



❖ Hood Canal

Overview

This region includes the watersheds draining into Hood Canal. For the purposes of this review, the HSRG reviewed the hatchery programs involving each identified regional salmonid stock (for example, Skokomish summer/fall Chinook). The review included a consideration of the program's effects on all other hatchery and naturally spawning regional salmonid stocks (see table below under Stock Status). This chapter provides an overview of the Hood Canal region, followed by reviews and recommendations for each salmonid stock that has an associated hatchery program.

FISHERIES⁵

The production and harvest of salmon in Hood Canal are managed according to the provisions of two court-ordered plans negotiated between the state and tribal co-managers—the Hood Canal Salmon Management Plan (HCSMP) and the Puget Sound Salmon Management Plan (PSSMP). Of the runs returning to Hood Canal, the early fall chum, Hoodspout Hatchery pinks, southern Hood Canal Chinook, and Port Gamble and Quilcene-Dabob management units of coho are managed on the basis of hatchery production. The remaining management units of all species are managed on the basis of natural production. These include all of the remaining coho management units, all summer chum (managed as secondary to Chinook and coho), mid-Canal natural pink, and all late fall chum. Additionally, management strategies have been adopted to reduce impacts on two Endangered Species Act (ESA)-listed evolutionarily significant units (ESUs) of salmon, including Hood Canal/Strait of Juan de Fuca summer chum and Puget Sound Chinook. Pre-terminal harvest takes place in commercial and recreational marine fisheries from southeast Alaska through Oregon, on the coast and in the Strait of Juan de Fuca and Puget Sound. Within Hood Canal, fisheries occur in all marine areas. In freshwater areas, treaty harvest occurs primarily in the Skokomish and Quilcene rivers, with lesser fisheries in other rivers. Recreational fisheries occur in nearly all rivers.

Treaty Indian and recreational winter steelhead fisheries are targeted at early-timed hatchery steelhead, which are expected to return primarily during December and January. WDFW has established escapement objectives for wild winter steelhead stocks, but the escapement objectives and method used to derive them have not been jointly agreed to by WDFW and the treaty tribes. There is no summer steelhead hatchery program in Hood Canal and no fisheries target summer steelhead. Sea-run cutthroat management is based entirely on natural production and does not include any directed commercial fishery.

CONSERVATION⁶

All Hood Canal Chinook are managed under PSSMP, HCSMP and the Puget Sound Comprehensive Chinook Management Plan: Harvest Management Component (recently updated for 2004). The intent of the latter plan, as it applies to Hood Canal, is to control exploitation on natural Chinook populations below levels that will prevent harvest-related decline, and to allow greater natural

⁵ Information provided by Jack Tipping, WDFW.

⁶ *Ibid.*



production if habitat conditions improve. In basins where habitat loss and degradation persists, hatchery production may continue to be necessary to maintain naturally spawning populations. Under the co-manager's Comprehensive Coho Management Plan and HCSMP, coho stocks are managed using exploitation rates to optimize production and harvest of natural coho.

Natural-origin fall chum are separated into early fall and late fall chum. Late fall chum are managed for fixed escapement goals. Early fall chum are managed secondary to early fall chum hatchery units. Pinks, in odd-numbered years, include natural populations returning to the Dosewallips, Duckabush, and Hamma Hamma rivers. These populations are generally managed to maximize escapements. The goal of wild winter steelhead management is to protect wild stocks, while directing most harvest at early-timed steelhead, which may contain a greater proportion of hatchery-reared steelhead. In addition, wild (unmarked) steelhead release regulations are in effect for recreational fisheries in all marine areas and on all Hood Canal streams open during the winter steelhead season. Catch-and-release regulations are also in effect for sea-run cutthroat trout in marine and freshwater recreational fisheries.

The state and tribal co-managers, in cooperation with federal agencies, prepared the Summer Chum Salmon Conservation Initiative (SCSCI) that was distributed in 2000. The initiative is an implementation plan for summer chum conservation and recovery that specifies strategies and actions for harvest management, artificial production and habitat protection.

Recently, many new habitat conservation and recovery projects have been completed or are in progress, owing in large part to funding that has become available for salmon recovery through state and federal sources. Projects include land acquisitions for conservation, fish passage improvements (e.g., culvert replacements), decommissioning forest roads, and stream channel and estuary restorations.

HABITAT⁷

Hood Canal is a natural, glacier-carved fjord more than 60 miles long with over 200 miles of shoreline. It forms the westernmost waterway and margin of the Puget Sound basin. The Canal has an entrance sill depth of about 150' and is seasonally stratified with limited flushing action. The Canal averages a depth of about 300' and is over 600' deep in places. Hood Canal is well-known for shellfish production and supports popular fisheries for crab, shrimp and clams.

Hood Canal shorelines include large estuaries, moderate sloped beaches and abundant eelgrass beds important for support of juvenile salmonids. In addition, critical food fish for salmonids, such as surf smelt (*Hypomesus pretiosus*), Pacific sand lance (*Ammodytes hexapterus*) and Pacific herring (*Clupea harengus*), spawn in Hood Canal eelgrass beds and bays and on moderate sloped beaches with gravels and substrate.

The Hood Canal region is characterized by large river systems flowing from the Olympic Mountains on the west side and lowland streams on the east side. It is a highly desirable destination for

⁷ Information provided by Doris Small, Thom Johnson, Jeff Davis, WDFW; Marty Ereth, Skokomish Tribe, Lee Boad, Hood Canal Salmon Enhancement Group; Ginna Correa and Mike Kuttel Jr, Washington Conservation Commission; and Keith Folkerts, Kitsap County Dept. of Natural Resources. The following watershed descriptions are modified from the Limiting Factors Analysis WRIA 17 by the Washington Conservation Commission and authored by Ginna Correa. The description includes drainages outside of the HSRG Hood Canal region (e.g. Snow Creek). Additional helpful material regarding habitat conditions of Hood Canal drainages can be found in the Limiting Factors Analysis and the Hood Canal Coordinating Council Salmon Habitat Recovery Strategy.



recreational pursuits, shellfish and fishing, and for retirement or vacation homes. Much of the residential development of the region is concentrated along the entire length of shoreline, with a few small towns and commercial developments. The lowland streams have low to medium density residential development with associated urbanization impacts. Despite small size, the lowland streams are highly productive.

Major river systems on the west side of Hood Canal include the Skokomish, Hamma Hamma, Duckabush, Dosewallips and Big Quilcene rivers. Numerous smaller systems drain from the Olympic Mountains as well. A high percentage of the west side river watersheds are within the Olympic National Park or US Forest Service ownership. The river valleys have residential and agricultural development, with associated floodplain management problems.

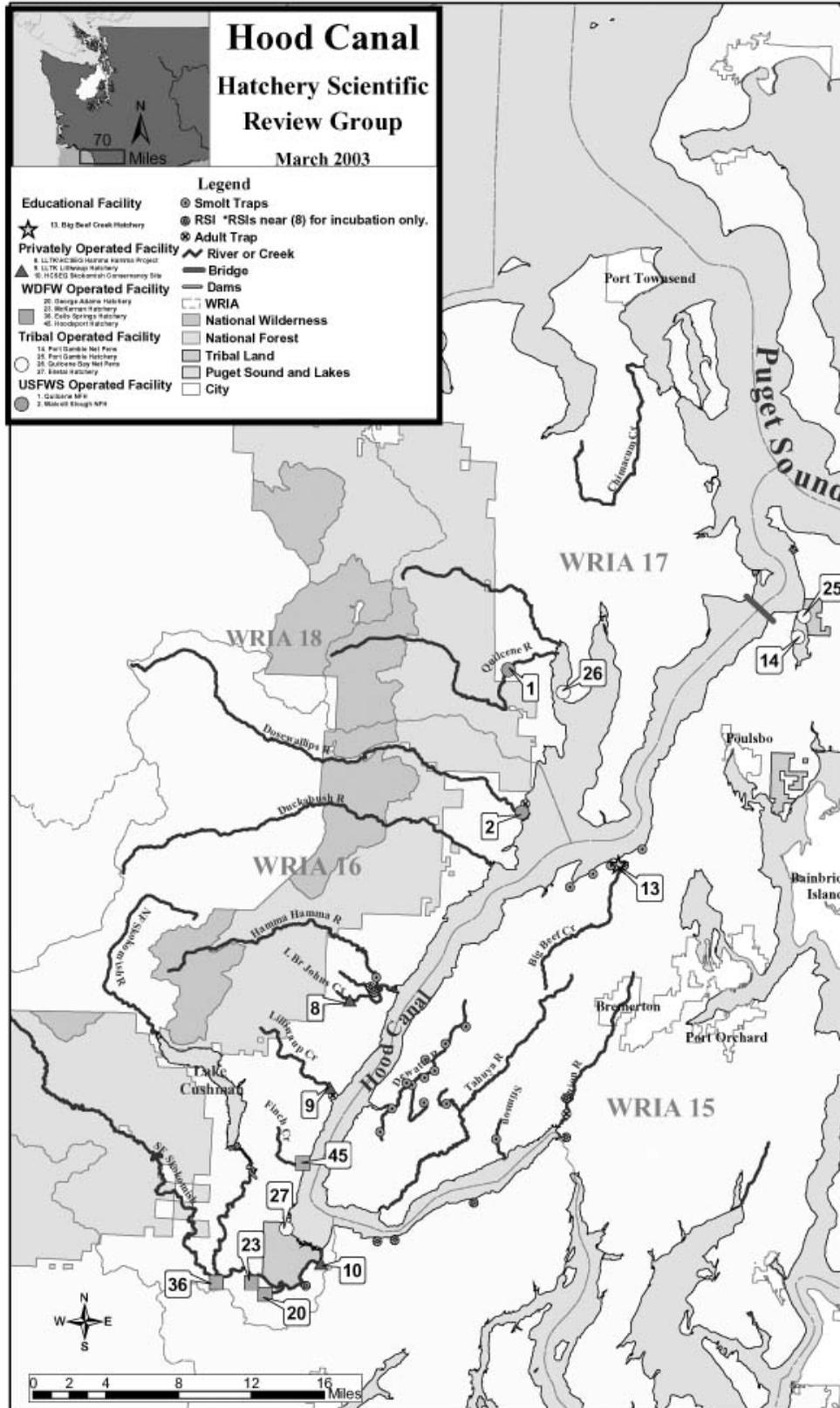
The rivers, streams and marine waters of Hood Canal have been the subject of numerous studies, habitat assessment projects, salmon recovery planning efforts, and related documents. Habitat conditions are evaluated and described in watershed analyses by the US Forest Service on the South Fork Skokomish (1995), Hamma Hamma (1997), Dosewallips (1998) and Duckabush (1999). The region has several salmonid refugia studies and limiting factors analyses underway. Salmon recovery efforts are documented in the SCSCI (2000) and the Hood Canal Coordinating Council (HCCC) Salmon Habitat Recovery Strategy (2002). Additional water resource studies are underway for watershed planning units throughout the Canal, as well as the beginning of an eco-regional planning effort. In-depth habitat analysis is ongoing by the Point No Point Treaty Council and regional enhancement groups. There are many groups and efforts focused on salmon recovery and habitat restoration in Hood Canal.

Habitat conditions in the lower section of the Dosewallips, Duckabush and Skokomish rivers are affected by residential and agricultural development. Diking and filling impacts impair estuarine function. Conditions in the upper watersheds of the Dosewallips and Duckabush are better. The lower reaches of Dosewallips River in the Brinnon area are proposed as an Urban Growth Area. If this proposal goes forward, adverse impacts to the river and shoreline are likely to occur. There is some progress occurring on restoring the Skokomish estuary, but the riverine processes are still impaired. The outlook of habitat on the Skokomish is dependent on large-scale changes in river management that are politically difficult.

Habitat Improvement

Restoration projects are identified in the HCCC Salmon Habitat Recovery Strategy and Salmon Refugia Study WRIAs 14 and 16 Phase 1 Summary Report. Major projects include restoration of estuaries of the large river systems and floodplains in the lower rivers, as well as riparian plantings and sediment control projects. Estuarine restoration projects have been proposed for Salmon Recovery Funding Board funding during 2003. Progress on restoration of riverine processes continues, but at a slow pace.

HATCHERY SCIENTIFIC REVIEW GROUP
Puget Sound and Coastal Washington Hatchery Reform Project



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STOCK STATUS⁸

Stocks	Hatchery Program ?	Biological Significance (L=Low, M =Intermediate, H =High)			Population Viability (L=Critical, M = At Risk, H = Healthy)			Habitat (L = Inadequate, M = Limiting, H = Healthy)			Harvest Opportunity (0 = None, L = Occasional, M = Most years, H = Each year)		
		Goals			Goals			Goals			Goals		
		Now	Short-Term	Long-Term	Now	Short-Term	Long-Term	Now	Short-Term	Long-Term	Now	Short-Term	Long-Term
Big Beef Hatchery Summer/Fall Chinook	Y	L	L	L	M	M	M	M	M	M	0	0	0
Eastern Hood Canal Summer/Fall Chinook	N	L	L	L	L	L	L	M	M	M	0	0	L
Finch Creek (Hoodsport) Hatchery Summer/Fall Chinook	Y	L	L	L	H	H	H	H	H	H	H	H	H
Hamma Hamma Summer/Fall Chinook	Y	L	L	M	L	L	M	M	M	M	0	0	L
Hood Canal Summer/Fall Chinook	N	M	M	M	L	L	M	M	M	M	0	0	L
Skokomish Summer/Fall Chinook	Y	M	M	M	M	M	M	L/M	L/M	M	M	M	H
Big Quilcene Hatchery Coho	Y	M	M	M	H	H	H	M	M	M	H	H	H
Hood Canal Coho	N	M	L/M	L/M	M	M	M	M	M	M/H	M	M	H
Port Gamble Net Pen Coho	Y	L	M	M	H	H	H	M	M	M	H	H	H
Purdy Creek (George Adams) Hatchery Coho	Y	L	L	L	M	H	H	M	M	M	H	H	H
Quilcene Net Pen Coho	Y	L	M	M	H	H	H	M	M	M	H	H	H
Big Beef Summer Chum	Y	M	M	M	L	M	H	L	M	M	0	0	L
Hamma Hamma Summer Chum	Y	M	M/H	H	L	M	M	M	M	M	0	0	L
Hood Canal Summer Chum (Dose, Duck)	N	M	M/H	M	M	M	M	M	M	M	0	0	L
Lilliwaup Creek Summer Chum	Y	M	M	M	L	L	M	M	M	M	0	0	L
Little Quilcene/Big Quilcene Summer Chum	Y	M	M	M	M	M	M	L	L	M	0	0	L
Union/Tahuya River Summer Chum	Y	M	M	M	M	M	M	M	M	M	0	0	L
Big Quilcene Fall Chum	Y	M	M	M	M	M	M	L	L	M	H	H	H
Enetai Creek Hatchery Fall Chum	Y	L	L	L	H	H	H	M	M	M	H	H	H
Hood Canal Fall Chum	N	L	L	L	H	H	H	M	M	M	H	H	H
Hoodsport Hatchery Fall Chum	Y	M	M	M	H	H	H	M	M	M	H	H	H
Little Boston Creek Hatchery Fall Chum	Y	L	L	L	H	H	H	M	M	M	H	H	H
McKernan Hatchery Fall Chum	Y	L	L	L	H	H	H	M	M	M	H	H	H
Purdy Creek (George Adams) Hatchery Fall Chum	Y	L	L	L	H	H	H	M	M	M	H	H	H
Hood Canal Late Fall Chum	N	L	L	L	H	H	H	M	M	M	H	H	H
Finch Creek (Hoodsport) Hatchery Pink	Y	L	L	L	H	H	H	M	M	M	H	H	H
Hood Canal Pink (Hamma, Duck, Dose)	N	H	H	H	H	M/H	M/H	M	M	M	0	0	L
Hood Canal Summer Steelhead	N	M	?	?	L	?	?	M	M	M	0	0	0
Hamma Hamma Winter Steelhead	Y	M	M	M	L	M	M	M	M	M	0	0	M
Hood Canal Winter Steelhead	N	M	M	M	L	L	M	M	M	H	0	0	L
Hood Canal Hatchery Winter Steelhead	Y	L	L	L	L	L	M	M	M	H	H	H	H
Skokomish Bull Trout	N	M	M	M	M	M	M	M	M	M	0	0	0
Hood Canal Sea-Run Cutthroat	N	M	M	M	H	H	H	M	M	M	H	H	H

Biological significance is determined by considering a number of specific factors relating to stock origin, biological attributes and population subdivisions, with the stock defined as being of either low, intermediate or high significance.

