the loss of portions of estuary habitats caused by the dam at the head of Chambers Bay.[30]

[28] *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.*

[29] *Conservation Priorities: An Assessment of Freshwater Habitat For Puget Sound Salmon, The Trust For Public Land, Seattle, WA, November 2000.*

[30] *John Kerwin, Washington Conservation Commission, July 2001.*

HATCHERIES

Lakewood Hatchery

The Lakewood Hatchery (formerly the South Tacoma Hatchery) is located on Chambers Creek in South Puget Sound, adjacent to the South Puget Sound Wildlife Area approximately 500 yards from Chambers Creek at river mile 3.3. The Lakewood Hatchery is part of the South Sound Hatchery Complex which includes Garrison Springs Hatchery, Chambers Creek Hatchery, and the Chambers Creek Adult Trap; all in the Chambers Creek Basin. Until 1997, Lakewood Hatchery (and the other facilities in this complex) provided significant support for winter-run and summer-run steelhead and catchable rainbow trout programs throughout western Washington. In 1997, fish management decisions to develop locally-adapted steelhead broodstocks and to substantially cut catchable trout production reduced the need for support from these facilities. Today, Lakewood Hatchery produces 200,000 yearling fall chinook, maintains a small rainbow trout broodstock population, and provides support for other trout programs in the region.

Chambers Creek Hatchery

The Chambers Hatchery is located on Chambers Creek in South Puget Sound. The primary goal of the current hatchery program is to provide chinook salmon for recreational harvest in the Puget Sound (released as yearlings). Today, Chambers produces 100,000 yearling fall chinook, 200,000 cutthroat fry and more than 400,000 kokanee. The hatchery was originally a private trout hatchery. It was purchased by the Game Department in the late 1960s and was rebuilt in the late 1970s. It was opened as a Game Department facility in 1976.

Garrison Springs Hatchery

Garrison Springs Hatchery is located in a canyon between Western State Hospital and the Abitibi Paper Mill. There is no migratory outlet from the hatchery, as the water passes several man-made cascades and a portion enters the paper mill. Garrison Creek enters the tidewater in Chambers Bay approximately one quarter mile below the Chambers Creek Trap. All fish reared at Garrison Springs Hatchery are shipped out on planting trucks. Garrison Springs Hatchery is currently programmed to release 850,000 sub-yearling chinook at 50 fish per pound into Chambers Creek. This program has been in existence for about 20 years. Garrison Springs Hatchery also supports other facilities by incubating eggs and rearing fish during the summer.

The Chambers Creek trap is at river mile 0.4 on Chambers Creek and is at the terminal limit of tidal influence, the Chambers Creek Dam. A satellite to Garrison Creek Hatchery, the Chambers Trap is located at tidewater near the Abitibi Paper Mill and the Pierce County Waste Treatment Facility. This facility provides the backbone for hatchery chinook production in Chambers Creek. The main uses of the Chambers Trap are to collect broodstock for salmon programs in the basin, enumerate and pass other species of naturally spawning salmon and trout upstream, and to acclimate chinook fingerlings prior to release into Chambers Creek.[31]

[31] *Rich Eltrich, Washington State Department of Fish and Wildlife, July 2001.*

Chambers Basin Hatchery Fall Chinook

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[32]	Low	Low	Low
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Chambers Creek Basin hatchery fall chinook program began in the 1980s with fish of Green River origin from Deschutes, Soos and Puyallup hatcheries. This stock is maintained through adult returns to the Chambers Creek trap, but can be supplemented with Minter Creek and Deschutes stock. The purpose of this program is to provide for harvest. To this end, 300,000 yearlings (200,000 at Lakewood Hatchery, 100,000 at Chambers Creek Hatchery) and 850,000 fingerlings (600,000 at Chambers Creek trap, 250,000 at Steilacoom Lake) are released into the Chambers Creek drainage. Yearling production is eyed and hatched at Chambers Creek Hatchery and reared at both Chambers Creek and Lakewood hatcheries. Fingerling production is eyed, hatched and reared at Garrison Springs Hatchery.

OPERATIONAL CONSIDERATIONS

- The operations of this program are generally consistent with guidelines for a segregated harvest program.
- Evaluation of the contribution of the yearling program was not possible because the program is relatively new, with minimal tagging to date.
- Use of circular ponds previously used in the trout program and seasonal water quality problems were identified as contributing to infections of furunculosis and parasites, both of which require regular drug treatments to control.
- The size of the current yearling program is too large for the existing facilities, requiring excessive transfer between stations to maintain the program level.

[32] *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 currently provides significant benefits to the terminal area treaty and recreational fishery from its fingerling component. This program is not only consistent, but necessary to attain, the short-term and long-term harvest goals for the basin, since natural production potential for fall chinook in this basin is severely limited by habitat quantity and quality. Since the yearling component of this program is relatively new, it was not possible to evaluate its contribution to he harvest goals for this stock.

B. Likelihood of attaining goals?
The likelihood of attaining the goals is dependent on improving rearing conditions at the facilities, evaluation of the release strategies employed, and implementation of the most successful strategy or strategies.

C. Consistent with goals for other stocks?
Risks to other populations include competition risks to other South Sound chinook stocks, including those in the Nisqually, Deschutes and Key Peninsula basins. A general concern exists across all species regarding the current South Sound carrying capacity. There are also potential predation risks to natural chum salmon stocks from the region, particularly from the yearling component of the program.

RECOMMENDATIONS

- Evaluate the success of the different fall chinook release strategies (yearling and fingerling) in the basin.
- Develop a local fall chinook broodstock for the basin.
- Operate programs and facilities to allow for full volitional release of chinook.
- Develop a facility in the lower basin to improve acclimation, rearing and release options for fingerlings and yearlings. WDFW has property and a water right in the lower basin near the Chambers Creek trap that can be used for this purpose.
- Resize the program for current and planned facilities to minimize the need for periodic fish transfers between facilities.
- Operate Chambers Creek Hatchery with Garrison Springs Hatchery for fall chinook fingerlings.
- Transition the Lakewood facility from a chinook production facility to more appropriate species for this facility.
- Enhance educational opportunities at Lakewood to take advantage of the open space at this facility, in the middle of an increasingly urban environment.

COMMENTS

- The water supply and facilities used for the yearling program have a significant potential use for resident fish.
- Rearing and release strategies need to consider potential interspecific effects.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG and has initiated a scoping study (using funding from the Puget Sound Recreational Enhancement account) to evaluate options for developing a

facility in the lower basin. Additional funding will be required to evaluate the success of different release strategies and modify the facilities as recommended.

Garrison Springs Chum

Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

The Garrison Springs chum stock derives from wild chum collected in Chambers Creek from 1979 to the present. The stock is maintained through adult returns to Chambers Creek trap. Garrison Springs chum salmon belong to the Central/South Puget Sound Fall Chum GDU. Eight other stocks are in this GDU. The purpose of the program is to restore a chum stock that has recently shown steep declines in returning adults. To this end, 50,000 unfed chum fry are released into Flett Creek. Eggs are eyed at Garrison Springs Hatchery and smolts released from a remote site incubator (RSI).

OPERATIONAL CONSIDERATIONS

- Even though this is a small program, because of recent low returns of chum salmon to this watershed, collection of even a small number of eggs could be considered "broodstock mining."

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The benefit of this program to conservation is currently unknown. There is an educational benefit from this program that is linked to watershed protection. If the program is not successful, there is a risk to this population from removing natural spawners from an already depressed population

B. Likelihood of attaining goals?
The likelihood that this program will attain its goal is dependent on the fish released from the remote site incubator being representative of the natural stock and surviving to reproduce at a higher rate than naturally spawning chum. These factors are currently unknown.

C. Consistent with goals for other stocks?
The program is consistent with goals for other stocks.

RECOMMENDATIONS

- Evaluate the success of the RSI program in providing naturally spawning fish in the newly available habitat.
- Use the results of the evaluation to determine if the program should be continued, eliminated or expanded to additional restoration efforts in the basin.
- 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

- Recent returns to the basin (1999 and 2000) have been only a few hundred fish, after averaging several thousand per year over the last 30 years.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG but notes that additional funding will be required to evaluate the success of the RSI program.

