❖Grays Harbor

Overview

This region includes all the rivers and streams draining into Grays Harbor, including the Chehalis River Basin. For the purposes of this review, the HSRG reviewed the hatchery programs involving each identified regional salmonid stock (for example, Humptulips River 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 Grays Harbor region, followed by reviews and recommendations for each salmonid stock that has an associated hatchery program.

FISHERIES[49]

The tribes cooperatively co-manage fisheries resources of the Grays Harbor Basin with the WDFW. As in most of the other regions of western Washington, both treaty and non-treaty fisheries occur at some time during the year. Treaty fisheries occur in-river and in the estuary, while non-treaty commercial fisheries are restricted to the estuary only. The usual and accustom fishing areas reserved through treaty by the Quinault Indian Nation include coastal rivers, the Humptulips and extend into the Chehalis Basin. The Chehalis Tribe fishes the mainstem Chehalis only, on-reservation near the town of Oakville. Chinook, coho, and chum in Grays Harbor and the associated watershed are managed to meet escapement goals of both wild and hatchery stocks. In the Gray Harbor system, both natural production and hatchery supplementation provide opportunity for recreational and commercial harvest. Salmon harvest in Grays Harbor is conducted by way of agreement between all stakeholder, treaty and non-treaty commercial fishers and recreational users through the North of Falcon Process. The goals and intent of managements in Grays Harbor are to create and maintain sustainable fishing opportunities, while providing ecological benefits from both natural and hatchery salmon populations in the basin. WDFW will continue managing for adequate hatchery coho, Chinook and steelhead egg take needs to continue future, programmed hatchery release levels.

CONSERVATION[50]

Since 1990, West Coast salmon fisheries have been modified to accommodate special requirements for the protection of salmon species listed under the Endangered Species Act (ESA). While there are no ESA-listed species in the Grays Harbor watershed, the potential exists for listed stocks to be encountered as they make their way to natal streams. The conservation needs of salmon in the Grays Harbor watershed are addressed through the North of Falcon Process. Annual agreements are produced through this process that provide a summary of the previous year and a comprehensive overview of current year management objectives. These agreements define the management regime needed to maintain exploitation of natural salmon populations below levels that would negatively impact the health of a particular stock, and achieve hatchery escapement adequate to make egg take goals. In basins where habitat continues to degrade, hatchery production will continue to be necessary to maintain significant commercial and recreational fisheries.

[49] *Information provided by Jack Tipping, WDFW.*
[50] *Ibid.*

HABITAT[51]

The Grays Harbor region includes the Grays Harbor estuary and watersheds within Water Resource Inventory Areas (WRIAs) 22 and 23. The geographic area includes the entire Chehalis drainage and all tributaries to the Chehalis River. The region also includes the independent watersheds that drain into Grays Harbor, such as the Humptulips, Hoquiam, Johns and Elk rivers, and several smaller streams. Grays Harbor is about 12 miles wide at the widest point, and at high tide covers about 97 square miles. A two-mile wide channel connects Grays Harbor to the Pacific Ocean.

Two major river basins drain into Grays Harbor. The Chehalis River drains 2,200 square miles into the inner harbor, while the Humptulips Basin drains 245 square miles into North Bay. The North Bay is relatively undeveloped, while the inner harbor is heavily industrialized. Pulp mills, landfills, sewage treatment plants and log storage facilities are all located within the inner harbor. In addition, the inner harbor is regularly dredged.

In total, there are 1,391 streams with 3,353 linear stream miles within the two WRIAs (Phinney and Bucknell 1975). The Chehalis Basin is the second largest basin in Washington state, second only to the Columbia River Basin. The largest tributaries, based upon average annual discharge, are the Satsop sub-basin (1,968 cubic feet per second or cfs), the Humptulips sub-basin (1,344 cfs), the Wynoochee sub-basin (1,316 cfs), the Skookumchuck sub-basin (540 cfs), the Newaukum sub-basin (506 cfs), Cloquallum Creek (375 cfs), and the Black River (330 cfs) (Pickett 1992).

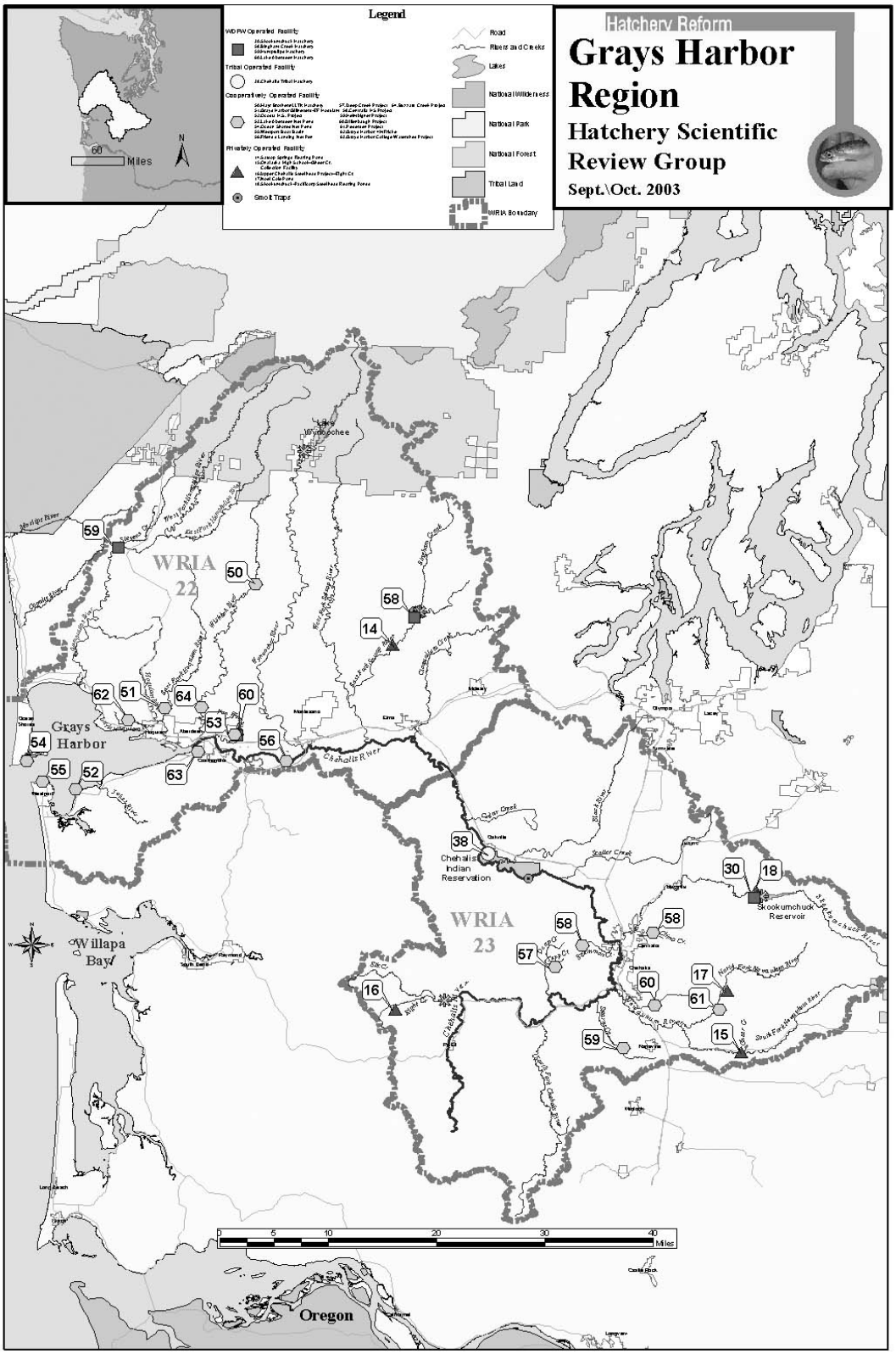
Grays Harbor provides vital feeding and transitional habitat for salmonids, both when juveniles leave the rivers to enter saltwater, and when adults return to the rivers to spawn. All salmonid species use estuarine and nearshore environments at some time during their life cycle. Within Grays Harbor, shorelines include large estuaries, low gradient beaches and tidal flats, and eelgrass beds important for support of juvenile salmonids. Critical food fish for salmonids also occupy areas within the harbor. The larval northern anchovy is found in deeper waters of Grays Harbor and serves as food for Chinook and chum (Simenstad and Eggers 1981). These authors also suggest that open-water zooplankton levels limit the population of juvenile salmonids in Grays Harbor. Areas that are especially important for zooplankton production include Moon Island, Cow Point and the marine waters east to Stearns Bluff.

Pacific herring (*Clupea harangus*) spawning beds have been recently located in and around the Elk River estuary, and Pacific sand lance (*Ammodytes hexapterus*) spawning was documented in South Arbor (Bob Burkle, WDFW, personal communication). Both of these species are important food items for salmonids. Large woody debris (LWD) in the estuary was common prior to logging and settlements, but is now believed to be very low. Estuarine LWD serves as cover for juvenile salmonids (Martin and Dieu 1997). The wood also creates firm substrates in a fine sediment environment, and is used as nurse logs by spruce and cedar.

Estimated loss of estuarine habitat in Grays Harbor has varied. In 1996, NRC estimated that about 30% of historic estuary has been lost, and this is probably the best estimate to-date. This amounts to 14,579 acres lost, and includes all types of estuarine habitat. The specific known areas of loss include wetlands near Cow Point and tidelands that were filled to build the cities of Aberdeen and Hoquiam

[51] *Provided by Gary Bell, WDFW. Includes information modified from the* Salmon and Steelhead Limiting Factors-Chehalis Basin and Nearby Drainages, Water Resource Inventory Areas (WRIA) 22 and 23 *by Dr. Carol Smith of the Washington Conservation Commission and Mark Wenger of the Columbia Pacific RC&D, May 2001.*

(Hiss and Knudsen 1992). Significant diking exists in the lower Wishkah and Hoquiam rivers and near Montesano, with minimal diking near Humptulips (Burrows Road) (Bob Burkle, WDFW, personal communication). Additional impacts include a rail line along the Johns River estuary (Bob Burkle, WDFW, personal communication). A different estimate examined marsh habitat (Seliskar and Gallaghar 1983) estimated that 3,840 acres of marsh habitat has been lost, but this analysis did not include other types of estuarine wetlands.


Legend
Road
Rivers and Creeks
Lakes
National Wilderness
National Park
National Forest
Tribal Land
WRIA Boundary
Smolt Traps
Hatchery Reform
Grays Harbor Region
Hatchery Scientific Review Group
Sept.\Oct. 2003
WRIA 22
WRIA 23
Grays Harbor
Willapa Bay
Chehalis Indian Reservation
Skookumchuck Reservoir
Lake Wynoochee
Chehalis River
Oregon
Miles

STOCK STATUS[52]

Stocks	Hatchery Program?	Biological Significance (L=Low, M =Intermediate, H =High)			Population Viability (L=Critical, M = At Risk, H = Healthy)			Habitat (L = Inadequate, M = Limiting, H = Healthy)			Harvest Opportunity (0 = None, L = Occasional, M = Most years, H = Each year)		
		Now	Goals: Short-Term	Goals: Long-Term	Now	Goals: Short-Term	Goals: Long-Term	Now	Goals: Short-Term	Goals: Long-Term	Now	Goals: Short-Term	Goals: Long-Term
Chehalis Fall Chinook	N	M	M	M	H	H	H	M	M	M	H	H	H
Chehalis Spring Chinook	N	M	M	M	M	M	M	M	M	M	H	H	H
Hoquiam River Fall Chinook	N	M	M	M	M	M	M	M	M	M	H	H	H
Humptulips River Fall Chinook	Y	M	M	M	M	M	M	M	M	M	H	H	H
Satsop River Fall Chinook	Y	M	M	M	M	M	M	M	M	M	H	H	H
Satsop River Summer Chinook	N	M	M	M	L	?	M	M	M	M	H	H	H
South Grays Harbor Tributaries Fall Chinook	N	L	L	L	L	L	L	M	M	M	H	H	H
Wishkah River Fall Chinook	Y	M	M	M	L	L	M	M	M	M	H	H	H
Wynoochee River Fall Chinook	Y	M	M	M	M	M	M	M	M	M	H	H	H
Upper Chehalis River Coho	Y	M	M	M	H	H	H	M	M	M	H	H	H
Chehalis River Late Coho	Y	L	L	L	M	M	M	M	M	M	H	H	H
Hoquiam River Coho	Y	M	M	M	M	M	M	M	M	M	H	H	H
Hoquiam River Late Coho	N	M	M	M	M	M	M	M	M	M	H	H	H
Humptulips River Coho	Y	M	M	M	M	M	M	M	M	M	H	H	H
Humptulips River Late Coho	Y	M	M	M	M	M	M	M	M	M	H	H	H
Satsop River Coho	Y	M	M	M	H	H	H	M	M	M	H	H	H
Satsop River Late Coho	Y	M	M	M	M	M	M	M	M	H	H	H	H
South Grays Harbor Tributaries Coho	Y	M	M	M	M	M	M	M	M	M	H	H	H
South Grays Harbor Tributaries Late Coho	N	M	M	M	M	M	M	M	M	M	H	H	H
Wishkah River Coho	Y	M	M	M	M	M	M	M	M	M	H	H	H
Wishkah River Late Coho	N	M	M	M	M	M	M	M	M	M	H	H	H
Wynoochee River Coho	Y	M	M	M	M	M	M	M	M	M	H	H	H
Wynoochee River Late Coho	N	M	M	M	M	M	M	M	M	M	H	H	H
Westport/Ocean Shores Net Pen Coho	Y	L	L	L	H	H	H	M	M	M	H	H	H
Lower Chehalis Coho	Y	M	M	M	H	H	H	M	M	M	M	M	M
Gheer Creek Chum	Y	M	M	M	M	M	M	M	M	M	H	H	H
Humptulips River Chum	N	M	M	M	M	M	M	M	M	M	H	H	H
Satsop River Chum	Y	M	M	M	M	M	M	M	M	M	H	H	H
South Grays Harbor Tributaries Chum	N	M	M	M	M	M	M	M	M	M	H	H	H
Wishkah River Chum	Y	M	M	M	M	M	M	M	M	M	H	H	H
Chehalis River Hatchery Summer Steelhead	Y	L	L	L	L	L	M	M	M	M	H	H	H
Humptulips River Hatchery Summer Steelhead	Y	L	L	L	L	L	M	M	M	M	H	H	H
Wynoochee River Hatchery Summer Steelhead	Y	L	L	L	H	H	H	H	H	H	H	H	H
Chehalis Winter Steelhead	Y	M	M	M	M	M	H	M	M	M	H	H	H
Hoquiam River Winter Steelhead	N	M	M	M	M	M	M	M	M	M	0	0	0
Hoquiam River Hatchery Winter Steelhead	Y	L	L	L	L	L	M	M	M	M	H	H	H
Humptulips River Winter Steelhead	Y	M	M	M	M	M	M	M	M	M	H	H	H
Newaukam River Winter Steelhead	Y	M	M	M	M	M	M	M	M	M	H	H	H
Satsop River Winter Steelhead	Y	M	M	M	M	M	M	M	M	M	H	H	H
Skookumchuk River Winter Steelhead	Y	M	M	M	M	M	M	M	M	M	H	H	H
South Grays Harbor Hatchery Winter Steelhead	Y	L	L	L	L	L	M	M	M	M	H	H	H
South Grays Harbor Tributaries Winter Steelhead	N	L	L	L	L	L	L	M	M	H	M	M	M
Wishkah River Winter Steelhead	N	M	M	M	M	M	M	M	M	M	H	H	H
Wynoochee River Winter Steelhead	Y	L	L	L	L	?	?	M	M	M	H	H	H
Wynoochee River Hatchery Winter Steelhead	Y	L	L	L	L	L	L	M	M	M	H	H	H
Grays Harbor Coastal Cutthroat	N	M	M	M	M	M	M	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).*

[52] *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 HSRG Principles and Recommendations Report, Benefit/Risk Tool appendix.*

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.