Population viability is determined by considering a number of specific factors such as age class structure, spawner escapement and proportion of hatchery-origin fish in natural spawning, with the stock's viability defined as being either critical, at risk or healthy. This rating refers to the stock's ability to sustain itself in the natural environment (except in the case of a segregated harvest program, in which case the ratings are low, medium and high and refer to the stock's ability to sustain itself in the culture environment).

The stock's spawning, freshwater, migration and estuarine **habitat** is rated as either inadequate (target stock is unproductive and the population will go extinct, even without terminal harvest), limiting (target stock is productive enough for the population to sustain itself at a low level terminal harvest) or healthy (productivity of the stock is high and the population is capable of growth and supporting significant terminal harvest).

Harvest opportunity is rated according to whether the goal is to provide no directed harvest opportunity, occasional opportunity, opportunity most years, or opportunity each year.

⁸ This table contains ratings for all the salmonid stocks in the region, as provided by the managers. For a more detailed definition of these ratings, see the HSRG Principles and Recommendations Report, Benefit/Risk Tool appendix.



HATCHERIES⁹

Big Beef Hatchery

The Big Beef Creek Project is located at a man-made hatchery pond and experimental channel complex at river kilometer 0.1 of Big Beef Creek, in the Hood Canal Basin. The property is owned by the University of Washington, which furnishes staff support, land, incubation, rearing water and electricity. Water used in the facility for incubation and tank flow is from a freshwater production well. USFWS, WDFW and the Point-No-Point Treaty Council and tribes are providing technical support, particularly in the realm of habitat improvement, land use issues in the Big Beef Creek watershed, and summer chum recovery in the Hood Canal ESU.

Eells Springs Hatchery

Eells Springs Hatchery is located on Hunter Creek, a tributary of the Skokomish River, approximately ten miles north of Shelton and four miles west of Highway 101. The hatchery was constructed in 1947 and is operated by WDFW. The hatchery site is 42 acres and consists of a hatchery building with 112 shallow trough incubators with an eyeing capacity of 2,800,000 eggs. Eight concrete raceways (10' x 85'), 12 round concrete ponds (40' in diameter), one large (1.75 acre) and one medium (1.25 acre) earthen pond. A single family residence and duplex are available for on-station personnel. Eells Springs is staffed with four full-time employees.

Enetai Hatchery

This hatchery is operated by the Skokomish Tribe. The Point No Point Treaty Council provides technical assistance. The Northwest Indian Fisheries Commission provides fish health services. The hatchery is located at the mouth of Enetai Creek (WRIA 16.0217), just north of the Skokomish River in southern Hood Canal. Facilities include a fish weir and adult collection pond at the mouth of the Creek, fish incubation and rearing facilities just upstream on the west side of Highway 101, and a water intake and supply system, with the intake located in the Creek, approximately 200 yards upstream. Fall chum broodstock return to the Skokomish Hatchery through a fish weir at the mouth of Enetai Creek. The fish enter a concrete adult collection pond measuring approximately 30' x 8' x 6'. Incubation facilities consist of 16 plastic boxes (each approximately 3' x 3' x 3') with upwelling flows and seven Netarts-style incubators (each 40' x 4' x 1.5'). Each incubation box has a capacity of 100,000 eggs, providing a total egg capacity of 1.6 million. Each of the seven Netarts-style incubators has a capacity of 400,000 eggs, for a combined capacity 2.8 million eggs. Swim-up fry are moved to seven fiberglass circular ponds (24' diameter, 5' height). The ponds have center drains and the water heights are controlled by external stand-pipes. Fall chum are reared in these ponds until release.

George Adams Hatchery

George Adams Hatchery is owned and operated by WDFW. It is located at river mile 1.0 on Purdy Creek, a tributary of the Skokomish River that flows into Hood Canal near Union, Washington. The hatchery site is located at the junction of Highway 101 and the Skokomish Valley Road. George Adams Hatchery was originally constructed in 1960. It was expanded to its current size with 1977 Salmon Enhancement Funds. The property spans 31 acres and consists of an incubation building with office and shop, a three-bay storage building, a freezer building capable of holding 100,000

⁹ Information provided by Kathy Hopper and Rick Endicott, *Long Live The Kings*; Thom Johnson, Ed Jouper, Darrell Mills, Dan Adkins, Manuel Farinas, Denis Popochock and Jack Tipping WDFW; Lee Boad, Hood Canal Salmon Enhancement Group; Ron Wong, Dave Zajac and Larry Telles, USFWS; and Chris Weller, Point no Point Treaty Council.



pounds of fish food, a covered spawning shed, and two residences. There are six standard raceways (ponds 1–6), a 48' x 240' x 33" gravel-bottom rearing/release pond (pond 7), a 71' x 157' x 27" adult trap that is also used as a release pond (pond 8), a 61' x 167' x 55" gravel-bottomed rearing/release pond (pond 9), ten Japanese style "keeper channel" raceways used for hatching of chum, and two 109' x 10' x 41" "collection raceways" (ponds 11 and 12) used for collecting chum fry for distribution as they out-migrate from the keeper channel raceways. The collection raceways are also used as conventional raceways for rearing coho and rainbow trout.

Huson Spring Hatchery

The Huson Spring facility is located on a tributary to the Union River at river mile 1 .5. Trained volunteers and project funding are provided by the Hood Canal Salmon Enhancement Group (HCSEG), which is supported by WDFW through the Regional Enhancement Program. Technical input is provided by the Point No Point Treaty Council and the Skokomish Tribe. Oversight and technical support are provided by WDFW Minter/Hood Canal Hatchery staff. An on-site hatchery operation is staffed by HCSEG volunteers. The Huson Spring facility consists of two gravity water intakes, a clarifier for removing solids from water used for incubation, four 16' x 3' x 3' fiberglass raceways, and four 55-gallon remote site incubators. The broodstock collection site is located on the Union River (WRIA 15.0503) at river mile 0.3. It consists of a removable adult fish trap and rack that is installed prior to commencement of the run, and removed after the run has ended. There is also a removable green pen for holding adult broodstock, when necessary. A mobile trailer is located at the site, to provide security during broodstock collection.

Hoodsport Hatchery

Hoodsport Hatchery is located at the mouth of Finch Creek, which flows into Hood Canal at the town of Hoodsport, Washington. The site is approximately 4.32 acres. The main hatchery building consists of an incubation room with 84 vertical-stack incubators and four concrete shallow troughs used for egg sorting, office, store room, feed room, freezer and garage. The second floor is a two bedroom apartment occupied by a hatchery staff member. There is also a three bedroom, single-family residence with a one car garage and a four bay shop with feed storage. The facilities include a generator/salt water pump building, a one room shed .25 miles from main hatchery grounds at the hatchery intake, 13 standard 20' x 80' x 2.5' raceways, one 40' x 110' x 2.5' raceway, and three rearing/adult holding 13' x 205' x 6' raceways. There are also two 15-horsepower salt-water pumps, each providing approximately 1,000–1,400 gallons per minute, and three ten horsepower reuse pumps, each providing approximately 800–1,000 gallons per minute. WDFW has an easement on the south side of Finch Creek, to facilitate the removal of gravel accumulated from winter flooding. Hoodsport Hatchery is the only WDFW facility with the ability to pump saltwater.

Lilliwaup Hatchery

Lilliwaup Hatchery is located in Mason County along the east side of Lilliwaup Creek, which drains into the west side of Hood Canal, north of Hoodsport. The property is owned by the Lilliwaup Falls Generating Company and operated by the non-profit organization Long Live the Kings. The hatchery site covers three acres. The hatchery building has meeting and office space upstairs, incubation and early rearing (24 four-foot circular tanks) downstairs. Outside there are 16 20' circular tanks, 12 10' circular tanks and a storage building. Additionally, there is a spring-fed, gravity flow intake, a small stream used for natural spawning, a wetland for coho rearing, and a settling pond for hatchery effluent.



Little Boston Creek Hatchery

This hatchery is operated by the Port Gamble S'Klallam Tribe. It is located at mouth of Little Boston Creek (WRIA 15.0350), at the northeast end of Port Gamble Bay in northern Hood Canal. Facilities include a fish weir and adult collection pond in the creek, and adjacent fish incubation and rearing facilities. Fall chum broodstock return to the Port Gamble Hatchery through a fish weir at the mouth of Little Boston Creek. The fish enter a concrete adult collection pond measuring 30' x 30' x 3'. The incubation facilities consist of a shed, covering an area approximately 24' x 20' with an 8' ceiling, in which 12 vertical stacks of 16 Heath/Techna trays are housed. A branch pipe from the main water supply provides water flow to the eggs. Sediments are removed from the water by an inclined plate gravity separator filter system. Egg capacity is 1.5 million eggs. Rearing facilities include six concrete raceways (each 40' x 4' x 1.5') and three fiberglass circular ponds (13' diameter x 4' high). The majority of rearing takes place in the raceways. The circular ponds are used to reduce the density of fish, should water supply become limited and there is indication of potential stress from increased fish loading.

McKernan Hatchery

McKernan Hatchery is owned and operated by WDFW. It is located at river mile 1.0 on Weaver Creek, a tributary of the lower Skokomish River that flows into Hood Canal near Union, Washington. The hatchery site is located on Deyette Road, 1.5 miles west of George Adams Hatchery. Construction of McKernan Hatchery was completed in 1979 with 1977 Salmon Enhancement Funds. An incubation building was added and some pond modifications were made in 1994 with Puget Sound Recreational Enhancement and pathogen-free water funds. The property spans 11.2 acres and consists of an incubation building, office and shop, covered spawning shed and one residence. There is a gravel-bottomed in-stream rearing/release pond- 25' x 380' x 3' (pond 5), two concrete raceways- 16' x 147' x 2.2' (ponds 2 and 3), one concrete raceway- 22' x 147' x 2.2' (pond 4), and one asphalt-bottomed, combination rearing pond and adult holding pond, 184' x 55' x 4' (pond 1).

Port Gamble Net Pen

This hatchery is operated by the Port Gamble S'Klallam Tribe. Coho net pens are anchored at the north end of Port Gamble Bay, in northern Hood Canal. The pens are hung from a stainless steel framework that is supported by foam-filled plastic floats and anchored to the bottom of the bay. Up to four 50' square, 25' deep nets can be accommodated in a two-by-two configuration. However, only two ½" mesh nets are used to rear the coho. A net, to protect against bird predators, is suspended above each pen. Walkways on the framework and along the periphery of the net pens accommodate fish feeding, equipment maintenance and periodic coho weight and fish health sampling.

Quilcene Bay Net Pens

This hatchery is operated by the Skokomish Tribe. The Point No Point Treaty Council has provided technical assistance since the hatchery operations began in late 1976. The Northwest Indian Fisheries Commission provides fish health services. WDFW is a co-manager and provides fish feed for the project. USFWS provides net pen coho smolts from Quilcene National Fish Hatchery. The coho net pen is anchored at the southeast end of Quilcene Bay near Fisherman's Point. The pen is hung from a stainless steel framework that is supported by foam-filled plastic floats and anchored to the bottom of the bay. It is a 50' square by 40' deep net with ½-inch mesh. A net, to protect against bird predators, is suspended above the pen. Walkways on the framework, along the periphery of the net pen, accommodate fish feeding, equipment maintenance and periodic coho weight and fish health sampling.



Quilcene National Fish Hatchery

Quilcene National Fish Hatchery (NFH) is located at the confluence of the Big Quilcene River and Penny Creek, on the east side of the Olympic Peninsula in Jefferson County. The hatchery is located along U.S. highway 101, two miles south of the town of Quilcene or 75 miles northwest of Olympia, Washington. The hatchery facilities lie in a narrow valley approximately two miles upstream from Dabob Bay, an arm of Hood Canal. The valley runs southwest to northeast in the foothills of the Olympic Mountains. Quilcene NFH is operated and funded by the US Fish and Wildlife Service (USFWS). USFWS owns approximately 32 acres at Quilcene NFH and about two acres at Walcott Slough (a satellite facility). The main hatchery facilities consist of 39 8'x 80' raceways, three water intake structures, a pre-settling pond, a pollution abatement pond, a hatchery building (containing the office, laboratory and tank room), an egg isolation building, a service/shop building, a domestic water tank, three residences, and one temporary residence. Walcott Slough (for capturing and spawning chum) is located on Brinnon Flats, near the confluence of the Dosewallips River and Dabob Bay. This facility is ten miles south of the hatchery on Highway 101 and adjacent to the highway. A previous satellite station was operated on the Duckabush River, and weirs and traps were operated annually on the Dosewallips and Little Quilcene rivers and at Walcott Slough, to capture adult salmon.

Union, Dewatto and Tahuya

The Union site is located on a spring-fed tributary entering the mainstem Union River at river mile one (Huson Spring). Ownership is private and the site has a 13 year history of supplementation projects, with no significant problems. The Dewatto site is located on a spring-fed tributary that enters the Dewatto mainstem at river mile two (Impy Spring). Ownership is private and the site has a three year history of supplementation, with no significant problems. The Tahuya site is where past Chinook supplementation occurred on a private ownership located at river mile 0.5. This was a spring-fed tributary that had limited supplementation potential due to available water. Future supplementation at this site would occur on a spring-fed tributary entering the Tahuya mainstem at river mile three.