NISQUALLY RIVER AND DELTA

Overview

STOCK STATUS[33]

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
Nisqually River Fall Chinook	Y	L	M	H	M	M	H	M	M	H	H	H	H
McAllister Creek Hatchery Fall Chinook	Y	L	L	L	L	L	L	L	L	L	H	H	H
Nisqually River Late Coho	N	M	M	M	M	M	M	M	M	H	0	0	L
Nisqually River Coho	Y	L	M	M	L	M	M	L	M	M	L	L	M
Nisqually River Late Chum	N	H	H	H	H	H	H	M/H	H	H	H	H	H
McAllister Creek Chum	N	H	H	H	H	H	H	M	M	H	H	H	H
Nisqually River Pink	N	H	H	H	L	M	H	M	M	H	0	L	M
Nisqually River Steelhead	N	H	H	H	L	M	H	M	M	H	0	M	H

HABITAT

The Nisqually River has the largest estuary in southern Puget Sound and the last major undeveloped delta in Puget Sound. The historic estuary area has been reduced about 30% percent by dikes. Much of the riparian area along the lower river is already in protected status. Of the 40 miles of mainstream accessible to anadromous fishes, 64% is in protected status. The mainstem Nisqually has three dams. The present upstream distribution limit of anadromous fish is river mile 41.4.

The largest watersheds in the Nisqually River Basin are Muck Creek and the Mashel River. Ohop Creek and Tanwax Creek are medium-sized, with stream flows dominated by rainfall. There are a number of smaller, independent drainages. McAllister Creek is a medium-sized, spring water fed creek that flows into Puget Sound through the western edge of the Nisqually Delta. It provides some spawning and good rearing habitat primarily for chum.[34]

Nisqually River spawning sockeye salmon are observed annually, downstream of the Centralia Diversion Dam. The status of native char populations in the basin is unknown. Salmonid habitat condition in the mainstem Nisqually River is currently fair to good. The status of the pink salmon population is depressed at best. The major habitat concerns associated with the mainstem Nisqually River include a loss of functional floodplain due to remnant flood control dikes that reduce side-channel habitats; the loss of portions of the estuary; and the possible loss of coarse sediment transport

[33] *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.*

[34] *Conservation Priorities: An Assessment of Freshwater Habitat For Puget Sound Salmon, The Trust For Public Land, Seattle, WA, November 2000.*

and large, woody debris recruitment out of the upper mainstem basin, past the Alder and LaGrande water storage and power dams, respectively.

Habitat conditions in the McAllister Creek watershed are currently poor. Major habitat concerns include a significant loss of historic estuary, a reduction in floodplain connectivity, a lack of habitat complexity, and poor substrate condition. Red Salmon Creek is a small, independent tributary to the Nisqually Delta entering along the eastern edge of the delta. The creek is fed by surface water runoff and groundwater. It currently supports steelhead, coho, chum and coastal cutthroat. The overall habitat condition would probably be considered fair. Sequalitchew Creek is a medium-sized independent tributary to Puget Sound located northeast of the Nisqually Delta. The creek is fed by surface water runoff and groundwater and has several lakes, dominated by Lake Sequalitchew, and marsh complexes associated with its upper reaches. Habitat conditions are generally fair in the upstream reaches and generally good in the lower reaches.[35]

HATCHERIES

McAllister Hatchery

McAllister Hatchery is located in South Puget Sound on McAllister Creek at river mile 4.0. McAllister Creek is an independent drainage in the Nisqually Valley, west of the Nisqually River. The hatchery was originally designed to rear large numbers of chum and smaller numbers of delayed-release (yearling) chinook. Today, the primary goal of the programs at McAllister is to raise chinook salmon for recreational harvest in Puget Sound. The present program calls for the release of 300,000 fall chinook yearlings in April at 6 FPP and 1,000,000 zero-age fall chinook in May at 50 FPP. McAllister also provides incubation support for the Tumwater Falls chinook program.[36]

Kalama and Clear Creek Hatcheries

Fall chinook are reared at two tribal facilities on the Nisqually River. Kalama Creek Hatchery is located on a left bank tributary of the Nisqually at approximately river mile 9.2. Clear Creek Hatchery is located on a right bank tributary at approximately river mile 6.2. Kalama Creek Hatchery began releasing fall chinook in 1980 (brood year 1979) and Clear Creek Hatchery began releasing chinook in 1991 (brood year 1990). Both programs began with importation of various South Sound chinook stocks, but the current broodstock policy allows only the use of Nisqually River stocks at both facilities. Incubation and rearing takes place on-station with a release goal of 600,000 zero-age smolts at Kalama Creek Hatchery and 3,500,000 zero-age smolts at Clear Creek Hatchery. Both Kalama and Clear Creek hatcheries also produce coho salmon. Like fall chinook, both of these coho programs began with the importation of several Puget Sound stocks. The present program calls for the release of 350,000 coho smolts at Kalama Creek and 630,000 smolts at Clear Creek. Incubation and rearing take place on-station. The primary goal for both facilities is to produce fish for treaty-reserved fishing opportunity for the Nisqually Indian Tribe and recreational opportunity for Puget Sound recreational fishers.[37]

[35] *John Kerwin, Washington Conservation Commission, July 2001.*

[36] *Rich Eltrich, Washington State Department of Fish and Wildlife, July 2001.*

[37] *John Barr, Nisqually Tribe, July 2001.*

Nisqually River Fall Chinook

Nisqually Tribe

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Intermediate	High
Population Viability	At Risk	At Risk	Healthy
Habitat	Limiting	Limiting	Healthy
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest and Conservation		
Type	Integrated		

PROGRAM DESCRIPTION

The Nisqually River fall chinook at Kalama Creek and Clear Creek hatcheries derive from Green River origin stock from Soos Creek, Puyallup, Tumwater Falls, McAllister and George Adams hatcheries. Kalama Creek Hatchery began releases in 1980 with Soos Creek and Puyallup hatchery fish and has been self-sustaining since 1991. Clear Creek (using Kalama Creek Hatchery fish) began releases in 1991 and has been self-sustaining since 1996. Nisqually River fall chinook belong to the South Puget Sound, Hood Canal, and Snohomish Summer+Fall GDUs. This program's current goal is to support treaty-reserved fisheries for the Nisqually Tribe and recreational fishing in the South Sound region. The long-term goal is to assist with restoration of naturally spawning populations of fall chinook salmon in the Nisqually River. To these ends, eggs are collected from adults returning to the Nisqually River to satisfy the following hatchery production targets: Kalama Creek Hatchery, 630,000 smolts; Clear Creek Hatchery, 3.4 million smolts.

OPERATIONAL CONSIDERATIONS

- Existing genetic data (allozyme data) unable to detect any significant allele frequency differences among the two hatchery stocks, natural-origin chinook in the Nisqually River, and the Green River Hatchery stock. However, sample sizes for naturally spawning fish from the Nisqually River were only 30 and 23 fish in 1998 and 1999, respectively. In contrast, sample sizes for the hatchery stocks ranges from 99 to 106 fish.[38]
- Efforts are made to maintain an effective number of breeders of 1,500–2,500 adult fish per year.
- Pre-spawning mortality of adults is less than one percent.
- All released fish are marked to assess potential contribution of hatchery fish to naturally spawning populations, and to better assess the status of the natural populations themselves.
- Recent changes in harvest management will allow greater escapement and natural spawning. There has been a strong attempt to match smolt releases to the carrying capacity of the Nisqually River and estuary via the *Ecosystem Diagnosis and Treatment (EDT)* model and analyses.

[38] *Data provided by Anne Marshall and Craig Busack, Washington State Department of Fish and Wildlife.*

- The program features a complete volitional release of sub-yearling smolts. A yearling program was terminated recently.
- The program has generated significant numbers of precocious males. Procedures are now in place to address this problem.

BENEFITS AND RISKS

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

A high contribution of hatchery-origin fish to harvest indicates that the program is meeting harvest goals and is successful from that perspective. Recent changes in operations and proposed activities in the future are consistent with potentially restoring naturally spawning populations in the Nisqually River.

B. Likelihood of attaining goals?

A high likelihood exists of continuing to achieve harvest goals. Much uncertainty surrounds the ability of the current hatchery stock to establish a viable, self-sustaining, naturally spawning population that can be integrated genetically with the hatchery population. Nevertheless, given the current status of chinook salmon in the Nisqually River, activities to achieve restoration/conservation goals pose little risks, but can potentially yield high benefits.