HATCHERIES[53]

Bingham Creek Hatchery

This hatchery was originally called Simpson State Salmon Hatchery. The facility sits on approximately five acres at river mile 17.5 on the East fork Satsop River (a tributary of the Chehalis River, which flows into Grays Harbor). The Hatchery site is 18 miles north of Brady off Highway 12 or 22 miles west of Shelton off Highway 101. It is owned and funded by WDFW, along with Skookumchuck mitigation funds. The Hatchery was built in 1948. Its two acre rearing pond was partially remodeled in 1993 and a major remodel took place in 1995, which included a fish ladder, three 20' x 120' magnum ponds for rearing and adult holding, and a water distribution tower. The Hatchery has ten standard rearing ponds (20' x 80'), and six rearing troughs (10' x 3' x 3'). The Hatchery building houses the office, a one bay shop and incubation room. Vertical Heath trays are used for incubation of eggs and shallow troughs are used for short-term storage of eyed eggs. There is one half-acre pond, standard pond, and pollution abatement pond away from the main site. There are three residences for employees. The buildings on the hatchery site are a 15'x 20' storage building, a 20'x 20' generator building, an 80' x 30' four-bay shop and a combination 25'x 40' freezer and dry feed storage building. There are three types of water supply for the hatchery and incubation room: Bingham Creek gravity flow water, East Fork Satsop pumped water, and well water. All water supply lines converge at the water distribution tower, where operators are able to use one or a mix of all three sources for standard ponds, magnum ponds, or the incubation room.

Carlisle Lake/Onalaska FFA

This project consists of three 24' diameter tanks in a 24' x 76' building that are covered with a chain link enclosure. At one end of the building is a 20' x 24' enclosed room that includes three half stack vertical incubation trays, sink, feed storage freezer, and storage. This room functions as the work area for taking eggs, incubation, and education. The facility also has three 12' diameter uncovered tanks outside. This equipment is housed in the bus complex of the Onalaska School District and is fed by gravity flow spring provided by the Onalaska Water/Sewer District. The rest of the facility is located in Carlisle Lake, approximately .5 miles from the school site and Gheer Creek (the outlet of Carlisle Lake), and includes three 30' x 30' floating net pens and an 8' x 10'fish trap in Gheer Creek. The building was provided by a WDFW grant and the upkeep and maintenance is paid for by Onalaska School District. Partial funding is also provided by Skookumchuck mitigation and the Onalaska FFA Chapter.

Eight Creek Pond

Eight Creek Pond is ten miles west of the town of Doty, off Elk Creek Road on Weyerhaeuser land. It is a two acre earthen pond, an old beaver pond. The outflow of this pond flows into Eight Creek, a tributary of Elk Creek (which is itself a tributary of the Chehalis River). The pond is managed by the Upper Chehalis Fishery Enhancement Association and is funded by Skookumchuck Mitigation sources.

Elma High School FFA

[53] *Information provided by Kevin Young, Keith Burns, and Joel Jaquez WDFW; Dave Hamilton, Region 6 RFEG; Kathy Hopper and Terry Baltzell, Long Live the King; Dave Ruthaford, Onalaska FFA Advisor; Tim Schnieder, Elma High School FFA Instructor; the Lyle Heimbigner Coop; Mary Aleshire, Grays Harbor College; and Dave Ruthaford, Advisor, Carlisle Lake/Onalaska FFA*

Elma High School has an aquaculture center with a recirculating fish system that consist of eight 800 gallon tanks and two 250 gallon tanks. This is a reuse system that exchanges ten percent of the total water daily. The system also has an ozone system that runs constantly when the fish are in, to fight bacteria and viral diseases. There are also two "bio-towers" that culture bacteria to eliminate toxic levels of ammonia and convert nitrites to nitrates. Two settling tanks are also used to separate solids from the reuse water. These solids are then released into the local sewer system for treatment. The aquaculture center is contained in a 40' x 60' pole building, located on the Elma High School grounds in the city of Elma.

Friends Landing Net Pens

Friends Landing Net Pens are located on Quigg's Lake, which is connected to the Chehalis River about a mile downstream of the mouth of the Wynoochee River. The site consists of two 20' x 20' net pens and is operated by Trout Unlimited employees and volunteers.

Grays Harbor 4-H/Fricke Project

The Grays Harbor 4-H facility is located on Blazer Creek, a tributary to the West Fork Hoquiam River. Its purpose is for recreational, commercial and tribal harvest, as well as educational opportunity for 4-H members. The facility is gravity fed from Blazer Creek.

Grays Harbor College Aquaculture Center

The Grays Harbor College Aquaculture Center is located on the lower level of the college's campus, just at the tail of Alder Creek. The hatchery grounds consist of a main facility, three storage sheds, two 52' x 11' raceways, twelve permanent, intermediate tanks, eight portable, intermediate tanks, three 3'x 3' x 16' juvenile tanks, and four full stacks of incubators.

Grays Harbor Gill Nets

The Grays Harbor Gillnetters facility is a private home on the East Hoquiam River. It is for recreational, commercial and tribal harvest. The facility is gravity spring fed.

Humptulips Hatchery

Humptulips Hatchery, owned by WDFW, is located on Stevens Creek, at river mile 22.5 on the Humptulips River, approximately 1.5 miles from the town of Humptulips. The hatchery is located at the site of an old county hatchery, which raised chum and possibly Chinook. The current Humptulips Hatchery began operation in 1976 and achieved full production in the fall of 1977. Total acreage on-site is approximately 34.5 acres. The hatchery has two water sources. The primary source is Humptulips River water, which is pumped from the river to the central distribution tower. The secondary water source is Hatchery Creek, and is used for incubating, hatching eggs and, on a limited basis, for imprinting for Chinook fry. The hatchery has ten 20' x 80' deep standard raceways, four 10' x 80' deep standard raceways, two one-half acre rearing ponds, and seven 3' x 3' x 15' intermediate troughs that are used for initial ponding of steelhead fry. There are three residences on-site, a four-bay shop, a main hatchery building, a pump house located on the Humptulips River, and a domestic well pump house adjacent to the main pump house.

Lake Aberdeen Hatchery

The Lake Aberdeen Hatchery is located about two miles east of the town of Aberdeen, next to the outlet of Lake Aberdeen. The hatchery site is at the foot of the earthen Lake Aberdeen Dam. There

are four buildings, which consists of a hatchery building, two residences and a garage. There are 17 10' x 80' raceways, two brood ponds, 14 intermediate tanks, and 20 half stacks of incubators. There are also eight usable net pens on the lake, several hundred yards from the hatchery site.

Lyle Heimbigner Project

The property for this project is provided by a private landowner at Section 32, Township 13N, Range 2W. It features a ten acre pond, one tank, and one remote site incubator (RSI). Release is into Stearns Creek.

Nole Cole Pond

This land and pond is owned by Nole Cole and located between Centralia and Onalaska on the North Fork of the Newaukum River at PT1 SW1/4 SEC 16 PWP, 13NRWWM. Nole Cole Pond is a one-third acre pond with an average depth of six feet. The property includes a residence, shop and RV parking bay, and a fish storage shop. For the past 20 years, WDFW has funded the project. In 2004, the Olympia chapter of Trout Unlimited will fund it.

Satsop Springs Hatchery

Satsop Springs is owned by WDFW and operated by the Chehalis Basin Fisheries Task Force. The facility is located on 60 acres at river mile two on the East Fork of the Satsop River (a tributary of the Chehalis River). The facility was originally a spring-fed, chum spawning area that has changed several times, as WDFW altered the facility to meet programs based there. Currently, the facility consist of three rearing ponds (156' x 36' x 4.5'; 165' x 18' x 4'; and 123' x 30' x 6'), an outlet channel, and a man-made spawning channel that is also used as a natural rearing area. The facility has a single-wide mobile home that is used as the employee's residence, a 25' x 50' four-bay storage building, a 12' x 10' office, and a standard, concrete spawning station.

Skookumchuck Rearing Ponds and Dam

Skookumchuck Rearing Ponds are located on the Skookumchuck River, a tributary of the Chehalis River. The facility consists of a hatchery building with an office and two bay shop, two one-half acre rearing ponds and one 8' x 80' raceway, which is divided into sections to hold groups of fish for tagging. This facility does not have the capability to incubate eggs or alevins. Approximately 20 cubic feet per second of water is supplied by gravity flow from Skookumchuck Reservoir. Water temperature can be regulated (40–56o F) by three intake levels in the reservoir. The Skookumchuck Dam and rearing pond is located nine miles up the Skookumchuck Road and sits at the base of a 125' earthen dam. On the 20 acre site is the one-half acre pond, a 40' x 30' building (an office, one bay shop and storage room), a 25' x 30' one bay shop and storage area, a hydroelectric power plant, and an adult trapping facility. The ownership and funding of the trapping site, pond, dam, and reservoir is by PacifiCorp Power and Light Company. Adult broodstock are trapped at the Skookumchuck dam fish trap. Other phases of rearing are completed at Bingham Creek Hatchery (incubation/rearing), Skookumchuck (WDFW) Rearing Pond (rearing/acclimation/release), Nole Cole Pond (rearing/acclimation/release), and Onalaska High School FFA (incubation/release).

Westport and Ocean Shores Net Pens

Westport Net Pens are located in the Westport Marina, which is owned by the city of Westport. WDFW, Ocosta High School, the Kiwanis Club, and the Port of Westport all help in the operation of the net pens and the funding comes from the Aquatic Lands Enhancement Account. The net pens sit inside boat slips in the marina. Ocean Shores Net Pens are located in the Ocean Shores Marina, which

is owned by the Quinault Indian Nation. WDFW and The Quinault Indian Nation are the operating entities.

Wishkah Hatchery

Wishkah Hatchery, formerly known as Mayr Brothers Ponds, is in Grays Harbor County, at river mile 25–25.5 on the mainstem Wishkah River. The property is owned by WDFW. Long Live the Kings (LLTK) operates and maintains the facility. Funding for fish production and off-channel habitat work comes from LLTK (including money from USFWS, WDFW and private grants). WDFW does capital construction and maintenance of buildings and other permanent structures. The property is 32 acres with two residences, a hatchery building, a small shop/old generator building, a free standing standby generator, a barn/shop, a pump house, and a water treatment building. The river pumping station has three pumps that each pump 1,000 gallons per minute. There are two earthen rearing ponds: 350’ x 150’ x 6’ and 50’ x 50’ x 5’. The largest pond is connected below the screens to two – 4’ x 50’ x 3’ concrete raceways. Next to the hatchery building, there are eleven- 3’ x 3’ x 16’ fiberglass rearing tanks, and one 6’ x 3’ x 30’ stainless steel tank. The well pumps a minimum of 50 gallons per minute and is plumbed to the Hatchery, as well as the steel tank outside. The hatchery building has 14 half stack incubators and two shallow troughs. The most unique feature of the facility is the natural rearing ponds for Chinook and coho production. Trees planted side by side along the perimeter of the ponds now overlap and provide shade and predator control. They also add insects and detritus that drop in the water. Additionally there are several off-channel ponds (not planted with fish), which were created on-site by LLTK, to serve as habitat for salmonids and other species.

Humptulips River Fall Chinook

Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

This is a native stock with hatchery and natural production. Although various non-native hatchery stocks were introduced into the Humptulips system between the early 1950s and 1984, hybridization has not been substantiated genetically. This stock is one of nine within the South Coast Fall Chinook GDU. 500,000 fingerlings at 70 fish per pound are released on-station at Humptulips Hatchery. Spawning, incubation and rearing occur on-station.

OPERATIONAL CONSIDERATIONS

- Adults are collected at Humptulips Hatchery from returnees back to the hatchery via Stevens Creek. However, adults are also collected by snagging from the Humptulips River, because of homing problems back to Stevens Creek (see below).
- Fish are reared on Humptulips River water at the hatchery, but are released into Stevens Creek, where the adult recapture ladder is located. This creates homing problems back to the hatchery.
- Juvenile Chinook are imprinted on Hatchery Creek water in an attempt to reduce straying.
- This program experiences a ten percent rate of pre-spawning mortality.
- Approximately 125 females to 125 males are spawned.
- Spawning occurs in five-by-five gamete pools in a single container.
- Released fish are not marked or tagged. Therefore, the proportion of broodstock composed of hatchery- and natural-origin fish is unknown.
- The Willapa Hatchery stock released into the Humptulips River is the most likely to have hybridized with the native stock. The hatchery population was similar to its nearest neighbors such as in the Wishkah and Wynoochee rivers. Due to the genetic similarity of neighboring stocks (such as stock from Naselle Hatchery) to the Grays Harbor/Chehalis population group, it would be difficult to quantify introgression between Willapa and Humptulips natives using allozyme markers. Also, spawn timing of the Humptulips River stock is later than the spawn timing of Willapa stock. If hybridization between the native stock and the hatchery stocks has occurred, it is probably insignificant.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The inability to distinguish hatchery- and natural-origin adults when collecting broodstock prevents the program from achieving genetic management goals for an integrated program. The lack of marking/tagging of released fish also prevents estimating the proportion of hatchery-origin adults among natural spawners, and assessing the risk that stray hatchery-origin fish pose to the naturally-spawning population.

