



1. Introduction

Purpose

The Stillaguamish Chinook Salmon Recovery Plan is intended to provide guidance to local stakeholders in a collaborative effort to restore and protect Chinook salmon populations in the Stillaguamish River watershed – Water Resource Inventory Area (WRIA) 5. This Plan is one of fourteen local watershed plans being prepared for submittal to the Shared Strategy for Puget Sound. The Shared Strategy is compiling this information for a Puget Sound-wide salmon recovery plan, as required by the federal Endangered Species Act. Once the draft plan is submitted, it will undergo review by NOAA Fisheries in advance of a final plan being produced in mid-2005.

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The overall goal of the Stillaguamish Watershed Chinook Salmon Recovery Plan is to help Chinook salmon populations recover to sustainable and harvestable levels. This document recommends an integrated strategy for protecting and restoring Chinook salmon populations, including individual strategies for habitat management, harvest management, and hatchery management, as well as an initial 10-year recovery plan with specific actions for Chinook salmon habitat improvement. The Plan's recommendations include habitat projects to restore watershed processes that affect Chinook salmon populations, protection of existing habitat through regulatory and non-regulatory strategies, stewardship education and outreach, and a monitoring and adaptive management plan.

This watershed plan was prepared by the Stillaguamish Implementation Review Committee (SIRC), the local stakeholder group overseeing salmon recovery and watershed planning efforts in WRIA 5. This document is the result of ongoing work by fisheries experts and the 25 local organizations and citizens who participate on the SIRC and have agreed to the watershed goals and priorities in the document.

SIRC Mission and Objectives

The Stillaguamish Implementation Review Committee (SIRC) is a broad-based watershed stakeholder committee with 25 members representing local municipalities, tribes, state and federal government agencies, agricultural and forestry interests, flood control districts, environmental groups, and citizens.

The mission of the SIRC is “To restore and maintain a healthy, functioning Stillaguamish Watershed by providing a local forum in which agencies, organizations, communities, and the public can engage in a collaborative watershed-based process of decision making and coordination.”

The SIRC was established in 1990 to review implementation of the Stillaguamish Watershed Action Plan, which addressed water quality problems in the Stillaguamish Watershed. In the mid-1990s, with leadership from the Stillaguamish Tribe and Snohomish County, the SIRC began addressing salmon habitat restoration issues in the watershed. Since 1999, the SIRC has served as the local citizens committee for recommending prioritized lists of salmon habitat restoration projects to the Washington State Salmon Recovery Funding Board. In September 2000, a SIRC subcommittee called the Stillaguamish Technical Advisory Group (STAG) produced a document titled *Technical Assessment and Recommendations for Chinook Salmon Recovery in the Stillaguamish Watershed*. The SIRC is also the local forum for public input on Snohomish County’s long-term salmon conservation planning effort for the Stillaguamish Watershed.

The focus of the SIRC is on collaborative watershed-based decision-making and coordination. The SIRC will work to implement the approved Stillaguamish Watershed Chinook Salmon Recovery Plan and will address future issues at a watershed scale. This ongoing effort will include coordination among the watershed’s jurisdictions and stakeholders to secure commitments to this Plan and achieve the collective vision for Chinook salmon recovery in the Stillaguamish Watershed.

Relationship to Shared Strategy and Central Puget Sound ESU Efforts

The State of Washington has proposed a statewide salmon recovery plan that covers multiple species of salmonids and Evolutionarily Significant Units (ESUs), distinct population groups as established by NOAA Fisheries that can receive ESA coverage. The Puget Sound Chinook salmon ESU covers all Chinook salmon populations in the Puget Sound region from the North Fork Nooksack River to the Elwha River on the Olympic Peninsula. The State’s plan includes sections for a regional response within the Central Puget Sound area as well as watershed-specific actions.

The Shared Strategy for Puget Sound is a collaborative initiative involving public and private stakeholders to share information and coordinate recovery planning across watersheds within the Central Puget Sound ESU region. The Shared Strategy effort relies on local watersheds to develop most of the technical information and public involvement effort for a Chinook salmon

recovery strategy. The Stillaguamish Watershed is one of fourteen watersheds that are working with the Shared Strategy to identify actions to recover salmon and obtain the commitments needed to achieve this goal. Individual watershed groups, such as the SIRC, are developing the technical and policy recommendations and will identify actions and commitments for habitat, harvest, and hatchery management to achieve local watershed goals.

