



SalmonGram

Committed to Restoring South Sound Salmon Habitat

Spring 2006

Nisqually Estuary Fish Ecology Studies: Learning what we can from South Puget Sound's largest estuary

Christopher Ellings Nisqually National Wildlife Refuge and Ducks Unlimited & *Sayre Hodgson* Nisqually Indian Tribe

The roughly 5000-acre Nisqually River Estuary complex, having barely escaped large-scale industrial development in the 1960's, thanks largely to conservation minded local citizens, represents one of the best examples of historic Puget Sound estuarine habitat. The continued preservation of the Nisqually Delta ecosystem coupled with extensive restoration of altered estuarine habitat is the highest priority habitat action for the recovery of naturally spawning, self-sustaining Nisqually River fall Chinook (*Oncorhynchus tshawytscha*).

The Nisqually Indian Tribe has already restored over 40 acres of historic estuary in the Nisqually Delta and plans on restoring an additional 100 acres in the near future. In addition, the Nisqually National Wildlife Refuge (Nisqually NWR) recently finalized a Comprehensive Conservation Plan that will guide management of the Refuge for the next fifteen years, the cornerstone of which is a plan to restore 700 acres of estuarine salt

marsh and tidal slough habitat, amounting to the single largest estuary restoration project in Puget Sound. The restoration of the Nisqually Delta ecosystem represents a unique opportunity to study the response of organisms to a recovering system.

Since 2002 the Nisqually Tribe, and in subsequent years the Nisqually NWR and Ducks Unlimited, have conducted research focused on spatial and temporal distribution of fish populations, co-occurrence and diet overlap between juvenile Chinook salmon of hatchery and wild origin, and pre- and post-restoration monitoring in the lower Nisqually River and Estuary. Plus, we have partnered with the U. S. Geological Survey Western Fisheries Research Center in Seattle to study Nisqually Chinook life history diversity, estuary residency, and estuary growth using otolith (bony structures in a fish ear) microstructure analysis.

In 2005, the Nisqually Reach

Nature Center (NRNC) was added to the partner list. The NRNC has been identifying and enumerating invertebrates (fish food) collected in the Delta. This plethora of data will be used to evaluate hypotheses about the response of fishes to management actions like restoration and to monitor trends in fish distribution and abundance in the Nisqually.

Data from the Nisqually studies have regional significance as governments and private entities gear up to restore a functioning Puget Sound ecosystem and look to a model watershed for guidance.

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Beach seining in the Nisqually Estuary.



Adult surf smelt netted near Nisqually Estuary.

South Puget Sound Salmon Enhancement Group

The SPSSEG is a non-profit volunteer-based organization that conducts salmon restoration, salmon enhancement and community education to increase salmonid populations in the South Puget Sound Region.

The SPSSEG is one of fourteen Regional Fisheries Enhancement Groups created in 1989 by the Washington State Legislature. The Regional Fishery Enhancement Program is partially supported by surcharges on sport and commercial fishing licenses. The Washington Department of Fish & Wildlife provides technical and administrative support to the program.

The SPSSEG is administered by a volunteer board of nine directors elected by the general membership.

Joe Williams—*President*
retired DOE

Terry Wright—*Vice President*
NWIFC

Dan Wrye—*Treasurer*
Pierce County Water Programs

Bill Graeber—*Board Member*
Retired NOAA, Stillwater Sciences

Suzy Lutey—*Board Member*
U.S. Fish and Wildlife Service

Blake Smith—*Board Member*
Puyallup Indian Tribe

Marc Wicke—*Board Member*
Tacoma Power

Bruce Verhei—*Board Member*
Vacant—*Board Member*

How to get involved?

Attend the SPSSEG General Membership or Board Meetings. Volunteer on projects or inform us of your salmon habitat restoration project ideas.

SPSSEG Annual Celebration

Renowned story teller and advocate for the environment and salmon, Peter Donaldson helped SPSSEG celebrate another successful year. This year's annual celebration was held at the Tacoma Public Utilities (TPU) conference hall in Tacoma. The facility was perfectly suited for our celebration and free of charge thanks to TPU.

