



Whatcom Marine Resources Committee (MRC) 2024 Forage Fish Monitoring Final Report

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Whatcom County Public Works—Natural Resources

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Abstract

The Whatcom MRC participates in a regional effort, led by the Washington Department of Fish and Wildlife (WDFW), to characterize populations of the two species of forage fish that spawn on Puget Sound beaches: Pacific sand lance and surf smelt. This project has included a successful collaboration between WDFW, the Northwest Straits Initiative, and the MRC's citizen scientists, which has improved knowledge of forage fish spawning grounds in Washington State.

The MRC recruits and trains volunteers to conduct spawning surveys at priority beaches in Whatcom County as identified by the MRC and WDFW. During the reporting period, surveys were conducted monthly at Little Squalicum Beach and every other month at Clayton Beach using forage fish survey protocols developed by WDFW. MRC staff and volunteers conducted the forage fish survey sample collection and processing, then sent the condensed samples to WDFW for egg counting, identification, and analysis. From October of 2023-May of 2023, 138 surf smelt eggs were found at Little Squalicum Beach and 1 surf smelt egg was found at Clayton Beach. Forage fish samples from the remainder of the reporting period (June-September) are awaiting analysis by WDFW.

Gathering data on forage fish spawning grounds can result in legal protections of spawning beaches, can inform potential soft shore restoration projects for Whatcom County, and can be used to assess the effectiveness of local restoration projects. The MRC will continue to work with local partners to identify and prioritize critical areas to be monitored for forage fish spawning throughout Whatcom County.

Project Goals

Because forage fish are a vital component of the food web in the Salish Sea, the Washington Department of Fish and Wildlife (WDFW) monitors their population status, spawning locations, and how they respond to shoreline development. The MRC serves as a local partner to WDFW to support their statewide sampling efforts and expand the impact of the study. As such, the goal of the forage fish monitoring project is to survey local beaches for forage fish to support state wide sampling and to inform potential soft shore restoration projects for Whatcom County.

Project Engagement

Forage fish monitoring efforts rely on community volunteers and staff from Whatcom County Public Works (WCPW). The scope of forage fish monitoring efforts in Whatcom County is shaped in part by project partners including the City of Bellingham, the Port of Bellingham, and the Northwest Straits Foundation. Since 2023, the MRC has conducted forage fish surveys along Squalicum Beach and Clayton Beach. Little Squalicum was chosen with the MRC's knowledge and support of shoreline restoration projects recently completed by the City of Bellingham and the Port of Bellingham. Clayton Beach was also chosen in partnership with the Northwest Straits Foundation and the Skagit MRC in preparation for a proposed shoreline restoration project.

Partners/ Organizations

- **Washington Department of Fish and Wildlife (WDFW):** Coordinates data analysis, supplies for volunteers, training, and on the beach sampling practice and refreshers. Develops and provides protocols.
- **Northwest Straits Commission (NWSC):** Coordinates with MRC project managers and WDFW staff to provide supplies/materials and training to volunteers. Receives samples from the MRC and transfers to WDFW.
- **Whatcom County Public Works (WCPW) MRC Staff:** Sets sampling dates, manages volunteer coordination, leads sampling and processing efforts following protocols, tracks training needs, and coordinates with NWSC and WDFW. Creates county reports and manages data.
- **The City of Bellingham:** Completed restoration of the Little Squalicum Estuary, aiming to restore tidal and sedimentary processes, to improve fish passage, and to return saltmarsh, mudflat and estuary habitats to an area where historical wetlands had been lost.
- **The Port of Bellingham:** Completed a shoreline enhancement project at Squalicum Beach to remove industrial fill, wood waste, and large slabs of broken concrete from the shoreline, creating a much larger and more accessible beach and creating priority habitat for forage fish.
- **Northwest Straits Foundation:** Provided suggestions to the MRC to monitor Clayton Beach in partnership with the Skagit MRC in preparation for a proposed shoreline restoration project at this location. The MRC monitors this location.

Participants

Forage fish survey efforts depend on community volunteers and staff with WCPW. A full volunteer list is included in Appendix A. Throughout the reporting period, 12 volunteers participated, contributing over 60 hours of volunteer time to the project.



Volunteers assist with forage fish sample collection and processing. Photo credits: Dana Flerchinger, MRC staff.

Methods

Sample collection, processing, and analysis were conducted according to WDFW protocols (See Appendix B). Activities were conducted by or under direct supervision of MRC staff and MRC volunteers that have completed the WDFW forage fish survey training. The MRC also created and follows a Standard Operating Procedure (See Appendix C), that provides step by step instructions on survey planning, equipment cleaning, and other survey details. Forage fish surveys are conducted monthly when the tide is below 5ft for the entirety of the survey process.

