

Forage Fish Surveys



Project Reporting Period 10/01/23-9/30/24 Task 2.7

Grant number SEANWS-2023-CICoCD-00005



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1. Abstract

The forage fish monitoring program is an integral program of the Washington Department of Fish and Wildlife (WDFW), whereby the Clallam County Marine Resources Committee (CCMRC) collects substate samples from selected beaches for analysis by WDFW to determine usage by shoreline forage fish species. In addition to providing WDFW status information of certain fish species, the CCMRC can provide county planners the importance of retaining natural state of select beaches.

Designated beaches include Cline Spit, East and West Elwha River beaches on either side of the Elwha River mouth, and the inside of Ediz Hook. Sampling protocol is dictated by WDFW. CCMRC does preliminary processing by sieving and winnowing, and then passes the preserved samples to WDFW.

Elwha River beaches and Ediz Hook are designated as restoration sites by the CCMRC and the Lower Elwha Klallam Tribe. Due to restoration status and changing of beach substrate and morphology, the presence of forage fish eggs has been rare. At Cline Spit, forage fish eggs, particularly Surf Smelt (*Hypomesus pretiosus*) are abundant during the spring and summer months. Other species found included Pacific Sand Lance (*Trichodon trichodon*) and Northern Rock Sole (*Lepidopsetta polyxystra*).

These data are processed by Washington Department of Fish and Wildlife (WDFW) and added to their regional database. This project is well established and successful for the Clallam MRC, and sampling at these four sites will continue in future reporting periods.



Figure 1. A mix of sand and forage fish eggs, shown on a person's hand for scale. The eggs can be identified as perfectly round, off-white particles. Photo credit WDFW.

2. Project Goals

The forage fish monitoring project is part of a larger ongoing regional forage fish monitoring program. The Clallam MRC monitors forage fish spawning on a monthly basis at four different locations to provide valuable information on seasonal sand spatial spawning trends by forage fish on Clallam County beaches. This ongoing project is to have accurate spatial population data for forage fish in Clallam County as part of ongoing forage fish monitoring program. This data will contribute to the Washington Department of Fish and Wildlife (WDFW) database documenting status and trends.

3. Project Engagement

The forage fish monitoring project engages with local citizen scientists (Clallam MRC), the Lower Elwha Klallam Tribe and WDFW. The Lower Elwha Klallam Tribe does not have the capacity to monitor for forage on the newly formed beaches at the mouth of the Elwha River. The Elwha River Restoration Project is the 2nd largest U.S. restoration site and the CMRC is helping to document when forage fish start to utilize the new habitat. The forage fish project is part of the larger WDFW monitoring project and WDFW analyzes the samples and send us the data as well as adding it to their long-term data set.

3.1. Partners/Organizations

The Northwest Staits Commission assists with writing the Quality Assurance Project Plan and organizes sampling protocol training with WDFW. Washington Department of Fish and Wildlife supplies the training, supplies for preserving samples and analyzes the samples for egg species. WDFW also compiles the data and uploads it to their long-term data set as well as an end of season presentation to all MRCs on results per County.

4. Project Methods/Actions

Clallam MRC sampled for forage fish eggs in this reporting period at four sites, determined in partnership with WDFW. Sampling took place monthly. Elwha Beach East was not sampled October 2023 – May 2024. This was due to a combination of two concerns: safety issues with nighttime low tides on the log-strewn beach, and temporary concern about whether the habitat was suitable for forage fish due to the condition of the beach.

Table 1. The list of four sites sampled by the Clallam MRC in this reporting period.

Site Name	Type	Sampled by CCMRC since
Cline Spit	Index	2018
Ediz Hook	Restoration	2017
Elwha Beach East	Restoration	2022
Elwha Beach West	Restoration	2022