The purpose of this event is to recognize the hard work of many individuals and agencies in helping restore salmon populations in South Puget Sound. They were presented with a small gift of appreciation.

Partners: Organizations who consistently help us with restoration and enhancement:

Mason Conservation District
National Fish and Wildlife Foundation
Nisqually Indian Tribe
Pierce Conservation District
Pierce County
Salmon Recovery Funding Board
Squaxin Island Tribe
Thurston Conservation District
Thurston County Stream Team
US Fish and Wildlife
WSDOT—Native Plant Nursery



Everyone knows how the real world works—right? - Peter Donaldson

Donors: Thanks to the following who donated items for our Raffle and Silent Auction, which supports the Kennedy Creek Salmon Trail:

Batdorf and Bronson Coffee Roasters
Boston Harbor Marina
Dave Mongovin
Don's Ruston Market
Fishy Business
The Grand Cinema
Harlequin Productions
The Old House Café
Ramblin' Jacks
Regal Cinemas

The Rock
Sea Grill
Sea Lice Charters: Blake Smith
Taylor Shellfish
The Tumwater Valley Golf Course
Two Dog Charters: Brian Abbott
Verle's Sportcenter and Marine
Vic's Pizzeria
Washington State History Museum
Wild Thyme Farm
Xihn's Clam and Oyster House

2006 Summer Construction Update

Once again it's the time of year when SPSSEG's project managers are busy preparing for construction season.

This summer we expect to remove six fish passage barriers and conduct several habitat enhancement projects such as the Mashel River LWD project.

The winter and spring months are spent securing Federal and State permits, funding, partnerships, advertising and selecting contractors, and ordering materials such as bridges, culverts and plants. In one sense our construction season is a year long process, but the actual in-water work is performed during the months of July, August and September with plantings occurring during the fall and winter.

Summer construction is an exciting time of year for staff; it's when all the faxes, emails, phone calls, paper work and meetings culminate into actual on-the-ground improvements. Below is a list of this year's construction projects and brief descriptions. Please feel free to contact us for additional information.

Malaney Creek

Location: Mason County
Construction Cost: \$365,000 (Mason County, SRFB)

Water-body: Malaney Creek, tributary to Oakland Bay

Description: This project involves removing a 4 foot diameter steel pipe and replacing it with a 20 foot concrete box culvert. This large scale fish passage project will result in a three week closure of Agate Road.

Little Skookum Valley Habitat Enhancement

Location: Mason County
Construction Cost: \$15,000 (SRFB)
Water-body: Tributary to Skookum Creek

Description: In-stream habitat improvements including the addition of several pieces of LWD.

McKenna Creek Culvert Replacement

Location: Thurston County
Construction cost: \$45,000 (FFFPP)
Water-body: McKenna Creek, tributary to the Nisqually

Description: SPSSEG is replacing a 36-inch, undersized and perched culvert with a 112-inch diameter fish-passing culvert. When complete, this project result in access to over 2 miles of stream habitat and access to critical over-wintering habitat

Silver Creek Barrier Removal

Location: Pierce County
Construction Cost: \$9,000 (USFWS)
Water-body: Tributary to the White River

Description: The project involves the modification of two derelict fish hatchery diversion dams to allow unimpeded fish passage.



Huge Creek Bridge Project

Location: Pierce County
Construction cost: \$120,000 (FFFPP, LIP)

Water-body: Huge Creek, largest tributary to Minter Creek.

Description: This project will remove an abandoned concrete culvert and a failing bridge with concrete abut-

ments. A 60 foot pre-fabricated steel beam bridge placed on concrete footings will replace the old crossing.