B. Likelihood of attaining goals?
There is a presumed harvest benefit based on coded-wire tag returns from 1988-90 releases, but current harvest benefits are unknown because released fish have not been marked or tagged for several years. The likelihood that the program will achieve the goals of an integrated program is low because the proportion of hatchery- and natural-origin fish in the broodstock cannot be controlled. Returning hatchery-origin adults may also have a high stray rate due to imprinting problems at the hatchery and the high tendency of those fish to bypass the Stevens Creek return route and spawn in the Humptulips River. The proportion of natural spawners composed of hatchery-origin adults could be exceeding the HSRG guidelines (30%) for an integrated program. Also, the pooled five-by-five mixing of gametes may substantially reduce the genetic effective number of breeders and the effective population size of returning adults.

C. Consistent with goals for other stocks?
The program provides no significant risks to other stocks.

RECOMMENDATIONS

- Mark all released fish, so that hatchery- and natural-origin adults can be distinguished.
- Initiate a tagging program. Monitor and evaluate the contribution of hatchery-origin fish to harvest, their stray rates, and potential natural spawning in the Humptulips River and adjacent watersheds.
- Operate the program consistent with HSRG System-Wide Recommendations for integrated programs: include natural-origin fish in the broodstock and control the number of hatchery-origin fish on the spawning grounds.
- Follow HSRG-recommended spawning protocols; employ modified matrix or overlapping pairwise spawning of adults.
- Avoid using adults that suffer pre-spawning mortality for "nutrient enhancement."
- Develop a Stevens Creek water intake for final rearing and acclimation prior to release of juveniles to improve imprinting and homing back to the hatchery.

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).

MANAGERS RESPONSE

WDFW generally supports the recommendations of the HSRG, but notes that additional funding will be required to:

- develop a Stevens Creek water intake;
- mark all released fish;
- initiate tagging of representative production;
- quantify the abundance of hatchery- and natural origin spawners; and
- integrate natural-origin adults into the broodstock.

Satsop River Fall Chinook

Chehalis Basin Fisheries Task Force and Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

This is a native stock with hatchery and wild production. Although there have been extensive releases of non-native hatchery fall Chinook into the Satsop basin since 1952 (including Humptulips, Willapa Bay, Puget Sound, Columbia River and Oregon coastal stocks), genetic evidence from the East Fork Satsop River stock indicates a more native profile. This stock is one of nine within the South Coast Fall Chinook GDU. Adults are collected from the East Fork Satsop River (within two miles of the Satsop Springs facility) by hook-and-line snagging or beach seining. Eggs and milt are removed from ripe adults at Satsop Springs and shipped unfertilized to Bingham Creek Hatchery, where the eggs are fertilized (the egg take goal is 360,000 eggs). The fertilized eggs are incubated, hatched and the fry initially reared at Bingham Creek. Approximately 330,000 fry at 300 fish per pound are transferred back to Satsop Springs in March. The program goal is to release 300,000 subyearling fry from Satsop Springs at 70–80 fish per pound into the East Fork Satsop River in June.

OPERATIONAL CONSIDERATIONS

- Eggs are pooled at six females per bag; milt is pooled at three males per bag. Bags are then mixed one-to-one at Bingham Creek.
- Eggs are incubated and hatched on well water at Bingham Creek.
- Fish are volitionally released from Satsop Springs.
- Released fish are unmarked and untagged.

BENEFITS AND RISKS

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

The genetic effective number of spawners may be substantially less than the actual number (approximately 80 females by 40 males) because of pooled spawning of male gametes. Thus, the spawning protocols are inconsistent with a conservation program. Broodstock collection methods by hook-and-line snagging prevent random sampling of adults.

B. Likelihood of attaining goals?
Benefits are unknown because released fish are unmarked and untagged. Similarly, the likelihood that the program will achieve the genetic management goals of an integrated program is low because hatchery- and natural-origin adults cannot be distinguished.

C. Consistent with goals for other stocks?
There appear to be some uncertainties regarding whether summer-run Chinook represent a genetically-distinct stock. Summer-run Chinook in the Satsop River are considered one of two early-run stocks in the Chehalis Basin GDU (upper Chehalis spring Chinook). Therefore, the hatchery program poses a potential hybridization risk to both summer-run Chinook and fall-run Chinook because of uncertainties in overlap of spawn timing. Although the staff at Satsop Springs believes it can easily distinguish summer run and fall run adults trapped at Satsop Spring on the basis of external coloration and stage of sexual maturity, this distinction needs to be verified genetically to reduce the hybridization risk.

RECOMMENDATIONS

- Focus the program on conservation goals, and operate it consistent with achieving those goals, until the stock status is better understood.
- Spawn equal numbers of males and females, following HSRG spawning protocols for modified matrix spawning to maximize the genetic effective number of breeders.
- Tag all released fish with coded wire tags, so that hatchery- and natural-origin fish can be distinguished electronically, without posing undue harvest risk to the stock.
- Operate the program consistent with HSRG recommendations for integrated programs: include natural-origin fish in the broodstock and control the straying of hatchery-origin fish into the Satsop River.
- Conduct a genetic study to determine whether summer and fall Chinook represent two distinct stocks. If summer-run fish represent a distinct stock, determine their status and potential overlap in spawn timing with fall Chinook, to minimize potential impacts of adult collections targeting fall Chinook.

COMMENTS

- Prior to the hatchery program at Satsop Springs, the depressed status of Chinook in the Satsop River imposed a major restriction on sport harvest of Chinook and coho. The Satsop Springs program was designed to use wild spawning broodstock to supplement the wild spawning population, with the goal of recovering the stock to historical numbers and maintaining them while providing tribal, sport and commercial harvest opportunities. Potential harvest should be considered a long-term goal, after the stock has sufficiently recovered.
- 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

WDFW generally supports the recommendations of the HSRG, but notes that additional funding will be required to:

- tag all fish released; and

- conduct a genetic study to determine whether summer and fall Chinook represent two distinct stocks; quantify the abundance of hatchery and natural-origin spawners.

Wishkah River Fall Chinook

Long Live the Kings and Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

This is a native stock with both hatchery and natural production. Since the 1980s, naturally-spawning Chinook have been collected for hatchery brood stock. This is one of nine stocks within the South Coast Fall Chinook GDU. Adults are collected from the Wishkah River by hook-and-line or dip netting. Spawning, incubation, rearing and release take place on-station at Wishkah Hatchery. The program goal is to release 200,000 fish at 80 fish per pound in June.

OPERATIONAL CONSIDERATIONS

- The program requires approximately 50 adult females and 50 adult males to meet release goal.
- It is rare that enough adults are collected to meet the release goal.
- Adults are spawned pairwise, but a second male is used as a backup.
- Fish are released volitionally.
- Released fish are unmarked and untagged. Therefore, the proportion of hatchery- and natural-origin adults in the broodstock is unknown.
- Chinook in the Wishkah River are considered a native stock.

BENEFITS AND RISKS

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

The inability to distinguish hatchery- and natural-origin adults when collecting broodstock prevents the program from achieving genetic management goals for an integrated program. The lack of marking/tagging of released fish also prevents estimating the proportion of hatchery-origin adults among natural spawners and assessing the risk that stray hatchery-origin may fish pose to the naturally-spawning population. Broodstock collection methods by hook-and-line snagging prevent random sampling of adults.

B. Likelihood of attaining goals?

The likelihood that the program will achieve the goals of an integrated program is unknown because the proportion of hatchery- and natural-origin fish in the broodstock and among natural spawners is unknown.

C. Consistent with goals for other stocks?
There are no obvious risks to other stocks from this program.

RECOMMENDATIONS

- Mark or tag all released fish and follow HSRG recommendations for integrated hatchery programs.
- Use modified matrix spawning, according to HSRG recommended spawning protocols, because this program has conservation goals and the number of adults spawned is relatively low.
- Estimate the relative proportions of hatchery- and natural-origin Chinook in the Wishkah River.

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).

MANAGERS RESPONSE

WDFW generally supports the recommendations of the HSRG, but notes that additional funding will be required to:

- tag or mark all fish released; and
- estimate the proportions of hatchery- and natural-origin Chinook in the Wishkah River.

Wynoochee River Fall Chinook

Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

This is a mixed stock with hatchery and natural production. There have been three releases of small numbers of non-native hatchery fall Chinook into the Wynoochee Basin. The Lake Aberdeen Hatchery stock was started using a combination of strays to the hatchery and wild brood stock from the Wynoochee River. This stock is one of nine within the South Coast Fall Chinook GDU. Adult collection, spawning, incubation, rearing and release occur on station at Lake Aberdeen. The program goal is to release 50,000 subyearlings at 90 fish per pound.

OPERATIONAL CONSIDERATIONS

- Released fish are unmarked and untagged.
- Only 12–15 females are required to meet the release goal of 50,000.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is too small to confer significant harvest or conservation benefits. The program is also too small to pose significant risks. The overall purpose or goal of this program is not clear.

B. Likelihood of attaining goals?
Low. The program does not appear to have a well-developed plan. The contribution of released fish to harvest is unknown, because released fish are not marked or tagged.

C. Consistent with goals for other stocks?
The program is too small to have a significant impact on other stocks.

RECOMMENDATIONS

- Suspend the program in its present form (see comments).

COMMENTS

- The current program appears to simply represent the opportunistic spawning of whatever adults return to the hatchery.
- Previously, the program released 250,000 subyearlings, but WDFW reduced the program to 50,000 subyearlings, because of fears that too many wild fish were being "mined" for broodstock. A major source of those broodstock mining fears would be the inability to distinguish hatchery- and natural-origin adults, because the released fish are not marked or tagged.
- The need for a conservation or harvest program for fall Chinook at the Lake Aberdeen Hatchery may need to be evaluated. If either type of program is determined to be necessary or a high priority relative to other stocks or species, then the size of any new program should be based on the desired number of adult returns and their contribution to either harvest or escapement and not based on the number of fish to be released All released fish should be marked or tagged, so that hatchery- and natural-origin adults can be distinguished.

MANAGERS RESPONSE

WDFW understands the concerns of the HSRG and will review potential program modifications.

Upper Chehalis River Coho

Upper Chehalis Fisheries Enhancement Association and Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

This is a mixed stock with composite production. Releases of hatchery-reared coho yearlings were continuous from 1950–70. In the late 1970s, a large-scale fingerling program was carried out using stocks from Soos Creek, Samish, Dungeness, Satsop, Minter Creek, Sol Duc and Humptulips hatcheries. As a result of the historical movement of stocks and the size and frequency of hatchery releases, this stock is no longer considered to be native. 150,000 smolts (50,000 at Skookumchuck Rearing Pond, 50,000 at Gheer Creek, 50,000 at Eight Creek), 60,000 fed fry (10,000 at Cook Creek, 50,000 Stearns Creek) and 245,000 unfed fry (at Stall, Sylvia, Gable, Tapp, Dillenbaugh, Prairie, Newaukum, Deep, China and Scammon creeks) are released. Adult collection, spawning, incubation and rearing occur at Bingham Creek Hatchery.

OPERATIONAL CONSIDERATIONS

- Based on allozyme analysis, the stock has been shown to be distinct from other coho populations tested in the Chehalis Basin.
- All yearlings are adipose-fin clipped prior to release or transfer from Bingham Creek.
- Some releases/transfers are also coded wire-tagged.
- The program operators report being instructed to use less than ten percent wild spawners in the hatchery broodstock each year, and to use jacks at no more than two percent of the males and females spawned.
- Because of gamete pooling (pooled eggs from five females fertilized with pooled sperm from five males), an effective population size is not being attained.
- Smolt releases from the Eight Creek and Skookumchuck sites are volitional.
- All returning adipose-clipped adults to the Eight and Gheer creek sites are removed from the watershed; this is not the case at the Skookumchuck site.
- No information was provided about the fed and unfed fry programs.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is being operated in a manner consistent with the goals for harvest and education.

B. Likelihood of attaining goals?
It seems likely that smolt releases would be better suited than fry releases to providing harvest, but data on the harvest contributions of the smolt and fry releases have not been provided. Educational benefits are provided by the Gheer Creek component of the program, which focuses on students, and by the Eight Creek component, which is operated by volunteers.

C. Consistent with goals for other stocks?
Releases of smolts could pose a risk of predation to juveniles of wild coho and other stocks in the watershed, but the small size of the smolt program and the fact that most of the smolts are volitionally released probably reduces the risk. Releases of fed and unfed fry could result in competition risks for food and habitat, but again the size of the releases (255,000 fry over ten widely dispersed release sites) probably reduces this risk. Genetic risks in the basin could be considerable because the stock being used in the program is genetically distinct (based on allozyme analysis) from other coho stocks tested in the Chehalis basin.

RECOMMENDATIONS

- Continue the components of the program involving releases at sites where removal of unharvested returning Satsop stock adults is done, or is feasible.
- Develop a broodstock at Skookumchuck, based on an upper Chehalis River stock, and use this stock in place of the Bingham Creek stock for the numerous outplants being made, with an educational focus in the upper Chehalis River.
- Ensure that this new broodstock is properly integrated with its wild counterparts. See HSRG guidelines for accomplishing this and for ensuring that an effective population size is maintained.
- Increase the use of jacks to ten percent of the males used for spawning.
- Develop a plan to assess whether outplants using fed and unfed fry are contributing to the harvest goal as well as the educational goal.

COMMENTS

- The use of Satsop coho stock that is genetically distinct from other coho stocks in the Chehalis watershed is only appropriate if outplants into the system are removed to prevent interbreeding with the other coho stocks in the system. A stock for outplanting at sites where adult removal is not feasible should be integrated, genetically, with the other coho stocks in the upper Chehalis system. Using such a stock for outplants made largely for educational programs enhances the educational benefits of those programs.
- WDFW has recently reduced the size of the fry outplantings in the upper Chehalis. It should continue its periodic evaluations of the outplanting programs to ensure that they are attaining their goals.
- The FFA should consider improving the educational benefits of its Gheer Creek project by collecting its own eggs, incubating them, and rearing the resulting progeny to the release stage.
- The Skookumchuck facility will have to be upgraded to permit it to incubate and rear salmon.

- 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

WDFW supports the recommendations of the HSRG, but notes that WDFW currently has identified a single Chehalis River coho stock. The stock includes all tributary and mainstem spawners upstream of the Satsop River.

Chehalis River Late Coho

Onalaska School District, Onalaska Chapter-Future Farmers of America, Washington Department of Fish and Wildlife

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

Program Description

This is an introduced stock that originated from the Satsop River and is managed for hatchery and natural production. Broodstock is collected at Bingham Creek Hatchery, then transferred as follows: 52,500 at 20 fish per pound to Carlisle Lake, 52,500 at 20 fish per pound to Eight Creek, 52,500 at 20 fish per pound to Skookumchuck Rearing Ponds. Fish are released as follows: 50,000 at 15 fish per pound Carlisle Lake, 50,000 at 15 fish per pound to the Skookumchuck River, 50,000 at 15 fish per pound to Eight Creek.