The Stillaguamish Watershed will work with the Shared Strategy and the other watersheds and stakeholders throughout Puget Sound to integrate science and social policy into the regional recovery plan for Chinook salmon in the Central Puget Sound ESU. The watershed goal and recovery actions identified for the Stillaguamish Watershed will be coordinated with those from other watersheds to develop regional implementation scenarios. A regional consensus process will ensure that the final salmon recovery plan for Puget Sound ultimately reflects local needs and priorities, while meeting ESA requirements. The Shared Strategy is on schedule to deliver a regional recovery plan by June 2005.

Stillaguamish River Watershed Overview

The Stillaguamish River is the fifth largest tributary to Puget Sound. The Stillaguamish Watershed drains an area of approximately 700 square miles and includes more than 3,112 miles of river, stream, and marine shore habitat (Figure 1). Elevations in the watershed range from sea level to about 6,854 feet on Three Fingers Mountain. The river enters Puget Sound at Stanwood, 16 miles north of Everett in northwestern Snohomish County. The watershed drains into both Port Susan and Skagit Bay. It is also part of the Whidbey Basin, which includes Skagit Bay, Saratoga Passage, Port Susan, and Deception Pass.

The Stillaguamish Watershed can be divided into three general regions: the North Fork, South Fork, and Lower Mainstem. The two forks join in Arlington, 18 river miles from the mouth. Pilchuck, Deer, Boulder, and Canyon Creeks are the four largest tributaries to the Stillaguamish River system. The watershed includes land governed by Snohomish County and Skagit County, the cities of Arlington, Stanwood, and Granite Falls, and the Stillaguamish and Tulalip Tribes. Land use within the Stillaguamish Watershed is 76% forestry, 17% rural, 5% agriculture, and 2% urban (Snohomish County 1995). Federal, state, and private forest land uses occupy the majority of the watershed.

The local climate is typically maritime with cool, wet winters and mild summers. Rainfall is highly variable throughout the watershed, with average

annual rainfall ranging from 30 inches per year in the western lowlands of the watershed to 150 inches per year at higher elevations in the eastern portion of the watershed (Pess et al. 1999). Approximately 75% of the precipitation falls between October and March. Precipitation and streamflows are highest in late autumn and winter as a result of rainstorms and rapid snowmelt during warmer rainstorms (called rain-on-snow events). The lowest flows occur usually during the summer dry period from July through October.

Figure 1. Stillaguamish Watershed

Salmonid Species in the Stillaguamish Watershed

Chinook Salmon

Chinook salmon (*Oncorhynchus tshawytscha*) inhabit the mainstem, North Fork and South Fork of the Stillaguamish River, as well as several of the watershed's larger tributaries (Pilchuck, Jim, Canyon, Squire, French, Deer, and Boulder Creeks) (Figure 2). Two populations of Chinook salmon are found in the Stillaguamish Watershed: North Fork summer Chinook salmon and South Fork fall Chinook salmon. These two populations are distinguished by temporal, and to a lesser degree, spatial differences in spawning. Juvenile Chinook salmon rear throughout the river system. Approximately 98-99% of Stillaguamish Chinook salmon are ocean-type that reside in freshwater habitat for one to five months before migrating to the estuary, while the remaining 1-2% are stream-type that rear for approximately one year in freshwater before migrating to the estuary (Griffith et al. 2003). While Stillaguamish-specific information regarding the types of habitat utilized by Chinook during their freshwater residence is lacking, it is likely that they rear in the margins and low velocity habitats of the mainstem and larger tributaries (Healy 1991).

