

Forage Fish Sampling

October 2024 – September 2025

SEANWS-2023-IsCoPH-00007 / Task 2



Processing Samples by Kelly Zupich



Gathering Substrate by Kelly Zupich



Sample by Kelly Zupich



Measuring the Beach by Kelly Zupich



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1. Abstract

Forage fish are a vital part of the Puget Sound ecosystem, and the monitoring of their status is an important component to the recovery of Puget Sound and the Salish Sea. This project of the Island County Marine Resources Committee (MRC) focuses on forage fish spawning at nearshore restoration sites and index sites. Index sites are locations identified by Washington Department of Fish and Wildlife (WDFW) which have public access and have previous documentation of forage fish spawning. The monitoring work of the Island County MRC supports the greater work of Salish Sea partners in understanding and documenting forage fish nearshore use within the region for proactive management.

The Island County MRC has concentrated on the following project goal: The Island County MRC forage fish program aspires to monitor long-term beach spawning patterns, recovery at restoration sites, and to provide spawning data in support of beach protection efforts.

The project contributes both to these local goals, consistent with the MRC's mission to protect and restore marine life and habitat along our County's shoreline, as well as contributing to the consistent forage fish data collected across the MRCs of the Northwest Straights Initiative, and by the Washington Department of Fish and Wildlife and Washington Department of Natural Resources.

2025 continued monthly surveys at the sites surveyed in 2024, as documented in the appendices below, and showed continued signs of regular beach usage at three sites, as well as new data about beach usage at the newest site, Cavalero Beach on Camano Island. At the end of 2025 we will be evaluating continued surveying at well-surveyed post-restoration sites as well as our long-term index sites. Our experiences will also be informing the development of our proposal for new citizen science supported research into forage fish beach usage.

2. Project Goals

The goals of the intertidal forage fish spawning surveys in Island County are to:

- Monitor forage fish spawning at selected sites in conjunction with completed, planned, and proposed shoreline restoration work.
- Expand regional knowledge of location of forage fish spawning through index site surveys.
- Determining presence of spawning for beach protection.

These surveys are designed to establish continuity with existing WDFW and Washington State Department of Natural Resources (WDNR) data in an effort to define trends and develop an understanding of the conditions and processes affecting the study areas over time. To achieve this, all surveys use established standards and sampling methodologies developed and made available by WDFW. All surveys are required to be led by an individual who has undergone the forage fish monitoring certification training provided by WDFW. As the planned monitoring program is implemented over succeeding years, it has and will continue to generate data that can be used to establish baseline conditions, define trends, document changes, track restoration projects, and identify potential new restoration opportunities.

3. Project Engagement

The forage fish sampling project engaged with standing regional volunteers, such as those from Sound Water Stewards, whose expertise aided in the project's success. This work would not be possible without the hard work and dedication of many volunteers (Table 1). The MRC would like to extend its thanks to the volunteers who help make this program possible. Collectively, volunteers reported hundreds of hours of invaluable service into this project during the 2024-2025 season.

3.1. Partners/Organizations

Table 1

Volunteer/Staff	Role	Survey Locations
Kirk Larsen	Volunteer Project Lead / Survey Lead	Keystone Farm
Sean Duffy	Volunteer	Keystone Farm
Heather Anson	Volunteer	Keystone Farm
Beverly Yoshida	Volunteer	Keystone Farm
Kristin Galbreath	Volunteer Survey Co-Lead	Seahorse Siesta
Scott Galbreath	Volunteer Survey Co-Lead	Seahorse Siesta
Rachel Nostrom	Volunteer Survey Co-Lead	Seahorse Siesta
Allison Hiltner	Volunteer	Seahorse Siesta
Kurt Herzog	Volunteer Survey Lead	Glendale
Karen Scharer	Volunteer Survey Lead	Hoypus Point and Cornet Bay
Tracy Braun	Volunteer	Hoypus Point and Cornet Bay
Paul Williams	Volunteer Survey Lead	Maple Grove
Tim Cuchna	Volunteer	Maple Grove
Art Evjen	Volunteer Survey Lead	Cavalero Beach
Barbara Gallagher	Volunteer	Cavalero Beach
Kelly Zupich	IC Staff (through July 2025)	

3.2. Participants

Participants noted in Table 1 above and participated in each monthly sampling and monitoring survey.