Big Beef Hatchery Summer/Fall Chinook

University of Washington, Hood Canal Salmon Enhancement Group and Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
<i>Biological Significance</i>	Low	Low	Low
<i>Population Viability¹⁰</i>	Medium	Medium	Medium
<i>Habitat</i>	Limiting	Limiting	Limiting
<i>Harvest Opportunity</i>	None	None	None
Hatchery Program:			
<i>Purpose</i>	Research and Education		
<i>Type</i>	Segregated		

PROGRAM DESCRIPTION

The historical source of broodstock was Hoodsport Hatchery in the late 1960s. Thereafter, returning fish to the hatchery were used for brood stock, except in 1993 when eggs from George Adams Hatchery were transferred to Big Beef. Chinook are considered non-native to the Big Beef watershed. 200,000 fingerlings are released into the Big Beef Creek estuary. Adult collection, incubation and rearing take place at Big Beef Creek Hatchery.

OPERATIONAL CONSIDERATIONS

- None.

BENEFITS AND RISKS

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

The program's research and education goals are not currently being met—there is no evidence of either occurring on site.

B. Likelihood of attaining goals?

It is conceivable, but not apparently likely, that the stock will be a valuable research resource in the future.

C. Consistent with goals for other stocks?

The program presents a potential predation risk to chum and pinks in the region, mitigated in part by restrictions on release time.

¹⁰ 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

- Discontinue the program.

COMMENTS

- The Big Beef weir facilities provide the unique opportunity to control and monitor upstream/downstream migration. This could provide the opportunity to develop a valuable regional applied research laboratory to serve the co-managers' informational needs.

MANAGERS RESPONSE

The co-managers concur that the research and education goals described for the program have not been met. Alternative program options will be reviewed, including improved use of the research facility and alternative types of production.



Finch Creek (Hoodsport) Hatchery Summer/Fall Chinook

Skokomish Tribe and Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
<i>Biological Significance</i>	Low	Low	Low
<i>Population Viability¹¹</i>	High	High	High
<i>Habitat</i>	Healthy	Healthy	Healthy
<i>Harvest Opportunity</i>	Each Year	Each Year	Each Year
Hatchery Program:			
<i>Purpose</i>	Harvest		
<i>Type</i>	Segregated		

PROGRAM DESCRIPTION

The Hoodsport stock was started in 1952 with a release of Dungeness Hatchery spring/summer Chinook (Eastern Straits region), followed by several years of releases from Soos Creek Hatchery (Green River sub-region of Central Puget Sound), until the stock became largely self-sustaining. Additional broodstock inputs have included Tumwater Falls (South Puget Sound), Voights Creek (Puyallup sub-region of Central Puget Sound), Big Beef Creek, Minter Creek (South Puget Sound), and Trask River (Oregon). The actual contribution of these fish to the Hoodsport stock is unclear. This stock is part of the South Puget Sound, Hood Canal, and Snohomish summer/fall Chinook GDU. Genetic analysis of the Hoodsport population showed similarities to the Marblemount (Skagit) Hatchery fall Chinook population, which may reflect the mixed origin of both populations. This stock is not included within a GDU. Three million fingerlings and 250,000 yearlings are released on-station. Adult collection, spawning, incubation and rearing occur on-station.

OPERATIONAL CONSIDERATIONS

- High production depends on reusing water.

BENEFITS AND RISKS

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

There is a harvest benefit from the program, though it is limited in comparison to the past.

B. Likelihood of attaining goals?

The high density of fish in the facility, exceeding recommended flow/density indexes, presents risks associated with stress and disease, catastrophic loss and diminished smolt fitness. Declining market value has reduced harvest from historical rates, reducing the likelihood of the program meeting its harvest goal.

¹¹ 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 large population released presents a potential predation risk to chum and pinks in the region, mitigated in part by restrictions on release time. The large surplus returns present a potential ecological risk to other stocks, because of the tendency of these fish to stray into regional streams, even if they do not reproduce successfully

RECOMMENDATIONS

- Downsize the Chinook program significantly in order to address loading and density problems, and further adjust the program's size to be consistent with harvest goals and goals for other stocks. Since the program consistently produces unharvested returns that exceed escapement needs, it should either be reduced or additional harvest options should be explored that take full advantage of harvest opportunities.
- Monitor the number of returning fish taken in all harvests.
- Monitor the number of returning fish that are surplus to harvest and broodstock each year.
- Monitor smolt quality (growth trajectory, pre-release size and other measures).
- Maintain varied release strategies; evaluate and adjust the program based on what is successful.
- Apply an external mass mark to the stock. This may make possible selective fisheries that would increase the harvest of these fish.

COMMENTS

- None.

MANAGERS RESPONSE

The co-managers began reviewing WDFW's Hood Canal hatchery programs in the summer of 2003. This effort has included describing where problems with exceeding production capacity exist, identifying operational problems at the hatcheries, and considering options to address these problems. The co-managers expect this review will lead to positive program changes to the Finch Creek hatchery summer/fall Chinook programs that are consistent with the HSRG's recommendation to address loading and density problems. Results of the review are expected to be available early in 2004.

In addition to the co-manager comments, WDFW supports the HSRG recommendation to apply an external mass mark on Chinook released at Hoodport Hatchery. WDFW notes that the following HSRG recommendations have been implemented:

- As described in the resource management plan, monitoring of fishery harvest will be facilitated by the initiation in 2004 of coded-wire-tagging of representative production;
- Monitoring of smolt quality will continue in conjunction with the completion of the development of performance measures for this program in 2004.

In addition to the co-manager comments, the Skokomish Tribe does not entirely agree with the HSRG statement that the harvest benefit is limited in comparison to the past. In 2003, Skokomish Tribal fishers harvested 14,661 (in 2002, 16,571) Chinook from the area in front of Finch Creek (Hoodport Hatchery zone). This Tribal commercial fishery has been growing in effort over the last three years. While the value of the fish have declined in recent years, the value of Chinook eggs for caviar



markets has increased significantly, which is increasing the participation in this fishery. The recreational fishery in the Hoodport Hatchery zone is also growing.



Hamma Hamma Summer/Fall Chinook

Long Live the Kings, Hood Canal Salmon Enhancement Group, Port Gamble S’Klallam Tribe, and Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
<i>Biological Significance</i>	Low	Low	Intermediate
<i>Population Viability</i>	Critical	Critical	At Risk
<i>Habitat</i>	Limiting	Limiting	Limiting
<i>Harvest Opportunity</i>	None	None	Occasional
Hatchery Program:			
<i>Purpose</i>	Conservation and Research		
<i>Type</i>	Integrated		

PROGRAM DESCRIPTION

This program began in 1995 with eyed eggs from George Adams Hatchery. Chinook fry and/or fingerlings have been released into the Hamma Hamma River in the past, but their contribution to adult returns and/or spawning success is unknown. Historical Chinook populations native to Hood Canal are thought to have been replaced with Chinook of Green River origin that have since become locally adapted. This stock is one of 19 stocks within the South Puget Sound, Hood Canal and Snohomish summer/fall Chinook GDU. For this program, up to 100,000 fingerlings (50,000 from George Adams, 50,000 natural-origin recruits) are released from the Johns Creek Ponds. Adults are collected both at George Adams and from returns to the Hamma Hamma River. Adults returning to George Adams are spawned at George Adams. Their eggs are eyed at George Adams, hatched at Lilliwaup Hatchery and reared at Johns Creek. Adults from the Hamma Hamma are collected by seine net, held in PVC tubes and spawned on-site. Incubation and rearing occur at Johns Creek.

OPERATIONAL CONSIDERATIONS

- Evaluation of the hatchery- or natural-origin of spawners uses information from thermal marks and adipose fin clipping.
- Fry are released volitionally.
- Smolt production is monitored at a trap.

BENEFITS AND RISKS

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

The program is consistent with the long-term conservation goal of establishing a sustainable run in the Hamma Hamma River.

B. Likelihood of attaining goals?



Persistent use of George Adams eggs may affect reproduction by natural-origin recruits. If the use of those eggs can be limited to one or two generations, the likelihood of achieving a sustainable run at Hamma Hamma within a decade or two is high.

C. Consistent with goals for other stocks?

The program is consistent with goals for other stocks.

RECOMMENDATIONS

- Execute a plan to replace the program’s George Adams eggs with eggs from natural-origin returns; include a specific end point for the use of George Adams eggs.
- Monitor distribution, growth and survival of fingerlings in the river, to assess the capacity of the river for fry production, and adjust the program commensurately.

COMMENTS

- Like all integrated hatchery programs, success will depend on good habitat being available to both the hatchery- and natural-origin components of the integrated population (see HSRG system-wide recommendation about productive habitat).
- The rationale for releasing 100,000 fingerlings is the statistical power of detecting differences of returns between native and George Adams-parentage fish, not an assessment of the ecological capacity of the stream or the estuary for Chinook juveniles.
- Underlying the HSRG’s specific recommendations for each Hood Canal Chinook program is the region-wide recommendation that a conservation/rebuilding program be undertaken to develop a locally-adapted, integrated stock of Chinook in the Skokomish River Basin. This developing natural population must be, at least for the short term, sustained by hatcheries. This concept is not without risk. However, it is based on a “hedge-your-bet” approach to conserve and protect a locally adapting stock until the time that improved habitat can support a natural, self-sustaining population. Elements of this recommendation include:
 - Domestication selection should be minimized through the use of rearing protocols and environmental conditions that produce smolts that mimic as closely as possible the morphological, behavioral and physiological characteristics of wild fish rearing in the river.
 - This integrated conservation approach should incorporate natural spawners into the broodstock on a regular basis and in numbers to assure that hatchery populations always favor the genetic makeup of the natural spawners.
 - Other Hood Canal rivers might be used as supplemented refugia for the developing Skokomish native stock and as a hedge against catastrophic loss within the Skokomish River Basin, as has happened in recent years due to flooding and other environmental events.

MANAGERS RESPONSE

The co-managers support the recommendations of the HSRG and plan to continue to monitor and evaluate the program.

Additional co-manager comments regarding the HSRG’s region-wide Chinook recommendation are provided under the Skokomish summer/fall Chinook program.



Skokomish Summer/Fall Chinook

Skokomish Tribe and Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
<i>Biological Significance</i>	Intermediate	Intermediate	Intermediate
<i>Population Viability</i>	At Risk	At Risk	At Risk
<i>Habitat</i>	Inadequate/Limiting	Inadequate/Limiting	Limiting
<i>Harvest Opportunity</i>	Most Years	Most Years	Each Year
Hatchery Program:			
<i>Purpose</i>	Harvest and Conservation		
<i>Type</i>	Integrated		

PROGRAM DESCRIPTION

The Skokomish Chinook stock is a mixed stock with composite production. Naturally spawning Chinook in the Skokomish are a mix of hatchery- and natural-origin fish. George Adams Hatchery fall Chinook originated in 1961 from Hoodspout Hatchery stock, which included transfers from Soos Creek (Green River sub-region of Central Puget Sound), Tumwater Falls, Voights, Big Beef and Minter creeks, and Trask River (Oregon). This stock is one of 19 stocks within the South Puget Sound, Hood Canal and Snohomish summer/fall Chinook GDU. For this program, 3.8 million fingerlings are released on-station into Purdy Creek/Skokomish River from George Adams Hatchery. 125,000 yearlings are released from Rick’s Pond into the Skokomish (75,000 reared at Rick’s Pond, 50,000 at Lilliwaup Hatchery). All adult collection and incubation occur at George Adams. Fingerlings are reared on-station at George Adams. Yearlings are early-reared at George Adams and Lilliwaup, prior to transfer to Rick’s Pond.

OPERATIONAL CONSIDERATIONS

- Fish are not currently mass marked, but a portion of the releases has been double-indexed tagged since 1995.
- Broodstock is collected from volunteer returns to the hatchery.
- The best estimates of the contribution of hatchery fish to natural spawning range from 13–41%.
- Natural escapement to the Skokomish River has ranged from 926–1,913 for the years 1998–2002 (escapement goal is 1650 natural spawners).

BENEFITS AND RISKS

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

There is a demographic benefit from the hatchery program in the severely deteriorated habitat of the Skokomish River. However, the population’s viability is rated by the managers as ‘at risk’ and is expected to remain ‘at risk’ because habitat is expected to remain poor and it is difficult to control the straying of hatchery fish, due to the lack of marks on the hatchery fish.



B. Likelihood of attaining goals?

The conservation goal of an integrated population of naturally-reproducing fish (supplemented with hatchery production, but adapting to the available habitat in the river) can be reached if care is taken to allow natural reproduction to occur, without undue interaction with members of the hatchery-produced population. The harvest goal will be more likely to be met if the natural- and hatchery-origin sectors of the population can be distinguished at harvest.

C. Consistent with goals for other stocks?

There is a harvest benefit from the program, although it is limited in comparison to the past. The large size of the program presents risks of ecological and genetic interactions with other stocks. The high density of fish in the facility, exceeding recommended flow/density indexes, presents risks associated with stress and disease, catastrophic loss and diminished smolt fitness.

RECOMMENDATIONS

- Monitor the status and productivity of the naturally-spawning sector of the population. This will require mass marking the hatchery fish, in order to identify them.
- Ensure that hatchery-origin fish do not constitute more than one-third of natural spawners.
- Include an annual average of 10–20% natural-origin fish in the hatchery broodstock.
- Reduce the density of fish in culture, in order to achieve higher quality fish at release.
- Quantify genetic divergence between the naturally spawning and hatchery populations; use this information to adjust broodstock guidelines.

COMMENTS

- These recommendations are based upon the managers' goal for this program, to provide both harvest and conservation benefits.
- Options for achieving a properly integrated program include reducing the number of hatchery fish released, using selective fisheries techniques to maintain harvest while reducing hatchery-origin spawners, and/or capturing adult hatchery-origin returns.
- Like all integrated hatchery programs, success will depend on good habitat being available to both the hatchery- and natural-origin components of the integrated population (see HSRG system-wide recommendation about productive habitat).
- Underlying the HSRG's specific recommendations for each Hood Canal Chinook program is the region-wide recommendation that a conservation/rebuilding program be undertaken to develop a locally adapted, integrated stock of Chinook in the Skokomish River Basin. This developing natural population must be, at least for the short term, sustained by hatcheries. This concept is not without risk. However, it is based on a "hedge-your-bet" approach to conserve and protect a locally adapting stock until the time that improved habitat can support a natural, self-sustaining population. Elements of this recommendation include:
 - Domestication selection should be minimized through the use of rearing protocols and environmental conditions that produce smolts that mimic as closely as possible the morphological, behavioral and physiological characteristics of wild fish rearing in the river.
 - This integrated conservation approach should incorporate natural spawners into the broodstock on a regular basis and in numbers to assure that hatchery populations always favor the genetic makeup of the natural spawners.



- Other Hood Canal rivers might be used as supplemented refugia for the developing Skokomish native stock and as a hedge against catastrophic loss within the Skokomish River Basin, as has happened in recent years due to flooding and other environmental events.