North Fork (Summer) Chinook Salmon

North Fork Chinook salmon are the predominant Chinook salmon population within the Stillaguamish Watershed. The majority (80%) of the North Fork Chinook salmon spawn in the middle and upper sections of the North Fork Stillaguamish, with limited numbers of fish using the larger tributaries (Boulder, Squire, Deer, and French Creeks) for spawning (STAG 2000; Stillaguamish Tribe and WDFW, unpublished spawner survey data). North Fork Chinook salmon select spawning areas that are associated with tail outs, riffles, and bars in the deeper portions of the low flow channel area. These spawning locations are at high risk for impacts from late fall and winter flooding. North Fork Chinook salmon females typically lay 3,000 to 5,000 eggs in one or more nests (redds) (Stillaguamish Tribe, unpublished broodstock records). Redds are generally located in gravel 1 to 3 inches in diameter, and eggs are usually buried in gravel up to 10 inches deep. In the Stillaguamish River, Chinook salmon eggs should reach the eyed stage from mid-October to mid-November and should hatch in November. Emergence from the gravel usually occurs during December and January.

South Fork (Fall) Chinook Salmon

The few small populations of fall Chinook salmon in the Stillaguamish Watershed can be found in Jim Creek, Pilchuck Creek, and the lower portion of the South Fork Stillaguamish. Fall Chinook salmon are also infrequently found in French Creek and Canyon Creek. South Fork Chinook salmon tend

to enter the river later than North Fork Chinook salmon, with fish arriving on the spawning grounds during mid-September and completing their spawning by mid-October (STAG 2000). The South Fork Chinook population salmon is a genetically unique population from the North Fork Chinook salmon population. Within the Puget Sound genetic units, the South Fork population more closely aligns with the Snohomish and South Sound stocks (including Green River) (Marshall et al. 1995).

Bull Trout

Four local populations of bull trout (*Salvelinus confluentus*) exist in the Stillaguamish Watershed (USFWS 2004): the North Fork Stillaguamish River (including Boulder Creek and potentially Squire Creek); the South Fork Stillaguamish River; Canyon Creek; and Upper Deer Creek (including Higgins Creek). There are also resident freshwater populations of bull trout in the watershed. Stillaguamish bull trout populations are presumed to use nearshore marine areas in Skagit Bay, Port Susan, and Possession Sound. According to the latest information available, many bull trout migrate annually, leaving the estuaries during the warm summer and early fall months.

The U.S. Fish and Wildlife Service (USFWS) has listed the Puget Sound bull trout as Threatened under the federal Endangered Species Act. Since the range of Chinook salmon habitat in the Stillaguamish Watershed is also used by bull trout, it is believed that actions taken in this plan to recover Chinook salmon will also benefit bull trout populations in areas of overlap.

Other Salmonid Species¹

Coho Salmon

The SASSI identifies two distinct coho salmon (*Oncorhynchus kisutch*) populations: Stillaguamish and Deer Creek. The former is considered a mixture of native and non-native fish because of releases of hatchery coho salmon from the early 1950s to 1981. This population is classified by SASSI as depressed. The Deer Creek population is a native population. Its status is unknown. The Stillaguamish Tribe operates a coho salmon brood stock program with fish derived from naturally and hatchery spawned adults. Coho salmon return to the Stillaguamish River in September and October, and generally spawn from mid-November through January. They spawn in almost all accessible tributary streams in the Stillaguamish River system, preferring smaller streams with stable streamflow and gravel-sized substrate (Miller and Somers 1989). Coho salmon fry emerge in March and April, and spend a full year in the watershed before migrating as smolts to salt water (Miller and Somers 1989). Juvenile coho salmon rear throughout the watershed, preferring small streams, side channels, wetlands and beaver ponds. Between 1986 and 1989, the annual coho salmon smolt production estimates from the

¹ Stock information is taken from SASSI (1993), SaSI (1998) and WCC (1999) unless otherwise noted.

Stillaguamish watershed averaged 649,081 and ranged from a high of 826,297 (1986) to a low of 514,680 (1989) (Nelson et al. 1997).

Chum Salmon

The Stillaguamish chum salmon (*Oncorhynchus keta*) are geographically separated into two populations: North Fork and South Fork. Chum salmon enter the river from September through December. Spawning occurs from mid- to late October through December. Chum salmon prefer to spawn in side channels and in larger tributary streams. Chum salmon fry emerge in March through May and leave the freshwater system almost immediately (Miller and Somers 1989). Juvenile chum salmon may linger in the estuary for up to three months before migrating into Puget Sound.