C. Consistent with goals for other stocks?

The HSRG is concerned about possible impacts of chinook salmon releases on pink and chum salmon fry in the Nisqually River. The risk analysis performed by the Tribe assumes that pink and chum out-migration occurs prior to the release and out-migration of hatchery-origin chinook salmon smolts. If this assumption is wrong, then the hatchery program could potentially be posing risks to those other species. The HSRG is particularly concerned about the status of the pink salmon population, which is rated as being of "high" biological significance, but for which the total estimated escapement has been less than 600 adults in each of the past four brood years (1993, 1995, 1997, 1999). This low number of adults is becoming dangerously close to the level at which genetic concerns are an issue. Thus, risks posed by the hatchery program could be particularly significant.

RECOMMENDATIONS

- Obtain a better understanding of the status of the naturally spawning population of chinook salmon in the Nisqually River. Marking all hatchery-origin smolts prior to release will potentially assist with obtaining this information.
- Introduce an average of 10% naturally spawning fish into the hatchery broodstock each year for on-station releases.
- Conduct additional genetic studies to better understand the genetic relationship between hatchery and naturally spawning populations in the Nisqually River and their relationship to the Green River Hatchery stock. Sample sizes for natural-origin fish from the Nisqually River in previous genetic studies are too small to test, with a desirable level of power, the null hypothesis of a single gene pool for hatchery and natural-origin fish.
- Test and evaluate, via field studies, the assumption that pink and chum out-migration occurs prior to the release and out-migration of hatchery-origin chinook smolts.
- Develop a protection strategy for pink salmon, including an assessment of the effects of the hatchery program at each of the key life history stages. Protection of the existing pink salmon population in the Nisqually River, including if appropriate an enhancement program, is important because of its high biological significance at the southern end of the species' range.

- 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

- Recent termination of the yearling program was a positive move towards reducing potential ecological risks.
- The HSRG commends the Nisqually Tribe for initiating a plan to help restore and recover naturally-spawning populations of chinook salmon in the Nisqually River. To this end, the HSRG is reviewing two plans: an adaptive management plan and the stock management section of the *Chinook Salmon Recovery Plan for the Nisqually River*.
- In response to the HSRG's informal verbal review, a Nisqually Tribal biologist noted that Nisqually pink salmon may be heavily affected by the intensive harvests in Canada and those targeting fish returning to the Skagit River in north Puget Sound. The biologist noted that genetic studies to distinguish Nisqually, Skagit, and Canadian stocks of pink salmon might be useful to protect Nisqually River fish in pre-terminal, mixed fisheries. This latter study could be performed by the WDFW Genetics Unit.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG and has taken the following actions with the Nisqually Tribe:

- All hatchery origin smolts have been marked to facilitate identification of the origin of returning adults.
- A three-year study has been initiated to collect samples and analyze the genetic relationship between natural and hatchery spawning populations.

The Nisqually Tribe supports the recommendations of the HSRG (the Tribe's full comments are appended to this document) and has taken the following actions with WDFW:

- All hatchery origin smolts have been marked to facilitate identification of the origin of returning adults.
- A three-year study has been initiated to collect samples and analyze the genetic relationship between natural and hatchery spawning populations.
- The Nisqually Tribe has obtained funds through the tribal hatchery reform efforts to better estimate the escapement contribution of both hatchery and natural origin fall chinook and to better characterize juvenile salmon utilization of the Nisqually River estuary.
- Additional discussion and funding to develop an adequate broodstock collection facility will be required to properly incorporate natural origin recruits into the artificial production program.

McAllister Creek Hatchery Fall Chinook

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[39]	Low	Low	Low
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The McAllister Creek Hatchery fall chinook stock derives from transplants primarily from the Deschutes Hatchery in 1984. This stock is Green River origin and has been self-sufficient since the late 1980s. The objective of the program is to support recreational and treaty harvest in Puget Sound. To this end, eggs are collected from adults returning to McAllister Creek Hatchery in sufficient numbers to satisfy the following hatchery production targets: one million sub-yearlings and 300,000 yearlings released per year into McAllister Creek.

OPERATIONAL CONSIDERATIONS

- McAllister Creek Hatchery is located at river mile 4.0 of McAllister Creek, an independent stream draining into the Nisqually River estuary.
- The hatchery was originally built to rear chum salmon.
- The hatchery has a number of significant problems including the following:
    - Presence of the parasite *Nanophyetus salmincola.* in the watershed severely limits the use of the facility to only six months of the year (December through May).
    - This requires the use of a variety of in- and out-of-basin facilities for rearing.
    - There is a very high organic loading of the watershed, due to the prevalence of livestock farms.
    - The hatchery is located too low in the watershed. McAllister Creek at this location is affected by tidal fluctuations and this causes effluent from the hatchery to be entrained with the hatchery intake water during high tides.
    - The hatchery depends exclusively on returning adults to voluntarily enter the hatchery, which has poor attraction water due to its low location within the watershed. As a result, only about two-thirds of the returning fish are trapped, which makes it difficult to meet broodstock requirements. The other one-third of the returning fish remaining in

[39] *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.*

McAllister Creek far exceeds natural spawning habitat capacity. Hatchery fish carcasses further contribute to the high organic nutrient load of the creek.

- Fish exhibit questionable survival and require extensive transfers among different facilities to avoid water quality and disease problems.

BENEFITS AND RISKS

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

The program is providing few benefits. This program and hatchery pose significant risks, because fish must be transferred out of the facility prior to release, due to parasite problems. Risks and biological problems with this hatchery outweigh the questionable benefits of the program.

B. Likelihood of attaining goals?

There is little likelihood that this program or hatchery could ever achieve desired goals, because of physical problems with the facility and parasite problems in the watershed.

C. Consistent with goals for other stocks?

There are potential predation problem from this program's yearling component for Nisqually and McAllister late chum. Multiple transfers increase risk from pathogens.

RECOMMENDATIONS

- Discontinue this program and use of this facility for salmonid culture. Resources devoted to this program and facility could be better used to achieve regional goals.

COMMENTS

- The McAllister Hatchery was built at a very poor site and provides little hope of ever supporting a successful program.

MANAGERS RESPONSE

WDFW supports the termination of the fall chinook program at McAllister Creek Hatchery and is currently proposing this action to the Washington State Legislature. If the program is terminated, alternative uses of the facility will be considered. The Fish and Wildlife Commission has the ultimate authority for determining the use of agency facilities.

Nisqually River Coho

Nisqually Tribe

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

PROGRAM DESCRIPTION

The Nisqually River coho program began in 1979 with pre-smolts from George Adams Hatchery on Hood Canal, changed to Skykomish Hatchery stock in 1989, and changed again to Minter Creek Hatchery fish in 1998. Skagit River stock was also used initially for this program. Currently, this program is maintained by annual egg transfers from Minter Creek Hatchery. The objective of this program has been to support treaty-reserved harvest for the Nisqually Tribe and recreational fisheries in the South Sound region. Minter Creek stock is now being used in an attempt to establish a self-sustaining, natural spawning coho population, while conducting an integrated hatchery program to also provide harvest. To these ends, eggs are collected, incubated, and hatched at Kalama Creek Hatchery (350,000 smolts) and Clear Creek Hatchery (630,000 smolts). The fish are reared and released onsite.

OPERATIONAL CONSIDERATIONS

- This program was initially managed as a segregated harvest program using Skykomish River hatchery stock. With the change to the South Sound Minter Creek stock, the long-term goal of the program is now to manage coho salmon as an integrated hatchery program with both harvest and conservation goals.
- To potentially achieve goals for an integrated hatchery program, 125,000 smolts are to be out-planted into Beaver Creek when fish are available.
- Constant temperature ground water is used to rear coho salmon to the smolt stage at Clear Creek Hatchery.

BENEFITS AND RISKS

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

This program, with the Skykomish stock, was not meeting either harvest or conservation goals nor was it meeting broodstock needs.

B. Likelihood of attaining goals?
Success will depend on the return rate and survival of Minter Creek stock back to the Nisqually River as part of the revised program. The program's water source may present a risk to proper smoltification and subsequent life history responses of released fish, including survival.

C. Consistent with goals for other stocks?
Hatchery coho smolts may prey on pink salmon fry (see also discussion of Nisqually fall chinook program).

RECOMMENDATIONS

- Reduce program to a size no larger than needed for evaluation of Minter Creek stock.
- Introduce an average of 10% naturally spawning fish into the hatchery broodstock each year for on-station releases. The exact percentage will depend on the status of the natural population. This will require the establishment of a marked hatchery stock and a naturally spawning population.
- Evaluate return rates and contributions to fisheries of new broodstock for three brood years (five to six calendar years), including results of recently-implemented rearing strategies.
- Evaluate the contribution of hatchery fish to the natural spawning population.
- Discontinue the hatchery program for coho salmon in the Nisqually River if survival and return rates do not increase significantly (that is, if the benefits of the program do not outweigh the risks and economic costs).
- Evaluate the contribution to harvest and conservation of the Beaver Creek outplanting program. Continue program if goals are achieved.
- 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 Nisqually Tribe has taken important steps to rectify poor adult returns including: 1) replacement of the Skykomish stock with a South Sound stock (Minter Creek); and 2) development of alternative rearing strategies (volitional release of smolts, growth modulation via temperature and diet manipulations, and semi-natural rearing).