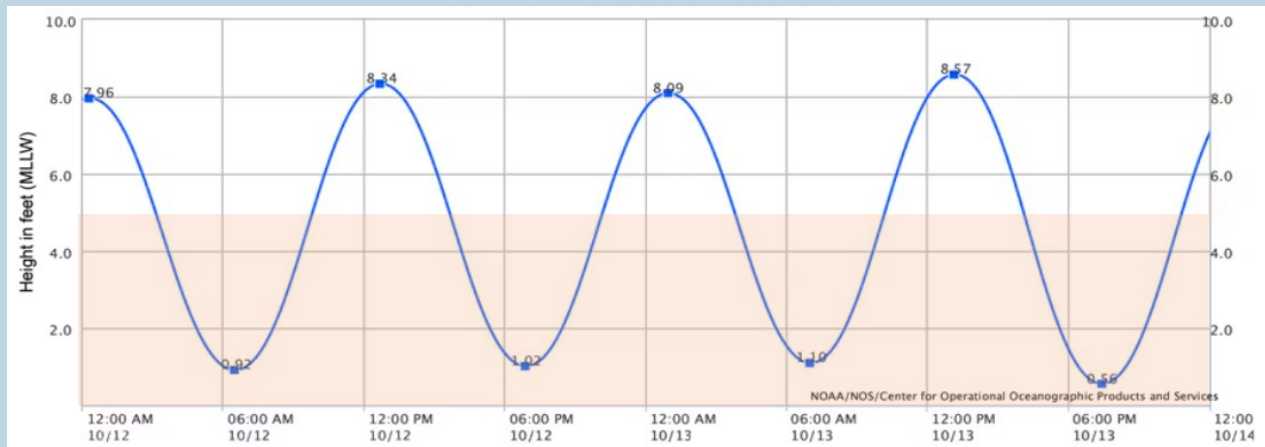


Figure 1: Example tide table showing appropriate tide window (less than 5 feet highlighted in tan) for the surveys.

Methods

- A bulk sediment sample is collected and condensed to concentrate eggs.
- While conducting the bulk sediment sample collection, several photos are taken to effectively characterize each of the sampling locations.
- Field data is entered into an iForm application on the MRC's field tablet, which is accessible to WDFW.



Left: Bulk substrate collection. Photo credit: Dana Flerchinger. Right: Photo characterizing a sample location along measuring tape. Photo credit: Eleanor Hines.

- Samples go through a wet sieving and winnowing process to obtain subsamples of forage fish egg-sized material from bulk beach substrate samples.
- A vortex method is used to separate lighter forage fish eggs from heavier sediment. The smaller volume of beach material that is then transferred to WDFW for lab analysis.



Left: Wet sieving and winnowing process. Right: The vortex method. Photo credit: Austin Rose

Methods: Little Squalicum Beach

The MRC collects bulk sediment samples from 4 locations along Squalicum Beach, within the beach nourishment areas of the two recent restoration projects completed by the City of Bellingham and Port of Bellingham.

Forage Fish Survey Station ID	Latitude, Longitude
LSE-1 (Reference Site)	48°45.804, -122° 30.834
LSE-2 (Near Estuary Tidal Channel)	48°45.870, -122° 30.027
LSE-3 (Beach Nourishment)	48°45.936, -122° 31.261
LSE-4 (Beach Nourishment)	48°45.967, -122° 31.391