Forage Fish Sampling Locations Clallam MRC 2023 - 2024

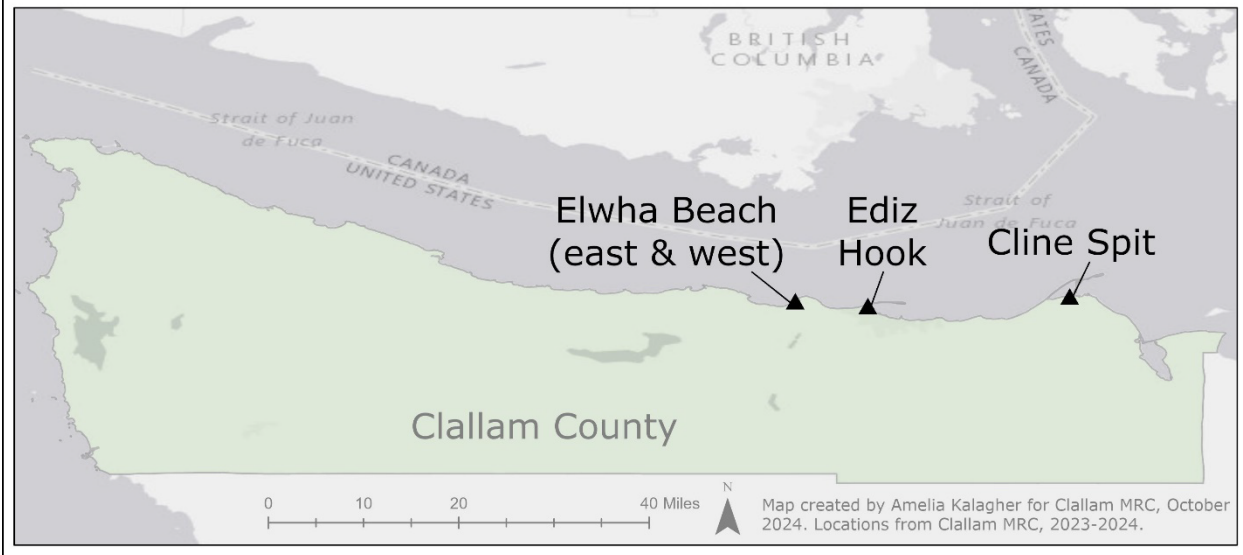


Figure 2. A map depicting the approximate locations of each sampling site within Clallam County. Created by Amelia Kalagher, October 2024.

Because WDFW is the lead entity for an area wide program, the Clallam MRC uses WDFW's [established protocol for collecting and initial processing](#). Initial processing consists of sieving and winnowing to separate eggs from the majority of the sediment in the sample. Once this processing is complete, samples are hand delivered to the WDFW office in Port Townsend and forwarded to WDFW's laboratory in Olympia for final egg identification and enumeration. WDFW staff reports data back to the MRC through staff on a routine basis.



Figure 3. A sieve (left) and winnowing setup (right) used for initial processing of samples. The winnowing setup separates eggs from sand as much as possible, by creating a gentle vortex and using the eggs' natural buoyancy to capture them from the water's surface. Photo credit Tim Cochnauer.

5. Results

The samples taken in this reporting period continue to follow the main seasonal trends of forage fish spawn events observed at each location since the MRC began sampling: early winter for sand lance, early spring for rock sole, and at highest levels in summer for surf smelt. The most interesting result in this reporting period was a large sand lance spawn event in December 2023 at Ediz Hook – the largest number of sand lance eggs ever recorded in a sample by the Clallam MRC.



Figure 4. MRC project lead Tim Cochnauer fills a sample bag at Cline Spit with sand and sediment, selected for optimal texture for forage fish spawning substrate.



Figure 5. MRC project lead Tim Cochnauer begins to collect a sample at Cline Spit, after laying a transect line for the length of the sampled area.

5.1. Data Summary

Surf smelt eggs were observed in six samples in this reporting period for which data is available. Low numbers of surf smelt eggs, ranging from 1-7 per sample, were observed late in the season between October and December 2023 at Ediz Hook, Elwha Beach West, and Cline Spit. One large surf smelt spawn event was observed at Cline Spit in May 2024, with 151 eggs found. This may be accompanied by additional large spawn events in summer 2024 as trends would predict, but data are not yet available from WDFW for these samples.

Two sand lance spawn events were observed. 2 eggs were found at Cline Spit in November 2023. The largest number of sand lance eggs ever found in a Clallam MRC sample was observed at Ediz Hook in December 2023. This sample contained 20 eggs.

No Northern Rock Sole eggs were observed in this reporting period, pending analysis of samples from June through September 2024.

Table 2. The samples taken in this reporting period that resulted in non-zero numbers of eggs found. Note that data from June 2024 onward is not included, as it has not yet been reported by WDFW.