MANAGERS RESPONSE

- The co-managers began reviewing WDFW's Hood Canal hatchery programs in the summer of 2003. This effort has included describing where problems with exceeding production capacity exist, identifying operational problems at the hatcheries, and considering options to address these problems. The co-managers expect this review will lead to positive program changes to the Skokomish summer/fall Chinook programs that are consistent with the HSRG system-wide recommendations. Results of the review are expected to be available early in 2004.
- The HSRG has made a region-wide recommendation (under "Comments") that a conservation/rebuilding program be undertaken to develop a locally adapted, integrated stock of Chinook in the Skokomish River Basin. The co-managers emphasize that Chinook conservation/rebuilding in the Skokomish River Basin must consider the currently degraded condition and extensive loss of habitat in the Skokomish watershed. The poor habitat conditions in the Skokomish watershed, in conjunction with treaty fishing rights and mitigation requirements, profoundly affect the appropriate hatchery production levels in the short- and long-term. A true integrated hatchery program may be difficult to implement, and phasing into an integrated program may require a longer period of time.
- The HSRG comments that other Hood Canal rivers might be used as "supplemented refugia for the developing integrated Skokomish River Chinook stock." However, the Summer Chum Salmon Conservation Initiative and a NMFS Biological Opinion direct that no Chinook be released in eastside Hood Canal summer chum streams (e.g., Union, Tahuya and Dewatto rivers), to reduce the risk of spawning ground space competition, redd superimposition and behavioral modification to summer chum.
- A study to quantify genetic divergence between naturally spawning and hatchery populations will require additional funding.
- In addition to the co-manager comments, WDFW supports the HSRG recommendation to apply a mass mark on Chinook released at George Adams Hatchery. Double-index tagging of Chinook began with the 1995 brood at George Adams Hatchery and currently provides a tool to monitor the incidence of hatchery strays and the status of the naturally-spawning Chinook population.
- In addition to the co-manager comments, the Skokomish Tribe agrees that a locally adapted, integrated, naturally spawning Chinook population should be developed for the Skokomish River Basin. While the HSRG has recommended one way to begin that process, the Tribe wants to reiterate that without significant habitat restoration in the Skokomish River, it will be very difficult, if not impossible, to achieve. The way the co-managers eventually develop the naturally spawning stock may be different than that recommended by the HSRG. The co-managers will develop a restoration and rebuilding plan for the River that will be effective, as long as significant habitat restoration is occurring as well. That rebuilding plan will withstand scientific and legal scrutiny and will accomplish the desired outcome. In the meantime, the hatchery portion of the Chinook population is augmenting the naturally spawning population, which is necessary to sustain the naturally spawning population, until there is more suitable habitat available for spawning and rearing in the Skokomish River.



Big Quilcene Hatchery Coho

US Fish and Wildlife Service

Stock Goals:	Current	Short-Term	Long-Term
<i>Biological Significance</i>	Intermediate	Intermediate	Intermediate
<i>Population Viability</i> ¹²	High	High	High
<i>Habitat</i>	Limiting	Limiting	Limiting
<i>Harvest Opportunity</i>	Each Year	Each Year	Each Year
Hatchery Program:			
<i>Purpose</i>	Harvest		
<i>Type</i>	Segregated		

PROGRAM DESCRIPTION

This stock has been artificially propagated since 1911 and currently exhibits a run timing that is slightly earlier than other stocks of Hood Canal coho. Eggs have been provided from Hoodspout Hatchery, the Skokomish, Duckabush, Skagit (Skagit region), Skykomish (Stillaguamish/Snohomish region), Dungeness (Eastern Straits region), Quinalt (North Coast region) and Clackamas (Oregon) rivers, and Lake Washington (Lake Washington sub-region of Central Puget Sound). The last eggs were imported in 1973. 450,000 yearlings are released on-station at Quilcene National Fish Hatchery (NFH). Adult collection, incubation and rearing occur on-station.

OPERATIONAL CONSIDERATIONS

- The last import of eggs for this program was in 1973.
- The hatchery stock has an extensive tagging history, with the stock currently serving as a double index indicator stock under the Pacific Salmon Treaty.
- The remainder of the hatchery release is marked with an adipose fin clip.
- Total survival rates for the program have been very consistent, averaging approximately 4.8% for brood years 1987–98.
- The stock displays earlier run timing than other coho stocks in Hood Canal. This is thought to be a result of past artificial selection at the hatchery.
- Strays from the program contribute to the high occurrence (40–50%) of hatchery fish in natural spawning populations in northern Hood Canal streams.

BENEFITS AND RISKS

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

The program provides annual harvest opportunity consistent with the short- and long-term goals for the stock.

¹² 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 contribution of the program to harvest has changed dramatically since brood year 1994, with returns from the program currently underused. Prior to that time, the program contributed approximately 26,000 fish annually to all fisheries. Brood years 1995–98, however, have only contributed approximately 4,400 fish per year to all fisheries. Hatchery escapement during the same period has averaged approximately 15,000 fish per year, well in excess of the broodstock needs. Terminal area catches in Quilcene Bay and the Big Quilcene River (attributed to this program and the Quilcene Bay Net Pens) have averaged only 2,000 and 300 fish, respectively, from 1996–2001.

C. Consistent with goals for other stocks?

The program presents a risk to summer chum through predation at the juvenile stage and through by-catch in fisheries directed at returning coho adults. The predation risk is mitigated to some extent by release timing consistent with the *Summer Chum Salmon Conservation Initiative* (SCSCI). The program poses genetic risks from straying to naturally produced coho in Hood Canal. It also poses potential competition risks with other natural coho stocks in Hood Canal. The program presents a predation risk to fall chum, pink and Chinook stocks.

RECOMMENDATIONS

- Replace the current hatchery brood stock with a normal-timed, in-region brood stock to improve harvest opportunity and reduce incidental harvest on summer chum.
- Adjust the program's size to control straying and to be consistent with harvest goals and goals for other stocks, including summer chum conservation. Since the program consistently produces unharvested returns that exceed escapement needs, it should either be reduced or additional harvest options should be explored that take full advantage of harvest opportunities.
- Select Big Beef Creek coho as the broodstock source, if the program is to provide fish for the Port Gamble Net Pen, as recommended by the HSRG for that program. Maintain its integration with Big Beef coho by introducing an annual average of 10–20% natural spawning fish of Big Beef Creek origin.
- Increase the use of jacks to ten percent of the males used for spawning.
- Mark and continue to tag hatchery releases to evaluate their contribution to natural spawning populations and to harvest.
- Devise and implement a strategy to transition from the current stock to the new one.

COMMENTS

- Modification of the program's size should prevent underutilization of returns from the program.
- The program should also be sized and designed to provide freshwater rearing support for the Port Gamble Bay Net Pens. Development of an integrated broodstock program will reduce the straying risks from this program and the Port Gamble Bay Net Pens.
- The managers identified a single coho stock for naturally-spawning populations in Hood Canal. Part of the rationale for recommending replacement of the existing coho hatchery stock at Quilcene NFH is its long history of artificial propagation (since the early 1900s) as a segregated stock, and the potential domestication and genetic risks this stock poses to naturally-spawning stocks in Hood Canal due to straying. Net pen releases from Quilcene Bay and Port Gamble Bay significantly increase this straying risk, thus warranting a different hatchery stock if those net pen releases are to continue.



MANAGERS RESPONSE

The HSRG recommends replacing the coho brood stock and selecting Big Beef as the source, if the Quilcene NFH continues to support the Port Gamble Net Pen program. However, the co-managers believe it would be prudent to develop more information upon which to base such a decision. The tribes believe a genetic assessment and straying study of north Hood Canal coho populations should be done, to provide better evaluation of the risks, help the co-managers decide on program objectives, and help decide what hatchery programs should continue and what stock the continuing programs should use.

Surplus coho returns to the hatchery are occurring at the current program size. While in recent years, harvest opportunity has been compromised by harvest limitations to protect summer chum, new fishing opportunities have been developed (an in-river recreational fishery and tribal dip net fishery). The tribes plan to explore additional fishing opportunities and, if the co-managers decide to change to a brood stock of later timing, the constraints associated with protecting summer chum may be removed, thus increasing harvest opportunity. Furthermore, the tribes and others are fully utilizing the current coho surpluses at the hatchery; there is no waste of these fish.

See also Appendix B: US Fish and Wildlife Service Response to HSRG Recommendations.



Port Gamble Net Pen Coho

Port Gamble S'Klallam Tribe, Washington Department of Fish and Wildlife, and US Fish and Wildlife Service

Stock Goals:	Current	Short-Term	Long-Term
<i>Biological Significance</i>	Low	Intermediate	Intermediate
<i>Population Viability</i> ¹³	High	High	High
<i>Habitat</i>	Limiting	Limiting	Limiting
<i>Harvest Opportunity</i>	Each Year	Each Year	Each Year
Hatchery Program:			
<i>Purpose</i>	Harvest		
<i>Type</i>	Segregated		

PROGRAM DESCRIPTION

Fish used for this program are of Quilcene National Fish Hatchery (NFH) stock. 400,000 yearlings are released on-site at the Port Gamble Net Pens. Adult collection and eyeing of eggs occur at Quilcene NFH. Eggs are hatched and reared to saltwater transfer at George Adams Hatchery. Smolts are transported to the net pens in January for release in May at approximately ten fish per pound.

OPERATIONAL CONSIDERATIONS

- A portion of the fish from this program receives a double index tag at George Adams prior to saltwater transfer. The remainder of the hatchery release is mass marked with adipose fin clips.
- Total survival rates for the program have been highly variable, but averaged approximately eight percent during brood years 1986–96.
- The stock displays an earlier run timing than other stocks in Hood Canal. This is thought to be a result of past artificial selection at Quilcene NFH.
- Smolts are immersed in a *Vibrio anguillarum* vaccine during transport to the net pens.
- The program has had occasional mortality problems from noxious phytoplankton (1981, 1987).
- Strays from the program contribute to the high occurrence (40–50%) of hatchery fish in natural spawning populations in northern Hood Canal streams.

BENEFITS AND RISKS

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

The program provides annual harvest consistent with the short- and long-term goals for the stock.

B. Likelihood of attaining goals?

¹³ 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.



Annual coho catches in Port Gamble Bay have declined in recent years, from an average of 7,700 fish in 1990–95 to an average of approximately 3,200 fish during 1996–2001. This could be due to the apparent decline in survival rates during the latter period, or to reduced participation in the fishery due to the current depressed market for salmon. Unlike Quilcene Bay, there is no adult collection site here, so uncaught hatchery returns are more likely to contribute to natural escapement in nearby streams.

C. Consistent with goals for other stocks?

The program poses genetic risks from straying and potential competition risks to naturally produced coho in Hood Canal. The genetic risk is compounded in this case by the inability to remove uncaught hatchery fish at a broodstock collection site. It also poses potential predation risks to summer and fall chum, pink and Chinook. The risk to summer chum is mitigated by release timing consistent with the *Summer Chum Salmon Conservation Initiative* (SCSCI).

RECOMMENDATIONS

- Adjust the program’s size to be consistent with harvest goals and goals for other stocks. Since the program consistently produces unharvested returns that exceed escapement needs, it should either be reduced or additional harvest options should be explored that take full advantage of harvest opportunities.
- Replace the current broodstock with the new, integrated broodstock proposed for Quilcene NFH (see recommendations for Big Quilcene Hatchery coho).
- Minimize straying into lower Hood Canal by rearing fish for this program at an upper Canal facility such as Quilcene NFH.
- Capture returning adults, especially when harvest effort is low, to reduce straying to local streams.
- Monitor harvest and surpluses to provide the information needed for adjusting program size.

COMMENTS

- None.

MANAGERS RESPONSE

The Port Gamble S’Klallam Tribe initiated an effort to renew on-reservation tribal coho fishing effort this past year, with good success. The key has been to find markets for the coho. The Tribe plans to continue this effort and, until the final success of the project is determined, believes the size of the net pen program should not be reduced.

The tribes do not wish to pursue changing the brood stock until more information is obtained to evaluate the risks and facilitate review and (potentially) reconsideration of program objectives. The tribes believe a genetic assessment and straying study should be done to provide needed information (see also Managers Response under Big Quilcene Hatchery Coho).

The tribes do not agree with changing the freshwater rearing location for the Port Gamble Net Pen Coho at this time. The change cannot be made without other major modifications in north Hood Canal hatchery programs and likely would require reducing the size of the Port Gamble program. As noted above, consideration of major changes to north Hood Canal programs requires more information upon which to base decisions.



Purdy Creek (George Adams) Hatchery Coho

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
<i>Biological Significance</i>	Low	Low	Low
<i>Population Viability¹⁴</i>	Medium	High	High
<i>Habitat</i>	Limiting	Limiting	Limiting
<i>Harvest Opportunity</i>	Each Year	Each Year	Each Year
Hatchery Program:			
<i>Purpose</i>	Harvest		
<i>Type</i>	Segregated		

PROGRAM DESCRIPTION

This stock originated in 1961 from Finch Creek, Eagle Creek (Oregon), and Green River stocks (Green River sub-region of Central Puget Sound). In the 1960s, eggs were also imported from Cranberry (South Puget Sound), May (Stillaguamish/Snohomish region), and Minter creeks (South Puget Sound region) for on-station release. In 1979, Soleduck (North Coast region) and Puyallup (Puyallup sub-region of Central Puget Sound) river stocks were released into Purdy Creek. Over the years, a variety of stocks were imported to George Adams for rearing and outplanting in Hood Canal and South Puget Sound tributaries. For this program, 500,000 yearlings are released on-station at George Adams Hatchery. Adult collection, incubation and rearing occur on-station.

OPERATIONAL CONSIDERATIONS

- The 1980 release of Minter stock into Purdy Creek was the last imported stock released.
- A portion of the fish from this program receives a double index tag. The remainder of the hatchery release is mass-marked with adipose fin clips.
- Total survival rates for the program have averaged approximately 4.6% for brood years 1990–97.
- Hatchery escapements for brood years 1995–2001 have averaged over 12,000 fish—well in excess of broodstock needs.
- Strays from this program are recovered on the spawning grounds in the Skokomish River, but the proportion of hatchery fish in this population cannot be readily determined.

BENEFITS AND RISKS

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

The program provides annual harvest in Hood Canal and the Skokomish River, consistent with the short- and long-term goals for the stock.

¹⁴ 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?

Fish provided for harvest by the program appear to be underused, based on the relatively high escapement levels in comparison with broodstock needs. This is possibly due to the current depressed market for salmon and to harvest limitations caused by conservation concerns for other stocks.

C. Consistent with goals for other stocks?

The program poses potential competition risks to naturally produced coho in Hood Canal. It also poses potential predation risks to summer and fall chum, pink and Chinook. The risk to summer chum is mitigated to some extent by release timing consistent with the *Summer Chum Salmon Conservation Initiative* (SCSCI).

RECOMMENDATIONS

- Adjust the program's size to be consistent with harvest goals and goals for other stocks. Since the program consistently produces unharvested returns that exceed escapement needs, it should either be reduced or additional harvest options should be explored that take full advantage of harvest opportunities.
- Monitor harvest and surpluses.
- Increase the use of jacks to ten percent of the males used for spawning.

COMMENTS

- Modification of the program size should prevent underutilization of returns. The HSRG makes no specific recommendation as to the exact size the program should be, but suggests considering returning to a release of approximately 300,000 fish.

MANAGERS RESPONSE

The co-managers began reviewing WDFW's Hood Canal hatchery programs in the summer of 2003. This effort has included describing where problems with exceeding production capacity exist, identifying operational problems at the hatcheries, and considering options to address these problems. The co-managers expect this review will lead to positive program changes to the Purdy Creek hatchery coho programs that are consistent with the HSRG system-wide recommendations. Results of the review are expected to be available early in 2004.