Operational Considerations

- Broodstock is collected annually at Bingham Creek (Satsop River), even though enough adults return to the three release points in the upper Chehalis River to maintain the program.
- Up to ten percent wild stock from the Satsop River is randomly selected from spawning adults, but this proportion is generally only about one percent of the hatchery broodstock.
- Fish are spawned in a one-to-one ratio in five fish pools; jacks are incorporated at a rate of no more than two percent of the spawning population.
- All releases are adipose fin clipped.
- The average annual contribution to fisheries is generally unknown, since the only coded wire tagging for this program was for the 1998–2001 brood year releases from Eight Creek pond.
- Late spawning coho comprised about five percent of the total natural escapement in 2001. However, the long-term spawning escapement for this stock, as well as the contribution of hatchery fish to the natural spawning population, appears to be unknown.
- Fry at Bingham Creek suffer significant loss from cold water disease (CWD), leading to the practice of ponding excess fry and culling the remainder of excess production after CWD epizootics.

Benefits and Risks

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

The program is operated in a manner that is consistent with the short- and long-term harvest and education goals for the stock. However, since there has been limited coded wire tagging of this program, the harvest contribution from this program cannot yet be quantified. The program is not consistent with the conservation goals identified for this stock, since the broodstock source for this integrated program is maintained in the Satsop River, rather than the upper Chehalis watershed.

B. Likelihood of attaining goals?
The likelihood that the program will attain its harvest goals is unknown. Success under the current operational protocols will depend on the survival of a lower river stock released in the upper watershed. Developing a successful integrated program is not likely because of a lack of a locally-adapted, natural stock to draw on as a broodstock source, and continued introduction of Satsop stock as that source. Educational goals, in regard to teaching fish culture, are currently being met, but could be improved by implementing the operational changes recommended below.

C. Consistent with goals for other stocks?
There is a risk of predation from this program's fish on naturally produced fall Chinook, coho and steelhead throughout the entire Chehalis Basin, because of the location of this program in the upper watershed. There is also a risk of competition with naturally-produced coho throughout the watershed. These risks are mitigated somewhat by the relative small size of the program and by volitional release of smolts from the Skookumchuck and Eight Creek ponds.

RECOMMENDATIONS

- Change the strategy for this program from integrated to segregated.
- Continue to operate the segregated program from the three facilities where adult collection and removal of excess adults can be accomplished.
- Develop a locally-adapted, hatchery broodstock from returns to the upper basin and discontinue the use of Satsop River stock.
- Discontinue the pooling of gametes and use a spawning protocol to maximize the genetic diversity of the hatchery stock (See HSRG System-Wide Recommendations).
- Increase the use of jacks to ten percent of the males used for spawning.
- Coded wire tag fish released from this program for a minimum of three years, to assess their contribution to harvest.

COMMENTS

- Consider improving the education benefits to the Onalaska school program by developing on-site incubation and year-round rearing, rather than operating the program under the current approach.

MANAGERS RESPONSE

WDFW generally supports the recommendations of the HSRG, but notes that implementing a tagging program will require additional funding.

Hoquiam River Coho

Grays Harbor Gillnetters and Washington Department of Fish and Wildlife

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

Program Description

This is a mixed stock with hatchery and natural production. Releases of hatchery-reared coho yearlings were continuous from 1950–70. In the late 1970s, a large-scale fingerling program was carried out using stocks from Soos Creek, Samish, Dungeness, Satsop, Minter Creek, Sol Duc and Humptulips hatcheries. As a result of the historical movement of stocks and the size and frequency of hatchery releases, this stock is no longer considered to be native. Eggs are taken at Humptulips (Humptulips stock). Eyed eggs are shipped as follows: 200,000 to Grays Harbor Gillnetters, 20,000 to the Fricke 4H Project. The Gillnetters release 190,000 fish at 200 fish per pound into the Hoquiam River. 4H releases 17,000 at 100 fish per pound into the Little Hoquiam River, for educational purposes.

Operational Considerations

- Since 1980, all broodstock have been from returns to Humptulips.
- Fingerlings resulting from the transferred eggs at the Gillnetters site are released unmarked, while those released from the Fricke site are 100% adipose fin clipped.
- Releases of fingerlings from the Gillnetters and Fricke sites are forced.
- Given the size of the fingerlings at release, they probably reside in the river for months.
- Imprinting to Hoquiam River water occurs during rearing at the both the Gillnetters and Fricke Project sites.

Benefits and Risks

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

B. Likelihood of attaining goals?
A modest sports catch occurs in the Hoquiam River, but the contribution to it from the program is not known. Conservation and harvest benefits would likely be enhanced if the fish could be released as

smolts. An education benefit occurs because of the involvement of the Gillnetters and 4H club members.

C. Consistent with goals for other stocks?
Releasing fingerlings instead of smolts likely results in a significant risk of competition for food and habitat with juveniles of naturally-spawning coho and other salmon. Risks of predation would, however, be minimal, given the size of the fish at release. Use of the Humptulips stock poses genetic risks to any existing Hoquiam coho and could result in a loss of biological significance and population viability of the latter.

RECOMMENDATIONS

- Mark all releases into the Hoquiam and evaluate the harvest and conservation benefits of the program.
- Evaluate the status of natural coho production in the Hoquiam River, in order to determine the proportion of hatchery- and natural-origin spawners.
- Collect broodstock in the Hoquiam River and discontinue using the Humptulips stock for outplantings into the Hoquiam system. Instead, use (preferably) Hoquiam coho if stock status permits it, or (as an alternative) use adults returning to the Gillnetters site supplemented, if possible, with naturally spawning (unmarked) Hoquiam coho.
- Increase the use of jacks to ten percent of the males used for spawning.

COMMENTS

- Changing the stock used in these programs to one that is native or locally-adapting (or -adapted) would increase the chances of meeting the conservation and harvest goals and enhance the educational benefit of the program.
- The possibility of rearing the fish to the smolt stage at the Gillnetters and Fricke sites is apparently negated by the limited water supply at these sites.
- 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

WDFW generally supports the recommendations of the HSRG, but notes that additional funding will be required to:
- mark all fish released;
- evaluate the status of natural coho production in the Hoquiam River; and
- collect broodstock in the Hoquiam River.

Humptulips River Coho

Quinault Indian Nation, Ocosta High School, Westport Kiwanas, Port of Westport and Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

This is a native stock with hatchery and natural production. Releases of hatchery-reared coho have been continuous since the early 1950s. The majority of releases occurred in the mainstem Humptulips River with stocks that included Soos Creek, Minter Creek, Samish, Dungeness, Sol Duc, and Satsop. This same stock mix is found throughout Grays Harbor tributaries. In 1977, Humptulips Hatchery began large-scale, on- and off-station production releases. As a result of the historical movements of stocks and the size of yearling release groups, and in more recent years, the large numbers of naturally spawning hatchery adults, this stock is likely a mixture of native and non-native stocks. The egg take goal is 1.85 million. Fish are spawned, incubated, and reared at Humptulips. Fish are transferred as follows: 100,000 at 22 fish per pound to Ocean Shores Net Pens, 200,000 at 22 fish per pound to Westport Net Pens. Fish are released as follows: one million released on station at 15 fish per pound in April and 10,000 at 1,500 fish per pound released into Burg Slough/RFEG 9 (for a secondary, educational purpose).

OPERATIONAL CONSIDERATIONS

- This stock can probably be considered a locally adapted composite stock because, since 1980, it has been sustained entirely from returns to the hatchery.
- The program operators report being instructed to use less than ten percent wild spawners in the hatchery broodstock each year, and to use jacks at no more than two percent of the males and females spawned.
- Ten fish pools of eggs and milt are combined to accomplish fertilization.
- All fish released or transferred from the hatchery are adipose fin-clipped.
- Fish releases from the hatchery are 95% volitional; fish releases from the net pens are forced.

BENEFITS AND RISKS

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

The program is being operated in a manner consistent with its short- and long-term goals for harvest and education.

B. Likelihood of attaining goals?
Based on coded wire tag data for 1988-96, the program clearly provides a sport and commercial harvest benefit. Educational benefits are also provided through the hatchery's involvement with volunteer groups, students and the general public.

C. Consistent with goals for other stocks?
The large size of the yearling releases from the hatchery presents a potential risk of predation to juvenile salmon in the Humptulips River, but the fact that the release is 95% volitional reduces the risk significantly as migration out of the river should be rapid. Unharvested fish from the net pens may stray to rivers other than the Humptulips, and thus represent a potential genetic risk.

RECOMMENDATIONS

- Evaluate composition of the naturally spawning coho population in the Humptulips River to determine whether natural-origin recruits are driving adaptation in the river. If not, take steps to reduce hatchery-origin recruits in the naturally spawning population.
- Ensure that the Humptulips Hatchery broodstock is well integrated with its wild counterparts by following the HSRG guidelines for developing properly integrated hatchery broodstocks.
- Use HSRG spawning protocols for ensuring that an effective population size is maintained in the broodstock.
- Increase the use of jacks to ten percent of the males used for spawning.
- Develop a plan for evaluating the straying of unharvested net pen fish and for dealing with any significant straying problems detected.
- Periodically evaluate the harvest contribution of each of the program's components.
- 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.

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).

MANAGERS RESPONSE

WDFW generally supports the recommendations of the HSRG, but notes that additional funding will be required to evaluate the status of natural coho production in the Humptulips River.

Humptulips River Late Coho

Washington Department Fish and Wildlife

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

PROGRAM DESCRIPTION

This is an introduced stock that originated from the Satsop River and is managed for hatchery and wild production. 256,000 eyed eggs are shipped from Bingham Creek Hatchery (late Satsop stock in 2003, normally 236,000 from Humptulips). Fish are reared and released at Humptulips. The program releases 200,000 fish at 15 per pound in May.

OPERATIONAL CONSIDERATIONS

- The hatchery stock is derived from the Bingham Creek hatchery late coho stock, but is maintained from returns to Humptulips. A one year transfer of late coho from Bingham Creek was required to fill a "missing" year class of returns.
- The program operators report being instructed to use less than ten percent wild spawners in the hatchery broodstock each year, and to use jacks at no more than two percent of the males and females spawned.
- Fish are spawned in a one-to-one ratio in ten fish pools.
- All releases are adipose fin clipped.
- Average annual contribution to fisheries is unknown, since the stock has never been tagged.
- Escapement to the hatchery has averaged 1,297 fish per year since 1990, with a range from 145–4,936 fish during broodyears when adults returned.
- The long-term spawning escapement for this stock, as well as the contribution of hatchery fish to the natural spawning population, appears to be unknown.
- Fish routinely suffer from a variety of parasites and from cold water disease, columnaris and furunculosis. Columnaris and "ich" cause a significant loss of fish (up to 60%) during the warm water months of June through August. These losses lead to the practice of ponding excess fry and culling the remainder of excess production after epizootics.
- Fish are released volitionally for two weeks, beginning in late April.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is operated in a manner that is consistent with the short- and long-term harvest goals. However, since there has been no coded wire tagging of this program, its harvest contribution cannot be quantified. The consistency of the program with the stock's conservation goals is unknown, because of a lack of understanding about the composition of the natural spawning component of the stock.

B. Likelihood of attaining goals?
The historical gene flow between the naturally-spawning and hatchery components of this stock appears to be unknown. This poses a risk of loss of viability to the natural stock component, as well as a risk that the hatchery component is not actually adapted to the natural environment. Both of these requirements must be met in order to achieve a successfully integrated program.

C. Consistent with goals for other stocks?
There is a risk of predation from this program's fish on naturally produced fall Chinook, coho and steelhead fry from the lower Chehalis Basin. There is also a risk of competition with naturally produced coho smolts from the lower watershed. These risks are mitigated somewhat by the relatively small size of the program and by the volitional release of smolts.

RECOMMENDATIONS

- Evaluate the composition of the natural spawning component, to determine if naturally produced fish are driving the adaptation of the stock. If the evaluation indicates that this has been the case, follow the HSRG's System-Wide Recommendation on maintaining properly integrated programs.
- If the evaluation indicates that hatchery-origin fish have been driving the adaptation of the stock, take steps to reduce their spawning contribution to allow adaptation to the natural environment. Once this occurs, collect broodstock from that component and maintain continuity through annual incorporation of natural fish into the hatchery broodstock (See HSRG System-Wide Recommendations).
- Discontinue the pooling of gametes and use a spawning protocol to maximize the genetic diversity of the hatchery stock (See HSRG System-Wide Recommendation).
- Increase the use of jacks to ten percent of the males used for spawning.
- Coded wire tag this stock for a sufficient period of time to quantify harvest benefits.
- Weigh the benefits of the coho program versus the loss of productivity caused by water quality problems at the facility.

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).

MANAGERS RESPONSE

WDFW generally supports the recommendations of the HSRG, but notes that additional funding will be required to:

- tag representative production;

- evaluate the status of natural coho production in the Humptulips River; and
- collect broodstock in the Hoquiam River.

Satsop River Coho

Chehalis Basin Fisheries Task Force, Elma Chapter-Future Farmers of America and Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

This is a mixed stock with hatchery and natural production. Releases of hatchery-reared coho yearlings were continuous from 1950–70. In the late 1970s, a large-scale fingerling program was carried out using stocks from Soos Creek, Samish, Dungeness, Satsop, Minter Creek, Sol Duc and Humptulips hatcheries. As a result of the historical movement of stocks and the size and frequency of hatchery releases, this stock is no longer considered to be native. The egg take goal for this program is 1.7 million at Bingham Creek Hatchery, which rears and releases 300,000 at 17 fish per pound on-station. 625,000 fish are transferred at 100 fish per pound to Satsop Springs, where they are reared and released on-site, with a release goal of 450,000 at 17 fish per pound. Multiple eyed egg and fish transfers from Bingham Creek take place, for planting in Chehalis River tributaries. Elma FFA releases 1,000 at 150 fish per pound to the Satsop River.

OPERATIONAL CONSIDERATIONS

- Based on genetic analysis of allozymes, the stock is genetically distinct from other coho populations in the Chehalis Basin.
- All fish are said to be adipose fin clipped prior to release or transfer from Bingham Creek, but this would likely only hold true for the smolts released from the hatchery and fed fry transferred to other sites (e.g., Satsop Springs). Transfers of unfed fry to off-station sites are probably not marked in any way, and eyed egg transfers are not otolith-marked.
- Some releases from the hatchery are coded wire-tagged (a 150,000 double index group) and some transfers are also coded wire-tagged (25,000 of the fed fry transferred to Satsop Springs).
- The program operators report being instructed to use less than ten percent wild spawners in the hatchery broodstock each year, and to use jacks at no more than two percent of the males and females spawned.
- Because of gamete pooling (pooled eggs from five females fertilized with pooled sperm from five males), an effective population size is not being attained.
- Releases from Bingham Creek and Satsop Springs are volitional.

