



NORTHWEST STRAITS
marine conservation initiative

A Summary of the Sand Lance Workshop September 16, 2009

Background:

The Northwest Straits Commission (NWSC) has played an important role in helping Marine Resource Committees (MRC) in seven counties collect information on surf smelt and Pacific sand lance. These forage fishes, along with Pacific herring, are demonstrated drivers of the region's marine food web. Yet surprisingly little is known, particularly about Pacific sand lance. Recognizing that information is needed to understand basic life history characteristics, the NWSC brought together scientific experts to review what is known and not known about sand lance in the Northwest Straits. The workshop was convened at Padilla Bay on September 16, 2009.

Participants:

Greg Bargmann, Washington Department of Fish and Wildlife
Eric Beamer, Skagit River System Cooperative
Ginny Broadhurst, Northwest Straits Commission
Polly Fischer, Puget Sound Anglers Association
Kurt Fresh, NOAA Northwest Fisheries Science Center
Joe Gaydos, SeaDoc Society
Caroline Gibson, Northwest Straits Commission
Gary Greene, Tomolo Habitat Institute/Moss Landing Marine Laboratory
Sasha Horst, Northwest Straits Commission
George Hunt, School of Fishery and Aquatic Sciences, University of Washington
Ilon Logan, School of Marine Affairs, University of Washington
Doug Myers, People For Puget Sound
Jim Norris, Marine Resources Consultants
John Piatt, Alaska Science Center, U.S. Geological Survey
Dan Penttila, Washington Department of Fish and Wildlife
Tony Petrillo, Blue Water Engineering Services, Inc.
Suzanne Shull, Padilla Bay National Estuarine Research Reserve
Tina Wyllie-Echeverria, Wyllie-Echeverria Associates.

Invited Canadian participants - Cliff Robinson, Parks Canada Agency; Tom Therriault, Department of Fisheries and Oceans; and Ramona de Graaf, BC Shore Spawners Alliance - were regrettably unable to attend.

Workshop:

The meeting began with an overview by Dan Penttila on the role of Washington Department of Fish and Wildlife (WDFW) in efforts to gather life history and distribution information on Pacific sand lance. We learned that a baitfish project focused on Pacific herring began in 1972, during which data on sand lance and surf smelt were also collected. Sand lance are schooling plankton feeders, and prey to salmon, lingcod and other fishes, seabirds, and marine mammals. With an incubation period of ~30 days, they spawn at high tide –

commonly on distal ends of drift cells - from early November through February. Fecundity is 1,500-16,000 ova per female, and directly proportional to the size of the fish (ref. Martin Robards provided by Piatt.)

Pitted sand lance spawning areas documented in Port Gamble and elsewhere (possibly made by dabbling ducks as the tide receded) have contained high concentrations of sand lance eggs adhered to sand grains. Eggs are .6 mm in diameter and covered with sand grain coats, often occurring with surf smelt eggs. This year, Island County Beach Watchers hope to monitor sand lance spawning activity by video, during the day and at night.

No data are available on the impacts of human trampling on egg viability, though it is likely that they are susceptible. Because sand lance are winter spawners, and most low tides during the winter are at night, this may protect them. It was noted that Beamer is seeing fish up to 100 mm in length and not over that. Where are the mythical 14 cm sand lance? 4-7 year olds are found in the sand at low tides.

Penttila stressed the need for data on population biology, non-spawning behavior, and biomass of sand lance in Washington, as almost all work here has been on intertidal spawning habitat use. Sand lance are particularly vulnerable to the impacts of increasing shoreline development, due to their use of protected sand-gravel beaches. To date, approximately 250 miles of Puget Sound shoreline have been documented as spawning beaches, with little current effort to document new locations. Ramona DeGraff et al. are doing similar community-based sampling of sand lance and surf smelt spawning habitat in British Columbia.

Additional background presentations were given by Jim Norris and Gary Greene, on sampling methods and habitat mapping, respectively. The efficacy of gathering data by beach seining, trawling, stomach samples (specifically Chinook), gillnet (fine mesh from Norway), cast nets, and acoustic surveys was discussed, and Norris showed video footage of a prototype MOHT trawl net.

Greene described a promising means of determining biomass of sand lance through high-resolution mapping of associated benthic habitats such as sand fields. Questions were raised about the dynamics of the sediment in the sand waves (it's variable, as is sand wave size - waves can up to 30 meters high and may be too coarse for sand lance.) The sides of these subtidal sand dunes should to be looked at, and we need to learn what habitat are used at age 1, 2 and up.

The group held a productive roundtable discussion, and agreed that major information gaps exist around basic life history characteristics of Pacific sand lance. No index exists to determine the status of sand lance populations. It may be most important to determine the trends over time. Puget Sound Nearshore Ecosystem Restoration Project is working to determine what important intertidal habitat has been lost, by analyzing historical data on the geomorphology of Puget Sound shoreline and current armoring. Smith Island and Protection Island (both currently proposed for aquatic reserve status) have not been surveyed for forage fish spawning (per Dan Pentilla / Doug Myers).

Some of the research needs brought forward include:

- Identification of the threats to intertidal and sub-tidal spawning, including habitat destruction and water quality (artificial reefs, dredging, sewer outflows, tidal energy and others)
- Key predators – what eats Pacific sand lance?
- Drivers of interannual variation
- Competition
- Natural background variability
- Impacts of upland sediment transport (e.g., Elwha dam removal)

At least 12 databases of people doing salmon beach seining exist (ref. Tim Essington's work); this could provide a very important start on our understanding.

Outcomes/ Review

- A cohesive and compelling story about forage fish in this region needs to go public.
- The need to protect forage fish is recognized in the Puget Sound Partnership Action Agenda, but current funding within WDFW and other agencies is not focused on forage fish.
- The NWSC can provide a useful role by providing an information clearing house, and prioritizing funds for additional research.
- There are valuable opportunities to conduct citizen-based science, and engage volunteers in gathering new information about sand lance.

Possible projects identified during the workshop include:

- A survey of Puget Sound via beach seine, to include stomach and otolith (age structure) sampling.
- Identification of high potential sand lance spawning beaches in the region, and field sampling of those beaches for spawn.
- Investigation into whether there are genetic subpopulations in the Northwest Straits. (It was suggested that Dungeness Spit, Point Roberts, South Sound, and one outlier would be good candidate sites for sampling.)
- A comprehensive analysis of all historical beach seining activities, to glean information on when and where sand lance are captured in beach seines. This will provide preliminary data on population trends over time, and on the variability of surf smelt in beach seines, which can be used to help design more long-term beach seining (should that be warranted). This would be an excellent graduate student project.
- Identification of unpublished data sources on sand lance.
- Evaluation of existing habitat maps for potential juvenile sand lance habitat in the region.
- Identification of the forage fish prey that are the source of bird ball / marine bird feeding aggregations. Research could identify the birds and mammals in the feeding aggregation and use a cast net or dip net to identify the composition of fish in the bait ball.
- Creation of a framework - life history model - to which information can be added.

Next steps:

The NWSC committed to maintaining an online bibliography of sand lance references provided by workshop participants and the MRCs, and will work with our Technical Committee in coming weeks to discuss ideas from this workshop and pursue funding a specific project.