Quilcene Bay Net Pen Coho

Skokomish Tribe and US Fish and Wildlife Service

Stock Goals:	Current	Short-Term	Long-Term
<i>Biological Significance</i>	Low	Intermediate	Intermediate
<i>Population Viability</i> ¹⁵	High	High	High
<i>Habitat</i>	Limiting	Limiting	Limiting
<i>Harvest Opportunity</i>	Each Year	Each Year	Each Year
Hatchery Program:			
<i>Purpose</i>	Harvest		
<i>Type</i>	Segregated		

PROGRAM DESCRIPTION

Quilcene Bay net pen coho are of Quilcene National Fish Hatchery (NFH) stock. 190,000 yearlings are released on-site at the net pens. Adult collection, incubation and rearing prior to saltwater transfer occur at Quilcene.

OPERATIONAL CONSIDERATIONS

- Smolts are transported to the net pens in January for release in May at 15 fish per pound.
- Since broodyear 1996, a portion of the fish from this program has received a double index tag prior to saltwater transfer. Previous tagging was limited and inconsistent. The remainder of the hatchery release is unmarked.
- Total survival rates for the program have averaged approximately 3.8%.
- The program has been reduced from a planned release of 400,000 fish to its current size.
- The stock displays earlier run timing than other coho stocks in Hood Canal. This is thought to be a result of past artificial selection at Quilcene NFH.
- Smolts are immersed in a *Vibrio anguillarum* vaccine during transport to the net pens.
- The program has had occasional mortality problems from noxious phytoplankton (1987, 1989, and 2003).
- Strays from the program contribute to the high occurrence (40–50%) of hatchery fish in natural spawning populations in northern Hood Canal streams.

BENEFITS AND RISKS

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

The program is providing some harvest benefits, but appears to contribute minimal benefits to the terminal area fishery in Quilcene Bay relative to the contribution of the Big Quilcene Hatchery coho program. For return years 1991–96, this contribution generally ranged from 30–900 fish.

¹⁵ 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?

Terminal area catches in Quilcene Bay and the Big Quilcene River (attributed to both this program and the Big Quilcene Hatchery coho) have averaged only 2,000 and 300 fish, respectively, from 1996–2001. This is likely due to the current depressed market for salmon and to harvest limitations caused by conservation concerns for summer chum.

C. Consistent with goals for other stocks?

The program poses genetic risks from straying and potential competition risks to naturally produced coho in Hood Canal. The genetic risk is compounded in this case by the inability to remove uncaught hatchery fish at a broodstock collection site. It also poses potential predation risks to summer and fall chum, pink and Chinook. The risk to summer chum is mitigated by release timing consistent with the *Summer Chum Salmon Conservation Initiative* (SCSCI). The program also poses a risk to Quilcene River summer chum from fishery-induced mortality, because of the significant overlap in timing with that stock.

RECOMMENDATIONS

- Discontinue the program, because of limited harvest benefits and high genetic risks.

COMMENTS

- Discontinuing this program would also provide Quilcene NFH with the capacity to meet rearing needs for the Big Quilcene hatchery coho and the Port Gamble Net Pen programs.

MANAGERS RESPONSE

The Skokomish Tribe supports the joint comments made by the state and the Point-No-Point Treaty Council Tribes regarding the Quilcene Hatchery coho, since the net pen program is basically an extension of it. The Tribe is interested in exploring the use of a later-timed coho stock of local origin, because it may provide greater harvest opportunity for coho and reduced harvest-related mortality on summer chum. This could address the concerns identified in the Benefits and Risks section. No major changes should be made to the current program until after the assessments and studies referred to in the WDFW/Tribal joint comments (Quilcene Hatchery section) are completed.

The Skokomish Tribe also reports that the tribal, state and federal hatchery staff members involved have agreed to move the transfer date to early March, to minimize mortality related to noxious phytoplankton.



Big Beef Summer Chum

University of Washington and Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

Summer chum were extirpated from this watershed, but a program to reintroduce them to Big Beef Creek was initiated in broodyear 1996, using wild Big/Little Quilcene River stock from the Quilcene National Fish Hatchery (NFH). Beginning in 2000, summer chum returning to Big Beef Creek were used as broodstock. The program calls for 86,000 fry released on-station from Big Beef Creek Hatchery. Adult collection, incubation, rearing and release occur at Big Beef. This stock is one of 14 stocks within the Hood Canal summer chum GDU.

OPERATIONAL CONSIDERATIONS

- 32 males and 32 females are spawned each year in a two-by-two or three-by-three factorial mating design.
- From 1996–99, fish released into Big Beef Creek were the progeny of adults trapped and spawned at Quilcene NFH. Summer chum returning to Big Beef Creek were used for broodstock beginning in 2000.
- Released fish are all otolith marked, beginning with brood year 1999.

BENEFITS AND RISKS

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

The program is consistent with the managers' goals for the stock.

B. Likelihood of attaining goals?

The program is likely to attain the goals if the post-release environment is able to support the population and if current harvest management is continued. Adult returns to Big Beef Creek increased from zero (no fish) in 1998, four fish in 1999, and 20 fish in 2000 to 894 and 743 fish in 2001 and 2002, respectively. Based on otolith marks, fish returning in 2001 were program fish. Therefore, the program does appear to be conferring a conservation benefit.

C. Consistent with goals for other stocks?



The program does not appear to pose significant risks to other stocks, particularly given its size.

RECOMMENDATIONS

- Continue the existing program consistent with the *Summer Chum Salmon Conservation Initiative* (SCSCI), including collecting and analyzing all data necessary to evaluate the program's success.

COMMENTS

- The SCSCI is a well-designed, well-conducted program that appears to be achieving its goals. It is an example of a successful conservation program and partnership among state, tribal, private, and federal entities.
- The program, which may serve as a prototype for similar efforts in the future, has met the HSRG's first key principle of beginning with a solid goal setting process. Ensuring complete monitoring and evaluation of this program will be crucial to meeting the second and third principles—scientific defensibility and informed decision-making.
- Like all integrated hatchery programs, success will depend on good habitat being available to both the hatchery- and natural-origin components of the integrated population (see HSRG system-wide recommendation about productive habitat).

MANAGERS RESPONSE

The co-managers appreciate the HSRG comments in support of the SCSCI and support the recommendations of the HSRG.

The co-managers agree that collecting and analyzing data is necessary to evaluate the program; however, additional funding will be needed to fully implement the monitoring and evaluation work described in the SCSCI. For example, critical objectives of the SCSCI include the monitoring and evaluation of the effects of reintroduction and supplementation on the natural summer chum populations and of the effectiveness of the programs in recovering summer chum. Monitoring and evaluation of the supplementation and reintroduction programs is ongoing by the co-managers and cooperators. However, dedicated funding is not currently available for the analysis of all otolith and DNA samples collected from summer chum adults returning to streams in the Hood Canal ESU. Some funding has been provided by the Regional Fish Enhancement Groups (HCSEG and NOSC), the Port Gamble and Skokomish tribes (BIA Salmon Recovery funds), and by WDFW (ESA Salmon Recovery funds). However, these sources of funds are not totally secure and additional funding is needed.



Hamma Hamma Summer Chum

Long Live the Kings, Hood Canal Salmon Enhancement Group, and Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
<i>Biological Significance</i>	Intermediate	Intermediate/ Healthy	Healthy
<i>Population Viability</i>	Critical	At Risk	At Risk
<i>Habitat</i>	Limiting	Limiting	Limiting
<i>Harvest Opportunity</i>	None	None	Occasional
Hatchery Program:			
<i>Purpose</i>	Conservation		
<i>Type</i>	Integrated		

PROGRAM DESCRIPTION

This program was initiated in 1997. The naturally spawning population is considered native with little or no history of stock transfers, introductions or artificial propagation within the watershed, except for the supplementation program using native-origin fish. This stock is one of 14 stocks within the Hood Canal summer chum GDU. For the program, up to 125,000 fry per year are intended for release from John's Creek Pond. Adults are collected by seine net, held in PVC tubes and spawned on-site. Half of the progeny are incubated and reared at John's Creek. The other half are incubated and initially reared at Lilliwaup Hatchery, then acclimated for release from John's Creek.

OPERATIONAL CONSIDERATIONS

- The spawning goal consists of 34 males by 34 females, spawned in a factorial manner.
- All released fish are otolith marked.
- Actual releases have ranged from 30,000–100,000 fry per year.

BENEFITS AND RISKS

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

The program is consistent with the managers' goals for the stock.

B. Likelihood of attaining goals?

The program is likely to attain the goals if the post-release environment is able to support the population and if current harvest management is continued. The total number of adult returns to the Hamma Hamma River increased from 118 adults in 1997 to 1,216 and 2,294 adults in 2001 and 2002, respectively. The program appears to be conferring a conservation benefit.

C. Consistent with goals for other stocks?

The program does not appear to pose significant risks to other stocks, particularly given its size.



RECOMMENDATIONS

- Continue the existing program consistent with the *Summer Chum Salmon Conservation Initiative* (SCSCI), including collecting and analyzing all data necessary to evaluate the program's success.

COMMENTS

- The SCSCI is a well-designed, well-conducted program that appears to be achieving its goals. It is an example of a successful conservation program and partnership among state, tribal, private, and federal entities.
- The program, which may serve as a prototype for similar efforts in the future, has met the HSRG's first key principle of beginning with a solid goal setting process. Ensuring complete monitoring and evaluation of this program will be crucial to meeting the second and third principles—scientific defensibility and informed decision-making.
- Like all integrated hatchery programs, success will depend on good habitat being available to both the hatchery- and natural-origin components of the integrated population (see HSRG system-wide recommendation about productive habitat).

MANAGERS RESPONSE

The co-managers appreciate the HSRG comments in support of the SCSCI and support the recommendations of the HSRG.

The co-managers agree that collecting and analyzing data is necessary to evaluate the program; however, additional funding will be needed to fully implement the monitoring and evaluation work described in the SCSCI. For example, critical objectives of the SCSCI include the monitoring and evaluation of the effects of reintroduction and supplementation on the natural summer chum populations and of the effectiveness of the programs in recovering summer chum. Monitoring and evaluation of the supplementation and reintroduction programs is ongoing by the co-managers and cooperators. However, dedicated funding is not currently available for the analysis of all otolith and DNA samples collected from summer chum adults returning to streams in the Hood Canal ESU. Some funding has been provided by the Regional Fish Enhancement Groups (HCSEG and NOSC), the Port Gamble and Skokomish tribes (BIA Salmon Recovery funds), and by WDFW (ESA Salmon Recovery funds). However, these sources of funds are not totally secure and additional funding is needed.



Lilliwaup Creek Summer Chum

Long Live the Kings and Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
<i>Biological Significance</i>	Intermediate	Intermediate	Intermediate
<i>Population Viability</i>	Critical	Critical	At Risk
<i>Habitat</i>	Limiting	Limiting	Limiting
<i>Harvest Opportunity</i>	None	None	Occasional
Hatchery Program:			
<i>Purpose</i>	Conservation		
<i>Type</i>	Integrated		

PROGRAM DESCRIPTION

This stock is considered native with little or no history of stock transfers, introductions or artificial propagation within the watershed, except for the supplementation program using native-origin fish. This stock is one of 14 stocks within the Hood Canal summer chum GDU. Up to 100,000 fry per year are intended for release on-station at Lilliwaup Hatchery. Adult collection is in Lilliwaup Creek, by trap, seine and snagging. Incubation, rearing and release occur at Lilliwaup. The program was initiated in 1992. All eggs collected for the supplementation program are collected from naturally spawning fish in Lilliwaup Creek.

OPERATIONAL CONSIDERATIONS

- Spawning of adults is two-by-two or three-by-three factorial mating.
- The program began formally in 1997, though some remote site incubator releases did occur from 1992–96.
- All released fish have been otolith marked since 1998.
- Actual releases have ranged from 15,000–60,000 fry per year.

BENEFITS AND RISKS

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

The program is consistent with the managers' goals for the stock.

B. Likelihood of attaining goals?

The program is likely to attain the goals if the post-release environment is able to support the population and if current harvest management is continued. The total number of adult returns were consistently less than 100 per year from 1982–2001, except for 1984 (n=187), 1988 (n=275), and 1994 (n=111). Total adult returns have increased from a low of 13 adults in 1999 to 817 adults in 2002. The program appears to be conferring a conservation benefit.

C. Consistent with goals for other stocks?



The program does not appear to pose significant risks to other stocks, particularly given its size.

RECOMMENDATIONS

- Continue the existing program consistent with the *Summer Chum Salmon Conservation Initiative* (SCSCI) including collecting and analyzing all data necessary to evaluate the program's success.

COMMENTS

- The SCSCI is a well-designed, well-conducted program that appears to be achieving its goals. It is an example of a successful conservation program and partnership among state, tribal, private, and federal entities.
- The program, which may serve as a prototype for similar efforts in the future, has met the HSRG's first key principle of beginning with a solid goal setting process. Ensuring complete monitoring and evaluation of this program will be crucial to meeting the second and third principles—scientific defensibility and informed decision-making.
- Like all integrated hatchery programs, success will depend on good habitat being available to both the hatchery- and natural-origin components of the integrated population (see HSRG system-wide recommendation about productive habitat).

MANAGERS RESPONSE

The co-managers appreciate the HSRG comments in support of the SCSCI and support the recommendations of the HSRG.

The co-managers agree that collecting and analyzing data is necessary to evaluate the program; however, additional funding will be needed to fully implement the monitoring and evaluation work described in the SCSCI. For example, critical objectives of the SCSCI include the monitoring and evaluation of the effects of reintroduction and supplementation on the natural summer chum populations and of the effectiveness of the programs in recovering summer chum. Monitoring and evaluation of the supplementation and reintroduction programs is ongoing by the co-managers and cooperators. However, dedicated funding is not currently available for the analysis of all otolith and DNA samples collected from summer chum adults returning to streams in the Hood Canal ESU. Some funding has been provided by the Regional Fish Enhancement Groups (HCSEG and NOSC), the Port Gamble and Skokomish tribes (BIA Salmon Recovery funds), and by WDFW (ESA Salmon Recovery funds). However, these sources of funds are not totally secure and additional funding is needed.



Little Quilcene/Big Quilcene Summer Chum

US Fish and Wildlife Service

Stock Goals:	Current	Short-Term	Long-Term
<i>Biological Significance</i>	Intermediate	Intermediate	Intermediate
<i>Population Viability</i>	At Risk	At Risk	At Risk
<i>Habitat</i>	Inadequate	Inadequate	Limiting
<i>Harvest Opportunity</i>	None	None	Occasional
Hatchery Program:			
<i>Purpose</i>	Conservation		
<i>Type</i>	Integrated		

PROGRAM DESCRIPTION

This program began in 1992, with the collection of 411 adults for broodstock. This stock is native to the Big Quilcene/Little Quilcene area and is part of the Hood Canal summer chum GDU. 300,000 fed fry are released on-station from the Quilcene National Fish Hatchery (NFH). Adults are collected from beach seines during the coho-targeted fishery in Quilcene Bay. Spawning, incubation, rearing, and release occur at Quilcene NFH. This stock is one of 14 stocks within the Hood Canal summer chum GDU.