- Little or no information was provided about the many outplanting programs receiving eggs from Bingham Creek. However, fish raised from the eggs in the Elma High School facility and in the Lyle Heimbigner Project are 100% adipose fin clipped, reared to the yearling stage, and then released. Release from Elma High School is forced; release from the Lyle Heimbigner Project is 10% volitional and 90% forced.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is being operated in a manner consistent with the goals for harvest and education

B. Likelihood of attaining goals?
Coded wire tag data show that Bingham Creek and Satsop Springs are producing fish for commercial and sports harvest, but no data for harvest benefits were provided for the other components of the program. Educational benefits are provided through the program's involvement with Elma and Centralia high schools, Region 6 Educational Coops, Future Farmers of America groups, and other projects.

C. Consistent with goals for other stocks?
Releases of smolts could pose a risk of predation to juveniles of wild coho and other stocks in the watershed, but the fact that the smolts from the largest releases (i.e., the Bingham Creek Hatchery and Satsop Springs Facility releases) are volitional reduces the risk, since migration out of the system should be rapid. The risk of predation by smolts released from other sites is likely to be small, considering the small size of each such release. Releases of fed and unfed fry (if they occur) could result in competition risks for food and habitat, but again the size of the releases and the wide distribution of the release sites over a large watershed would tend to reduce the risk. Genetic risks in the basin could be considerable outside of the Satsop portion of the drainage, considering that the program is using a coho stock that is genetically distinct from coho populations outside of the Satsop portion of the system. There is a risk to Satsop River chum because adult chum are held in the Bingham Creek pond for a long period before being sorted out and passed upstream to spawn.

RECOMMENDATIONS

- Reduce the size of this program to lower the incidence of cold water disease and the risk to chum.
- Evaluate composition of the naturally-spawning coho population in the Satsop River to determine whether natural-origin recruits are driving adaptation in the river. If not, take steps to reduce hatchery-origin recruits in the naturally-spawning population.
- Ensure that the Bingham Creek broodstock is well integrated with its wild Satsop River counterparts by following the HSRG guidelines for developing properly integrated hatchery broodstocks.
- Use HSRG spawning protocols to ensure that an effective population size is maintained in the broodstock
- Increase the use of jacks to ten percent of the males used for spawning.
- Retain the double index tagging program at Bingham Creek, because of the ability to get good escapement data at the trap located in the Satsop system.
- Continue the components of the program involving releases from Bingham Creek and Satsop Springs.

- Transition the numerous small outplants in the upper Chehalis River (conducted largely for educational purposes) to a new broodstock (see Upper Chehalis coho program) better adapted to the upper Chehalis.
- Develop a plan to assess the educational programs and to determine whether the many outplants associated with these programs are consistent with conservation goals for the stock.
- 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.

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).

MANAGERS RESPONSE

WDFW generally supports the recommendations of the HSRG and will evaluate potential remedies for the incidence of cold water disease. Additional funding will be required to:

- evaluate the status of natural coho production in the Satsop River; and
- collect and maintain broodstock for the upper Chehalis River.

Satsop River Late Coho

Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

This stock originated from native fish from the Satsop River, but is maintained from hatchery returns.. The egg take goal for this program is 300,000 at Bingham Creek Hatchery. Incubation, rearing and release occur on-station, with a release goal of 300,000 at 17 fish per pound.

OPERATIONAL CONSIDERATIONS

- The program operators report being instructed to use less than ten percent wild spawners in the hatchery broodstock each year, and to use jacks at no more than two percent of the males and females spawned.
- Fish are spawned in a one-to-one ratio in five fish pools.
- All releases are adipose fin clipped, with the exception of the non-marked double index tag group.
- Escapement to the hatchery has averaged 1,943 fish per year since 1990, with a range from 17–7,530 fish.
- The long-term spawning escapement for this stock, as well as the contribution of hatchery fish to the natural spawning population, appears to be unknown.
- Fry suffer significant loss from cold water disease (CWD), leading to the practice of ponding excess fry and culling the remainder of excess production after CWD epizootics.
- Fish are volitionally released from mid-April through May.

BENEFITS AND RISKS

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

The program is operated in a manner that is consistent with the stock's short- and long-term harvest and education goals. However, since there has been no coded wire tagging of this program, its harvest contribution cannot be quantified. The consistency of the program with the stock's conservation goals is unknown because of a lack of understanding about the composition of the naturally-spawning component of the stock.

B. Likelihood of attaining goals?
The historical gene flow between the naturally-spawning and hatchery components of this stock appears to be unknown. This poses a risk of loss of viability to the natural stock component, as well as a risk that the hatchery component is not actually adapted to the natural environment. Both of these requirements must be met in order to achieve a successfully integrated program.

C. Consistent with goals for other stocks?
There is a risk of predation from this program's fish on naturally produced fall Chinook, coho and steelhead fry from the lower Chehalis Basin. There is also a risk of competition with naturally produced coho smolts from the lower watershed. These risks are mitigated somewhat by the relative small size of the program and by the partial volitional release of smolts.

RECOMMENDATIONS

- Evaluate the composition of the natural spawning component to determine if naturally produced fish are driving the adaptation of the stock. If the evaluation indicates that this has been the case, follow the region-wide recommendation for incorporating natural-origin recruits into the hatchery broodstock.
- If the evaluation indicates that hatchery-origin fish have been driving the adaptation of the stock, take steps to reduce their spawning contribution to allow adaptation to the natural environment. Once this occurs, collect broodstock from that component and maintain continuity through annual incorporation of natural fish into the hatchery broodstock (See HSRG System-Wide recommendations).
- Discontinue the pooling of gametes and use a spawning protocol to maximize the genetic diversity of the hatchery stock (See HSRG System-Wide recommendations).
- Increase the use of jacks to ten percent of the males used for spawning.
- Coded wire tag this stock for a sufficient period of time to quantify harvest benefits.
- Modify release protocols to accomplish a full volitional release.

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).

MANAGERS RESPONSE

WDFW generally supports the recommendations of the HSRG, but notes that additional funding will be required to evaluate the hatchery and wild composition of fish spawning in the Satsop River.

South Grays Harbor Tributaries Coho

Grays Harbor Community College Aquaculture Center, Ocosta High School and Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

This is a mixed stock with hatchery and natural production. Releases of hatchery-reared coho yearlings were continuous from 1950–70. In the late 1970s, a large-scale fingerling program was carried out using stocks from Soos Creek, Samish, Dungeness, Satsop, Minter Creek, Sol Duc and Humptulips hatcheries. As a result of the historical movement of stocks and the size and frequency of hatchery releases, this stock is longer considered to be native. The Grays Harbor Community College (GHCC) portion of the program involves adult collection from Alder Creek, then rearing and releasing the progeny on station as follows: 1,500 at 17 fish per pound into Alder Creek and 70,000 at 500 fish per pound into Lake Swano. Ocosta High School (OHS) releases 25,000 at 500 fish per pound into the Elk River and 25,000 at 500 fish per pound into Johns River.

OPERATIONAL CONSIDERATIONS

- Juveniles released from the GHCC facility are derived from a stock that returns to Alder Creek. The stock originated from outplants of the Chehalis River stock, obtained from Lake Aberdeen Hatchery. The latter stock is a composite of Wynoochee River coho and past introductions of coho stocks from out-of-basin, probably now locally-adapted.
- No wild adults are used in the broodstock at the GHCC facility, as no wild coho enter Alder Creek.
- The spawning protocol at the GHCC facility is normally one female to two males.
- Release (in April) of adipose-clipped fingerlings from the GHCC facility is via Lake Swano, where the fish rear until the following spring before out-migrating volitionally from the Lake; outmigrating smolts are counted at a trap at the Lake outlet. No information was provided on the method of release for the on-station smolt release.
- Releases from OHS are forced (fish are trucked). The OHS releases are derived from eyed eggs obtained from Lake Aberdeen Hatchery (the same Wynoochee River based stock mentioned above).

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is being conducted in a manner consistent with the goals for education, but it is doubtful this holds true for the goal of conservation, as the stock being used is not a local one.

B. Likelihood of attaining goals?
It is clear that the program is providing an important education benefit, but the conservation benefit would improve if a more local (or locally-adapted) stock were used.

C. Consistent with goals for other stocks?
The small size of the fish being released, and the small size of the program, reduce the potential for predation of juveniles of wild coho and other salmonids in the systems being planted, but increase the likelihood of competition for habitat and food in these small watersheds. Assuming that wild stocks of coho occur in the Johns and Elk rivers (they apparently do not in the Alder Creek system), these outplants also pose a potential genetic risk to these stocks.

RECOMMENDATIONS

- Continue the program and focus it on the educational benefits.

COMMENTS

- Because of the small size of the program, it is not likely to contribute a significant conservation benefit.
- Because no naturally spawning stocks are available to drive the adaptation process for the GHCC portion of the program and because the program at OHS is based entirely on imported eggs, the program is not being operated consistent with the HSRG's guidelines for a properly integrated program (see HSRG System-Wide Recommendations).

MANAGERS RESPONSE

WDFW supports the recommendation of the HSRG.

Wishkah River Coho

Long Live the Kings and Washington Department of Fish and Wildlife

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

Program Description

This is a mixed stock with hatchery and natural production. Releases of hatchery-reared coho yearlings were continuous from 1950–70. In the late 1970s, a large-scale fingerling program was carried out using stocks from Soos Creek, Samish, Dungeness, Satsop, Minter Creek, Sol Duc and Humptulips hatcheries. As a result of the historical movement of stocks and the size and frequency of hatchery releases, this stock is longer considered to be native. The egg-take goal for this program is 360,000 taken on-station, plus 35,000 collected at Buzzard Creek. 360,000 eyed eggs are shipped to Humptulips for incubation and early rearing. The early reared fish are marked and shipped back to Wishkah Hatchery at 50 fish per pound in September. Fish are taken to the Aberdeen Net Pens for acclimation and release in two groups of 150,000 at 15 fish per pound. These fish are acclimated in the pens for six weeks prior to release. In addition, 25,000 fish are released at Buzzard Creek.

Operational Considerations

- The broodstock used in the program is a composite of native and introduced coho, some of the latter from out-of-basin. The introductions apparently ended in about 1980 and so the stock can probably now be considered locally adapted.
- Up to 20% of broodstock is derived from natural-origin adults.
- Adults are mated two males to one female, until returns exceed hatchery staff capacity; then gametes are pooled (five females to five males).
- Excess fish are passed upstream to spawn in the wild.
- Final rearing at Wishkah is in a pond, under fairly natural conditions.
- All fish are adipose fin clipped.
- Release from Buzzard Creek is volitional; release from the net pens is forced.

Benefits and Risks

A. Consistent with short-term and long-term goals?
The program is being carried out in a manner consistent with providing harvest.

B. Likelihood of attaining goals?
The program provides a harvest benefit, both in the vicinity of the net pens and in-river. However, the size of the harvest contributed by the program has not been quantified.

C. Consistent with goals for other stocks?
The early (March) net pen releases pose potential predation and competition risks to juvenile salmonids in the vicinity, because the early releases may not be rapidly migratory. In addition, straying of unharvested adults from the net pens poses a potential genetic risk to other coho populations in the Chehalis system. The magnitude of this straying may have increased in recent years with the need to curb the intensity of fisheries in Grays Harbor to protect Chinook stocks.

RECOMMENDATIONS

- Evaluate the composition of the naturally-spawning coho population in the Wishkah River, to determine whether natural-origin recruits are driving adaptation in the river. If not, take steps to reduce the proportion of hatchery-origin recruits in the naturally spawning population.
- Ensure that the Wishkah broodstock is well integrated with its naturally-spawning Wishkah River counterparts by following the HSRG guidelines for developing properly integrated hatchery broodstocks.
- Use HSRG spawning protocols to ensure that an effective population size is maintained in the broodstock.
- Increase the use of jacks to ten percent of the males used for spawning.
- Stop the early (March) releases from the net pens, and replace them with an on-station release of smolts from Wishkah.
- Continue the April net pen releases, but evaluate the degree of straying from this operation.
- Conduct a three-year study to evaluate the program's contribution to harvest.
- 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.

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).

MANAGERS RESPONSE

WDFW generally supports the recommendations of the HSRG, but notes that additional funding will be required to:
- tag representative production; and
- evaluate the status of natural coho production in the Wishkah River.

Westport/Ocean Shores Net Pen Coho

Quinault Indian Nation, Ocosta High School and Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[54]	High	High	High
Habitat	Limiting	Limiting	Limiting
Harvest Opportunity	Each Year	Each Year	Each Year
Purpose	Harvest and Education		
Type	Segregated		

PROGRAM DESCRIPTION

This stock originated from hatchery fish from Humptulips Hatchery. The broodstock used in this program is a composite of local and introduced stocks, some of the stocks from out-of-basin. It can probably now be considered a locally-adapted, composite stock because, since 1980, the stock has been sustained entirely from returns to the Hatchery. Westport Net Pen releases 200,000 fish of Humptulips stock at 12 fish per pound (with participation from Ocosta High School). Ocean Shores releases 100,000 fish of Humptulips stock at 12 fish per pound (operated with the Quinault Indian Nation). Adult collection, incubation and early rearing occur at Humptulips.

OPERATIONAL CONSIDERATIONS

- The fish held in the net pens are all adipose fin clipped, but they are not coded wire-tagged. Fish released from Westport Net Pens were coded wire-tagged in 1988–90.
- Fish are force-released from the net pens during daylight in late April/early May

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is being operated in a manner consistent with the goals for harvest and education.

B. Likelihood of attaining goals?
The program provides a harvest benefit, but the magnitude of the harvest has not been quantified. It also provides an educational benefit because of the involvement of Ocosta students and Kiwanis Club members.

C. Consistent with goals for other stocks?

[54] *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.*

Unharvested fish from the program pose a genetic risk because of the likelihood of straying to rivers and creeks different than the source river of the net pen stock. The magnitude of this straying may have increased in recent years with the need to curb the intensity of fisheries in Grays Harbor to protect Chinook stocks. However, the genetic impacts of the straying may be small because much of it may occur in the Humptulips River (the source of the stock) or in systems already impacted by transplants from the Humptulips River Hatchery coho stock (e.g., the Hoquiam River).