MANAGERS RESPONSE

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

- Eliminating or reducing the size of the program has numerous implications that will require discussion with the Nisqually Tribe.
- Identification of the number of natural-origin spawners incorporated in the hatchery broodstock is a complex topic that will require additional analysis and discussion.

The Nisqually Tribe supports the recommendations of the HSRG (the Tribe's full comments are appended to this document), and notes the following:

- Additional discussion and funding to develop an adequate broodstock collection facility will be required to properly incorporate natural origin recruits into the artificial production program.

DESCHUTES RIVER

Overview

STOCK STATUS[40]

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
Deschutes River Hatchery Fall Chinook	Y	L	L	L	L	?	?	M	M	H	H	H	H
Deschutes River Coho	N	L/M	M	M	L	L	M	L	L	M	0	L	M
Deschutes River Hatchery Steelhead	Y	L	L	L	L	L	L	M	M	M	L	M	M

HABITAT

The Deschutes River, draining into Budd Inlet, is the largest of the southwest Puget Sound-area independent drainages, with a drainage area of about 166 square miles and a length of 52 miles.[41] Included within the sub-region are one large watershed (Deschutes River/Percival Creek), several medium-sized watersheds (Woodland Creek, Woodard Creek, McLane Creek, Green Cove Creek) and a number of smaller independent streams.

The Deschutes River is the second largest watershed south of the Tacoma Narrows. Anadromous salmon and steelhead runs in the Deschutes are artificially introduced, as there is an impassable falls at the upper end of Capitol Lake that was only recently laddered (in the mid-1900s). Chinook production has been managed strictly as a hatchery return, with sporadic releases of varying magnitude and composition released upstream of the hatchery; coho and steelhead are passed upstream of the hatchery facility to spawn naturally throughout the watershed. The lower part of the Deschutes flows through the cities of Olympia and Tumwater, with the majority of the watershed being suburban and agricultural in the lower/middle portions and commercial forest (Weyerhaeuser) in the upper watershed. Composite habitat condition for the Deschutes should probably be considered as fair. Natural salmonid productivity in the watershed is impaired by:

- Lack of large, woody debris and pools, which reduces the habitat complexity,
- Lack of off-channel rearing habitat in the lower watershed,
- Debris flows and stream bank instability that results in high turbidity and high presence of fine sediments in the substrate,
- Altered peak flows from heavily logged areas in the headwaters, agricultural runoff, and urban storm-water runoff,

[40] *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.*

[41] *Conservation Priorities: An Assessment of Freshwater Habitat For Puget Sound Salmon, The Trust For Public Land, Seattle, WA, November 2000.*

- Water quality (high water temperatures and low dissolved oxygen) in the lower river, Capitol Lake, and lower Budd Inlet, particularly in late summer, and
- Adult and juvenile fish passage impacts associated with direct transition between Capitol Lake and Budd Inlet.

Much of the coho production from the Deschutes originated from Huckleberry Creek, which is located on commercial forestland in the upper watershed. A large slide and debris flow eliminated much of the suitable spawning and rearing habitat in Huckleberry Creek. Percival Creek is a medium-sized watershed that also flows into Capitol Lake. Although Percival Creek flows through an urban area, with hydrology significantly impacted by urban storm water runoff, much of the watershed is within a deep ravine with good riparian buffers.

Woodland Creek flows into the southern end of Henderson Inlet, with headwaters in the City of Lacey. It supports stocks of coho, chum, steelhead and cutthroat, plus a low number of chinook. Habitat condition should be generally considered as fair. Woodard Creek flows into the west side of Henderson Inlet, with headwaters in the City of Olympia, flowing through a rapidly urbanizing area northeast of Olympia. It supports stocks of coho, chum, steelhead, and cutthroat. Habitat condition should generally be considered as fair to poor. McLane Creek flows into the southern end of Eld Inlet, on the western edge of WRIA 13. Land use in the watershed is primarily rural residential and forest land. The creek supports stocks of coho, chum, steelhead, and cutthroat. Habitat condition should generally be considered as fair to good, providing good natural production of coho and chum. Green Cove Creek flows into the northwest shoreline of Eld Inlet. It supports stocks of coho, chum, steelhead, and cutthroat. Habitat condition should generally be considered as fair. There are a number of small, independent drainages throughout WRIA 13. These streams have potential to support coho, chum, steelhead, and cutthroat. Habitat conditions should generally be considered as fair to poor.

There are approximately 90 miles of marine shoreline in WRIA 13 (estimate also includes the Eld Inlet shoreline within WRIA 14). Natural shoreline functions have been altered by extensive bulk heading. As of 1993, 31% of the entire marine shoreline was armored (bulk headed), with armoring being as high as 47% in Budd Inlet. Estuarine water quality is also impaired by high water temperature and low dissolved oxygen resulting from freshwater inflow, particularly in lower Budd Inlet.[42]

HATCHERIES

Tumwater Falls

Tumwater Falls Trap/Acclimation Pond is located on the Deschutes River at river mile 2.0, inside the Tumwater Falls Park. The Percival Cove Net Pens facility is located at the mouth of Percival Creek. Percival Creek enters Capitol Lake at its midpoint, on the west shore. Capitol Lake is actually the mouth of the Deschutes River, which was dammed in the early 1950s. The current program calls for the release of 3.8 million chinook fingerings at two locations, Tumwater Falls Park (river mile 3.3) and Percival Cove (river mile 0.5). The goal of both of these programs is to provide for harvest opportunity in sport, commercial and tribal fisheries in Puget Sound and coastal areas.[43]

[42] *Donald Haring, Washington Conservation Commission, March 19, 2001*.

[43] *Rich Eltrich, Washington State Department of Fish and Wildlife, July 2001.*

Deschutes River Hatchery Fall Chinook

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[44]	Low	?	?
Habitat	Limiting	Limiting	Healthy
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Deschutes River hatchery fall chinook stock was derived from Green River origin stock in the 1950s. This stock has been maintained through adult fish returns to the Tumwater Falls Trap on the Deschutes River. The objective of the program is to provide for harvest while avoiding adverse impacts on other fish stocks in the basin. To this end, the program currently releases 3.8 million sub-yearlings as well as 250,000 yearlings (see below). Sub-yearling production is eyed at McAllister Hatchery and Minter Creek Hatchery. Fry are hatched and reared at Wallace River Hatchery (two million; Snohomish drainage) and Coulter Creek Hatchery (1.8 million) via Minter Creek. Yearling production is eyed at McAllister Hatchery and hatched and reared at McKernan Hatchery (Skykomish drainage). Sub-yearling releases include 3.3 million at Tumwater Falls Hatchery and 0.5 million at Percival Cove Pens. 250,000 yearlings are released from Percival Cove Pens.

OPERATIONAL CONSIDERATIONS

- The program uses a variety of facilities, both in- and out-of-region, with extensive transfer of fish.
- The operation in Percival Cove often has poor water quality resulting in poundage limits and early release of juveniles.
- The program requires a waiver of the co-managers' disease policy for rearing on surface water at Wallace Hatchery.

BENEFITS AND RISKS

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

The Deschutes River fall chinook program is operated as a segregated harvest program consistent with its short- and long-term goals, and the program provides significant benefits to sport and commercial fisheries. Its location is ideal for significant educational and public outreach benefits.

[44] *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?
Current facilities are inadequate to realize the goals of the program. Extensive transport is required among a number of facilities both in- and out-of-region increasing the risk of transfer of pathogens. Sub-yearlings are reared on surface water at Wallace Hatchery, requiring a waiver of the disease policy. Further, inadequate water and space result in less than optimal release time and condition and likely decrease survival rates.

C. Consistent with goals for other stocks?
The Deschutes River fall chinook program is operated as a segregated harvest program consistent with the goals for other stocks in the watershed. Risks from yearling production include potential predation on southern Puget Sound chinook, chum, and pink salmon and competition with coho and steelhead.