OPERATIONAL CONSIDERATIONS

- Spawning is pairwise (one-to-one) mating.
- All released fish are adipose fin clipped. One-hundred percent marking has occurred since 1998.
- 2003 is the last scheduled year of adult collections and spawning for this 12-year program under the *Summer Chum Salmon Conservation Initiative (SCSCI)*.
- Summer chum spawn throughout the lower Big Quilcene River, with an increasing proportion of hatchery-origin adults as one moves upstream from the bay to the hatchery. In 2002, approximately 50% of the returning adults in the Big Quilcene River were of hatchery origin (age three = 39%; age four = 68%; age five = 22%).

BENEFITS AND RISKS

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

The program is consistent with the managers' goals for the stock.

B. Likelihood of attaining goals?

The program has attained the conservation goals for the stock. Total adult returns ranged from one to 731 adults from 1979–94 and from 2,788–9,250 adults from 1995–2002, respectively. The long-term viability of the stock will be likely if the post-release environment is able to support the population, and if current harvest management is continued.



C. Consistent with goals for other stocks?

There is a potential straying risk by fish from this program to summer chum populations in the Duckabush and Dosewallips rivers. In 2001, 11% and 18% of natural spawners in those two rivers, respectively, were adipose fin clipped fish from Quilcene NFH. In 2002, those percentages were 19% and 27%, respectively. Those two populations are intended to serve as “control” populations, with no hatchery influence under the SCSCI. Three percent of natural spawners in the Hamma Hamma River in 2002 were also adipose fin clipped fish from Quilcene NFH. In 2003, approximately two percent, three percent and one percent of the summer chum sampled in the Dosewallips, Duckabush, and Hamma Hamma, respectively, were adipose fin clipped fish from Quilcene NFH.

RECOMMENDATIONS

- Discontinue the program in 2003, one year short of the maximum 12 years specified in the plan.

COMMENTS

- The program has achieved its conservation goal for the stock. Recovery programs need not continue once the goals have been achieved. The primary concern now is the straying risk to other populations.
- The SCSCI is a well-designed, well-conducted program that appears to be achieving its goals. It is an example of a successful conservation program and partnership among state, tribal, private, and federal entities.
- The program, which may serve as a prototype for similar efforts in the future, has met the HSRG’s first key principle of beginning with a solid goal setting process. Ensuring complete monitoring and evaluation of this program will be crucial to meeting the second and third principles—scientific defensibility and informed decision-making.
- Like all integrated hatchery programs, success will depend on good habitat being available to both the hatchery- and natural-origin components of the integrated population (see HSRG system-wide recommendation about productive habitat).

MANAGERS RESPONSE

- The co-managers appreciate the HSRG comments in support of the SCSCI and support the recommendations of the HSRG.
- The co-managers agree that collecting and analyzing data is necessary to evaluate the program; however, additional funding will be needed to fully implement the monitoring and evaluation work described in the SCSCI. For example, critical objectives of the SCSCI include the monitoring and evaluation of the effects of reintroduction and supplementation on the natural summer chum populations and of the effectiveness of the programs in recovering summer chum. Monitoring and evaluation of the supplementation and reintroduction programs is ongoing by the co-managers and cooperators. However, dedicated funding is not currently available for the analysis of all otolith and DNA samples collected from summer chum adults returning to streams in the Hood Canal ESU. Some funding has been provided by the Regional Fish Enhancement Groups (HCSEG and NOSC), the Port Gamble and Skokomish tribes (BIA Salmon Recovery funds), and by WDFW (ESA Salmon Recovery funds). However, these sources of funds are not totally secure and additional funding is needed.

See also Appendix B: US Fish and Wildlife Service Response to HSRG Recommendations.



Union/Tahuya River Summer Chum

Hood Canal Salmon Enhancement Group and Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
<i>Biological Significance</i>	Intermediate	Intermediate	Intermediate
<i>Population Viability</i>	At Risk	At Risk	At Risk
<i>Habitat</i>	Limiting	Limiting	Limiting
<i>Harvest Opportunity</i>	None	None	Occasional
Hatchery Program:			
<i>Purpose</i>	Conservation		
<i>Type</i>	Integrated		

PROGRAM DESCRIPTION

The hatchery program on the Union River began in 2000. The naturally spawning population is considered native with little or no history of stock transfers, introductions, or artificial propagation within the watershed, except for this program using native-origin fish. This stock is one of 14 stocks within the Hood Canal summer chum GDU. 83,000 fry are released on-site from the Huson Spring Hatchery. Adults are trapped and spawned on the Union River. Eggs are eyed at George Adams Hatchery. One-half of the eyed eggs are transferred to remote site incubators (RSI) at the Huson Spring facility for hatching and volitional ponding at Huson Spring. The other half is hatched at George Adams for subsequent transport and forced-ponding at Huson Spring. All rearing takes place at Huson Spring prior to release into the Union River.

OPERATIONAL CONSIDERATIONS

- This program was designed as a supplementation and restoration program for the Tahuya River. Tahuya River summer chum were extirpated in the mid-1990s. Estimated escapement in the Tahuya River ranged from 726–3,200 adults during the period 1974–77. The population crashed during the years 1978–90, from 266 to six adults, respectively. Escapement was estimated to be zero adult fish in eight of 12 years, 1991–2002.
- The Union River population is considered “healthy.” Natural-origin adult returns to the Union River ranged from 744–1,500 adults during the period 2000–02.
- The first adult returns to the Union River from this program are expected in 2003 as age three fish.
- A supplementation program for the Union River will first be implemented as a strategy for boosting the abundance of the population to allow transfers of “surplus” fish for the reintroduction of summer chum in the Tahuya River.
- Spawning consists of 32 males and 32 females spawned in a two-by-two or three-by-three factorial mating scheme. All other trapped adults are passed upstream in the Union River.
- Reintroduction of summer chum into the Tahuya River began in 2003.



- All fish are otolith marked to distinguish: a) hatchery- and natural-origin adults; and b) RSI- and hatchery-produced adults during broodstock collection and carcass surveys.
- There appears to be a potential bacterial gill disease problem for fish emerging from the RSIs.

BENEFITS AND RISKS

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

The program is consistent with the managers' goals for these stocks.

B. Likelihood of attaining goals?

The program is too new to determine whether the goals will be achieved. However, the expectation is that the program should have the same success as other summer chum programs in Hood Canal (e.g. Big Beef Creek).

C. Consistent with goals for other stocks?

The program does not appear to be posing significant risks to other stocks.

RECOMMENDATIONS

- Continue the existing program consistent with the *Summer Chum Salmon Conservation Initiative* (SCSCI), including collecting and analyzing all data necessary to evaluate the program's success.

COMMENTS

- The SCSCI is a well-designed, well-conducted program that appears to be achieving its goals. It is an example of a successful conservation program and partnership among state, tribal, private, and federal entities.
- The program, which may serve as a prototype for similar efforts in the future, has met the HSRG's first key principle of beginning with a solid goal setting process. Ensuring complete monitoring and evaluation of this program will be crucial to meeting the second and third principles—scientific defensibility and informed decision-making.
- Like all integrated hatchery programs, success will depend on good habitat being available to both the hatchery- and natural-origin components of the integrated population (see HSRG system-wide recommendation about productive habitat).

MANAGERS RESPONSE

The co-managers appreciate the HSRG comments in support of the SCSCI and support the recommendations of the HSRG.

The co-managers agree that collecting and analyzing data is necessary to evaluate the program; however, additional funding will be needed to fully implement the monitoring and evaluation work described in the SCSCI. For example, critical objectives of the SCSCI include the monitoring and evaluation of the effects of reintroduction and supplementation on the natural summer chum populations and of the effectiveness of the programs in recovering summer chum. Monitoring and evaluation of the supplementation and reintroduction programs is ongoing by the co-managers and cooperators. However, dedicated funding is not currently available for the analysis of all otolith and DNA samples collected from summer chum adults returning to streams in the Hood Canal ESU. Some funding has been provided by the Regional Fish Enhancement Groups (HCSEG and NOSC),



the Port Gamble and Skokomish tribes (BIA Salmon Recovery funds), and by WDFW (ESA Salmon Recovery funds). However, these sources of funds are not totally secure and additional funding is needed.



Big Quilcene Fall Chum

US Fish and Wildlife Service

Stock Goals:	Current	Short-Term	Long-Term
<i>Biological Significance</i>	Intermediate	Intermediate	Intermediate
<i>Population Viability</i>	At Risk	At Risk	At Risk
<i>Habitat</i>	Inadequate	Inadequate	Limiting
<i>Harvest Opportunity</i>	Each Year	Each Year	Each Year
Hatchery Program:			
<i>Purpose</i>	Harvest		
<i>Type</i>	Integrated		

PROGRAM DESCRIPTION

The Big Quilcene chum stock originated from spawners trapped on the Big and Little Quilcene rivers, but it has also had major inputs from stocks in the Duckabush and Dosewallips rivers and particularly from Walcott Slough. This stock is largely the result of a transfer of the Walcott Slough stock, back into the Quilcene system. The Walcott Slough stock has been maintained as a large hatchery stock since the early 1900s, and was originally developed from local returns and hatchery transfers from the Quilcene and Duckabush hatcheries. This stock of fall chum has a return timing that is later than other fall chum in Hood Canal; typically fish enter the Big Quilcene River from mid-November through the end of December. This stock is one of six stocks within the Hood Canal fall chum GDU. The current program involves a release of 2.2 million fry at 454 fish per pound into the Big Quilcene River. Adult collection and egg-take occur on-station at the Quilcene National Fish Hatchery (NFH), as does incubation, hatching, rearing and release.

OPERATIONAL CONSIDERATIONS

- Egg-take at Quilcene occurs from mid-November to the end of December (the stock is a late run stock), but hatchery returns sometimes fall short of the program's needs.
- Releases take place in May, to avoid interactions with listed summer chum.
- All releases are unmarked.
- IHN virus has been detected in spawners at Quilcene.
- The program has on occasion provided eggs for the Enetai Hatchery fall chum program.

BENEFITS AND RISKS

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

The short- and long-term goal for this stock is harvest, and the program is being operated in a manner consistent with this goal. However, see B., below.

B. Likelihood of attaining goals?



The program provides for harvest opportunity, but the harvest benefits from the program are very limited because the chum fishery in Puget Sound is managed to target the early-run fall chum.

C. Consistent with goals for other stocks?

Considering the size of the fish at release, the program is not likely to pose any significant ecological risk to other species of salmonids in Hood Canal. Also, the timing of release should ensure that risks to listed Hood Canal summer chum are minimal. The relatively small size of the program reduces the risk of any significant competition with wild fall chum juveniles in Hood Canal. It also reduces the likelihood of any significant adult straying. However, coho are also released from the hatchery in May, posing a potential predation risk to the chum.

RECOMMENDATIONS

- Discontinue the current fall chum program, since it confers no significant harvest benefits.
- Allow the Big Quilcene River fall chum stock to maintain itself naturally in the Big Quilcene River.

COMMENTS

- None.

MANAGERS RESPONSE

The co-managers agree with the recommendations. The fall chum program was discontinued with the 2003 brood year.

See also Appendix B: US Fish and Wildlife Service Response to HSRG Recommendations.



Enetai Creek Hatchery Fall Chum

Skokomish Tribe

Stock Goals:	Current	Short-Term	Long-Term
<i>Biological Significance</i>	Low	Low	Low
<i>Population Viability</i> ¹⁶	High	High	High
<i>Habitat</i>	Limiting	Limiting	Limiting
<i>Harvest Opportunity</i>	Each Year	Each Year	Each Year
Hatchery Program:			
<i>Purpose</i>	Harvest		
<i>Type</i>	Segregated		

PROGRAM DESCRIPTION

The original broodstock source for this program was Walcott Slough (Quilcene NFH), but beginning in 1980, Enetai Hatchery has generally been able to obtain sufficient eggs to meet its production goals from spawners returning to the hatchery. The program started in 1976. For the program, 2.5 million fry (1.5 million at 400 fish per pound; one million unfed or partially fed fry at 1,250–900 fish per pound) are released on-station at Enetai Creek Hatchery. Adult collection, egg incubation, and fish rearing occur on-station.

OPERATIONAL CONSIDERATIONS

- Egg-take at Enetai Creek extends from late November to early January (the stock is a late run stock).
- All returning adults are collected; excess fish are “surplussed.” No adults are passed upstream into Enetai Creek.
- Releases take place after April 1, to avoid interactions with listed summer chum.
- All releases are unmarked.
- The program has on occasion provided eggs for the Big Quilcene Hatchery fall chum program.

BENEFITS AND RISKS

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

The program has been successful at producing fish, but due to the run’s late timing and harvest management constraints, little harvest occurs.

B. Likelihood of attaining goals?

The program provides fish for harvest, but the late timing of the run limits commercial fishing opportunities. A small recreational fishery exists near the mouth of Enetai Creek.

¹⁶ 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?

Considering the size of the fish at release, the program is not likely to pose any significant ecological risk to other species of salmonids in Hood Canal. Also, the timing of the release should ensure that risks to listed Hood Canal summer chum are minimal. The relatively small size of the program reduces the risk of any significant competition with wild fall chum juveniles in Hood Canal, and it also reduces the likelihood of any significant adult straying.

RECOMMENDATIONS

- Change the program to an early-run fall chum stock, in light of the limited harvest opportunity provided by the current program. Then, resize the program to avoid fish rearing density problems caused by the limited water supply and facility capacity.
- Collect all returning adults to reduce straying risks to other local chum populations.

COMMENTS

- None.

MANAGERS RESPONSE

The Skokomish Tribe is in the process of reviewing the hatchery program at Enetai in connection with the WDFW/Tribal review of the Hood Canal hatcheries. In this process, we will consider the recommendations of the HSRG. The results of this review will be available in early 2004.



Hoodsport Hatchery Fall Chum

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
<i>Biological Significance</i>	Intermediate	Intermediate	Intermediate
<i>Population Viability</i> ¹⁷	High	High	High
<i>Habitat</i>	Limiting	Limiting	Limiting
<i>Harvest Opportunity</i>	Each Year	Each Year	Each Year
Hatchery Program:			
<i>Purpose</i>	Harvest		
<i>Type</i>	Segregated		

PROGRAM DESCRIPTION

Hoodsport fall chum originated in 1954 from the Hoodsport Hatchery (Finch Creek) stock and belongs to a GDU within the Puget Sound fall and winter run MAL. The Hoodsport stock was started in 1955 with a release of 20,000 fingerlings. The current program started in 1986. Fifteen million fry (at 450 fish per pound) are released on-station at Hoodsport Hatchery. Adult collection and about half of the egg-take occur at Hoodsport Hatchery. The other half of the egg-take occurs at George Adams and McKernan hatcheries. Incubation occurs at Hoodsport, George Adams and McKernan. Short-term reared fry (~50% of the Hoodsport releases) are transferred to Hoodsport from George Adams and McKernan for final rearing and release. The egg-take for the overall Hood Canal fall chum program occurs at Hoodsport, George Adams and McKernan (see below); the stock is managed as a composite stock and the egg-take is adjusted at each hatchery to meet the total program needs.