Survey Date	Location	Surf Smelt	Sand Lance	Rock Sole	Total Eggs
10/25/2023	Cline Spit	7	0	0	7
10/26/2023	Ediz Hook	6	0	0	6
10/26/2023	Elwha Beach West	1	0	0	1
11/28/2023	Cline Spit	5	2	0	7
12/22/2023	Cline Spit	2	0	0	2
12/22/2023	Ediz Hook	0	20	0	20
5/22/2024	Cline Spit	151	0	0	151

Data for all samples from this reporting period are provided as an appendix. This includes samples that found zero eggs, and samples for which data is not yet reported from WDFW.

5.2. Outcomes

This project's goal is to monitor forage fish spawning monthly at four locations, and thus contribute to the WDFW's long-term database. This goal was accomplished in the 2024 grant year, as all four locations were successfully monitored and samples reviewed by WDFW. One location, Elwha Beach East, was not monitored from October through May due to volunteer safety and suitable habitat concerns, but six samples were taken from this

location June through September and it is expected to be consistently sampled going forward.

5.3. Outputs

- 136 volunteer hours contributed to the forage fish project
- 38 samples collected from 4 sample sites
- 194 total eggs found in grant year 2024 (172 surf smelt, 22 sand lance)
- 6 spawn events detected (i.e. at least two eggs found at a location)

5.4. Results in context

Summer months historically include the largest surf smelt spawn events, particularly at Cline Spit. Because most data for June 2024 and onward are not yet available from WDFW, direct comparison of summer 2024 with previous years is not possible. However, MRC members usually take a preliminary review of samples prior to delivering to WDFW for formal analysis, and were surprised this year to see a lack of abundant surf smelt eggs in summer samples from Cline Spit. WDFW's reporting of results will reveal whether or not there was a true lack of large surf smelt spawning on Cline Spit in summer 2024.

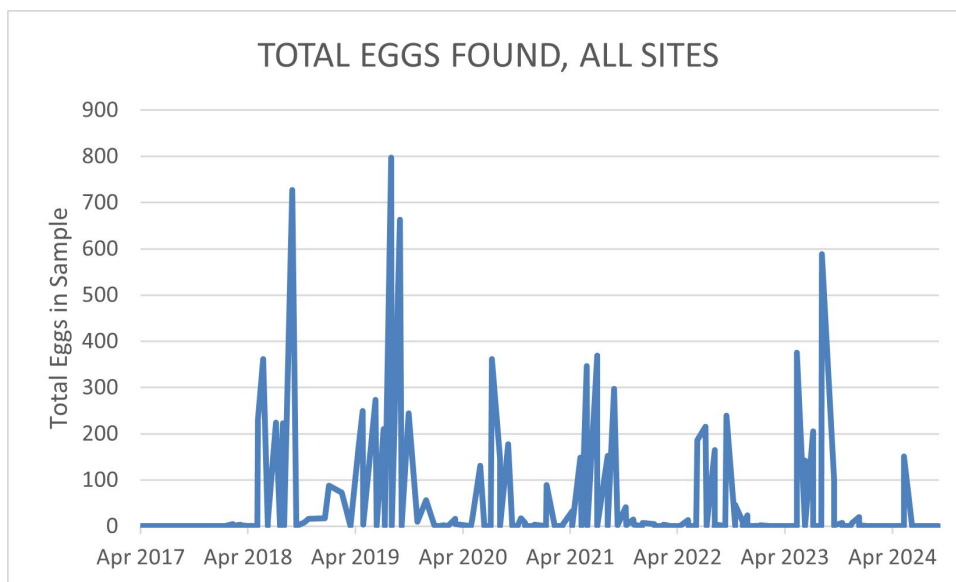


Figure 6. A plot of total eggs found across the four sample sites, for all species, by date. Due to the very large numbers of surf smelt that spawn in summer at Cline Spit, the scale of this plot is overwhelmingly driven by their spawn events, while smaller spawn events of other species and at other locations generally do not register visually at this scale.

The sand lance spawn event observed in December 2023 at Ediz Hook, with 20 eggs found, represents the largest number of sand lance eggs found in any Clallam MRC sample to date. Along with other samples taken at Ediz Hook in this reporting period, confirms the trends in spawn timing by species that continue to be seen at this site. Surf smelt are mainly spawning between June and October, sand lance between November and January, and rock sole between February and May. The Ediz Hook site shows the greatest balance between the three sampled species, with small to moderate spawn events for all three routinely being observed at the restoration site.