RECOMMENDATIONS

- Obtain a memorandum of understanding (MOU) from NMFS addressing the potential Endangered Species Act status of chinook spawning naturally above Tumwater Falls, prior to implementing the long-term plans described below.
- Develop long-term plans for rearing and release facilities that eliminate the need for out-of-basin transfers. This requires investment in new facilities in the Deschutes River basin.
- Implement a transitional, in-region program that restricts fish and egg transfers, to be consistent with the co-managers' disease policy. Consider incubation at Minter Creek and rearing at Coulter Creek as part of this transitional program.
- Develop rearing and release locations that eliminate all net pen operations in Percival Cove.
- Provide adequate water and pond space to allow fish to grow and be released at the optimal time and size for maximum survival advantage.
- Develop appropriate pollution abatement or rearing strategies to meet local, state and federal clean water requirements.
- Develop a strong educational component involving local partnerships, given the location of the drainage within a major urban area, the state capitol, and the City of Tumwater.

COMMENTS

- The basin provides a significant opportunity to foster a research component focusing on the productivity of hatchery-origin chinook released to a natural spawning environment.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG and has taken the following actions:
- Pursued discussions with the National Marine Fisheries Service regarding chinook spawning naturally above Tumwater Falls, but have been unable to secure an agreement.
- Initiated the final phase of a scoping process leading to the selection and development of cost estimates for the preferred alternative for new facilities in the Deschutes Basin.
- Reduced the reliance on out-of basin facilities by 40%.

The Squaxin Island Tribe's full comments are appended to this document.

Deschutes River Hatchery Steelhead

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[45]	Low	Low	Low
Habitat	Limiting	Limiting	Limiting
Harvest Opportunity	Occasional	Most Years	Most Years
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Deschutes River hatchery steelhead program relies on annual outplants of Chambers Stock from Puyallup, Tokul or Eells Spring hatcheries. From 1975–96, this program was maintained primarily by adult returns to Eells Spring Hatchery. From 1997 until the present, this program has been maintained primarily through adult returns to Puyallup Hatchery. The objective of this program is to provide for harvest while avoiding adverse interactions with other fish stocks in the watershed. To this end, 25,000 yearlings are released into the Deschutes drainage. Eggs are hatched and the hatch reared at Puyallup Hatchery.

OPERATIONAL CONSIDERATIONS

- Fish are reared at Puyallup Hatchery, which is located in a region that has yet to be reviewed by the HSRG.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
Minimal harvest opportunity benefits are presently being obtained. This may be due to the low numbers of smolts being released or to the quality of smolts being released.

B. Likelihood of attaining goals?
If the future goal of increased harvest is to be realized, the two factors mentioned above will need to be examined.

C. Consistent with goals for other stocks?
There is the potential for competition with, and predation on, coho, cutthroat and chinook.

[45] *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.
- Develop on-site incubation and rearing with the new hatchery facility described in recommendations for Deschutes River fall chinook program.
- 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.
- Evaluate potential competition and predation on coho, cutthroat and chinook to determine appropriate program size.

COMMENTS

- Increasing smolt quality and/or release numbers will probably be necessary to meet desired harvest opportunity goals. These benefits must be balanced against the risks to other species; however, due to a natural migrational blockage, the risk to native stocks is limited to non-migratory species.

MANAGERS RESPONSE

WDFW supports the recommendations and has initiated, with funding provided by the HSRG, studies to evaluate the risks posed by competition and predation by hatchery origin smolts.

SQUAXIN/SOUTH SOUND NET PENS AND INDEPENDENT TRIBUTARIES

Overview

STOCK STATUS[46]

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
So. Sound Indep. Trib. Coho	N	M	M	M	M	M	M	M	M	M	H	H	M
Squaxin/S Sound Net Pens Hatchery Coho	Y	L	L	L	L	L	L	L	L	M	H	H	H
So. Sound Indep. Trib. Normal Chum	N	H	H	H	H	H	H	M/H	H	H	H	H	H
So. Sound Indep. Trib. Summer Chum	N	H	H	H	M/H	H	H	M	M	H	M	M	H
So. Sound Indep. Trib. Steelhead	N	M	H	H	L	L	M	L	L	M	0	0	0

HABITAT

This region consists of a complex system of streams, estuaries, and extensive marine inlets on the southwest terminus of Puget Sound. From south to north, Eld Inlet, Totten Inlet, Little Skookum Inlet, and Hammersley Inlet/Oakland Bay are the primary marine water bodies in this region. For all streams in this region, the extensive estuary mud flats along the inlets have been historically rich production areas for shellfish, as well as marine and anadromous fish.[47] There are at least 36 independent drainages to saltwater in WRIA 14 that have been identified as supporting anadromous salmonids, with several of the watersheds providing what would be considered as fair to good coho, chum, steelhead, and cutthroat habitat. Adult chinook presence is also documented in several of the larger watersheds, although these do not have "typical chinook habitat." Collectively, the natural coho, chum, and cutthroat production is very significant.

The larger watersheds of particular note include Schneider, Kennedy, Skookum, Mill/Goznell, Goldsborough, Johns, Cranberry, Deer, and Sherwood creeks. Kennedy Creek has perhaps the highest documented chum spawner density of any Puget Sound stream. Coho and chum spawner densities are also high in several of the other watersheds. Although there are habitat impairments identified in each of the watersheds, development densities are generally low and habitat conditions are generally in good condition when compared to other Puget Sound watersheds. Productivity is also enhanced by high quality estuarine habitat present throughout the sub-region's marine inlets[48].

[46] *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.*

[47] *Conservation Priorities: An Assessment of Freshwater Habitat For Puget Sound Salmon, The Trust For Public Land, Seattle, WA, November 2000.*

[48] *Donald Haring, Washington Conservation Commission, March 19, 2001*.

HATCHERIES

South Sound Net Pens

The Squaxin Island/South Sound Net Pen enhancement facility is a harvest-oriented program that has been in operation since the early 1970s. The complex is located in southern Puget Sound near Squaxin Island in Peale Passage. The program is co-managed by WDFW and the Squaxin Island Tribe. Under agreement, the Tribe provides labor and maintenance while the State supplies fish, feed, and technical assistance. The primary goal of the net-pen program is to provide for harvest opportunities of adult coho salmon in a terminal area fishery. Production from this facility provides harvest for Squaxin tribal fishermen exercising treaty fishing rights and recreational fishers in Southern Puget Sound. The current production goal is to rear 1.8 million coho smolts for delayed release in June at a size of 10 fish per pound. Historically, production at the pens has averaged 2.3 million coho, but due to recent ocean conditions and poor survival the production goal was reduced.[49]

[49] *Will Henderson, Squaxin Island Tribe and Rich Eltrich, Washington State Department of Fish and Wildlife, July 2001.*

Squaxin / South Sound Net Pens Hatchery Coho

Squaxin Tribe and Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[50]	Low	Low	Low
Habitat	Inadequate	Inadequate	Limiting
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

Egg sources for this program include the Wallace River in the Skykomish drainage and the Minter Creek Hatchery stock that originated from Minter Creek and the Green and Skagit rivers. The purpose of this program is to provide pre-terminal and terminal sport harvest and terminal area treaty harvest in southern Puget Sound. To this end, 1.8 million yearlings at ten to the pound are released into Peale Passage. Eggs are collected at Wallace River Hatchery (Skykomish drainage) and incubated at Wallace River and Marblemount hatcheries (Skagit drainage). Rearing takes place at Wallace River (400,000) for direct transfer to the net pens and at Skookumchuck Ponds (1.4 million) (Chehalis drainage) for the component transferred through Marblemount Hatchery.

OPERATIONAL CONSIDERATIONS

- This program relies on egg take, incubation, and rearing at multiple facilities in several drainages.
- Fish are released at a larger size, and generally later, than freshwater coho yearlings.
- The program has used a variety of coho stocks, primarily Issaquah Creek, southern Hood Canal, Skykomish River, and southern Puget Sound stocks.
- The current production goal is 1.8 million fish, which is reduced from a previous average of 2.3 million fish.
- All released fish are marked to allow for assessment of harvest contribution from the hatchery release and evaluation of the status of natural stocks.

BENEFITS AND RISKS

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

This program is generally consistent with the defined harvest goals. However, non-treaty harvest opportunities have been limited.

[50] *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 likelihood of attaining harvest goals for this program will be dependent on an overall improvement of survival from the net pen releases, as well as improved access to harvest by the non-treaty fishery. Use of non-local broodstock and multiple transfers of fish resulting from out-of-basin rearing may be contributing to lowered survival. Another risk that could affect the long-term success of this program is the current process of transferring these fish through several watersheds, which could interrupt the net pen program should a serious pathogen problem be identified in one of the rearing locations. This has the potential to halt transfers necessary to fulfill the current program.

