FORAGE FISHES AND THEIR CRITICAL HABITAT IN THE NEARSHORE ZONE OF PUGET SOUND

KEY POINTS

1. Seasonal forage fish spawning activity is an important ecological feature for a significant portion of the Puget Sound shoreline (for maps search: WDFW PHS Marine Map - ArcGIS).

2. Located in the intertidal/nearshore zone, forage fish spawning habitats are vulnerable to the effects of shoreline usage and development. Substantial amounts of forage fish spawning habitat have been degraded or destroyed by the cumulative impact of shoreline usage and development in Puget Sound.

3. Preservation of spawning habitats is essential for forage fish preservation. Retention of shoreline vegetation is important for **shading beaches**, reducing temperatures and preventing dehydration of forage fish eggs (Rice, 2006).

4. ***All known forage fish spawning habitat sites are currently protected from net loss by specific language in the WDFW Hydraulic Code (WAC 220-660-320), local shoreline master programs, and critical areas ordinances.***

5. Our knowledge of the location and temporal usage patterns of forage fish spawning sites is incomplete. Additional sites continue to be identified, and/or the spawning timeframe more completely described, in on-going surveys.

6. ***Forage fish spawning habitat preservation cannot depend solely on public acquisition, restoration, or mitigation.*** Few restoration/mitigation efforts have been rigorously evaluated with regard to long term improvement or replacement of spawning habitat.

7. Given widespread privatization of tidelands in the Puget Sound basin, forage fish spawning habitat preservation will increasingly depend on the application of regulations to private property. Adherence to private property rights must be balanced with effective stewardship and preservation of the public's forage fish resources and associated critical habitat.

8. The need for public education about forage fish, their critical habitat, and their ecological role is critical to maintain a well-informed citizenry. **Public education and involvement are key!**

Original document by Dan Penttila, WDFW; modified by Dayv Lowry, WDFW 2011; adapted by Todd Sandell, WDFW 2016.

- Herring: Typically spawn on aquatic vegetation; eggs hatch in ~7-12 days dependent on temperature. Spawning windows are January to April for most stocks; a few northerly stocks spawn through mid-June. Spawning occurs in the intertidal (-3 ft.) to subtidal (down to a depth of -20 ft.; rarely to -40ft.).

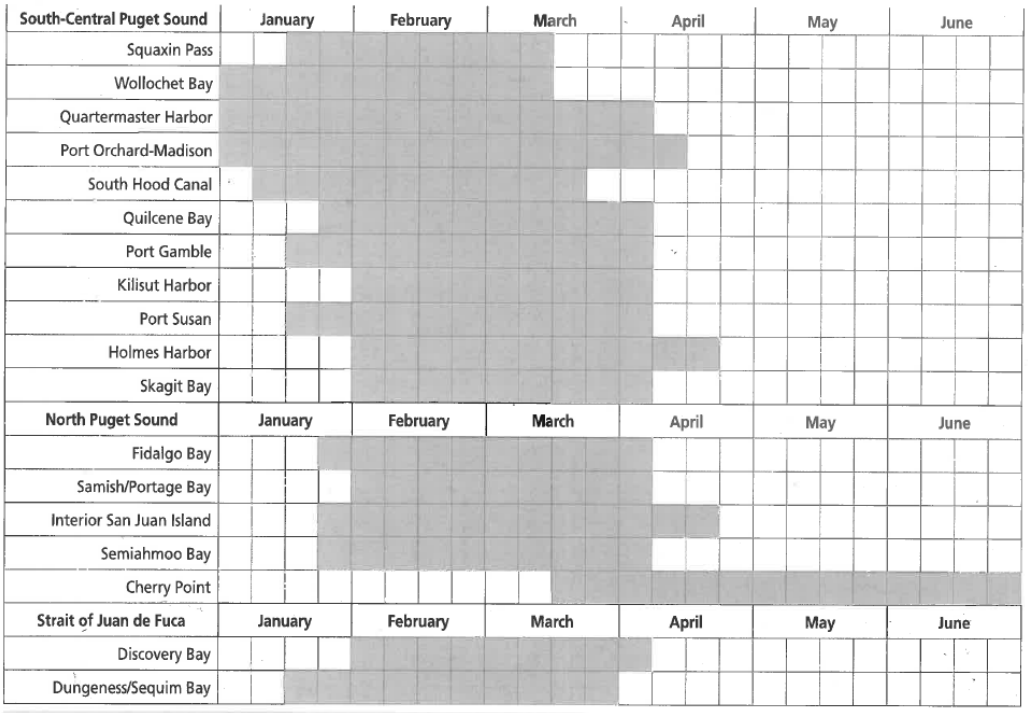

Figure 3. Documented spawning times for Puget Sound herring stocks.

- Surf Smelt can spawn year-round, with most occurring in summer or fall. Smelt spawn in the upper intertidal (max high water to +7 ft.) zone of gravel beaches. Surf smelt in Puget Sound are considered to be a single genetic stock.
- Sand Lance spawn in fall and early winter, slightly lower on the beach (high water to +5ft.) than surf smelt. At present we have little information about sand lance genetics or ecology, but research has shown that they are a preferred food item of Chinook salmon.

Information and Resources:

http://wdfw.wa.gov/conservation/research/projects/marine_fish_monitoring/herring_population_assessment/index.html
http://wdfw.wa.gov/conservation/research/projects/marine_beach_spawning/
http://www.ecy.wa.gov/programs/sea/pugetsound/species/sandlance.html
https://sites.google.com/a/psemp.org/psemp/for
http://www.nwstraits.org/our-work/forage-fish/
http://www.pewtrusts.org/en/research-and-analysis/fact-sheets/2013/09/25/forage-fish-faq

Herring and midwater trawl information: Todd.Sandell@dfw.wa.gov
Surf smelt and sand lance, beach surveys: Phillip.Dionne@dfw.wa.gov