Nooksack Salmon Enhancement Association

Salmon Spawner Survey 1999

Written by
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The field crew of the Nooksack Salmon Enhancement Association (NSEA) conducted a spawner survey in 1999, starting the first week of October in 1999 and extending through the first week of 2000. Survey areas were delegated after meeting with the Lummi Nation, Nooksack Tribe, and Washington Department of Fish and Wildlife (WDFW) survey staff. In our meeting we established survey protocols. Participants included Shannon Moore, NSEA; Mike MacKay, Lummi Nation; Loren Roberts, Nooksack Tribe; and Doug Huddle, WDFW. This four-party meeting allowed the different survey teams to determine areas to be surveyed to ensure coverage of the Nooksack Basin. It also prevented duplication of survey effort.

We met frequently during the survey period to share information. Exchanging field data during the season has several advantages. It provides a means for assuring both survey coverage and quality control checks of the data collected. Coordinating the team survey effort also allows us to share necessary supplies and forms when needed.

We attempted to compile and summarize our field data immediately after the survey for future use by others who have tasks relating to the recovery of Threatened and other listed stocks of concern as specified under the Endangered Species Act. For example, a summary of all DNA tissue samples collected alerts other resource managers about the availability of samples that may be examined to provide stock identification. This very useful information supplements our field observations.

Our objective this season was to document Chinook spawning activity throughout the Nooksack Basin. WDFW focused on their traditional index areas, primarily located in the upper watershed. Lummi and Nooksack Tribes assisted with index reaches in the South Fork. NSEA provided primary coverage in the lower tributaries. Lummi and Nooksack Tribes also covered portions of the lower river mainstem.

Field crews working for NSEA in past years have noticed Chinook salmon returning to lowland streams, but were unable to assess these populations due to budget constraints. This season’s effort and results are the most comprehensive Chinook survey done on the Nooksack River and its tributaries, due primarily to good survey conditions (low/clear water) and our increased survey effort. Our work located several new areas of importance to spawning Chinook.

As the run of Chinook salmon subsided, NSEA continued to collect data from returning coho and chum salmon within our index areas and other streams in the lowland rural and urban areas.

Index areas were checked on a weekly basis. In some cases, survey frequency was shortened to twice in a 10-day period to increase our effort when higher numbers of fish were seen. The following data were collected:

- Live and dead salmon were recorded by species.
- Length measurements were taken from salmon carcasses and sex was determined.
- Six scale samples were removed from each carcass, then fixed to a scale card with the measurements and other identifying information.
- If the adipose fin was not present on the sampled carcass, the snout was removed and noted on the scale card. The snout was then bagged and tagged for later lab analysis. These adipose-clipped salmon have tiny coded wires installed in the nose, which will identify for the lab technician the stock of salmon and its origin. Notably, NSEA found no Chinook adipose clips. (The tails were removed from the salmon after sampling to ensure that they would be counted only once. Sampled carcasses were then returned to the location where they were found.)
- Completed salmon redds were counted and flagged to ensure that they were not duplicated. Salmon redds were identified and recorded by species.

DNA tissue was collected from fresh Chinook mortalities. These tissue samples were taken from the gill opercul, stored in vials, numbered, and recorded on the scale cards. The purpose of collecting DNA samples is to determine which stock of salmon is spawning at which location. Stray factors can be re-examined and questions may be answered, such as, “Are the Chinook salmon that use Fishtrap Creek genetically different from the salmon that spawn in the mainstem of the Nooksack River?”
Some stream index areas were biological hot spots, visited by large birds of prey and an array of other predators removing the salmon from the index areas. This occurrence made it difficult at times to find carcasses to sample. By shortening the survey frequency down to a 4- to 5-day period, data collection improved. Areas where high predation occurred were usually associated with a lack of sufficient tree cover or woody debris overstory.

At times it was difficult to determine how many redds had been constructed in a spawning reach due to the fact that many Chinook salmon were using one particular area. This situation was observed on Bertrand Creek and Fishtrap Creek. In one case on Bertrand Creek, fifteen redds were constructed in a 300-square-meter area, due in part to two factors: 1) fierce competition for excellent spawning gravels; and 2) a large beaver dam barrier. Generally speaking, completed Chinook redds were in the range of 2-3 meters in length and 1-2 meters in width.