C. Consistent with goals for other stocks?
The biological significance of naturally spawning coho stocks in the independent South Sound tributaries was rated as intermediate or high. Because of these ratings, there is reason to be concerned about the effects of the net pen program on these stocks, both from straying and ecological interactions. Straying risks include potential failure to meet goals for biological significance and population viability. Risks from ecological interactions include potential competition with other South Sound coho stocks, resulting in an overall loss of productivity. Risks to non-coho populations include potential predation on southern Puget Sound chinook, chum, and pink salmon and competition with steelhead.

RECOMMENDATIONS

- Quantify the amount of straying from South Sound Net Pens to South Sound coho tributaries.
- Compare the genetic and life history characteristics among South Sound, Skykomish and Minter Creek coho populations.
- Compare rates of straying between in-region and out-of-region incubation and rearing.
- During these evaluations, relocate incubation and rearing within the region to the extent that space exists at regional facilities.
- Evaluate benefits and risks of using Skykomish stock versus a within-region stock, probably Minter Creek Hatchery.
- During these evaluations, change the broodstock source for this program to a local broodstock.
- Develop a long-term strategy based on the results of the analyses described above and other relevant information.
- Do not increase the size of the program beyond the current level of 1.8 million fish, at least during this period when survival is depressed for many stocks possessing a yearling life history strategy.

COMMENTS

- The co-managers are currently exploring the redefinition of South Sound coho regional management strategies through the Comprehensive Coho planning process.
- Current survival rates (brood year 1988–94) have averaged 3.7 %, approximately 25% of the survival rate achieved during the 1970s and approximately 30% of the survival rates for brood years 1981–87.
- Contribution of this program (based on expanded use of coded wire tags) to the South Sound 13D net fishery for the period 1985–98 has ranged from 46%–100%, averaging 63.8%. In 1999, that catch was the lowest on record (5,038 fish) and the program contribution was only 1.6% of the catch.

- The HSRG is concerned about the carrying capacity of southern Puget Sound, and its effect on current survival rates of all species with the yearling life history strategy, including natural and hatchery chinook, coho and steelhead.
- This program's out-of-region rearing also creates risks for stocks in the Skagit and Chehalis watersheds, and competition for hatchery resources.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG.

The Squaxin Island Tribe's full comments are appended to this document.

KEY PENINSULA

Overview

STOCK STATUS[51]

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
White River Spring Chinook (Hupp Springs)	Y	H	H	?	L	L	?	L	L	?	L	L	?
Minter Creek Hatchery Fall Chinook	Y	L	L	L	L	L	L	L	L	L	H	H	H
Coulter Creek Hatchery Fall Chinook	Y	L	L	L	L	L	L	L	L	L	H	H	H
Fox Island Net Pens Hatchery Fall Chinook	Y	L	L	L	L	L	L	L	L	M	H	H	H
Minter Creek Coho	Y	M	M	M	M	M	M	M	M	M	H	H	H
Fox Island Net Pens Hatchery Coho	Y	L	L	L	L	L	L	L	L	M	H	H	H
Minter Creek Chum	Y	L	L	L	H	H	H	M	M	M	H	H	H
Minter Creek Pink	Y	L	L	L	L	L	L	L	L	L	0	0	0

HABITAT

There are 46 independent, low-elevation drainages to saltwater with salmonid presence that flow into the Gig Harbor Peninsula/Key Peninsula/Islands portion of southeast WRIA 15, including over 58 miles of stream known to be used by anadromous salmonids (with additional stream length used by cutthroat). Streams within this sub-region originate in the lowland hills of the Kitsap Peninsula and empty into several large inlets within western Puget Sound. Although this sub-region contains no major river systems, many of these streams historically supported substantial salmon runs. Currently, several stream systems contribute significantly to the salmon production of this sub-region, although nearly all watersheds on the eastern Peninsula have been impacted to some degree by land use.[52]

All of these drainages support cutthroat, most support coho and chum, many support steelhead, and some of the larger ones have documented adult chinook returns, although they do not have "typical chinook habitat." Habitat conditions vary within and between streams, ranging from good to very poor. Habitat condition in several of the smaller streams is unknown. Collectively, and particularly when considered in conjunction with the streams in WRIA 14, these streams represent significant potential natural coho, chum, and steelhead production.

The largest streams are Minter, Coulter, Rocky, Burley and Purdy creeks. Minter Creek is the largest of the watersheds in this sub-region (~10,000 acres) and enters the west shoreline of Carr Inlet. The watershed supports coho, chum, steelhead, cutthroat and chinook. The Minter Creek watershed is experiencing population growth and development pressure, and habitat condition varies from poor to

[51] *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.*

[52] *Conservation Priorities: An Assessment of Freshwater Habitat For Puget Sound Salmon, The Trust For Public Land, Seattle, WA, November 2000.*

good between different reaches. Coulter Creek enters the north end of Case Inlet, and supports natural coho, chum, steelhead, cutthroat and chinook. Much of the Coulter Creek watershed is operated as a private tree farm (Overton Tree Farm). Consequently, development within the watershed is low, there are few road encroachments on the stream channel, and freshwater and estuarine habitats are in generally good condition and thought to be very productive.

The Burley Creek watershed enters Burley Lagoon at the north end of Carr Inlet, and supports coho, chum, steelhead, cutthroat and chinook (chinook are probably of hatchery origin). The watershed is experiencing population growth and development pressure, and habitat condition varies from poor to good between different reaches. Rocky Creek enters the east shoreline of Case Inlet, and supports natural coho, chum, steelhead, cutthroat and chinook. Habitat conditions in Rocky Creek are generally fair to good. Purdy Creek enters the east shoreline of Burley Lagoon at the north end of Carr Inlet, and supports coho, chum, steelhead, cutthroat and chinook (chinook are probably of hatchery origin). The watershed is experiencing population growth and development pressure, and habitat condition varies from good in the lower watershed to poor in some upstream reaches.[53]

HATCHERIES

Minter Creek Hatchery

Minter Creek Hatchery is a harvest supplementation and stock recovery facility located on Minter Creek, a tributary to Carr Inlet, in south Puget Sound, approximately 10 miles west of Gig Harbor. The station was constructed in 1936 under a Works Progress Administration (WPA) contract, with the federal government furnishing materials and labor. It was operated as a research station until about 1960 when its primary function shifted to a harvest augmentation program. Beginning in 1993, the hatchery underwent a major renovation (mostly completed). Minter Creek Hatchery currently serves as the hub for several satellite facilities, including Coulter Creek Hatchery, Hupp Springs Hatchery, and the Fox Island Net Pens. Since the early 1980s, the hatchery has been involved in the restoration of the ESA-listed White River spring chinook. Minter Creek Hatchery now provides adult trapping, transportation and incubation support for Hupp Springs Hatchery. It also operates as a production facility for fall chinook, coho, pink and chum for various Puget Sound fisheries. Minter Creek Hatchery provides incubation and short-term rearing for other facilities, co-ops, and enhancement and educational projects in south Puget Sound.

Coulter Creek Hatchery

Coulter Creek Hatchery is located approximately two miles north of Allyn on State Highway 3. It operates as a harvest supplementation program. It was built in 1980 as part of a hatchery enhancement program to increase the production of chum salmon for an all citizen fishery. The hatchery is operated as a satellite of Minter Creek Hatchery and is supported by Minter. The Coulter Creek Hatchery program is designed to rear and transfer fall chinook to the Fox Island Net Pens, South Puget Sound Complex at Tumwater, to out-plant fingerling chinook on-site, and to provide yearling coho for the Agate Pass Net Pens, a cooperative project between WDFW and the Suquamish Tribe. The production program consists of 1.8 million fall chinook to be transferred to South Sound Complex, at Tumwater, at 150/lb, one million fall chinook to be released on station at 80/lb, and 350,000 yearling coho to be transferred to Agate Pass net pens at 25/lb. Coulter is also rearing 300,000 fall chinook for transfer to Fox Island Net Pens at 25/lb.[54]

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[53] *Donald Haring, Washington Conservation Commission, March 19, 2001*.