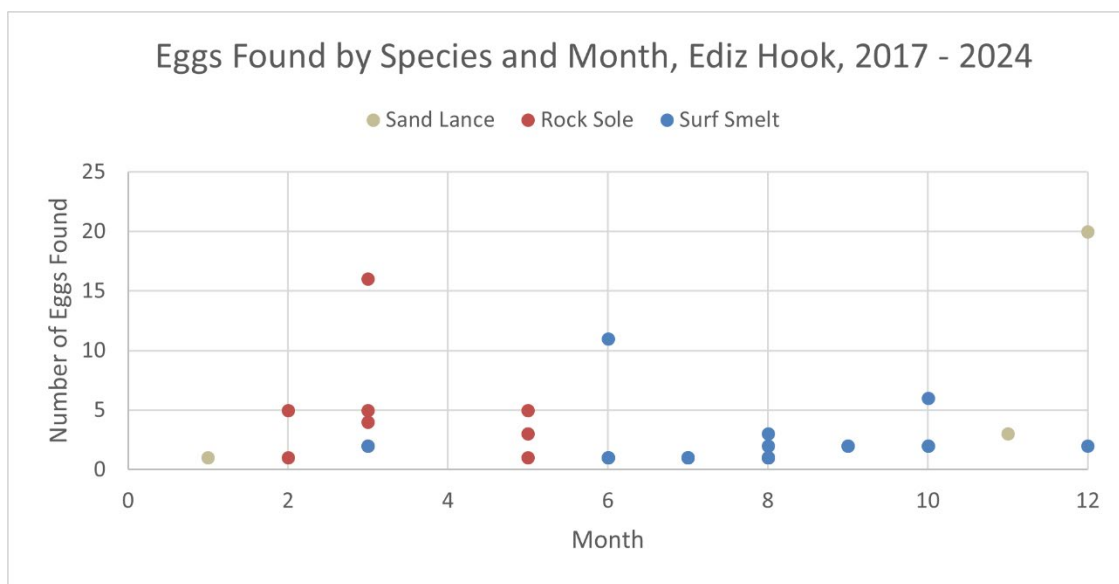


Figure 7. A scatter plot depicting all eggs found by Clallam MRC samples at the Ediz Hook sampling site. The X axis represents the month of the year in which the sample was taken, the Y axis represents the number of eggs in that sample, and species are depicted by color. The seasonal trends for each species' spawn events persist in Ediz Hook samples through this reporting period.

The following chart uses a logarithmic scale to depict the total eggs found by month and species throughout the Clallam MRC's sampling effort at these sites. This scale allows smaller numbers of observed eggs to remain visible on the chart, while data labels clarify the total numbers of eggs represented by each column. Once again, the data collected during this reporting period aligns well with historical trends for each species and location.