Mashel River LWD Restoration

Location: Pierce County, Town of Eatonville
Construction Cost: \$250,000 (SRFB, USFW, NFWF)

Water-body: Mashel River, tributary to the Nisqually River

Description: SPSSEG in partnership with the Nisqually Indian Tribe will install 11 Engineered Log jams on the Mashel River. This project will also include removal of 600 feet of rip rap and planting the riparian areas with native vegetation. Completion will increase in-stream habitat complexity, improve floodplain functions and riparian conditions. The species of interest in this reach are fall Chinook, coho and winter steelhead.

WF Rocky Creek Barrier Removal (2)

Location: Pierce County
Construction cost: \$75,000 (FFFPP, LIP)

Water-body: West Fork Rocky, Tributary to Rocky Creek.

Description: The project will involve the removal of two undersized fish barrier culverts and replacement with much larger multi-plate structures. Access will be improved to over two miles of spawning and rearing habitat for several salmonid species.

Acronyms:

FFFPP: Family Forest and Fish Passage Program

USFWS: US Fish and Wildlife Service

SRFB: Salmon Recovery Funding Board

LIP: Landowner Incentive Program

NFWF: National Fish and Wildlife Foundation

Movement of Acoustically Tagged Salmon Smolts in South Puget Sound

Scott Steltzner The Squaxin Island Tribe & Kyle Brakensiek Northwest Indian Fisheries Commission

The Squaxin Island Tribe has raised coho salmon in large floating net pens for over thirty years in Peale Passage. The program is intended to produce a viable fishery for both sport and tribal fisherman, the only problem is the continuing decline of fish year after year. "We're trying to figure out what is happening to these fish and where our problem is occurring. Is it in South Sound, is it in the Ocean or is it in North Sound?" describes fish biologist Scott Steltzner, a biologist with the Squaxin Island Indian Tribe, in charge of the project

Beginning in 2004 the Squaxin Island Tribe began an extensive migration study of their hatchery produced coho salmon. The study is made possible with the latest technology in acoustic tags and receivers. Acoustic tracking technology has progressed to the point where fish as small as 120mm can be planted with pinger tags. Use of this technology allows monitoring of juvenile salmonid residency, mortality and movement patterns.

The study begins by strategically placing receivers in the narrow inlets and passages that characterize South Puget Sound. Once the receivers are placed by divers fish are taken from the net pen facility and undergo a simple surgical procedure. The surgery implants a small tag that emits a unique code, detected by the underwater receivers. Tags were programmed to transmit every two minutes for a total of 120 days.

When these Coho are released they'll be tracked all the way

through the Sound, through the Strait, and out to the Continental Shelf. The Tribe's sensors join more than six dozen placed throughout Puget Sound and strung across the Strait of Juan de Fuca.

The tagging project is not operating alone. Several other agencies in the Pacific Northwest are taking part in this relatively new technology and are teaming up to share equipment and results. Currently the Squaxin Island Tribe is in year three of this study and have already compiled some interesting results for instance:

- Coho tagged in South Sound have been detected throughout Central Sound and in the Straights of Juan de Fuca.
- Species from other investigations migrating into South Sound include adult Chinook tagged in Lake Washington, opal eye squid tagged off Vashon Island, seven gill sharks tagged at the Seattle Aquarium, and

six gill sharks tagged in Willapa Bay.

- Initial mortality is high after salmonids (coho) enter saltwater.
- Preference is shown for holding areas in deep South Sound, they tend to stay 1 ½ to 2 weeks in South Sound followed by rapid out-migration past the Tacoma Narrows.
- Approximately 90% of the fish survived the tag implantation.
- 74% of fish were detected at receivers a distance from the release site.
- Individual fish were detected up to 75 days after release.
- Valuable information can be gained on habitat use, movement, and survival.
- Insightful information can be obtained from relatively few fish.



A small coastal cutthroat (*O. clarki clarki*) is stitched up after a tag has been inserted.

Since the beginning of this study the Tribe (and others) have experimented with tagging other species such as wild coho, steelhead, Chinook, cutthroat and lingcod.

Acknowledgements

The author acknowledges the Puget Sound and Coastal Washington Hatchery Reform Project for funding this research.