The reach of stream between river-miles 7.5 and 10.0 on Bertrand Creek has excellent spawning habitat. For the health of the resource, and given the amount of Chinook spawner use, this area needs to be preserved and protected. NSEA currently has plans for some riparian revegetation along this section. Portions of failing banks should not be overlooked.

In the larger tributaries surveyed, Chinook salmon were observed on the first outing (the week of October 1) and likely were present well before the survey started. The highest index counts of late-arriving Chinook salmon were during the week of October 28. As the late-arriving-Chinook run tailed off, smaller numbers of Chinook salmon were still observed constructing redds or simply housekeeping during the week of November 8. Arrival of Chinook salmon into the smaller tributaries was affected by available water. For example, Smith Creek and its tributaries did not have enough water to pass salmon onto spawning reaches until the first week of November. When sufficient water was available in Smith Creek and its tributaries, both Chinook salmon and coho salmon were observed constructing redds.

Recruitment of spawning salmon to Smith, McCauley, and Mitchell Creeks was higher than observations taken by survey crews in 1996 and 1997. High predation rates were similar to observations taken in 1996 and 1997. Predation of spawning salmon on Mitchell and McCauley Creeks is due to two factors.

- Spawning reach areas have a lack of tree canopy. Where canopy cover is sparse, great blue herons were observed spearing spawning salmon off redds with ease.
- The pools associated with spawning riffles lack sufficient depth at low flow. When stream flows were low, many pools lacked sufficient depth to sustain larger salmon; these salmon then became easy prey. Are these conditions effectively selecting for a population of smaller-sized adults, which seem to be adapting to changing watershed conditions? If so, is this a properly functioning stream -- or is the stream still sorting out watershed impacts?

For the most part, viewing conditions in the larger lowland tributaries of the Nooksack River remained stable from October into November. But as rains came in late November and December, these streams lost shape and became very turbid. Viewing conditions made it impossible to make accurate counts of spawner chum and coho salmon. For example, both chum and coho salmon were spotted in Bertrand Creek, but we cannot assume that these counts are an accurate representation of these species’ presence due to the terrible viewing conditions. Had the freezing level been lower through December, the survey crews would have been able to collect better fall counts of chum and coho salmon in the larger systems, such as Anderson, Bertrand, and Fishtrap Creeks.

The two index areas checked this year on Deer Creek had fewer coho spawner observations. Compared to 1998, the spawning population was down 50%. Spawning chum salmon were not present this year in Deer Creek. Other surveyors have noted that this chum population has been on the decline in recent years. This may be due to two factors: 1) small number of returning adults; and 2) predation of out-migrating fry in Barrett Lake.

Crystal Springs Creek, also known as Silver Springs Creek, had lower numbers of spawning salmon, when compared to 1998. Chinook salmon did not return this year and the chum counts were down substantially. In 1998, roughly 40 chums returned to spawn throughout this small system. These spawning adult chum
salmon are a product of a hydraulic egg-planting device. In the winter of 1995, NSEA and the Nooksack Tribe seeded some habitat projects on Crystal Springs Creek with Nooksack chum eggs. To establish a population of chum salmon, this seeding should have been continued for an entire life cycle (four years). However, the project showed positive results as the main group of three-year-olds returned to spawn in 1998. The product of the 1998 natural chum spawners will determine effectiveness of this short-term experiment. This group of adults will return in years 2001 and 2002. Because Crystal Springs Creek is far from the mainstem of the Nooksack River, the chum fry that emerged in 1998 may have been impacted by cutthroat and rainbow predation. Smolt trap results on Tenmile Creek last spring indicate a high presence of predator species, some of which were identified as exotics. The recruitment of spawning coho in Crystal Springs Creek totaled only 10 fish this year, similar to observations recorded in 1998.

Tinling Creek was surveyed for spawning coho with delightful results. This main tributary of Black Slough is located on the south fork of the Nooksack River. Surveyor Zitkovitch reported that 26 coho returned to spawn in his index reach. Since NSEA has numerous salmon habitat projects located on this slough, the spawner observations reaffirm the importance of continued work on this portion of the Nooksack River. On many occasions during the spring, NSEA crews have noticed out-migrating populations of smolting salmon on the slough. Also of importance are the observations of coho fry summering over on the Barker property along Black Slough. No spawning Chinook salmon were observed this season, although NSEA crew members have spotted fall Chinook in the proximity of Homesteader Road in years past. Black Slough would be an important system in which to install a smolt trap in order to determine if South Fork spring Chinook use this habitat. From the trapping results, we may be able to discern what populations of salmonids are using the Black Slough habitat.