3.3. Named community(ies) involved

N/A

4. Project Methods/Actions

The methodologies used during the surveys follow those described in the Field Manual for Sampling Forage Fish Spawn in Intertidal Shore Regions ([Moulton & Penttala, 2006](#)) and supplemented by the Vortex method for separation of forage fish eggs from beach sediment ([Dionne, 2015](#)). Additionally, all survey leads, and most volunteers, have received formal training in these methods from WDFW staff. Data and samples collected during the are submitted to the WDFW and data necessary to replicate the surveys (e.g., location and timing) are included with submissions and available from the WDFW forage fish survey database (see [web map](#) for summary, data access, and contact information). Survey activity timelines, by location, are included in appendices below.

The MRC conducts several intertidal and subtidal surveys to better understand marine habitats and species such as forage fish, juvenile salmon, eelgrass, and kelp. In addition, the MRC participates in shoreline restoration projects in Island County. In an effort to create a deeper knowledge base of the health of Island County's shoreline, the MRC chose monitoring sites at which survey and/or restoration projects are being conducted. Restoration projects at the selected forage fish monitoring sites are in in-progress, or post-project phases. In addition, in collaboration with WDFW, volunteers conducted surveys at three index sites. We began sampling at a new index site, Cavalero Beach on the east side of Camano Island.