The Good Side of Floods

Jason Lundgren



This fall Western Washington experienced record breaking periods of rain and very significant individual rain events which dropped several inches of rain in a matter of hours. Nightly news showed us dramatic images of damage to homes and infrastructures from across the Northwest.

Although rain and flooding wreaks havoc on waterfront homes, salmon need these rains to trigger migration and create and maintain their habitats.

When a river reaches full capacity and overtops it's banks the river occupies the flood plain. The floodplain stores water. The water recharges floodplain ponds and often delivers sediments, salmon carcasses and other organic debris.

This process may create new freshwater habitats such as ponds, side channels or oxbows, and

forming new connections with existing habitats. It is well know that salmonids rely on floodplain habitat for rearing and refuge. Water stored in a floodplain also helps hydrate the river during dry months.

An unaltered (natural) floodplain also provides a healthy riparian habitat, which provides shade and wood to the system. Without a floodplain all the water is forced into stream channels often scouring out important sediments and occasionally salmon redds.



What are some other benefits of floods? We all know that rivers in the Northwest can become quite large and powerful under flood stage. These floods can

remove fine sediments and redistribute substrates. New sources of sediment and wood can also be recruited by flood events. These components are essential for fish habitat and proper river function.

So you see floods are not all bad, they actually can improve and create salmon habitat. Human activities, such as development, logging and some recreational activities have resulted in increased frequency and magnitude of floods in some of Western Washington rivers, resulting in a loss of salmon habitat and occasional loss of human habitat as well.

The floodplain serves an incredibly important function to the rivers function and ecosystem. When we restrict the river from using it's floodplain the results are usually disastrous for humans and salmon.

Recently Funded Projects

January marked the funding decisions for the Sixth Round of the Salmon Recovery Funding Board (SRFB). The SRFB typically distributes around 20 million dollars a year to preservation, restoration and assessment projects around the state that have proven their technical merit through a very competitive local scoring process.

Typically SPSSEG does fairly well with our project proposals but every year the competition increases remarkably. This year

SPSSEG was awarded roughly \$2 million dollars in salmon recovery funds to continue our mission around South Puget Sound.

Thanks to support by our partners our proposals were much stronger. Partnerships with **Pierce County, Nisqually Indian Tribe, Mason County, US Fish and Wildlife Service, Pierce Conservation District and private landowners Ed Leaf and Myron Saikawetz**

made these projects feasible.

The list of our recently funded SRFB projects includes the **Ohop Creek Restoration, Jarrell Creek Barrier Replacement, Little Skookum Estuary Restoration, Frye Cove Bulkhead Removal, and the Rocky Creek Barrier Replacement.**

We are very fortunate to have such supportive partnerships in South Sound! Call for more details.

Nisqually Estuary Fish Ecology

Continued from page 1

In order to facilitate regional comparisons, we modeled our field sampling protocols after similar studies in the Snohomish and Skagit River systems. We utilize a standard 'Puget Sound seine,' set by boat and hauled to shore by hand. We also capture fish using fyke traps, funnel-shaped traps that are used for pre- and post-restoration monitoring of fish leaving specific tidal sloughs.

To assess habitat utilization and life history diversity of Chinook salmon and other fishes, we divided the estuary into the following distinct habitat zones based on salinity and observed dominant vegetation: freshwater, forested riverine tidal, emergent forested transition, estuary emergent marsh, delta flats, and Near-shore. The marsh zone was subdivided further into McAllister (MCA) marsh, Red Salmon Slough (RSS) marsh, and Nisqually (NIS) marsh to facilitate geographic comparisons. Each zone is sampled at 1 to 5 sites once every two weeks between February and October. The remainder of this article will focus solely on our general fish ecology beach seining efforts up to 2004.

Total catch from all beach seine sets in research years 2002-2004 was composed of 30% shiner perch (*Cymatogaster ag-*

were of hatchery origin in years 2002, 2003, and 2004 respectively.