RECOMMENDATIONS

- Continue the program and review past data on straying obtained using coded wire tags.
- 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.
- Reduce the program's size if significant straying has previously been shown to occur in drainages that have not already been planted with Humptulips River Hatchery coho (see the HSRG's System-Wide Recommendations regarding outplanting and net pen releases).

COMMENTS

- None.

MANAGERS RESPONSE

WDFW supports the recommendations of the HSRG.

The Quinault Indian Nation generally agrees with the recommendations of the HSRG, but notes that the program has been suspended.

Lower Chehalis Coho

Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

This stock originated at Lake Aberdeen Hatchery from fish straying to the hatchery from Wynoochee River plants. It is likely a combination of hatchery- and natural-origin fish and is now probably locally-adapted. 80,000 smolts are released (50,000 at Friends Landing Net Pens, 30,000 on-station at Lake Aberdeen). Adult collection, spawning, incubation and rearing occur at Lake Aberdeen.

OPERATIONAL CONSIDERATIONS

- All of the fish are adipose fin clipped. In addition, all fish released from Friends Landing Net Pens and some of those released from Lake Aberdeen are coded wire tagged.
- Releases from Lake Aberdeen start in April and are volitional; those from Friends Landing Net Pens are force-released into Quigg's Lake in late April.
- Some adults returning to the Wynoochee Trap are passed upstream of the Wynoochee River Dam for natural production.

BENEFITS AND RISKS

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

B. Likelihood of attaining goals?
The data indicate that Chehalis normal coho provide both a commercial and sport fishery benefit, but the contribution to that benefit by the present program was not quantified. This situation should be resolved in the near-term, because of the use of coded wire tags in a portion of the hatchery releases and in all of the net pen releases. Educational benefits are being provided by the net pen program, because of the involvement of Trout Unlimited employees and their volunteers. Educational benefits are also being provided via Lake Aberdeen's active involvement with a number of schools/colleges.

C. Consistent with goals for other stocks?

There is a potential predation risk to juveniles of salmonids in the system because of the size of the fish at release. However, the risk from the hatchery releases is likely reduced because they are volitional. Releases from the net pens pose a potential risk, as their speed of outmigration is not known. Straying from the net pen releases poses a potential genetic risk to other coho stocks in the Chehalis system.

RECOMMENDATIONS

- Evaluate the composition of the naturally-spawning coho population in the Wynoochee River, to determine whether natural-origin recruits are driving adaptation in the river. If they are not, take steps to reduce the proportion of hatchery-origin recruits in the naturally spawning population.
- Ensure that the Lake Aberdeen broodstock is well integrated with its wild counterparts by following the HSRG guidelines for developing properly integrated hatchery broodstocks.
- Use HSRG spawning protocols to ensure that an effective population size is maintained in the broodstock.
- Increase the use of jacks to ten percent of the males used for spawning.
- Continue both the hatchery and net pen release components of the program. Collect coded wire tag data to quantify the harvest benefits of each of the program's components, and to evaluate straying, particularly from the net pen component.

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).

MANAGERS RESPONSE

WDFW generally supports the recommendations of the HSRG, but notes that additional funding will be required to evaluate the hatchery and wild composition of fish spawning in the Wynoochee River.

Gheer Creek Chum

Chehalis Tribe, Onalaska High School and Washington Department of Fish and Wildlife

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

Program Description

This program originated with eggs taken from wild brood stock from the Chehalis and Black rivers, and is one of eight stocks within the South Coast Fall Chum GDU. Eggs are taken from tribal fisheries. Adults are collected at Black River and eggs are incubated at Onalaska High School. They are put into hatch boxes and 100,000 unfed fry are released into Gheer Creek in collaboration with the Chehalis Tribe.

Operational Considerations

- Adults are netted by the Chehalis Indian Tribe at Black River and transported live to Onalaska High School, where they are incubated, put into hatch boxes and released into Gheer Creek.
- Mating is one-to-one, in separate buckets.
- Eggs are incubated at Onalaska High School on spring water, with one female per tray.
- Fish are trucked to Gheer Creek at 900 fish per pound, and outplanted immediately downstream from Carlisle Lake.
- Approximately 100 high school students are involved in program. In addition, students from other high schools and community members are involved in the program.
- Fish are not marked or tagged.

Benefits and Risks

A. Consistent with short-term and long-term goals?
Educational benefits are met with over 100 high school students involved, as well as members of the community and students from other high schools. This is a small program at this time, with only ten adults netted to produce the broodstock during the first year of the program (2002–03). Risks to wild stocks are minimal with such small numbers. However, this program is attempting to operate as an integrated program with a non-native stock. Black River interceptions may not be bound to the release site (the south fork of the Newaukum River and Gheer Creek).

B. Likelihood of attaining goals?
Because of the problem mentioned above, the program may not be training students to run a properly designed conservation program.

C. Consistent with goals for other stocks?
Risks to other stocks from non-native releases are small given the program size, but it is inconsistent with an education program.

RECOMMENDATIONS

- Release fish back to the river of origin, the Black River.
- Size the program to meet HSRG integrated program guidelines.
- Consider otolith marking as both an education and evaluation tool.

COMMENTS

- The educational benefits would be enhanced if monitoring and evaluation components are included.
- 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

WDFW is unsure of the rationale for the concerns expressed by the HSRG regarding the broodstock source and release location. As noted in the program description, WDFW currently has identified only a single fall chum stock in the Chehalis River. Spawning occurs in the mainstem Hoquiam, Wishkah, Wynoochee, Satsop and Black rivers. Some spawners are also observed in Cloquallum Creek and the lower mainstem Chehalis River.

Satsop River Chum

Chehalis Basin Fisheries Task Force and Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

This stock is believed to be a mixture of Bitter Creek, Hood Canal and East Fork Satsop River, but introductions from outside the basin were believed to be unsuccessful with no significant impact to genetic makeup. The egg take goal is 225,000 from adults at Satsop Springs or the Satsop River, collected by hook-and-line snagging. Eggs are eyed at Bingham Creek and released on-site at Satsop Springs from remote site incubators (RSIs). The goal is a release of 200,000 @ 1,000 fish per pound. The stock belongs to the South Coast Washington fall chum salmon GDU.

OPERATIONAL CONSIDERATIONS

- Approximately 75 fish are collected.
- Pooled spawning procedures are used. Females are spawned six per bucket, males three per bag.
- Some rack returns to Bingham Creek may be used for spawning if needed.
- Eggs are incubated on well water.
- All fish receive an otolith mark.
- Eyed eggs are loaded at one-half density into RSIs at Satsop Spring.

BENEFITS AND RISKS

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

The need for a conservation program on this stock was not clearly demonstrated. This stock is given an otolith mark, so the contribution to conservation should be available. However, at the time of this evaluation, no information was available. Some monitoring for escapement occurs on Satsop Slough, but data were not provided. Collection by hook-and-line may not represent a random collection of spawners. Further, the large number of coho relative to the number of chum make collection difficult and possibly non random (see Bingham Creek). Pooled spawning protocols may result in unequal contributions of males.

B. Likelihood of attaining goals?

This program provides educational benefits to the large number of volunteers involved in operating it.

C. Consistent with goals for other stocks?
This program does not present any significant risk to other stocks, and could provide an ecological benefit.

RECOMMENDATIONS

- Suspend the snagging aspect of this program, and enhance on-station habitat for natural spawning.
- Focus this program on educational benefits through habitat restoration.

COMMENTS

- Comments were received indicating that this program is mitigating for lost chum habitat as a result of the construction of the hatchery, which eliminated side channel spawning areas.
- The HSRG attempted to evaluate the status and trends for chum, but found information was lacking. Spawner escapements are indexed annually for the Chehalis River. Surveys are conducted within three Satsop River sloughs: Schafer, Maple Glen and Creamer's. However, these numbers were not provided. No out-migrant monitoring or other index information was provided. Reference was also made to a 2002 unpublished revision to the Salmonid Stock Inventory (SaSI), indicating that Chehalis River chum are healthy, with stable escapement.
- Commercial fisheries have been restricted in recent years, although viable recreational opportunities exist.
- 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

WDFW understands the concerns of the HSRG and will review the program with the Chehalis Basin Fisheries Task Force.

Wishkah River Chum

Long Live the Kings, Aberdeen High School and Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

This stock originated with native fish from the Wishkah River. It is included under the Chehalis Fall Chum stock, which is one of eight stocks within the South Coast Fall Chum GDU. Broodstock for the program are collected by dip-netting and seining in the mainstem Wishkah River above and below Wishkah Hatchery. The program's egg take goal is 240,000. Eggs are incubated, reared and released on-station at Wishkah, with a goal of 195,000 at 300 fish per pound. Approximately 5,000 eyed eggs are released into the Hoquiam River.

OPERATIONAL CONSIDERATIONS

- 80 females and 160 males are collected (a one-to-two ratio).
- Each female is fertilized with two males. Male sperm for each female is pooled; eggs are not pooled.
- Eggs are incubated on well water; Wishkah River water is used for rearing.
- Natural vegetation is used for predator control and natural-like rearing.
- Fry are volitionally released, unmarked.
- Carcasses are returned to the river.
- Citizen involvement is featured in this hatchery program.
- Aberdeen High School will be involved starting this year.
- The program receives no formal fish health support.

BENEFITS AND RISKS

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

The program is well-run, incorporating conservation practices, some natural rearing and volitional releases. Fish cannot be identified, so the benefits and risks of this program cannot be evaluated. There are no clear criteria for starting, ending or operating this program. The educational benefit is

not well described. The rationale for releasing the Wishkah stock into the Hoquiam River was not stated.

B. Likelihood of attaining goals?
Introducing a non-native stock into the Hoquiam River is not consistent with an educational program, which should feature proper conservation principles.

C. Consistent with goals for other stocks?
High levels of coho production may adversely impact this stock.

RECOMMENDATIONS

- Suspend the program until a clear conservation need is identified. Educations goals could be met by other programs in region.

COMMENTS

- The HSRG attempted to evaluate the status and trends for chum, but found information was lacking. Spawner escapements are indexed annually for the Chehalis River. Surveys are conducted within three Satsop River sloughs: Schafer, Maple Glen and Creamer's. However, these numbers were not provided. No out-migrant monitoring or other index information was provided. Reference was also made to a 2002 unpublished revision to the Salmonid Stock Inventory (SaSI) indicating that Chehalis River chum is healthy, with stable escapement.
- Commercial fisheries on this stock have been restricted in recent years, although there are recreational opportunities.
- The HSRG concluded that the conservation need for chum was not clearly identified.
- Concern was expressed over the large production of coho, and potential risks to chum, from this level of production.

MANAGERS RESPONSE

This program will be discontinued.

Chehalis River Hatchery Summer Steelhead

Upper Chehalis Fisheries Enhancement Association and Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[55]	Low	Low	Medium
Habitat	Limiting	Limiting	Limiting
Harvest Opportunity	Each Year	Each Year	Each Year
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

Fish for this program are imported Skamania stock hatchery fish. The program has an egg take goal of 300,000. They are collected, spawned, incubated and early reared on station at Lake Aberdeen Hatchery. 47,000 fish at eight fish per pound are shipped to Eight Creek Pond (Upper Chehalis River) for release. 15,000 at five fish per pound are released on-station at Lake Aberdeen.

OPERATIONAL CONSIDERATIONS

- Fish released at 4.5–6.5 per pound from late April to mid-May.
- All releases are adipose fin clipped.
- Five-by-five pooled matings are used.
- Adult removal capability exists at the Lake Aberdeen and Elk Creek release sites.
- Fish from this program are released volitionally.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is being operated in a manner consistent with its short- and long-term goals. The lower river releases are providing a valuable harvest opportunity. Interbreeding of the hatchery stock with the naturally-spawning stock in the upper basin is a concern.

B. Likelihood of attaining goals?
There is a strong likelihood that harvest goals in the lower river will continue to be met. Coastal steelhead stocks have experienced relatively good survival in recent years.

C. Consistent with goals for other stocks?

[55] *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 outplanting program to Eight Creek could pose genetic and ecological risks to other stocks, for example, native cutthroat.

RECOMMENDATIONS

- Implement the HSRG's wild steelhead management zones System-Wide Recommendations in a modified manner adapted to this region (where many of the steelhead programs are using locally-adapted, integrated stocks; as opposed to the non-local, segregated stocks that typify steelhead programs in other regions). As part of this approach, use only integrated hatchery programs with native stocks in WRIA 23, and dedicate the Wishkah River in WRIA 22 to natural production. Fishing for steelhead in streams devoted to natural production would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. This approach would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- For segregated programs, use locally-adapted stock (of Chambers Creek or Skamania origin) and decrease reliance on other facilities (such as Bogachiel Hatchery) to backfill shortages in locally-adapting hatchery stock. Actions such as harvest restrictions should be implemented to achieve 100% local broodstock.
- Manage segregated hatchery stocks to maintain their 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 volitionally 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.

- Follow HSRG spawning protocols.
- Discontinue the Eight Creek portion of this program if a harvest benefit cannot be demonstrated. This will require a harvest monitoring program in the upper Chehalis to differentiate upriver from downriver catch.

COMMENTS

- None.

MANAGERS RESPONSE

WDFW appreciates the HSRG recommendations on Wild Steelhead Management Zones, but believes 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. WDFW conducted a steelhead workshop in 2003 to discuss recent research, performance of the hatchery programs, and management

options (including integrated and segregated programs). Information gathered during this workshop and HSRG recommendations will be used in 2004 to develop an implementation plan for improved steelhead programs. Implementation of an enhanced harvest monitoring program in the Upper Chehalis may require additional funding.

Humptulips River Hatchery Summer Steelhead

Washington Department of Fish and Wildlife

Stock Goals:	Current	Short-Term	Long-Term
Biological Significance	Low	Low	Low
Population Viability[56]	Low	Low	Medium
Habitat	Limiting	Limiting	Limiting
Harvest Opportunity	Each Year	Each Year	Each Year
Purpose	Harvest		
Type	Segregated		

PROGRAM DESCRIPTION

This program uses locally-adapted, summer stock of Skamania Hatchery origin (Washougal River). 30,000 smolts at six fish per pound are released on-station from Humptulips Hatchery. Adult collection, spawning and eyeing occur at Lake Aberdeen Hatchery. Hatching and rearing occur on-station at Humptulips.

OPERATIONAL CONSIDERATIONS

- Fish are released at 4.5–6.5 per pound from late April to mid-May.
- All releases are adipose fin clipped.
- Five-by-five pooled matings are used.
- Summer steelhead do not return to Humptulips.
- Fish are released volitionally.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is being operated in a manner consistent with its short- and long-term goals. It is providing valuable harvest opportunity. Interbreeding of the hatchery stock with the naturally spawning stock is a concern due to lack of adult capture capability.