Squalicum Creek remained impossible to survey during chum and coho runs due to constant rain events and poor turbidity conditions. This independent stream is adversely affected by urban runoff and flashes quickly. Baker Creek, a smaller tributary of Squalicum Creek, was surveyed twice when the mainstem was out of shape, with accurate observations of spawning chum salmon.

Working with NSEA, the Washington Conservation Corps crew was in charge of the Padden Creek salmon spawner survey. As reported, 200 chum salmon spawners were observed digging redds and traversing both fish ladders in the system. Also reported, chum salmon were unable to swim through the extremely long culvert at river-mile 1.25 to access the spawning habitat in Happy Valley. Many of these returning adults were imprinted above this impasse three and four years ago using remote-site salmon egg incubators. The likelihood of the trapped salmon becoming successful spawners is low due to stress caused by a barrier and crowded conditions.

At the end of this report are data sheets that summarize spawning salmon by stream. The number of salmon by species is recorded, along with the number of completed redds, scale cards, and DNA samples. Also available are data sheets that show salmon species sampled in the stream index areas. This information documents the sex, length, and river-mile location for each salmon.
Surveyed Streams and Index Sections

Bertrand Creek    r.m. 6.8 -- 9.7
Fishtrap Creek    r.m. 6.0 -- 7.0 & 7.8 -- 10.1
Double Ditch Creek r.m. 8.5 -- 10.5
Kamm Creek        r.m. 2.2 -- 3.2
Tennmile Creek    r.m. 0.0 -- 0.5
Crystal (Silver) Springs Creek r.m. 2.5 -- 3.5
Deer Creek        r.m. 3.0 -- 3.5
Anderson Creek    r.m. 2.5 -- 4.8
Smith Creek       r.m. 2.5 -- 3.5
McCaulley Creek   r.m. 1.0 -- 1.5
Mitchell Creek    r.m. 0.3 -- 1.0
Tinling Creek     r.m. 2.0 -- 2.5
Padden Creek      r.m. 0.0 -- 1.25
Baker Creek       r.m. 0.0 -- 1.1

Salmon Spawner Summary

Bertrand Creek: 01 - 0201

49 Chinook observed with 46 redds constructed
22 Chinook scale cards with 2 DNA samples
2 chum observed
1 coho observed

Double Ditch Creek: 01 - 0211

26 Chinook observed with 13 redds constructed
19 Chinook scale cards with 5 DNA samples
15 coho observed with 3 redds constructed
3 coho scale cards taken

Fishtrap Creek: 01 - 0210

68 Chinook observed with 64 redds constructed
24 Chinook scale cards with 13 DNA samples
Kamm Creek; 01 - 0223
6 Chinook observed with 5 redds constructed
6 Chinook scale cards with 2 DNA samples

Tenmile Creek, lower section; 01 - 0163
7 Chinook observed with 1 redd constructed
3 Chinook scale cards with 2 DNA samples

Deer Creek; 01 - 0165
7 coho observed with 8 redds constructed
2 coho scale cards taken

Crystal (Silver) Springs Creek; 01 - 0172
10 coho observed 12 redds constructed
6 coho scale cards taken
1 chum observed with 1 redd constructed

Smith Creek; 01 - 0234
9 Chinook observed with 6 redds constructed
1 Chinook scale card
9 coho with 5 redds constructed
4 coho scale cards taken

McCauley Creek; 01 - 0234
2 Chinook observed with one redd constructed
21 coho observed with 18 redds constructed
4 coho scale cards taken

Mitchell Creek; 01 - 0236
10 Chinook observations with 3 constructed redds
5 Chinook scale cards taken with 5 DNA samples
42 coho observed with 23 redds constructed
10 coho scale cards taken

Tingling Creek; 01 - 0250
26 coho observed with 9 redds constructed
2 coho scale cards taken

Baker Creek; 01 - 0555
57 chum observed with 15 redds constructed

Padden Creek; 01 - 0662
200 chum observed with 92 redds constructed
15 chum scale cards taken
11 coho observed
4 coho scale cards taken