Peak timing of the species caught during sampling differed, but there was considerable overlap among species, with peak total catch occurring in May – June. Average catch per set (CPS) of hatchery Chinook was highest in May, immediately following hatchery releases into the Nisqually River that occurred each year between early May and early June.

Hatchery Chinook were less abundant in June and almost absent in subsequent months. Unmarked Chinook were present in the catch throughout the months sampled (Feb. – Oct.) but were most abundant from late February through June. Chum salmon were present in the sampling areas from March to July, and peaked in May. Shiner perch, the most abundant fish in our catches, are captured in the Delta from May through the end of sampling in October with a large peak in abundance in June to July. Forage fish like sand lance (*Ammodytes hexapterus*) and Pacific herring (*Clupea harengus pallasii*) are captured sporadically in our beach seining.

We gain even better insights into Nis-

qually estuary fish ecology when we analyze the use of different habitat zones by the various fishes. For instance, *Figure 3* shows the average proportional catch per set by zone for unmarked Chinook, hatchery Chinook, and chum. The data indicate extensive co-occurrence between chum, unmarked, and hatchery Chinook, especially between unmarked and hatchery Chinook in the transition and marsh zones. The impacts of these co-

occurrences are unknown but are presumed to be greatest where and when hatchery Chinook are most abundant. In the Nisqually Delta this would occur in the transition and marsh zones during May-June.

This baseline research is a critical step in developing a multi-species conceptual model of fish ecology in the lower Nisqually River and estuary. Such a model should aid in predicting fish responses to restoration of estuarine habitats. For example, an increase in the area of NIS marsh and transition zones following large scale restoration in the Delta would be predicted to benefit both naturally spawned and hatchery Chinook, by increasing capacity and reducing co-occurrence pressure in these 'preferred' habitat zones. As another example, restoration of the forested riverine tidal habitat would be expected to benefit a large proportion of natural origin Chinook and chum and a small proportion of hatchery Chinook. Our understanding of fish ecology in the Nisqually is constantly improving and we hope that the lessons we learn from our living laboratory will help with local and regional fish and habitat management.

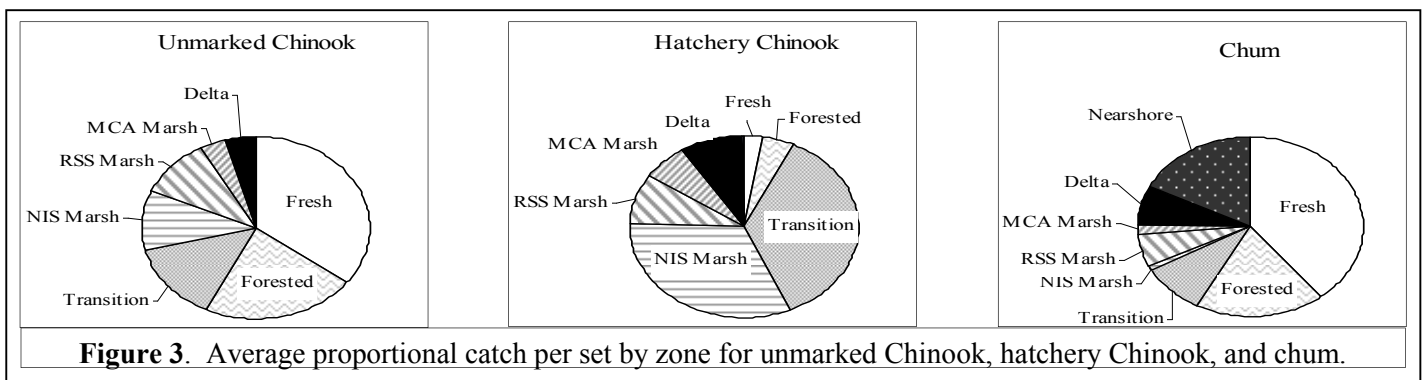


Figure 3. Average proportional catch per set by zone for unmarked Chinook, hatchery Chinook, and chum.