B. Likelihood of attaining goals?
There is a strong likelihood that harvest goals will continue to be met. Coastal steelhead stocks have experienced relatively good survival in recent years.

C. Consistent with goals for other stocks?

[56] *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 and ecological interaction with naturally-spawning, winter steelhead due to lack of adult removal capability.

RECOMMENDATIONS

- Implement the HSRG's wild steelhead management zones System-Wide Recommendations in a modified manner adapted to this region (where many of the steelhead programs are using locally-adapted, integrated stocks; as opposed to the non-local, segregated stocks that typify steelhead programs in other regions). As part of this approach, use only integrated hatchery programs with native stocks in WRIA 23, and dedicate the Wishkah River in WRIA 22 to natural production. Fishing for steelhead in streams devoted to natural production would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. This approach would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- For segregated programs, use locally-adapted stock (of Chambers Creek or Skamania origin) and decrease reliance on other facilities (such as Bogachiel Hatchery) to backfill shortages in locally-adapting hatchery stock. Actions such as harvest restrictions should be implemented to achieve 100% local broodstock.
- Manage segregated hatchery stocks to maintain their 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 volitionally 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.

- Suspend the program until effective adult removal methods are developed (e.g., via the Stevens Creek intake).
- Follow HSRG spawning protocols.
- Determine the stray rate of fish from this program and identify the risk of hatchery fish spawning in the wild.

COMMENTS

- None.

MANAGERS RESPONSE

WDFW appreciates the HSRG recommendations on Wild Steelhead Management Zones, but believes 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. WDFW conducted a steelhead

workshop in 2003 to discuss recent research, performance of the hatchery programs, and management options (including integrated and segregated programs). Information gathered during this workshop and HSRG recommendations will be used in 2004 to develop an implementation plan for improved steelhead programs. Estimation of the spawning escapement and resultant production of summer steelhead may require additional funding.

Wynoochee River Hatchery Summer Steelhead

Washington Department of Fish and Wildlife

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

Program Description

This program uses locally-adapted stock of Skamania Hatchery origin. 60,000 fish at five fish per pound are outplanted into the Wynoochee River from Lake Aberdeen Hatchery. Adult collection takes place primarily at Lake Aberdeen, with some at the Wynoochee Trap. Spawning, incubation and rearing occur at Lake Aberdeen.

Operational Considerations

- Fish are released at 4.5–6.5 per pound from late April to mid-May.
- All releases are adipose fin clipped.
- Five-by-five pooled matings are used.
- Adult removal capability exists at the Lake Aberdeen and Wynoochee Dam release sites.

Benefits and Risks

A. Consistent with short-term and long-term goals?
The program is being operated in a manner consistent with its short- and long-term goals. It is providing a valuable harvest opportunity.

B. Likelihood of attaining goals?
There is a strong likelihood that harvest goals will continue to be met. Coastal steelhead stocks have experienced relatively good survival in recent years.

C. Consistent with goals for other stocks?
These releases could pose genetic and ecological risks to other stocks.

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

RECOMMENDATIONS

- Implement the HSRG's wild steelhead management zones System-Wide Recommendations in a modified manner adapted to this region (where many of the steelhead programs are using locally-adapted, integrated stocks; as opposed to the non-local, segregated stocks that typify steelhead programs in other regions). As part of this approach, use only integrated hatchery programs with native stocks in WRIA 23, and dedicate the Wishkah River in WRIA 22 to natural production. Fishing for steelhead in streams devoted to natural production would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. This approach would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- For segregated programs, use locally-adapted stock (of Chambers Creek or Skamania origin) and decrease reliance on other facilities (such as Bogachiel Hatchery) to backfill shortages in locally-adapting hatchery stock. Actions such as harvest restrictions should be implemented to achieve 100% local broodstock.
- Manage segregated hatchery stocks to maintain their 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 volitionally 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.

- Follow HSRG spawning protocols.

COMMENTS

- None.

MANAGERS RESPONSE

WDFW appreciates the HSRG recommendations on Wild Steelhead Management Zones, but believes 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. WDFW conducted a steelhead workshop in 2003 to discuss recent research, performance of the hatchery programs, and management options (including integrated and segregated programs). Information gathered during this workshop and HSRG recommendations will be used in 2004 to develop an implementation plan for improved steelhead programs.

Chehalis Winter Steelhead

Upper Chehalis Fisheries Enhancement Association and Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

This stock is of native origin, with natural-origin broodstock collected upstream of the Newaukum River. This stock is one of 22 within the Southwest Coast Steelhead GDU. 32,000 smolts at five fish per pound are released from Eight Creek Acclimation Pond (Upper Chehalis River). Adult collection is from native stock by hook-and-line in the Upper Chehalis, upstream of Newaukum. Fish are held and spawned at a remote site on Elk Creek. Incubation, and sometimes early rearing, is at Forks Creek Hatchery in the Willapa Bay region. Rearing prior to acclimation and release from Eight Creek is at Bingham Creek Hatchery.

OPERATIONAL CONSIDERATIONS

- All releases are adipose fin clipped.
- Five-by-five pooled matings are used.
- Fish are released volitionally.
- Adult return removal capability exists at the Elk Creek trap release site.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
This program is too new to determine if it is meeting stock goals.

B. Likelihood of attaining goals?
There is a strong likelihood that harvest goals will continue to be met. Coastal steelhead stocks have experienced relatively good survival in recent years.

C. Consistent with goals for other stocks?
These releases could pose genetic and ecological risks to other stocks.

RECOMMENDATIONS

- Implement the HSRG's wild steelhead management zones System-Wide Recommendations in a modified manner adapted to this region (where many of the steelhead programs are using locally-adapted, integrated stocks; as opposed to the non-local, segregated stocks that typify steelhead programs in other regions). As part of this approach, use only integrated hatchery programs with native stocks in WRIA 23, and dedicate the Wishkah River in WRIA 22 to natural production. Fishing for steelhead in streams devoted to natural production would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. This approach would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- For segregated programs, use locally-adapted stock (of Chambers Creek or Skamania origin) and decrease reliance on other facilities (such as Bogachiel Hatchery) to backfill shortages in locally-adapting hatchery stock. Actions such as harvest restrictions should be implemented to achieve 100% local broodstock.
- Manage segregated hatchery stocks to maintain their 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 volitionally 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.

- Follow HSRG spawning protocols.
- Use returning hatchery fish for broodstock, consistent with the HSRG's integrated population management guidelines.
- Use Skookumchuck Hatchery for facility support for incubation and early rearing.

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).

MANAGERS RESPONSE

WDFW appreciates the HSRG recommendations on Wild Steelhead Management Zones, but believes 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. WDFW conducted a steelhead workshop in 2003 to discuss recent research, performance of the hatchery programs, and management options (including integrated and segregated programs). Information gathered during this workshop

and HSRG recommendations will be used in 2004 to develop an implementation plan for improved steelhead programs.

Hoquiam River Hatchery Winter Steelhead

Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

This is an early timed, locally-adapting hatchery stock of Chambers Creek origin from Lake Aberdeen and Bogachiel hatcheries. 20,000 fish at five fish per pound are outplanted from Lake Aberdeen Hatchery into the Hoquiam River. Adults are collected from volunteer returns (there is no adult rack return at the release site), spawned, incubated and reared at Lake Aberdeen.

OPERATIONAL CONSIDERATIONS

- Fish are released at 4.5–6.5 per pound from late April to mid-May
- All releases are adipose fin clipped.
- The Hoquiam River release site does not have adult collection facilities.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is being operated in a manner consistent with its short- and long-term goals. It is providing a valuable harvest opportunity. Interbreeding of the hatchery stock with the naturally-spawning stock is a concern because adult capture does not exist.

B. Likelihood of attaining goals?
There is a strong likelihood that harvest goals will continue to be met. Coastal steelhead stocks have experienced relatively good survival in recent years.

C. Consistent with goals for other stocks?
There is the potential for genetic interaction with naturally-spawning winter steelhead, due to lack of adult removal capabilities.

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

RECOMMENDATIONS

- Implement the HSRG's wild steelhead management zones System-Wide Recommendations in a modified manner adapted to this region (where many of the steelhead programs are using locally-adapted, integrated stocks; as opposed to the non-local, segregated stocks that typify steelhead programs in other regions). As part of this approach, use only integrated hatchery programs with native stocks in WRIA 23, and dedicate the Wishkah River in WRIA 22 to natural production. Fishing for steelhead in streams devoted to natural production would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. This approach would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- For segregated programs, use locally-adapted stock (of Chambers Creek or Skamania origin) and decrease reliance on other facilities (such as Bogachiel Hatchery) to backfill shortages in locally-adapting hatchery stock. Actions such as harvest restrictions should be implemented to achieve 100% local broodstock.
- Manage segregated hatchery stocks to maintain their 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 volitionally 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.

- Suspend the program until adult capture capability is provided.

COMMENTS

- None.

MANAGERS RESPONSE

WDFW appreciates the HSRG recommendations on Wild Steelhead Management Zones, but believes 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. WDFW conducted a steelhead workshop in 2003 to discuss recent research, performance of the hatchery programs, and management options (including integrated and segregated programs). Information gathered during this workshop and HSRG recommendations will be used in 2004 to develop an implementation plan for improved steelhead programs.

Humptulips River Winter Steelhead

Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

The broodstock for this program is primarily from Humptulips River, early-returning, natural spawners derived in the 1980s from a naturalized population that resulted from outplants from Lake Quinault and Bogachiel hatcheries. This stock is one of 22 within the Southwest Coast Steelhead GDU. The egg take goal is 270,000. 125,000 smolts at six fish per pound are released on-station at Humptulips Hatchery. Adult collection, spawning, incubation and rearing occur on-station. Excess fry are released into Duck Lake, a land-locked lake at Ocean Shores.

OPERATIONAL CONSIDERATIONS

- All releases are adipose fin clipped.
- Five-by-five pooled matings are used.
- Fish are released volitionally.
- Less than one percent of trapped adults and broodstock are of natural-origin.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The stock being used appears to be of non-native origin, with early run-timing, but is meeting harvest goals.

B. Likelihood of attaining goals?
Harvest goals will probably continue to be attained.

C. Consistent with goals for other stocks?
The program presents a genetic risk to the native, later-timed Humptulips steelhead stock. These releases could also pose genetic and ecological risks to other stocks.

RECOMMENDATIONS

- Implement the HSRG's wild steelhead management zones System-Wide Recommendations in a modified manner adapted to this region (where many of the steelhead programs are using locally-adapted, integrated stocks; as opposed to the non-local, segregated stocks that typify steelhead programs in other regions). As part of this approach, use only integrated hatchery programs with native stocks in WRIA 23, and dedicate the Wishkah River in WRIA 22 to natural production. Fishing for steelhead in streams devoted to natural production would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. This approach would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- For segregated programs, use locally-adapted stock (of Chambers Creek or Skamania origin) and decrease reliance on other facilities (such as Bogachiel Hatchery) to backfill shortages in locally-adapting hatchery stock. Actions such as harvest restrictions should be implemented to achieve 100% local broodstock.
- Manage segregated hatchery stocks to maintain their 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 volitionally 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.

- Convert this program to operate as a segregated program, using the early-timed population as broodstock. This will reduce the risks to the naturally-spawning population.
- Follow HSRG spawning protocols.

COMMENTS

- The recommendation to convert to a segregated program would allow adaptation of the naturalized population to reach an equilibrium with the environment, without being supported by the hatchery population and without affecting harvest opportunities. A segregated program will also result in better control of straying and run timing, and reduce risks to the late-timed, winter run steelhead.

MANAGERS RESPONSE

WDFW appreciates the HSRG recommendations on Wild Steelhead Management Zones, but believes 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. WDFW conducted a steelhead workshop in 2003 to discuss recent research, performance of the hatchery programs, and management

options (including integrated and segregated programs). Information gathered during this workshop and HSRG recommendations will be used in 2004 to develop an implementation plan for improved steelhead programs.

Newaukam River Winter Steelhead

Onalaska Chapter-Future Farmers of America and Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

Broodstock for this program originate from late returning, Skookumchuck River fish. The stock is one of 22 within the Southwest Coast Steelhead GDU. 30,000 at six fish per pound (20,000 from Onalaska FFA/Carlisle Lake; 10,000 from Nole Cole Pond) are released on-station. Adult collection, holding and spawning occur at Skookumchuck Dam. Incubation and rearing for the Carlisle Lake release occur at the Onalaska FFA/Carlisle Lake facilities. Incubation and early rearing for Noel Cole Pond occur at Bingham Creek Hatchery.

OPERATIONAL CONSIDERATIONS

- All releases are adipose fin clipped.
- Five-by-five pooled matings are used.
- No adult collection capability exists at the Nole Cole Pond release site.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
Relying on Skookumchuck returns and not using Newaukum adult returns compromises this as a properly-integrated program, and reduces the educational benefit.

B. Likelihood of attaining goals?
Harvest goals are likely being attained. The program does provide an educational benefit.

C. Consistent with goals for other stocks?
The program is too small to present significant risks to other stocks.

RECOMMENDATIONS

- Implement the HSRG's wild steelhead management zones System-Wide Recommendations in a modified manner adapted to this region (where many of the steelhead programs are using locally-adapted, integrated stocks; as opposed to the non-local, segregated stocks that typify steelhead programs in other regions). As part of this approach, use only integrated hatchery programs with native stocks in WRIA 23, and dedicate the Wishkah River in WRIA 22 to natural production. Fishing for steelhead in streams devoted to natural production would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. This approach would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- For segregated programs, use locally-adapted stock (of Chambers Creek or Skamania origin) and decrease reliance on other facilities (such as Bogachiel Hatchery) to backfill shortages in locally-adapting hatchery stock. Actions such as harvest restrictions should be implemented to achieve 100% local broodstock.
- Manage segregated hatchery stocks to maintain their 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 volitionally 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.

- Use adult returns to Carlisle Lake and Newaukum-origin broodstock, to properly integrate the program and improve the educational benefit.
- Follow HSRG spawning protocols.

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).

MANAGERS RESPONSE

WDFW appreciates the HSRG recommendations on Wild Steelhead Management Zones, but believes 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. WDFW conducted a steelhead workshop in 2003 to discuss recent research, performance of the hatchery programs, and management options (including integrated and segregated programs). Information gathered during this workshop

and HSRG recommendations will be used in 2004 to develop an implementation plan for improved steelhead programs.

Satsop River Winter Steelhead

Washington Department of Fish and Wildlife

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

Program Description

Broodstock for this program originates from natural spawners. The stock is one of 22 within the Southwest Coast Steelhead GDU. 55,000 smolts at five fish per pound are released on-station at Bingham Creek Hatchery and 100,000 fingerlings at 100 fish per pound are outplanted into the East Fork Satsop River. Broodstock are collected from the river by hook-and-line, and at the Bingham Creek trap. Adult holding, spawning, incubation and rearing occur at Bingham Creek.