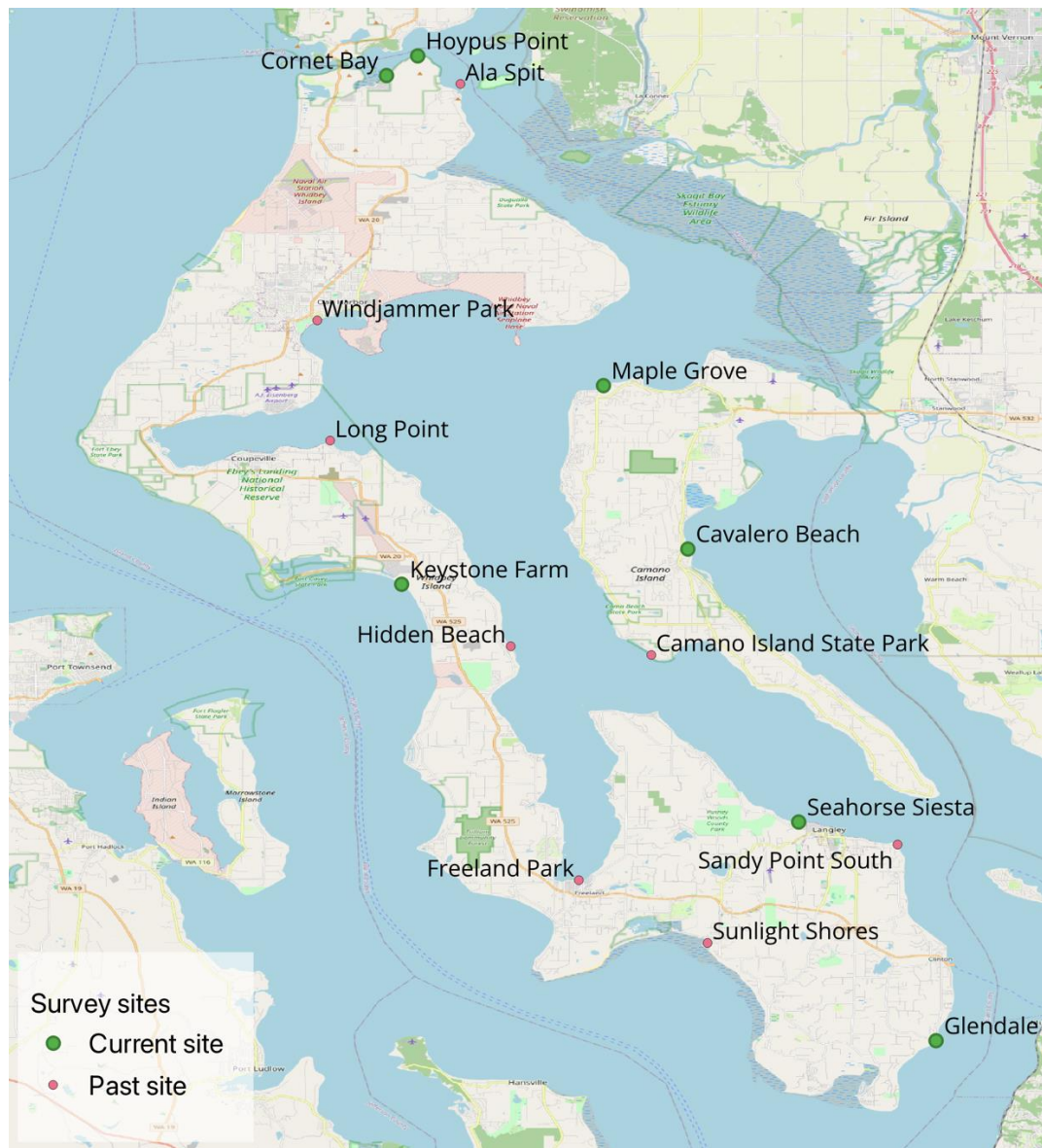


Image 1. Map showing location of the 2024-2025 sampling locations (please note that Seahorse Siesta is only sampled November - February).

	Cornet Bay	Hoypus Point	Keystone Preserve	Seahorse Siesta	Glendale	Maple Grove	Cavalero Beach
Type	Restoration	Restoration	Restoration	Restoration	Index	Index	Index
Lead(s)	Karen Scharer	Karen Scharer	Kirk Larsen	Rachel Nostrom, Kristin Galbreath	Kurt Herzog	Paul Williams	Art Evjen
Samples per Month	3 (3 stns/mo)	2 (2 stns/mo)	3 (3 stns/mo)	4 Nov-Feb (2 stns)	1 (1 stn/mo)	1 (1 stn/mo)	2 (2 stns/mo)
Location	North Whidbey	North Whidbey	Central Whidbey	Southeast Whidbey	South Whidbey	Northwest Camano	East Camano
Description	Bulkhead removal, fill removal, beach regraded in 2012. Removal of fill and beach regrading in section southwest of original restoration completed in Fall 2015.	A dilapidated 350 linear foot bulkhead lined the shoreline. Removal took place in 2022 to restore the shoreline to more natural conditions and gradients.	This property included a beach house and short bulkhead that was be removed in 2024 as part of the habitat restoration of the site.	Removal of barge and bulkhead fall 2020-winter 2021.	This site is at the mouth of Glendale Creek, which is a salmon-bearing stream.	This site is a popular public fishing site for surf smelt. Surf smelt eggs have been observed from May through October for multiple years.	This is the only known survey site on Port Susan (Snohomish MRC down not sample north of Everett) and there has been evidence of both surf smelt and sand lance in historical surveys.

Table 1. Overview of 2024-2025 Current Forage Fish Monitoring sites. “Stns” or stations.

5. Results

5.1. Data Summary

The digital iForms with included beach photos and data was shared regularly with WDFW, the lead agency on data analysis. Due to a high volume of samples some of our site’s samples have not been processed yet. As such, the data summary table below is incomplete.

Six sites were sampled at least once in the project year. Table 2 shows monthly surveys and results in terms of egg presence. Some samples, from January forward, are in queue with WDFW for analysis.

[illegible]

Key:		sampled in month							
	-	no eggs present in sample							
	3	number of eggs for site by species							
	SL	Sand Lance							
	SS	Surf Smelt							
		samples in queue for analysis							
		(t.b.d. - work in progress / forthcoming)							

				Sample year (October prior year to September)										
Site	Index	Rest.	Location	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
Hoypus Point		X	N Whidbey						12	12	12	12	8+	
Cornet Bay		X	N Whidbey				7	8	12	12	12	12	8+	
Ala Spit		X	N Whidbey			1	5	8						
Windjammer		X	C Whidbey	3	12	12	5							
Long Point			C Whidbey	8	12	12	5							
Keystone Preserve		X	C Whidbey								3	12	8+	
Hidden Beach		X	SE Whidbey				5	8	10	12	7			
Freeland County Park			SE Whidbey	1	10	12	3							
Seahorse Siesta		X	SE Whidbey					3	1	4	3	4	2+	
Sandy Point South			SE Whidbey	3										
Glendale	X		S Whidbey		9	12	3	5	6	5	12	12	7	
Sunlight Shores		X	SW Whidbey						5	11	11			
Maple Grove	X		NW Camano	7	9	7	8	2	5	12	12	12	8+	
Cavalero Beach	x		NE Camano									1	8+	
Camano State Park			SW Camano			7	3	1						