gregata), 19% sculpin (*Cottus and Lep-tocottus spp.*), 36% salmonids, and numerous other species. Among salmonids, hatchery Chinook were the most numerous, followed by chum (*O. keta*), pink (*O. gorbuscha*), unmarked Chinook, hatchery and unmarked coho (*O. kisutch*), cutthroat (*O. clarki clarki*), and steelhead (*O. mykiss*). Based on Chinook mark rates at Nisqually hatcheries and total catch, an estimated 14, 25, and 19% of the unmarked Chinook salmon caught

qually estuary fish ecology when we analyze the use of different habitat zones by the various fishes. For instance, *Figure 3* shows the average proportional catch per set by zone for unmarked Chinook, hatchery Chinook, and chum. The data indicate extensive co-occurrence between chum, unmarked, and hatchery Chinook, especially between unmarked and hatchery Chinook in the transition and marsh zones. The impacts of these co-

For more information please see:

Hodgson, S., C. Ellings, K. Brakensiek, and R. Coshov. 2005. Juvenile salmon baseline studies in the Nisqually Estuary; 2002-2004 results. Proceedings of the 2005 Puget Sound Georgia Basin Research Conference. Puget Sound Action Team. http://www.psat.wa.gov/Publications/05_proceedings/papers/A3_HODGS.pdf.

**Wear Your Support:
Get Your Very Own
SPSSEG Logo T-Shirt!!**

The shirts are made by Patagonia out of 100% organic cotton. Sizes available are adult M and L. The cost is \$15 and all proceeds go to helping support our group and salmon recovery in the South Puget Sound. For a \$25 donation you will receive a T-Shirt and a one year tax deductible membership to SPSSEG. Please e-mail or call if you are interested: SPSSEG@SPSSEG.ORG or (360) 412-0808.



**Board & Staff
Updates**

Spring is here and there are a few changes occurring at SPSSEG.

In February, we said goodbye to a long-time board member, **Richard Johnson**. Richard has served as secretary and on the SPSSEG board for the past ten years. He is dedicating more of his free time to Boy Scout activities. We'll miss you dearly, Richard!

The board elections brought the return of a prior member and past president—**Bruce Verhei**. We're very pleased to have an experienced board member join our cadre.

And **Jason Lundgren**, who has been a project manager for WRIs 13 & 15 these past four years, ac-

cepted a position with the Inter-agency Committee for Outdoor Recreation as a grant manager. We are very sad to see Jason go, but excited at this great opportunity for him.

Jason's last day with us was April 14. He's promised to keep in touch, so if you have any farewells you'd like to send, we can forward them to him.

GOOD BYE, JASON!

Volunteer Events

South Sound GREEN is looking for volunteer marine ecology instructors to teach stations at Henderson/Nisqually sites in May for field trips of GREEN student classes. The learning stations are being developed in April and input on those are welcome as well. Contact Information: Ann Mills, 360 754-3588 ext. 108.

Show Your Support! Join SPSSEG Today
A One Year Individual Membership is Only \$15 and is tax deductible.



**South Puget Sound Salmon
Enhancement Group
Membership**

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- ◇ Individual Membership.....\$15
- ◇ Family Membership.....\$25
- ◇ Business Membership.....\$200
- ◇ Corporate Sponsorship..... \$500

**Please Return form to: 6700 Martin Way East, Suite 112
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Mark Your Calendars for the SPSSEG Summer BBQ

Hot dogs, hamburgers, friends, fun and a little bit of history!

Please mark your calendars for **Wednesday, July 26 from 5-8 pm** for the **SPSSEG Annual BBQ**. This year we're gathering at the Tumwater Historical Park located on the lower Deschutes River.

Guest speakers will highlight the history of the Deschutes and its importance for salmon. Discussions will include past, current and future salmon management, Capitol Lake and the history of the oldest settlement in Washington.

This event is **free and open to the public**. BBQ fare and refreshments will be served. Friends, children and dogs (on leash), are welcome.



SalmonGram

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