Operational Considerations

- All releases are adipose fin clipped.
- Five-by-five pooled matings are used.
- Fish are released volitionally.
- Adult removal capability exists at the release site.

Benefits and Risks

A. Consistent with short-term and long-term goals?
The program is being operated consistent with short- and long-term goals for the stock, however the program is too new to evaluate success.

B. Likelihood of attaining goals?
The likelihood of attaining goals is high, due to relatively good survival of coastal stocks in recent years.

C. Consistent with goals for other stocks?
These releases could pose genetic and ecological risks to other stocks.

RECOMMENDATIONS

- Implement the HSRG's wild steelhead management zones System-Wide Recommendations in a modified manner adapted to this region (where many of the steelhead programs are using locally-adapted, integrated stocks; as opposed to the non-local, segregated stocks that typify steelhead programs in other regions). As part of this approach, use only integrated hatchery programs with native stocks in WRIA 23, and dedicate the Wishkah River in WRIA 22 to natural production. Fishing for steelhead in streams devoted to natural production would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. This approach would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- For segregated programs, use locally-adapted stock (of Chambers Creek or Skamania origin) and decrease reliance on other facilities (such as Bogachiel Hatchery) to backfill shortages in locally-adapting hatchery stock. Actions such as harvest restrictions should be implemented to achieve 100% local broodstock.
- Manage segregated hatchery stocks to maintain their 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 volitionally 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.

- Follow HSRG spawning protocols.
- Reduce the hook-and-line method of capture over time and incorporate hatchery fish into the spawning population. Follow HSRG guidelines for integrated population management.
- Maximize the use of well water for adult holding and early rearing of juveniles.

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).

MANAGERS RESPONSE

WDFW appreciates the HSRG recommendations on Wild Steelhead Management Zones, but believes 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. WDFW conducted a steelhead workshop in 2003 to discuss recent research, performance of the hatchery programs, and management options (including integrated and segregated programs). Information gathered during this workshop

and HSRG recommendations will be used in 2004 to develop an implementation plan for improved steelhead programs.

Skookumchuck River Winter Steelhead

PacificCorp Power and Light, Onalaska Chapter-Future Farmers of America and Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

Broodstock for this program originated from native stock taken at Skookumchuck Pond. The stock is one of 22 within the Southwest Coast Steelhead GDU. 75,000 smolts at five fish per pound are released on-station at Skookumchuck. Adults are collected, held and spawned at Skookumchuck Dam. Incubation and early rearing occur at Bingham Creek Hatchery. 40,000 eyed eggs are transferred to the NOAA Fisheries Manchester facility.

OPERATIONAL CONSIDERATIONS

- All releases are adipose fin clipped.
- Five-by-five pooled matings are used.
- Fish are released volitionally.
- There is adult collection capability at the release site.
- 400 adults are passed upstream of the Skookumchuck Dam to spawn.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The project is being operated consistent with short- and long-term goals. It is providing harvest and educational benefits.

B. Likelihood of attaining goals?
The likelihood of attaining goals is good, due to relatively good survival of coastal stocks in recent years.

C. Consistent with goals for other stocks?
These releases could pose genetic and ecological risks to other stocks.

RECOMMENDATIONS

- Implement the HSRG's wild steelhead management zones System-Wide Recommendations in a modified manner adapted to this region (where many of the steelhead programs are using locally-adapted, integrated stocks; as opposed to the non-local, segregated stocks that typify steelhead programs in other regions). As part of this approach, use only integrated hatchery programs with native stocks in WRIA 23, and dedicate the Wishkah River in WRIA 22 to natural production. Fishing for steelhead in streams devoted to natural production would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. This approach would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- For segregated programs, use locally-adapted stock (of Chambers Creek or Skamania origin) and decrease reliance on other facilities (such as Bogachiel Hatchery) to backfill shortages in locally-adapting hatchery stock. Actions such as harvest restrictions should be implemented to achieve 100% local broodstock.
- Manage segregated hatchery stocks to maintain their 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 volitionally 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.

- Follow HSRG spawning protocols.
- Follow HSRG integrated broodstock guidelines.
- Develop incubation and early rearing facilities at Skookumchuck.
- For four years, maximize the number of natural-origin recruits into the hatchery broodstock, then follow HSRG guidelines for properly integrated programs.
- Determine juvenile production from the 400 adult fish passed upstream of the Dam.

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).

MANAGERS RESPONSE

WDFW appreciates the HSRG recommendations on Wild Steelhead Management Zones, but believes 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. WDFW conducted a steelhead

workshop in 2003 to discuss recent research, performance of the hatchery programs, and management options (including integrated and segregated programs). Information gathered during this workshop and HSRG recommendations will be used in 2004 to develop an implementation plan for improved steelhead programs. Additional funding will be required to develop incubation and early rearing facilities at Skookumchuck Hatchery.

WDFW is unsure of the rationale for the concerns expressed by the HSRG regarding the broodstock source. As noted in the program description, WDFW currently has identified a single Skookumchuck/Newaukum winter steelhead stock. Spawning occurs in the Skookumchuck, Newaukum, North, Middle and South Forks of the Newaukum River. Some spawners are also observed in North Hanaford, Thompson, Lucas, Bernier, Mitchell and Kearney creeks.

South Grays Harbor Hatchery Winter Steelhead

Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

This is an early timed, locally adapting hatchery stock of Chambers Creek origin, from Lake Aberdeen and Bogachiel hatcheries. 5,000 fish at five fish per pound are released into the Elk River. 20,000 fish at five fish per pound are released into the Johns River from Lake Aberdeen. Adults are collected from volunteer returns (no rack return exists at the release sites), spawned, incubated and reared at Lake Aberdeen.

OPERATIONAL CONSIDERATIONS

- Fish are released at 4.5–6.5 per pound from late April to mid-May.
- All releases are adipose fin clipped.
- Five-by-five pooled matings are used.
- Elk and Johns rivers releases do not have adult collection capabilities.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
This program is providing a harvest opportunity.

B. Likelihood of attaining goals?
The program is likely to continue providing harvest.

C. Consistent with goals for other stocks?

Interbreeding of the hatchery stock with the naturally-spawning stocks is a concern, since adult capture capability does not exist. However, the risks from this program are minimal because both

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

short- and long-term biological significance and population viability goals for the naturally spawning stocks are low.

RECOMMENDATIONS

- Implement the HSRG's wild steelhead management zones System-Wide Recommendations in a modified manner adapted to this region (where many of the steelhead programs are using locally-adapted, integrated stocks; as opposed to the non-local, segregated stocks that typify steelhead programs in other regions). As part of this approach, use only integrated hatchery programs with native stocks in WRIA 23, and dedicate the Wishkah River in WRIA 22 to natural production. Fishing for steelhead in streams devoted to natural production would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. This approach would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- For segregated programs, use locally-adapted stock (of Chambers Creek or Skamania origin) and decrease reliance on other facilities (such as Bogachiel Hatchery) to backfill shortages in locally-adapting hatchery stock. Actions such as harvest restrictions should be implemented to achieve 100% local broodstock.
- Manage segregated hatchery stocks to maintain their 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 volitionally 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.

- Follow HSRG spawning protocols.
- Manage the hatchery stock to maintain its early spawn timing and reduce the likelihood of interaction with naturally-spawning steelhead.
- Size the hatchery program in a manner that achieves harvest goals with minimal impact on wild populations.

COMMENTS

- None.

MANAGERS RESPONSE

WDFW appreciates the HSRG recommendations on Wild Steelhead Management Zones, but believes 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. WDFW conducted a steelhead

workshop in 2003 to discuss recent research, performance of the hatchery programs, and management options (including integrated and segregated programs). Information gathered during this workshop and HSRG recommendations will be used in 2004 to develop an implementation plan for improved steelhead programs.

Wynoochee River Winter Steelhead

Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

Broodstock for this program was originally collected by hook-and-line from native fish in the Wynoochee River. This stock is one of 22 within the Southwest Coast Steelhead GDU. Adult collection is now of late timed fish at Wynoochee Dam. Up to 170,000 smolts at five fish per pound are outplanted into the Wynoochee River from Lake Aberdeen Hatchery. Spawning, incubation and rearing occur at Lake Aberdeen. Surplus fish are trucked upstream to spawn.

OPERATIONAL CONSIDERATIONS

- All releases are adipose fin clipped.
- Five-by-five pooled matings are used.
- The proportion of natural-origin spawners in the hatchery broodstock is unknown.
- This is a mitigation program for the Wynoochee River Dam.
- Fish are released volitionally.
- Adult collection capability exists at Wynoochee Dam.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program is being operated consistent with short- and long-term stock goals, and is providing harvest benefits.

B. Likelihood of attaining goals?
The likelihood of attaining goals is good, due to relatively good survival of coastal stocks in recent years.

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

RECOMMENDATIONS

- Implement the HSRG's wild steelhead management zones System-Wide Recommendations in a modified manner adapted to this region (where many of the steelhead programs are using locally-adapted, integrated stocks; as opposed to the non-local, segregated stocks that typify steelhead programs in other regions). As part of this approach, use only integrated hatchery programs with native stocks in WRIA 23, and dedicate the Wishkah River in WRIA 22 to natural production. Fishing for steelhead in streams devoted to natural production would not be incompatible with this approach, but no hatchery-produced steelhead should be introduced. This approach would reduce the risk of naturally spawning fish interbreeding with hatchery fish, and provide native stocks for future fisheries programs.
- For segregated programs, use locally-adapted stock (of Chambers Creek or Skamania origin) and decrease reliance on other facilities (such as Bogachiel Hatchery) to backfill shortages in locally-adapting hatchery stock. Actions such as harvest restrictions should be implemented to achieve 100% local broodstock.
- Manage segregated hatchery stocks to maintain their 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 volitionally 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.

- Assess the natural spawning population to understand the proportion of hatchery- versus natural-origin spawners. If natural-origin recruits are not driving adaptation, take steps to reduce hatchery-origin fish spawning naturally by following HSRG spawning and integrated population management guidelines (ensuring an annual average of at least ten percent natural-origin fish in the hatchery broodstock and no more than 30% hatchery-origin fish spawning naturally).

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).

MANAGERS RESPONSE

WDFW appreciates the HSRG recommendations on Wild Steelhead Management Zones, but believes 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. WDFW conducted a steelhead workshop in 2003 to discuss recent research, performance of the hatchery programs, and management

options (including integrated and segregated programs). Information gathered during this workshop and HSRG recommendations will be used in 2004 to develop an implementation plan for improved steelhead programs. Additional funding will be required to assess the proportion of hatchery- versus natural-origin spawners.

Wynoochee River Hatchery Winter Steelhead

Washington Department of Fish and Wildlife

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

PROGRAM DESCRIPTION

This is a contingency mitigation program for the Wynoochee Dam that is conducted if the integrated program's mitigation goal is not reached. The program has not been conducted for seven years. Broodstock for this program would be derived from locally-adapting, early-run, stock of Chambers Creek origin from Lake Aberdeen and Bogachiel hatcheries. Up to 120,000 early-timed stock would be incubated and reared at Lake Aberdeen to make up the difference and outplanted into the lower Wynoochee below the dam.

OPERATIONAL CONSIDERATIONS

- Fish would be released at 4.5–6.5 per pound from late April to mid-May.
- All releases would be adipose fin clipped.
- Five-by-five pooled matings would be used.
- Adult removal capability exists at the release site.

BENEFITS AND RISKS

A. Consistent with short-term and long-term goals?
The program would be consistent with short-term harvest goals.

B. Likelihood of attaining goals?
It is uncertain if this program would attain its harvest goal. Investing the resources this program would require in alternative strategies may be more likely to attain harvest goals.

C. Consistent with goals for other stocks?
These releases could pose genetic and ecological risks to the natural steelhead stock in the Wynoochee River, at times when that stock is depressed.

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

RECOMMENDATIONS

- Pursue modifications to the mitigation agreement to allow its resources to be used on some other project(s) more likely to provide the intended harvest benefit, without presenting risks to other stocks.

COMMENTS

- Alternatives could include hatchery, habitat, and/or angler access improvements, or other projects.

MANAGERS RESPONSE

WDFW understands the concerns of the HSRG and will review potential program modifications.

Facility and Regional Recommendations

Assembled below are the Hatchery Scientific Review Group's recommendations that involve capital improvements at hatchery facilities in the Grays Harbor region. Also included are several region-wide recommendations.

BINGHAM CREEK HATCHERY

- Improve the raceways.
- Provide mechanical crowders.
- Provide a heated water system and chiller.
- Improve adult sorting facility.
- Improve adult fish passage facility.

EIGHT CREEK POND

- Install outlet screens to control release timing.

HUMPTULIPS HATCHERY

- Develop an intake at Stevens Creek.

LAKE ABERDEEN HATCHERY

- Improve the screens.
- Upgrade the adult pond.
- Provide a heated water system and chiller.

SKOOKUMCHUCK REARING POND

- Develop facilities for on-site incubation and early rearing.
- Modify the adult trapping facility.
- Implement the HSRG's recommendations regarding the South Sound Net Pens, to eliminate rearing of fish for that program at Skookumchuck. This will accommodate the recommendations made in this regional review for programs at this facility.

WISHKAH HATCHERY

- Install intake screens.

ALL 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

- Identify fall, spring and summer Chinook stocks; determine their status; minimize impacts on other natural spawning stocks during adult collection.
- Mark and tag hatchery Chinook and coho, to determine their contribution to harvest and the proportion of hatchery-origin versus wild-origin fish on the spawning grounds.

COHO

Maintain and encourage regional diversity in this large, geographically diverse region. DNA analysis has shown that coho are more genetically diverse than was previously assumed. This will require further analysis of regional stock structure and suggests the use of locally-adapted broodstocks.

- Size coho programs consistent with goals for coho and other regional stocks.
- Include 10% jacks in broodstocks.

CHUM

- It was unclear to the HSRG that there was a need for conservation programs for chum. Regional chum stocks appear to be in reasonably good shape.

STEELHEAD

- Dedicate WRIA 23 to steelhead harvest programs, using integrated, native winter stocks.
- Dedicate the Wishkah River to natural production.

COOPERATIVE AND EDUCATIONAL PROGRAMS

- Ensure cooperative programs have adequate fish health support.
- Education programs should exemplify proper program design and operations, with clear educational objectives.
- Consider consolidating regional coho education programs, to improve the benefit.

CARCASSES

- Discontinue using pre-spawning mortalities for nutrification.
- Discontinue disposing of juvenile mortalities in pollution abatement ponds.