OPERATIONAL CONSIDERATIONS

- Egg-take at Hoodsport (approximately seven million eggs) occurs from mid-October to November 10; egg-takes at George Adams and McKernan occur from mid-November to the end of the run.
- All adults returning to Hoodsport are collected, but those collected after November 10 are “surplussed” without being represented in the egg-take.
- Fingerlings at Hoodsport are released after April 1, to avoid interactions with listed summer chum.
- All releases are unmarked.
- Because of the large size of the program, reused Finch Creek water is needed to maintain acceptable fry rearing densities.
- The program’s size necessitates the inter-watershed import of George Adams and McKernan stock to Hoodsport.
- IHN virus has been detected at Hoodsport in fall Chinook and fall chum adults.

¹⁷ 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.



- No fall chum adults are allowed to enter Finch Creek to spawn.

BENEFITS AND RISKS

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

The short- and long-term goal for this stock is to provide harvest. The program is being operated in a manner consistent with this goal.

B. Likelihood of attaining goals?

The program consistently makes a substantial contribution to both commercial and recreational harvest. Despite this, there are large surpluses of unharvested adults.

C. Consistent with goals for other stocks?

Considering the size of the fish at release, the program is not likely to pose any significant ecological risk to other species of salmonids in Hood Canal. Also, the timing of release should ensure that risks to listed Hood Canal summer chum are minimal. The large number of fish released, however, likely poses a risk of competition with wild fall chum juveniles in Hood Canal. In addition, because of the large size of the program, straying of hatchery adults may present genetic risks to wild Hood Canal fall and summer chum populations. Inability to identify the hatchery fish poses a risk of masking the status of natural fall chum populations in Hood Canal.

RECOMMENDATIONS

- Reduce the size of the program to eliminate the need for egg and fish transfers, and the reuse of water.
- Adjust the program's size to be consistent with harvest goals and goals for other stocks. Since the program consistently produces unharvested returns that exceed escapement needs, it should either be reduced or additional harvest options should be explored that take full advantage of harvest opportunities.
- Monitor harvest and surpluses.
- Ensure that the egg-take at Hoodsport is representative of the entire hatchery run.
- Continue to collect all returning fall chum adults, to reduce the likelihood of straying.
- Discontinue adult collection for this program at McKernan and George Adams.
- Upgrade water supplies and incubation capacity at Hoodsport by providing ground water for egg incubation, improving the water intake facility on Finch Creek, and refurbishing the salt water supply system.
- Institute a program to identify hatchery fish, to determine hatchery contributions to natural chum spawning and the status of the natural population.

COMMENTS

- Downsizing the Hoodsport Hatchery fall chum program should reduce the potential for inter-hatchery disease transfers, reduce the risks of catastrophic losses resulting from overtaxing the hatchery's water supply capabilities, do away with the problems of dealing with large surplus returns to the hatchery, and reduce the threat (both ecological and genetic) to naturally-spawning fall and summer chum stocks in Hood Canal. This should all be possible without compromising the attainment of harvest goals for the stock.



- Facilities and operations need to incorporate sufficient flexibility to adjust program size to respond to changing harvest needs.

MANAGERS RESPONSE

The co-managers began reviewing WDFW's Hood Canal hatchery programs in the summer of 2003. This effort has included describing where problems with exceeding production capacity exist, identifying operational problems at the hatcheries, and considering options to address these problems. The co-managers expect this review will lead to positive program changes to the Hoodport hatchery fall chum program that are consistent with the HSRG area wide recommendations. Results of the review are expected to be available early in 2004.

The co-managers plan to continue, for the present, fall chum egg and fish transfers within the Hood Canal hatchery complex (Hoodport, George Adams, and McKernan hatcheries) while following the established fish health protocols designed to minimize risks. In addition, the egg take within the complex will continue to represent the entire "early fall" hatchery chum return timing, to facilitate management of harvest on "early fall" hatchery chum while protecting later timed wild chum.

The co-managers agree with the HSRG recommendations to upgrade facilities (water supplies, incubation capacity, freshwater intake and saltwater supply system) and will discuss a program to facilitate the identification of fish of hatchery origin. However, implementation of these recommendations will require additional funding.



Little Boston Creek Hatchery Fall Chum

Port Gamble S’Klallam Tribe

Stock Goals:	Current	Short-Term	Long-Term
<i>Biological Significance</i>	Low	Low	Low
<i>Population Viability</i> ¹⁸	High	High	High
<i>Habitat</i>	Limiting	Limiting	Limiting
<i>Harvest Opportunity</i>	Each Year	Each Year	Each Year
Hatchery Program:			
<i>Purpose</i>	Harvest		
<i>Type</i>	Segregated		

PROGRAM DESCRIPTION

The Little Boston Creek fall chum program started in 1976 with Walcott Slough fall chum stock obtained through the USFWS. The program was changed to Hoodspout (Finch Creek) Hatchery stock in 1978. Since 1994, adult returns to Little Boston Creek have been the sole source of the hatchery’s eggs. This stock is part of the Hood Canal fall chum GDU. 950,000 fed fry at 550 fish per pound are released on-station at Little Boston Creek Hatchery. Adult collection, egg incubation, and fish rearing occur on-station.

OPERATIONAL CONSIDERATIONS

- Egg-take at Little Boston Creek Hatchery occurs in November and December (the stock is an early-run stock).
- All returning adults are collected. Small numbers of excess fish are passed upstream in Little Boston Creek to spawn, but most of them are “surplussed.”
- Releases take place in late April, to avoid interactions with listed summer chum and potential predation by coho, which are normally released from the nearby Port Gamble Net Pens in mid-May.
- All releases are unmarked.

BENEFITS AND RISKS

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

The short- and long-term goal for this stock is harvest, and the program is being operated in a manner consistent with this goal. However, see B., below.

B. Likelihood of attaining goals?

The program provides minimal harvest benefits, due to a lack of targeted harvest effort.

¹⁸ 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?

Considering the size of the fish at release, the program is not likely to pose any significant ecological risk to other species of salmonids in Hood Canal. Also, the timing of release should ensure that risks to listed Hood Canal summer chum are minimal. The relatively small size of the program reduces the risk of any significant competition with wild fall chum juveniles in Hood Canal. It also reduces the likelihood of any significant adult straying.

RECOMMENDATIONS

- Suspend the program or adjust its size to be consistent with harvest needs and the goals for other stocks. Currently, the program is larger than necessary to meet these needs and should be reduced.

COMMENTS

- Discontinuing the fall chum program at Little Boston Creek Hatchery would necessitate the collection and “surplussing” of all fall chum adults returning to the hatchery for up to five years following cessation of the program (to reduce straying).
- Facilities and operations need to incorporate sufficient flexibility to adjust program size to respond to changing harvest needs.

MANAGERS RESPONSE

The Port Gamble S’Klallam Tribe will take the recommendation under consideration. Other factors, such as socio-economic issues, will also be considered.



McKernan Hatchery Fall Chum

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
<i>Biological Significance</i>	Low	Low	Low
<i>Population Viability</i> ¹⁹	High	High	High
<i>Habitat</i>	Limiting	Limiting	Limiting
<i>Harvest Opportunity</i>	Each Year	Each Year	Each Year
Hatchery Program:			
<i>Purpose</i>	Harvest		
<i>Type</i>	Segregated		

PROGRAM DESCRIPTION

The McKernan Hatchery fall chum stock originated in 1978 from Hoodspport Hatchery stock. Significant stock transfers into the watershed have occurred historically, with the potential for significant interbreeding between native and introduced fish. This stock is one of six stocks within the Hood Canal fall chum GDU. The current program began in 1986. Ten million fry at 450 fish per pound are released on-station into Weaver Creek, a tributary to the Skokomish River. Adult collection and egg-take occur on-station, as does incubation, hatching, rearing and release. The egg-take for the overall Hood Canal fall chum program occurs at Hoodspport, George Adams and McKernan hatcheries (see below); the stock is managed as a composite stock and the egg-take is adjusted at each hatchery to meet the total program needs.

OPERATIONAL CONSIDERATIONS

- Egg take at Hoodspport occurs from mid-October to November 10th; egg takes at George Adams and McKernan occur from mid-November to the end of the run.
- All adult returns to the hatchery are collected, to reduce straying.
- Fingerlings at McKernan are released after April 1, to avoid interactions with listed summer chum (low water flows in one year forced releases in March).
- All releases are unmarked.
- Because of the size of the program, reused water is needed to maintain acceptable fry loadings.
- The program also involves the transfer of four million fry at 800 fish per pound to Hoodspport for final rearing and release.

BENEFITS AND RISKS

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

¹⁹ 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.



The short- and long-term goal for this stock is harvest, and the program is being operated in a manner consistent with this goal.

B. Likelihood of attaining goals?

The program consistently makes a contribution to both commercial and tribal harvest.

C. Consistent with goals for other stocks?

Considering the size of the fish at release, the program is not likely to pose any significant ecological risk to other species of salmonids in Hood Canal. Also, the timing of release should ensure that risks to listed Hood Canal summer chum are minimal. The large size of the releases, however, likely poses a risk of competition with wild fall chum juveniles in Hood Canal. In addition, because of the large size of the program, straying of hatchery adults may present genetic risks to wild Hood Canal fall chum populations, particularly wild fall chum in the Skokomish system.

RECOMMENDATIONS

- Reduce the size of the George Adams and McKernan programs in order to address loading and density problems, and further adjust the program's size to be consistent with harvest goals and goals for other stocks. Since the program consistently produces unharvested returns that exceed escapement needs, it should either be reduced or additional harvest options should be explored that take full advantage of harvest opportunities. Or, consolidate the Skokomish fall chum hatchery program at McKernan.
- Monitor harvest and surpluses.
- Continue to collect all adults returning to McKernan (to reduce straying) and ensure that the egg-take is representative of the entire Hood Canal fall chum run timing.
- Cease all out-of-watershed transfers of eggs and fry to other Hood Canal hatcheries.
- Mark a portion of the hatchery releases and conduct tests to determine the level of straying into the Skokomish River.
- Upgrade the adult collection facility, so that the sorting of returning adults is possible.

COMMENTS

- Downsizing the McKernan Hatchery fall chum program in a manner recommended above should reduce the potential for inter-hatchery disease transfers, reduce the risks of catastrophic losses resulting from overtaxing the hatchery's water supply capabilities, do away with the problems of dealing with large surplus returns to the hatchery, and reduce the threat (both ecological and genetic) to wild fall chum stocks in Hood Canal. This should all be possible without compromising the attainment of the harvest goals for this stock.

MANAGERS RESPONSE

The co-managers began reviewing WDFW's Hood Canal hatchery programs in the summer of 2003. This effort has included describing where problems with exceeding production capacity exist, identifying operational problems at the hatcheries, and considering options to address these problems. The co-managers expect this review will lead to positive program changes to the McKernan hatchery fall chum program that are consistent with the HSRG area wide recommendations. Results of the review are expected to be available early in 2004.



The co-managers plan to continue, for the present, fall chum egg and fish transfers within the Hood Canal hatchery complex (Hoodsport, George Adams, and McKernan hatcheries) while following the established fish health protocols designed to minimize risks. In addition, the egg take within the complex will continue to represent the entire “early fall” hatchery chum return timing, to facilitate management of harvest on “early fall” hatchery chum while protecting later timed wild chum.

The co-managers agree with the HSRG recommendations to upgrade the adult collection facility and will discuss a program to facilitate the identification of fish of hatchery origin. However, implementation of these recommendations will require additional funding.



Purdy Creek (George Adams) Hatchery Fall Chum

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
<i>Biological Significance</i>	Low	Low	Low
<i>Population Viability</i> ²⁰	High	High	High
<i>Habitat</i>	Limiting	Limiting	Limiting
<i>Harvest Opportunity</i>	Each Year	Each Year	Each Year
Hatchery Program:			
<i>Purpose</i>	Harvest		
<i>Type</i>	Segregated		

PROGRAM DESCRIPTION

The George Adams Hatchery fall chum stock originated from a 1976 release of 4.7 million fingerlings obtained from Hoodspout Hatchery (Finch Creek) broodstock. This stock is one of six stocks within the Hood Canal fall chum GDU. The current program began in 1986. Five million fry at 550 fish per pound are released on-station into Purdy Creek. Adult collection and egg-take occur at George Adams. Most of the egg-take is eyed, hatched and reared on-station. However, some eggs are routinely eyed at McKernan Hatchery and then transferred back to George Adams for hatching and rearing. The egg-take for the overall Hood Canal fall chum program occurs at Hoodspout, George Adams, and McKernan (see below); the stock is managed as a composite stock and the egg-take is adjusted at each hatchery to meet the total program needs.

OPERATIONAL CONSIDERATIONS

- Egg take at Hoodspout occurs from mid-October to November 10; egg takes at George Adams and McKernan occur from mid-November to the end of the run.
- All adult returns to the hatchery are collected, to reduce straying.
- Fingerlings at George Adams are released after April 1, to avoid interactions with listed summer chum.
- All releases are unmarked.
- Because of the size of the program, reused water is needed to maintain acceptable fry loadings. Also, the size of the egg take makes it necessary to transfer some eggs to McKernan for eyeing.
- The program also involves the transfer of 2.35 million early-reared fry at 800 fish per pound to Hoodspout for final rearing and release.

BENEFITS AND RISKS

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

²⁰ 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.



The short- and long-term goal for this stock is harvest, and the program is being operated in a manner consistent with this goal.

B. Likelihood of attaining goals?

The program consistently makes a contribution to recreational, commercial and tribal harvest.

C. Consistent with goals for other stocks?

Considering the size of the fish at release, the program is not likely to pose any significant ecological risk to other species of salmonids in Hood Canal. Also, the timing of release should ensure that risks to listed Hood Canal summer chum are minimal. The number of fish released, however, likely poses a risk of competition with wild fall chum juveniles in Hood Canal. In addition, because of the size of the program, the straying of hatchery adults may present genetic risks to wild Hood Canal fall chum populations, particularly wild fall chum population in the Skokomish system.

RECOMMENDATIONS

- Reduce the size of the George Adams and McKernan programs in order to address loading and density problems, and further adjust the program's size to be consistent with harvest goals and goals for other stocks. Since the program consistently produces unharvested returns that exceed escapement needs, it should either be reduced or additional harvest options should be explored that take full advantage of harvest opportunities. Or, consolidate the Skokomish fall chum hatchery program at McKernan.
- If the program is continued at this facility:
 - Continue to collect all adults returning to George Adams (to reduce straying) and ensure that the egg takes represent the entire Skokomish River fall chum run timing.
 - Monitor harvest and surpluses.
 - Cease all out-of-watershed transfer of eggs and fry to other Hood Canal hatcheries.
 - Institute a program to identify hatchery fish, to determine the level of straying into the Skokomish River.
 - Upgrade the adult collection facility, so that the sorting of returning adults is possible.
 - Take into account the need for reusing water in determining the program's size.