[54] *Dennis Popochock, Washington State Department of Fish and Wildlife, July 2001.*

Hupp Springs Hatchery

Hupp Springs Hatchery was built in 1979. The hatchery is located on Minter Creek, approximately three-quarters of a mile upstream from Minter Creek Hatchery. The original program called for rearing and releasing chum and delayed release fall chinook. The program was quickly changed and dedicated to the restoration of the depleted White River spring chinook. Spring chinook adults are captured at Minter Creek Hatchery and held for transfer to Hupp Springs Hatchery. The maximum release capacity for the facility is approximately 90,000 yearling chinook and 250,000 sub-yearling chinook. This station supports the recovery program for the White River Spring Chinook, an ESA-listed stock.[55]

Fox Island Net Pens

The Fox Island Net Pens are located in Echo Bay, on the north side of Fox Island, in Pierce County. The station was established in September 1975 and was designed to augment the sports fishery in southern Puget Sound by increasing residualization of fall chinook and coho. The current total release capacity is 320,000 yearling salmon per year. The Fox Island Net Pens were closed, effective July 1, 2001.[56]

[55] *Sherman Davis, Washington State Department of Fish and Wildlife, July 2001.*

[56] *Jon Lovrak, Washington State Department of Fish and Wildlife, July 2001.*

White River Spring Chinook (Hupp Springs)

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	High	High	?
Population Viability	Critical	Critical	?
Habitat	Inadequate	Inadequate	?
Harvest Opportunity	Occasional	Occasional	?
Hatchery Program:			
Purpose	Conservation		
Type	Integrated		

PROGRAM DESCRIPTION

The White River spring chinook (Hupp Springs) stock derives from fish collected in the Puyallup and White rivers from the late 1970s through the early 1980s, when the entire spring chinook run was trapped and moved into the hatchery or raised as captive brood. At one point, fewer than 30 fish per year remained. Captive brood were reared at the NMFS Manchester site and the South Sound net pens, to rapidly expand the program. This stock is maintained through adult returns to Minter Creek Hatchery. This stock is also maintained at White River Hatchery (Muckleshoot Tribe), which began with transfers from Hupp Springs' production. The White River spring chinook stock is maintained outside of its natal drainage for conservation purposes. This belongs to, and is the only stock within, the South Puget Sound Spring Chinook GDU. The objective of this program has been to support the recovery of the White River chinook salmon through an integrated conservation program and to maintain the gene pool at the Minter Creek/Hupp Springs complex. To this end, 370,000 eggs from adults returning to Minter Creek Hatchery are collected to produce annual releases of 250,000 sub-yearlings and 85,000 yearlings, with eggs and fry beyond the goal being transferred to the White River acclimation ponds and White River Hatchery. The program uses Minter Creek Hatchery for adult trapping and egg incubation. Unfed fry are transported to Hupp Springs Hatchery for rearing until release.

OPERATIONAL CONSIDERATIONS

- Returning adults are tagged and segregated from fall chinook salmon returning to Minter Creek.

BENEFITS AND RISKS

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

The objective of this program has been to support the recovery of the White River chinook salmon through an integrated conservation program. The goal of an integrated program is to minimize the potential genetic divergence between the hatchery broodstock and the naturally spawning populations. However, no infusion of naturally spawning individuals into the broodstock has occurred in this program since the captive brood program was initiated three to four generations ago. This presents a significant risk of domestication and genetic divergence between the broodstock and

populations targeted for restoration. Further, this continued infusion of domesticated genetic material might retard adaptation of hatchery-origin populations to the natural environment.

B. Likelihood of attaining goals?
This program has played an important role in the restoration of White River spring chinook, but continued infusion of genetic material from the three to four generation hatchery population into that once again present in the White River could retard adaptation of the latter population to the natural environment

C. Consistent with goals for other stocks?
Considerable effort has been expended to maintain the integrity of fall chinook salmon returning to Minter Creek. Risks to that stock from the White River spring chinook program appear to be within acceptable limits.

RECOMMENDATIONS

- Discontinue the conservation program, unless this program is demonstrated to be critical to the conservation effort on White River spring chinook.
- If the conservation program continues, implement protocols to reduce domestication and minimize genetic changes resulting from artificial propagation.
- If the goals of the program change, the program should be reevaluated.
- 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 will evaluate the role of Hupp Springs in the current White River recovery program during its review of the Central Puget Sound region in 2002.
- This program has played an extremely important role in the recovery of the White River during a period in which the stock was at an extreme risk of extirpation. However, the importance of the current program has changed with the reintroduction of naturally spawning populations in the White River drainage.

MANAGERS RESPONSE

WDFW generally supports the recommendations of the HSRG, but notes that:
- WDFW and the tribes need to evaluate the contribution of this program to the recovery of White River spring chinook.
- Identification of the number of naturally origin spawners incorporated in the hatchery broodstock is a complex topic that will require additional analysis and discussion.

Minter Creek Hatchery Fall Chinook

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[57]	Low	Low	Low
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Minter Creek hatchery fall chinook program was derived from fish of Green River origin. There is no native fall chinook stock in Minter Creek. This program is maintained through adult returns to the hatchery trap. The objective of this program is to provide fish for harvest while avoiding adverse interactions with other fish stocks in the region. To this end, 1.8 million fingerlings are released annually into Minter Creek. Eggs are incubated at the hatchery, where the resulting fry are reared until release.

OPERATIONAL CONSIDERATIONS

- None of the broodstock is passed into Minter Creek to spawn.
- Releases are marked to allow harvest of hatchery fish while protecting naturally spawning fish.
- Fish are not tagged.
- Returns to the hatchery are currently surplus to hatchery broodstock needs because of a lack of a satisfactory level of harvest.
- Change to an earlier run timing has occurred over the years, complicating the separation of this stock at the hatchery from returning adults of the White River spring chinook stock.
- The number of programs and a water supply problem at Minter Creek Hatchery compromise the effectiveness of the fall chinook and other programs at the hatchery.

BENEFITS AND RISKS

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

B. Likelihood of attaining goals?
The program is providing for harvest and is being operated in a segregated manner.

[57] *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?
The program is generally consistent with the goals for other South Sound stocks.

RECOMMENDATIONS

- Eliminate two programs (the pink and fall chum programs) at Minter Creek Hatchery (see relevant reviews for these programs). This will reduce constraints to the fall chinook program.
- Reverse, over time, the problem of earlier run timing in the fall chinook stock to avoid compromising its ability to contribute to harvest and to achieve a better separation between the timing of its return and that of the White River spring chinook stock.
- Upgrade the water supply system at the hatchery.

COMMENTS

- Adjusting the run timing of fall chinook at Minter Creek Hatchery would reduce the level of adult handling currently required to separate them from the White River spring chinook, both of which return to the hatchery at the same time. It would also result in a stock more closely resembling the one from which it was derived.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG.

Coulter Creek Hatchery Fall Chinook

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[58]	Low	Low	Low
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Coulter Creek hatchery fall chinook program relies on annual transfers of Minter stock, Coulter Creek Hatchery adult returns, and Tumwater Falls Hatchery as a backup. These fish were of Green River origin. This program's objective is to produce fish for harvest and to do so in a manner that minimizes adverse effects on other local stocks. To this end, eggs are collected, incubated, and hatched at Minter Creek Hatchery. Resulting fry are reared at Coulter Creek Hatchery for transfer to Fox Island Net Pens (which have been closed) and the South Puget Sound Complex at Tumwater Falls (1.8 million fingerlings). Releases are also made onsite directly into Coulter Creek (one million smolts).

OPERATIONAL CONSIDERATIONS

- Coulter Creek Hatchery was built in 1980 as part of a hatchery enhancement program to increase the production of chum salmon.
- The facility is now being used to rear, transfer and release fall chinook. The hatchery has no incubation capability.
- A dam provides an adult barrier and an impoundment to supply pumped water from Coulter Creek to two one-third acre rearing ponds. Due to pond design and fish health problems, an extended fall chinook rearing program was dropped.
- Coulter Creek does not have a pollution abatement pond and uses a naturally impounded area for settling out pond waste materials. Coulter Creek meets NPDES discharge levels, but the addition of an abatement system would upgrade the facility.

BENEFITS AND RISKS

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

The data indicate that there is a limited contribution to a terminal harvest.

[58] *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 been discontinued.

C. Consistent with goals for other stocks?
Because chum in Coulter Creek are managed for natural production, all returning chinook and chum adults are passed upstream. Returning chinook have a significant negative ecological impact as a result of redd superimposition on Coulter Creek chum salmon. Water quality at Coulter Creek in the fall and winter months can become a problem depending on the number of returning adults.