Pink Salmon

Pink salmon (*Oncorhynchus gorbuscha*) in the Stillaguamish Watershed are geographically and temporally separated into two populations: North Fork and South Fork. The genetic distinctions between the two stocks are unknown. This species is believed to be native to the Stillaguamish. There is no record of hatchery introductions. Pink salmon are listed by SASSI as healthy. Pink salmon enter the river on odd-numbered years from early August through early October. They are also found in the river on even-numbered years in limited numbers. The spawning season for pink salmon begins in late August and peaks in mid-October. Spawning mainly occurs in the North Fork and the South Fork and in larger tributaries (especially Squire, Boulder, Jim, and Pilchuck). Other tributaries are also used for spawning when sufficient flow is present. Pink salmon fry emerge from the gravels in March and leave the river almost immediately.

Steelhead Trout

Four steelhead trout (*Oncorhynchus mykiss*) populations have been identified in the Stillaguamish Watershed, including one winter run and three summer runs. The winter run is healthy according to SASSI, while summer runs are critical or unknown. Juvenile steelhead trout rear between one and three years in freshwater before departing for Puget Sound (Miller and Somers 1989). The pools of small quiet streams and beaver ponds are important for the young fry, but as the fish grow in size they are able to use the higher energy stream environments. Spawning occurs mainly in the North Fork and South Fork. The primary spawning tributaries include Pilchuck, Boulder, Squire, Jim, and Canyon Creeks. Approximately 100,000 to 130,000 hatchery winter steelhead trout smolts and 80,000 hatchery summer steelhead trout smolts are annually released into the Stillaguamish River. Smolts migrate out of the river from March through late June.

Sockeye Salmon

There is a small population of river sockeye salmon (*Oncorhynchus nerka*) inhabiting the Stillaguamish Watershed. Whether they are strays from other watersheds or a genetically distinct population is not known. Sockeye salmon

are known to spawn in the upper North Fork, as well as several tributaries including Jim, Deer, Squire and Boulder Creeks. Sockeye salmon generally enter the river from July through September and spawn from August through October. Smolts migrate out of the river from March through June.

Sea-run Cutthroat Trout

Sea-run (*Oncorhynchus clarki clarki*) and resident populations of cutthroat trout are found throughout mainstem tributary habitats in the Stillaguamish Watershed, although there has been no systematic inventory of these populations. Resident cutthroat trout, along with rainbow trout and brook trout, have been stocked in many lakes in the watershed (USFS 1995). Sea-run cutthroat trout begin entering the Stillaguamish in late July. Spawning occurs in mid-February through mid-May. Sea-run cutthroat trout typically rear from two to four years in freshwater before migrating to salt water, where they spend about two to five months before returning to the watershed (Spence et al. 1996).

Figure 2. Chinook Salmon Distribution

Non-Stillaguamish Salmonid Populations

Salmonids originating from other watersheds (non-natal populations) are known to use the Stillaguamish nearshore for juvenile rearing and adult feeding and migration. It is assumed that salmonids from the neighboring Snohomish and Skagit watersheds use the Stillaguamish nearshore more heavily than salmonids from more distant watersheds. However, recent studies have shown that juvenile salmonids are distributed widely throughout the Puget Sound basin nearshore after they leave their natal watersheds (Brennan et al. 2004).

Focus on Chinook Salmon

Chinook salmon is the focal species for the Stillaguamish Watershed Salmon Recovery Plan. While the watershed stakeholders have a strong vision for broad ecosystem restoration, the determination that Chinook salmon should be a clear focus of this plan was based on the following factors:

- Chinook salmon are listed as Threatened under the federal Endangered Species Act (ESA).
- The habitat and ecosystem processes that must be restored and protected for Chinook salmon will benefit all other salmonids in the watershed.
- Chinook salmon recovery efforts over three decades have not resulted in achieving the former escapement goal of 2,000 (Ames and Phinney 1977).
- While bull trout are also listed as Threatened under the ESA, much is unknown about what specific measures should be taken to address bull trout habitat needs. The USFWS is developing a Puget Sound Recovery Plan for bull trout on a separate track from the regional Puget Sound Chinook salmon recovery process.