COMMENTS

- Downsizing the fall chum program in the manner recommended above should: 1) reduce the risk of catastrophic loss resulting from overtaxing the hatchery's water supply capabilities; 2) eliminate the problems of dealing with large surplus returns to the hatchery; and 3) reduce the threats (both ecological and genetic) to wild fall chum stocks in the Skokomish River. This should all be possible without compromising the attainment of the region's harvest goals.
- Consolidation of the Skokomish River fall chum programs into a single facility would appear to promote opportunities for cost-effective management.
- Discontinuing the fall chum program at George Adams would necessitate the collection and "surplussing" of all fall chum adults returning to the hatchery for up to five years following cessation of the program (to reduce straying).



MANAGERS RESPONSE

The co-managers began reviewing WDFW's Hood Canal hatchery programs in the summer of 2003. This effort has included describing where problems with exceeding production capacity exist, identifying operational problems at the hatcheries, and considering options to address these problems. The co-managers expect this review will lead to positive program changes to the George Adams hatchery fall chum program that are consistent with the HSRG area wide recommendations. Results of the review are expected to be available early in 2004.

The co-managers plan to continue, for the present, fall chum egg and fish transfers within the Hood Canal hatchery complex (Hoodsport, George Adams, and McKernan hatcheries) while following the established fish health protocols designed to minimize risks. In addition, the egg take within the complex will continue to represent the entire "early fall" hatchery chum return timing, to facilitate management of harvest on "early fall" hatchery chum while protecting later timed wild chum.

The co-managers agree with the HSRG recommendations to upgrade the adult collection facility and will discuss a program to facilitate the identification of fish of hatchery origin. However, implementation of these recommendations will require additional funding.



Finch Creek (Hoodsport) Hatchery Pink

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
<i>Biological Significance</i>	Low	Low	Low
<i>Population Viability</i> ²¹	High	High	High
<i>Habitat</i>	Limiting	Limiting	Limiting
<i>Harvest Opportunity</i>	Each Year	Each Year	Each Year
Hatchery Program:			
<i>Purpose</i>	Harvest		
<i>Type</i>	Segregated		

PROGRAM DESCRIPTION

The Hoodsport pink salmon program originated in 1953 from the introduction of a single brood year of Dungeness River pink eggs and a small number of Dosewallips River pink eggs. The run has been self-sufficient since that time. Hatchery pink in Hood Canal are all age-two and return on odd-numbered years. The current program is sized for a release of one million juveniles. Adult collection, incubation and rearing occur on-station.

OPERATIONAL CONSIDERATIONS

- The hatchery stock exhibits earlier return and spawning timing, and is genetically distinct from naturally spawning wild pink stocks in Hood Canal (Hamma Hamma, Duckabush and Dosewallips rivers).
- Broodstock are collected at random from adults returning to Hoodsport.
- Eggs are collected in five female pools, and pooled milt is mixed (five-by-five).
- Green eggs are eyed in vertical incubators at Hoodsport.
- Pink rearing creates a potential minor loading problem conflict with the Chinook fingerling program at the hatchery.
- Fish from this program are not marked.
- The fish are provided with pumped seawater up to one week prior to release, to acclimate them to seawater.
- Hoodsport Hatchery pink are force-released after April 1 at a size of 450 fish per pound to minimize interactions with summer chum.

BENEFITS AND RISKS

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

²¹ 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.



The manager's goals are to maintain a healthy, self-sustaining stock, provide harvest opportunity and return the number of spawners required for maintenance of on-station hatchery production. The program is consistent with these goals.

B. Likelihood of attaining goals?

In most years, hatchery pinks provide harvest in fisheries, and return adequate numbers of spawners to provide for on-station production needs. This program supports a tribal beach seine fishery and a sport fishery. A popular "bubble" fishery has developed in the immediate vicinity of the hatchery.

C. Consistent with goals for other stocks?

There are potential genetic and competition risks to wild Hood Canal pink stocks. There is a competition risk with chum. The Hoodsport pink program is conducted in a manner consistent with the *Summer Chum Salmon Conservation Initiative* (SCSCI).

RECOMMENDATIONS

- Mark and monitor the population for straying.
- Monitor harvest.
- Adjust the program's size to be consistent with harvest goals, goals for other stocks and facility capacity, in light of all programs being conducted at the hatchery. Currently, the program is larger than necessary to meet these goals and should be reduced.
- Capture all returning adults.

COMMENTS

- It is important to ensure capture of all returning adults, to minimize the risk of straying and introgression with the naturally-spawning Hood Canal stock.

MANAGERS RESPONSE

The co-managers began reviewing WDFW's Hood Canal hatchery programs in the summer of 2003. This effort has included describing where problems with exceeding production capacity exist, identifying operational problems at the hatcheries, and considering options to address these problems. The co-managers expect this review will lead to positive program changes to the Hoodsport hatchery pink program that are consistent with the HSRG system-wide recommendations. Results of the review are expected to be available early in 2004.

A program to identify hatchery fish would require funding for marking and recovery analysis. Straying may be able to be detected based on the early return timing of the hatchery pinks, compared to the later return timing of wild pink stocks.



Hamma Hamma Winter Steelhead

Long Live the Kings, Hood Canal Salmon Enhancement Group, NOAA Fisheries, Point No Point Treaty Council, US Fish and Wildlife Service, and Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
<i>Biological Significance</i>	Intermediate	Intermediate	Intermediate
<i>Population Viability</i>	Critical	At Risk	At Risk
<i>Habitat</i>	Limiting	Limiting	Limiting
<i>Harvest Opportunity</i>	None	None	Most Years
Hatchery Program:			
<i>Purpose</i>	Conservation and Research		
<i>Type</i>	Integrated		

PROGRAM DESCRIPTION

Fish for this program are thought to be indigenous winter steelhead with little or no history of stock transfers, introductions or artificial propagation within the watershed. This stock is one of 22 stocks within the South Puget Sound GDU. Up to 5,000 two year-old smolts and 200 adults are released into the Hamma Hamma River. Eyed eggs are collected from naturally-spawned steelhead redds. Incubation and rearing for the smolt release occur at John's Creek Pond and Lilliwaup Hatchery. Captive rearing for adults occurs at Lilliwaup.

OPERATIONAL CONSIDERATIONS

- The 1998 brood was the first year class for two year-old smolt releases and captive-reared adults.
- An indigenous winter steelhead population exists without hatchery influence.
- The planned duration of the program is up to 12 years.
- The average size at release of two year-old smolts is 195 millimeters and 65 grams.
- A research study is ongoing and is an important component of the monitoring and evaluation of the program.

BENEFITS AND RISKS

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

The program is being conducted in a well-designed and scientific manner. A potential Ryman-Laikre effect and a competition risk to natural spawners do exist.

B. Likelihood of attaining goals?

Initial results indicate that the program has a good chance of achieving the goals for the stock, at least in the short-term. However, recent low ocean survival trends of steelhead from this region may make this more difficult.



C. Consistent with goals for other stocks?

The program is consistent with goals for other stocks.

RECOMMENDATIONS

- Proceed with program as designed.

COMMENTS

- If this program continues to be successful in the short- and long-term, it could serve as a model for steelhead conservation programs.
- Like all integrated hatchery programs, success will depend on good habitat being available to both the hatchery- and natural-origin components of the integrated population (see HSRG system-wide recommendation about productive habitat).

MANAGERS RESPONSE

The co-managers support the recommendations of the HSRG.



Hood Canal Hatchery Winter Steelhead

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
<i>Biological Significance</i>	Low	Low	Low
<i>Population Viability</i> ²²	Low	Low	Medium
<i>Habitat</i>	Limiting	Limiting	Healthy
<i>Harvest Opportunity</i>	Each Year	Each Year	Each Year
Hatchery Program:			
<i>Purpose</i>	Harvest		
<i>Type</i>	Segregated		

PROGRAM DESCRIPTION

The stock used for this program is similar to, and derived from, the Chambers Creek Hatchery winter stock. 72,500 yearlings are outplanted (50,000 into the Skokomish River; 10,000 into the Duckabush River; 12,500 into the Dosewallips River) from Eell Springs Hatchery. Eyed eggs from Tokul Creek Hatchery are reared to the fingerling stage (100 fish per pound or less) at Puyallup Hatchery (Central Puget Sound region) prior to being transferred to Eell Springs.

OPERATIONAL CONSIDERATIONS

- Fish are released at approximately five fish per pound between April 15 and May 15.
- All releases are adipose fin clipped.
- Fish at Eell Springs are reared on well water in a 1.25 acre pond.
- The program's release sites lack adult collection capability.

BENEFITS AND RISKS

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

The program is being operated in a manner consistent with what would traditionally seem prudent for meeting short- and long-term stock goals. However, recreational and tribal harvest has been very poor in recent years.

B. Likelihood of attaining goals?

Recent survival trends of steelhead will make it difficult to obtain harvest goals. Poor ocean conditions may be a major factor.

C. Consistent with goals for other stocks?

²² 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.



There is the potential for genetic interaction with naturally spawning winter steelhead, but this is reduced due to differential spawn timing. However, with the very small returning number of wild adults to the Duckabush and Dosewallips, any intermixing between the segregated hatchery stock and wild stock is a concern.

RECOMMENDATIONS

- Implement System-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. To meet harvest goals, hatchery releases may be increased in those streams selected for hatchery production.
- Select both wild and hatchery streams based on stock status and a balance of large and small streams and habitat types.
- Use locally-adapted stock (of Chambers Creek origin) for those streams. Decrease reliance on other facilities (such as Tokul Creek or Bogachiel hatcheries) to backfill shortages in locally adapting hatchery stock. Actions such as harvest restrictions should be implemented to achieve 100% local broodstock.
- Manage the hatchery stock to maintain its early spawn timing and reduce the likelihood of interaction with naturally spawning steelhead.
- Include adult collection capability wherever steelhead are released, to capture as many adults from the returning segregated population as possible. Discontinue releases where adults cannot be collected at return. Investigate feasible sites with adult collection capability, so that broodstock can be collected and removed from natural spawning population.
- Size the hatchery program in a manner that achieves harvest goals with minimal impact on wild populations.
- Release hatchery yearling steelhead smolts between April 15 and May 15 at target size of six fish to the pound, and a condition factor of less than 1.0.
- Conduct a workshop to implement this wild steelhead management zones concept.
- Implement monitoring and evaluation as a basic component of both wild steelhead management zones and hatchery harvest streams.
- Investigate the reasons for the recent decline in adult winter steelhead returns, formulate a working hypothesis for the decline (e.g. *Ceratomyxa*, fluctuating rearing water temperatures versus constant well water, etc.), and take appropriate actions.

- Discontinue hatchery plants of segregated Chambers Creek origin fish in the Dosewallips and the Duckabush until wild adult spawners significantly increase in numbers. The HSRG is concerned about the low number of adults returning to these rivers, especially the Duckabush.
- Rear and release steelhead from McKernan, to facilitate the development of a locally adapted, Chambers Creek origin broodstock.

COMMENTS

- The managers should consider developing a steelhead conservation program in the Duckabush. Consideration should also be given to conservation programs on the Dewatto and Union rivers. If



the Hamma Hamma River steelhead conservation project continues to be successful, this would be a good model to follow. This conservation program would require a DNA study on naturally-spawning steelhead in Hood Canal, to identify current stock diversity.

MANAGERS RESPONSE

The co-managers appreciate the HSRG recommendations on Wild Steelhead Management Zones but believe that a “white paper” on this topic could increase our understanding of HSRG concerns and recommended remedies. In particular, it would be helpful to include an explanation of why adult collection is required for all segregated hatchery steelhead programs. The co-managers have taken the following steps:

- The co-managers began reviewing WDFW’s Hood Canal hatchery programs in the summer of 2003. This effort has included describing where problems with exceeding production capacity exist, identifying operational problems at the hatcheries, and considering options to address these problems. The co-managers expect this review will lead to positive program changes to the Hood Canal hatchery winter steelhead programs that are consistent with the HSRG system-wide recommendations. Results of the review are expected to be available early in 2004.
- WDFW conducted a workshop in 2003 to discuss recent research, performance of the hatchery programs, and management options (including integrated and segregated programs).
- Releases of Chambers Creek-origin hatchery winter steelhead in the Dosewallips River and the Duckabush River have been eliminated.



Facility and Regional Recommendations

Assembled below are the Hatchery Scientific Review Group's recommendations that involve capital improvements at hatchery facilities in the Hood Canal region. Also included is a region-wide recommendation.

ENETAI HATCHERY

- Upgrade crowders.

GEORGE ADAMS HATCHERY

- Upgrade the adult collection capability if the fall chum program is continued at this facility, so that the sorting of returning adults is possible.
- Install pollution abatement ponds.
- Rebuild pond nine, in order to provide better flow distribution.

HOODSPORT HATCHERY

- Replace intake and hatchery water supply lines from Finch Creek, and the main supply lines to the hatchery ponds.
- Provide groundwater for incubation.
- Upgrade incubation facilities.
- Upgrade the saltwater pumping system.
- Install pollution abatement ponds.

HUSON SPRING HATCHERY

- Improve the clarifier for more complete filtration of solids from incubation water used for the remote site incubators.

MCKERNAN HATCHERY

- Upgrade the adult collection capability if the fall chum program is continued at this facility, so that the sorting of returning adults is possible.
- Install pollution abatement ponds.

ALL HOOD CANAL FACILITIES

- In order to maximize benefits from hatchery production, take into account facility water and space availability in determining the optimum species mix.
- Provide the needed equipment for fish culture and biological sampling (fish pumps, crowders, sorting facilities, abatement ponds, etc.).
- In order for hatcheries to adequately follow the general principles of scientific defensibility and informed decision making, the HSRG supports the need for increased monitoring and evaluation capabilities. This would include the acquisition of the equipment necessary for these activities. Examples would include the following:
 - Equipment for adult handling to improve both the recovery of evaluation data and to facilitate safe passage upstream of natural-origin fish.



- Equipment to facilitate adult collection for inclusion in integrated hatchery brood stock population management.
- Equipment for monitoring and evaluating the population status of integrated hatchery stocks and associated natural spawning populations.
- Equipment for improving hatchery inventory, monitoring and predator control.
- Opportunities to process data collections such as otolith reading, genetic sampling and mark recovery activities.

CHINOOK

- Underlying the HSRG’s specific recommendations for each Hood Canal Chinook program is the region-wide recommendation that a conservation/rebuilding program be undertaken to develop a locally adapted, integrated stock of Chinook in the Skokomish River Basin. This developing natural population must be, at least for the short term, sustained by hatcheries. This concept is not without risk. However, it is based on a “hedge-your-bet” approach to conserve and protect a locally adapting stock until the time that improved habitat can support a natural, self-sustaining population. Elements of this recommendation include:
 - Domestication selection should be minimized through the use of rearing protocols and environmental conditions that produce smolts that mimic as closely as possible the morphological, behavioral and physiological characteristics of wild fish rearing in the river.
 - This integrated conservation approach should incorporate natural spawners into the broodstock on a regular basis and in numbers to assure that hatchery populations always favor the genetic makeup of the natural spawners.
 - Other Hood Canal rivers might be used as supplemented refugia for the developing Skokomish native stock and as a hedge against catastrophic loss within the Skokomish River Basin, as has happened in recent years due to flooding and other environmental events.