RECOMMENDATIONS

- Use the resources dedicated to this program at Coulter Creek elsewhere to better achieve regional goals for chinook salmon.
- Discontinue the release of chinook salmon on station (the HSRG has been informed that the release of chinook salmon into Coulter Creek has been discontinued since this recommendation was made).

COMMENTS

- Coulter Creek also provides yearling coho for the Agate Pass Net Pen program, which will be reviewed as part of the Central Puget Sound regional review.

MANAGERS RESPONSE

WDFW has implemented the recommendation of the HSRG to discontinue releases of chinook at Coulter Creek.

Fox Island Net Pens Hatchery Fall Chinook

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[59]	Low	Low	Low
Habitat	Inadequate	Inadequate	Limiting
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Fox Island Net Pens hatchery fall chinook program relied on annual transfers from Minter Creek Hatchery. These fish were of Green River origin. The objective of this program was to provide fish for harvest and to do so in a manner that minimized adverse effects on other stocks. To this end, 240,000 yearling fall chinook salmon were released into Echo Bay. Eggs were collected, incubated, and hatched at Minter Creek Hatchery. Unfed fry were transferred to Coulter Creek Hatchery for additional rearing and transfer to the net pens.

OPERATIONAL CONSIDERATIONS

Not applicable (see Comments section below).

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program contributed to harvest.

B. Likelihood of attaining goals?
This program has been discontinued.

C. Consistent with goals for other stocks?
There was a concern about straying in South Sound and negative interaction such as predation on other stocks.

RECOMMENDATIONS

Not applicable (see Comments section).

[59] *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.*

COMMENTS

- WDFW has terminated the program, and discontinued use of the net pens.

MANAGERS RESPONSE

None.

Minter Creek Coho

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Intermediate	Intermediate	Intermediate
Population Viability	At Risk	At Risk	At Risk
Habitat	Limiting	Limiting	Limiting
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest and Education		
Type	Integrated		

PROGRAM DESCRIPTION

The Minter Creek coho stock derived historically from Minter Creek, and the Green and Skagit rivers. The inflow of Green and Skagit river fish stopped around 1980. This stock has been maintained by adult returns to Minter Hatchery for the past 25 years. Minter Creek coho belong to the Puget Sound/ Strait of Georgia ESU. The purpose of the program is to provide harvest, while minimizing adverse interactions with other local stocks. To this end, approximately 1.4 million yearlings are released annually on-station. Eggs are collected, incubated, hatched and reared at Minter Creek Hatchery. One million eyed eggs are collected for the Nisqually Hatchery coho program; 450,000 are collected for the Agate Pass net pens.

OPERATIONAL CONSIDERATIONS

- Run timing is increasingly early.
- All releases are mass-marked (adipose fin clipped).

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
This program is consistent with the harvest and education goals, but does not have the broodstock management plan needed to achieve goals of an integrated program.

B. Likelihood of attaining goals?
The program is providing significant harvest benefits, and also educational benefits (providing 65 schools with aquariums of eyed eggs). Increasingly early egg-take timing, decreasing size of returning adults and other domestication effects could decrease the viability of the population over time.

C. Consistent with goals for other stocks?
Magnitude of yearling releases poses some risk to local chum stocks.

RECOMMENDATIONS

- Collect sufficient gametes across entire run-timing, cull as needed to assure proportionate normal timed egg-take for rearing.
- Introduce an average of 10% naturally spawning fish into the hatchery broodstock each year for on-station releases.
- Upgrade the water supply system at the hatchery.

COMMENTS

- The Minter Creek coho program plays an integral role for meeting this region's goals.
- The HSRG and the managers discussed reducing the on-station releases from approximately 1.4 million to approximately one million. Subsequently, WDFW decided to make this change in the program.
- Minter Creek also provides coho for the Agate Pass Net Pen program, which will be reviewed as part of the Central Puget Sound regional review.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG but 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 funds will be required to upgrade the water supply system at the hatchery.

Fox Island Net Pens Hatchery Coho

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[60]	Low	Low	Low
Habitat	Inadequate	Inadequate	Limiting
Harvest Opportunity	Each Year	Each Year	Each Year
Hatchery Program:			
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

The Fox Island Net Pens hatchery coho program relied on annual transfers from Minter Creek Hatchery. This program used Minter Creek stock and operated from the early 1970s through 2001. The purpose of the program was to provide for harvest while minimizing adverse interactions with other local stocks. To this end, 40,000 (at ten fish per pound) and 10,000 age two-plus coho were released into Echo Bay. Eggs were collected, incubated, and hatched at Minter Creek Hatchery, where rearing until transfer to the net pens also occurred.

OPERATIONAL CONSIDERATIONS

None.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program contributed to harvest.

B. Likelihood of attaining goals?
See above comment.

C. Consistent with goals for other stocks?
There was a concern about straying in the Sound and negative interactions, such as predation on other stocks.

RECOMMENDATIONS

Not applicable (See Comments section).

[60] *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.*

COMMENTS

- WDFW has terminated the program, and discontinued use of the net pens.

MANAGERS RESPONSE

None.

Minter Creek Chum

Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

The original Minter Creek fall chum program began with introductions from Hoodsport Hatchery on Hood Canal. In the late 1980s, that stock was replaced by introduction of Elson Creek fish, a South Sound stock, for a period of five years. The program is currently maintained by returns to Minter Creek Hatchery. Minter Creek chum belong to the South Puget Sound Fall Chum GDU. There are eleven other stocks within this GDU. The objective of the program is to provide fish for harvest, while minimizing genetic divergence from the naturally spawning stock. To this end, two million fry at 450 fish per pound are released annually into Minter Creek. The eggs are incubated at the hatchery and fry are released on-site.

OPERATIONAL CONSIDERATIONS

- Returns surplus to hatchery needs are passed upstream to spawn in Minter Creek.
- Releases from the hatchery are unmarked.

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.

B. Likelihood of attaining goals?
The program has provided fish for harvest, but this opportunity has been underused.

C. Consistent with goals for other stocks?
The program is generally consistent with the goals for other stocks, but its very great success, coupled with the lack of a suitably intense harvest, is resulting in water quality problems at Minter Creek Hatchery that adversely affect coho and chinook programs at the hatchery.

RECOMMENDATIONS

- Suspend the chum program at Minter Creek until such time as a need for the program is identified.
- Manage chum salmon in Minter Creek for natural reproduction and to minimize unnecessary water quality problems at the hatchery.

COMMENTS

- Hatchery capacity at Minter Creek would be more effectively used to achieve the managers' regional goals if the fall chum program was suspended.
- Cessation of the chum program at Minter Creek Hatchery would have implications for co-op programs that depend on Minter Creek for their chum salmon supply. Solutions to this problem would have to be sought.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG and has taken the following actions:

- Reduced the size of the program by 75%.
- Proposed to the Washington State Legislature the termination of this program.

Minter Creek Pink

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability	Critical	Critical	Critical
Habitat	Inadequate	Inadequate	Inadequate
Harvest Opportunity	None	None	None
Hatchery Program:			
Purpose	Conservation		
Type	Integrated		

PROGRAM DESCRIPTION

The Minter Creek pink program began with introductions from South Prairie Creek (Puyallup River drainage) brood stock, beginning in 1989. This program is maintained by returns to the Minter Creek Hatchery. Minter Creek pinks belong to the Puyallup Pink GDU. The objective of the program is to establish an introduced stock. To this end, 90,000 fry are released into the Minter Creek drainage annually. Eggs are incubated at Minter Creek Hatchery, where they are hatched and released at 450 fish per pound or smaller.

OPERATIONAL CONSIDERATIONS

- There are no naturally spawning pink salmon in the Key Peninsula sub-region. The stock has a low biological significance.
- The number of adults is insufficient to maintain an effective population size of 1,000.
- Fish are released with no mark or tag.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The goals for this stock do not justify the program. Although this is described as a conservation program, there are no conservation goals for this stock.

B. Likelihood of attaining goals?
Conservation benefits are minimal or unknown. Because of the way broodstock is collected, the program does create a risk of domestication to the stock.

C. Consistent with goals for other stocks?
The program is generally consistent with the goals for other South Sound stocks.

RECOMMENDATIONS

- Terminate the program because no evidence has been presented that it is contributing or will contribute to its conservation goal.
- Allow returning fish to pass upstream and attempt to spawn naturally.

COMMENTS

- Since there is no infusion of new (naturally spawning) genetic material, there is no evidence that the program is actually integrated.
- This facility has more important programs to focus on.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG and will terminate the program beginning with the 2003 brood.