X	Sampled in year and number of times		
** 2025 is through August so + recognizes that more data may be forthcoming			

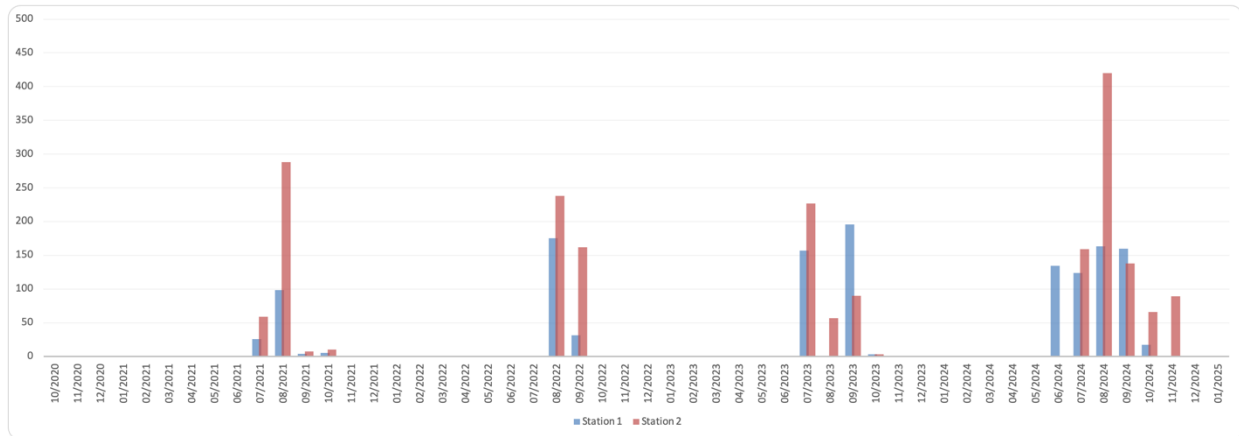


Chart 1. Hoypus Point surf smelt egg counts through January 2025

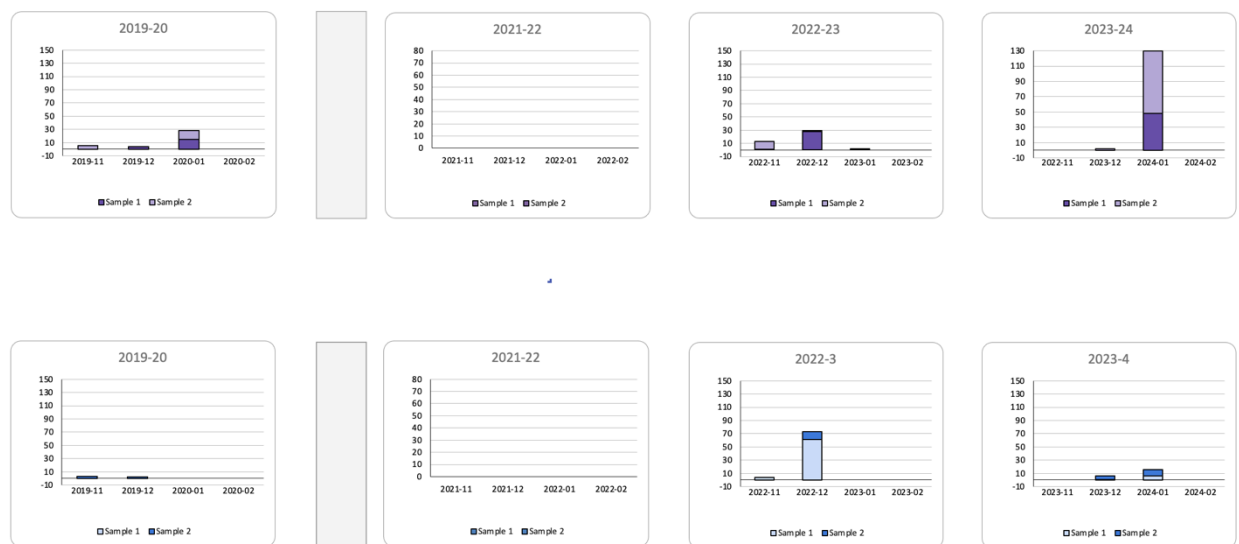


Chart 2. Seahorse Siesta sand lance egg counts through February 2024

5.2. Outcomes

The outcome of the intertidal forage fish spawning surveys in Island County are to:

- Monitor forage fish spawning at selected sites in conjunction with completed, planned, and proposed shoreline restoration work.
 - The MRC forage fish lead and project volunteers successfully monitored Island County’s seven forage fish monitoring sites. Of the seven monitoring sites, five of the sites had previously gone through restoration practices and

through the forage fish monitoring project, volunteers were able to document which beaches had the most sampling success to support the need for future restoration work on new beaches.

- Expand regional knowledge of location of forage fish spawning through index site surveys.
 - Through the forage fish sampling project, Island County MRC and their volunteers have contributed to a regional forage fish sampling database that supports the Puget Sound ecosystems overall health and continued knowledge base of the Puget Sound Vital Signs documentation and management.
- Determining presence of spawning for beach protection.
 - Island County MRC's forage fish sampling project has contributed to regional documentation of where forage fish are spawning and where future protections could be provided. In addition, the sampling work of various beaches, some who have undergone restoration and others who haven't, and have allowed managers to see where there has been restoration success and pave the way for future coastal restoration protections. The sampling work of Island County's MRC and neighboring MRCs will allow for coastal resource managers a better understanding of next steps in protecting forage fish spawning beaches for Puget Sound ecosystem recovery.

5.3. Outputs

- 16 volunteers participating in over 100 hours of forage fish citizen science.
- Seven forage fish spawning sites monitored monthly between 2023-2025.
- 3 samples at each of the 3 stations sampled at Cornet Bay per month; 2 samples at each of the 2 stations sampled at Hoypus Point per month; 3 samples at each of the 3 stations sampled at Keystone Preserve per month; 4 samples at each of the 2 stations samples at Seahorse Siesta between November and February; 1 sample at the 1 station sampled at Glendale per month; 1 sample at the 1 station sampled at Maple Groce per month; 2 samples at each of the 2 stations sampled at Cavalero Beach per month.
- Pacific Herring eggs observed at Cavalero Beach for the first time in 15 years.

Results in context

The 2023-2025 Island County MRC's forage fish sampling project has contributed to regional understanding of where forage fish are spawning and where future protections could be provided. The sampling work of Island County's MRC and neighboring MRCs will

allow for coastal resource managers a better understanding of next steps in protecting forage fish spawning beaches for Puget Sound ecosystem recovery.

6. Project Highlights, Innovations & Stories

While processing Cavalero Beach samples from February 2025, partners discovered developing Pacific Herring eggs. Unlike surf smelt and sand lance, herring do not spawn directly on the beach but lay down their eggs on the nearshore vegetation, which can break loose and drift onto shore. Finding herring eggs here is significant because while WDFW monitors spawning herring populations, partners only have capacity to visit sites that have seen herring spawn in the last decade. As herring eggs had not been found here for at least 15 years, this site was no longer considered a survey priority. In direct response to this sample, WDFW will extend surveys this coming year to ensure these grounds are being sampled for recent spawning. These surveys support the Forage Fish Vital Sign, which helps recognize the significance of herring populations to the overall health of Puget Sound.

7. Lessons Learned

There has been increased interest on the part of new volunteers to participate in surveys on both Whidbey and Camano. Camano volunteers have been actively recruiting new volunteers and bringing them out to observe.

There continues to be an interest in contributing to further research into and development of the current survey protocols. This has informed a new forage fish project proposal.

New site Cavalero Beach has already shown surf smelt spawning, and in winter months which we have not seen as much of at other productive sites such as Maple Grove and Hoypus Point. Herring roe was also found at Cavalero Beach, likely having detached from nearby aquatic vegetation. WDFW has expressed excitement about this finding and will be restarting herring surveys in Port Susan.

8. Next Steps

With the 2023-2025 project cycle coming to an end, forage fish project partners will transition away from the 2023-2025 goals and focus on the next 2025-2027 goals. These include documenting forage fish spawning at selected sites in conjunction with completed, planned, and proposed shoreline restoration work. Additionally, volunteers will document forage fish spawning at WDFW index sites and monitor the health of these sampling sites for future work.

Appendices