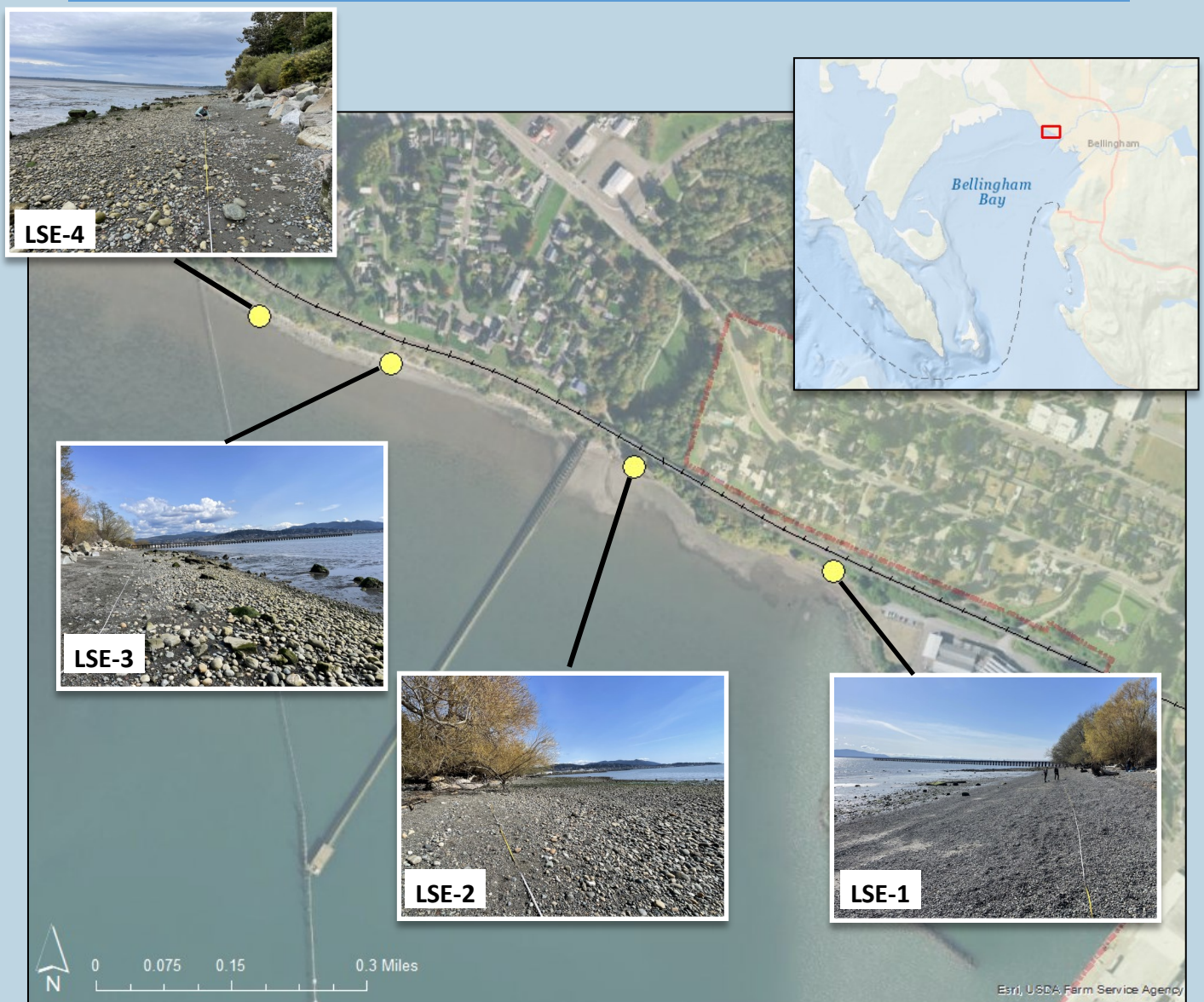


Figure 2: Sampling locations along Little Squalicum Beach. Photo credits: Dana Flerchinger, MRC staff.

Methods: Clayton Beach

In partnership with the Northwest Straits Foundation and the Skagit MRC, the Whatcom MRC conducts forage fish surveys at Clayton Beach every other month (the Whatcom MRC switches off with the Skagit MRC as this site is right on the county line). The MRC collects bulk sediment samples from 2 locations that are randomly selected relative to an established midpoint on the beach. These surveys are conducted in anticipation for a proposed nearshore restoration project at Clayton Beach.



Figure 3: Sampling locations at Clayton Beach. Photo credit: Dana Flerchinger, MRC staff.

Results: Little Squalicum Beach



Figure 4: Surf smelt eggs found at Little Squalicum Beach from 2023-2024. Total number of surf smelt eggs represent the combined counts at each of the 4 sites at Little Squalicum Beach. However, site LSE-1 had the majority of the eggs. Data from 2024 only goes until May as WDFW has not yet processed the samples from June-September of 2024. All raw data is included in Appendix D.

Results: Clayton Beach

The surveys at Clayton Beach started in October of 2023. Since then, only one surf smelt egg was found in December of 2023. Samples from August and September of 2024 are awaiting analysis by WDFW. All data is included in Appendix D.

Outcomes

The MRC continued to gather data on forage fish spawning grounds by monitoring two locations in Whatcom County for forage fish eggs. This project included successful collaboration between WDFW, the Northwest Straits Initiative, and the MRC's citizen scientists, improving knowledge of forage fish spawning grounds in Washington State.

Outputs

Over the course of the monitoring season:

- 60 samples were collected over 18 sampling events at Little Squalicum Beach and Clayton Beach
- 12 volunteers participated
- Over 60 volunteer hours were contributed

Next Steps

As coastal development and the impacts of climate change and sea level rise continue to impact shorelines throughout Whatcom County, identifying areas of critical habitat for forage fish spawning will be essential to effectively protect these vital populations. The MRC will continue to work with local partners to identify and prioritize critical areas to be monitored for forage fish spawning throughout Whatcom County.

Appendices

- **Appendix A:** Participating Volunteer List and Volunteer Email Distribution List
- **Appendix B:** WDFW Forage Fish Survey and Processing Protocols
- **Appendix C:** Forage Fish Survey MRC Standard Operating Procedures
- **Appendix D:** Raw Forage Fish Data from WDFW