Nearshore Surveys

Some people believe estuarine and low-lying wetland habitat is a vital habitat since smolts are in a weakened state caused by switching from freshwater to saltwater. Loss of critical habitat during this transition period could disproportionately harm the survival of smolt as they leave the river.

Lummi has a survey program that uses beach seines to sample juvenile salmon in the lower river, river delta, and suitable along-shore sites in the larger Bellingham Bay area to examine habitat associations and abundance.

Complementing this information, Lummi has recently begun to use a large lampera net in nearshore environments that are simply too deep for beach seine equipment. At each site, environmental parameters like water temperature and salinity are also recorded.

Co-occurrence studies

Several groups have expressed concerns that salmon smolts that are released from hatcheries may directly or indirectly harm smolts that are produced in the wild. In addition to data obtained during operation of the smolt trap, Lummi biologists use beach seines and snorkel surveys in the upper watershed to investigate the post-release behavior of hatchery smolts.

After two years of data collection it is clear that large hatchery Coho smolts do not linger in the river system for more than a few days thereby minimizing any impact from competition for resources, and gut content analysis has shown that no age-zero Chinook are at risk from predation by hatchery Coho yearlings.

If you have any questions about Harvest Management or Endangered Species Act responsibilities at Lummi, please contact Alan Chapman at 360-384-2202

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Natural Resources Department

Harvest Management
Salmon Science

Harvest Management: Salmon Science

Lummi people have depended on salmon for thousands of years. However, in recent years spring Chinook salmon in the Nooksack River have declined to disastrous levels and are now listed as endangered species. The problem is that each spawning adult produces less than one offspring that survives to spawn in the next generation and, consequently, each generation is smaller than the one before.

Lummi is working hard, along with our co-managers, to identify and fix the conditions that are causing this disastrous situation. Voluntarily cutting fishing catches by over 90% in the mid 1980's didn't turned the situation around, nor did the complete closure of the fishery for all spring Chinook in 1999, so Lummi is actively involved in studies to determine exactly which environmental or human factors are responsible for these problems. Our emphasis is on the Nooksack River watershed and near-shore environments.

For each spawning adult, less than one of their offspring survives to spawn

In order to identify what the problems are, it is first necessary to understand when and where salmon spend their time while in the river, and during their transition from fresh water to seawater. Secondly, we need to be able to measure survival of salmon during different times during their life and determine what factors are influencing survival rates. Finally, we need to be able to measure how the population responds to any restoration activities that are undertaken to fix the causal problems to be sure that our efforts are working.

Spawner Surveys

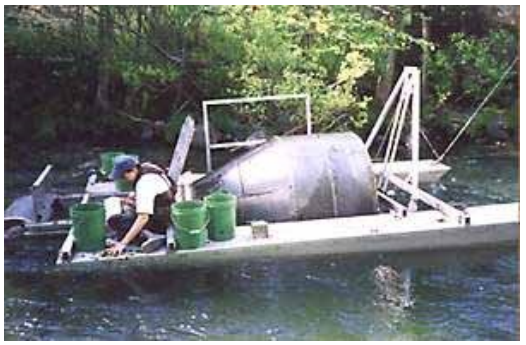
Each year, Lummi Natural Resources staff can be found in the upper watershed walking along miles of river looking for spawning salmon. Chinook salmon are counted and their carcasses retrieved, measured, and checked for markings and tags. If a coded wire tag is found, the snout is removed and the tags brought back for identification.

At the same time, redds (gravel nests where salmon deposit their eggs) are counted and located using GPS receivers. Locations of the redds are then plotted on a map to show where spawning activities are concentrated. Simple analysis of substrates at these locations provide information on the substrate's suitability and the likelihood of egg survival. Too-coarse substrates are difficult for salmon to dig into and cover their eggs sufficiently to protect them from strong river flows or predators. Too-fine substrates prevent oxygen from reaching the eggs and can eventually suffocate them.

Smolt Trap Studies

Every year, juvenile salmon follow their instincts and head downstream to the sea in a process called outmigration. Lummi operates a rotary screw-trap to intercept and capture some of these smolts unharmed as they get close to the mouth of the river. The smolts are counted, measured, and checked for marks and tags, before being promptly released again to continue their journey.

Data collected at the trap-site is used to estimate the



numbers of smolts moving downstream, and thereby to estimate the total number of smolts that outmigrate in a season. This allows us to estimate the total number of wild-origin smolts that are produced each year and, theoretically, predict returning year-class strengths for returning adult salmon. It also allows us to look at environmental variables and relate these to observed production levels of smolts. Our data so far indicate that there is a relationship between flood events in the fall and winter months with the production of Chinook smolts the following summer.

Furthermore, by looking at the number of spawners we can estimate the number of eggs produced. By comparing the number of eggs with the number of outmigrant smolts we can come up with an estimate for egg to smolts survival for the Nooksack River.

Another useful application of the data is to examine the behavior of hatchery-released smolts after they are placed in the river with a view to how they might interact with wild origin smolts. Results so far indicate that yearling Coho smolts stay in the river an average of just 2—3 days after release, whereas age-zero Chinook smolts may stay in the river considerably longer (two weeks or more).