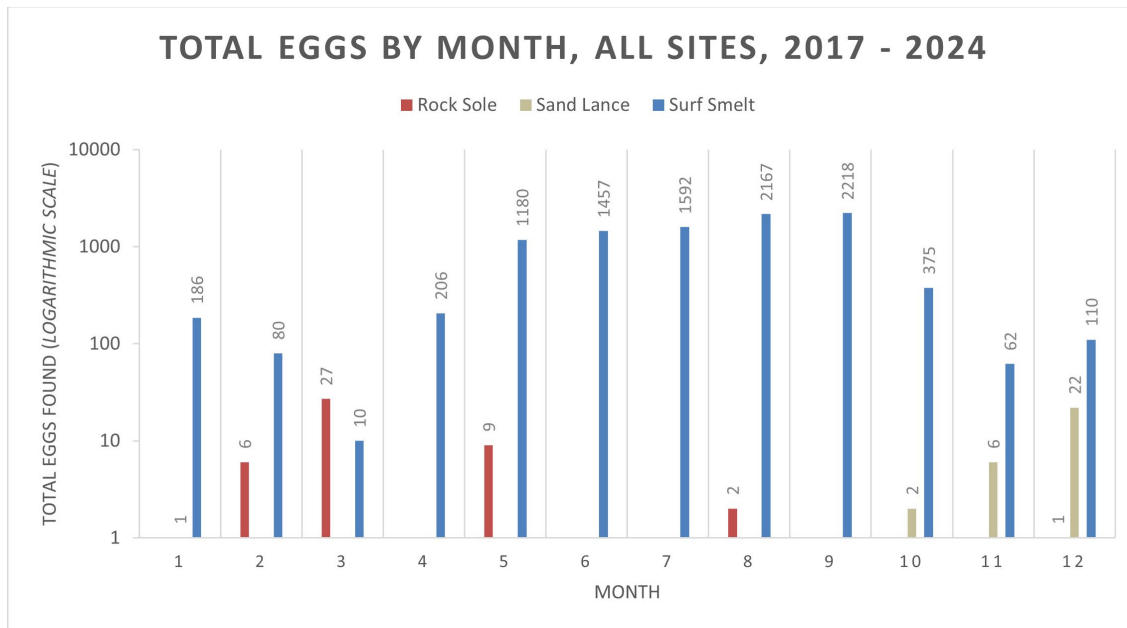


Figure 8. A clustered bar chart showing total eggs found across all years of the project, by month and species. Note that this chart uses a logarithmic scale on its Y axis for total eggs; this is intended to counter the very large disparity between numbers of surf smelt eggs found and the two other species, so that all three species can be effectively shown on one chart. The breakdown by month illustrates when each species appears to spawn across Clallam MRC's sample sites: early winter for sand lance, early spring for rock sole, and at highest levels in summer for surf smelt.

6. Project Highlights, Innovations & Stories

Project lead Tim Cochnauer shared a quote, reflecting on the comparative abundance of sand lance eggs (20) found in winter at Ediz Hook, and the potential lack of the usual massive surf smelt spawn events this summer:

"I was a math major, and 2+2 always equals four. But as a fisheries biologist, one understands that nature is continually changing. So, my forage fish adventure reaffirms the adage of 'expect the unexpected'." -Tim Cochnauer, MRC project lead

7. Lessons Learned

This project is well established for the Clallam MRC, and the routine sampling continues to go well. A lesson learned over the years, that may be relevant for other MRCs, is the value of being prepared for impromptu outreach while sampling on the beach. The MRC forage fish volunteers always carry a preserved jar of eggs while on the beach, so that they're well prepared to answer passersby that are curious about the seemingly strange activity. By having this simple extra item prepared, the team brings science to life a bit more for beachgoers who would otherwise just be looking at bags of sand.

8. Next Steps

The results of Clallam MRC's forage fish sampling contribute to the regional database maintained by WDFW. A [map of known spawning locations developed using this database is available here](#). WDFW and other entities may use this data to inform management decisions, as a positive sample with two or more eggs marks a particular beach as spawning habitat. The results may also inform CCMRC members' efforts to advocate for protection of beaches and shoreline habitat locally.

Monthly sampling will continue at these four sites in the 2024 – 2025 reporting period. MRC members evaluated the current set of sampling locations against relative interest and volunteer capacity, and these four remain feasible as well as vital sites at which to monitor forage fish spawn events.

Appendices

Appendix 1: Sample Results for this Reporting Period

Results of Clallam County Marine Resources Committee forage fish eggs sampling, October 2023 through September 2024. Results not yet reported are noted with **.

Survey Date	Location	Surf Smelt	Sand Lance	Rock Sole	Total Eggs
10/25/2023	Cline Spit	7	0	0	7
10/26/2023	Ediz Hook	6	0	0	6
10/26/2023	Elwha Beach West	1	0	0	1
11/21/2023	Ediz Hook	0	0	0	0
11/21/2023	Elwha Beach West	0	0	0	0
11/28/2023	Cline Spit	5	2	0	7
12/22/2023	Cline Spit	2	0	0	2
12/22/2023	Ediz Hook	0	20	0	20
12/22/2023	Elwha Beach West	0	0	0	0
1/23/2024	Cline Spit	0	0	0	0
1/24/2024	Ediz Hook	0	0	0	0
1/24/2024	Elwha Beach West	0	0	0	0
2/20/2024	Ediz Hook	0	0	0	0
2/20/2024	Elwha Beach West	0	0	0	0
2/22/2024	Cline Spit	0	0	0	0
3/29/2024	Cline Spit	0	0	0	0
4/22/2024	Cline Spit	0	0	0	0
4/25/2024	Ediz Hook	0	0	0	0
4/25/2024	Elwha Beach West	0	0	0	0
5/21/2024	Ediz Hook	0	0	0	0
5/21/2024	Elwha Beach West	0	0	0	0
5/22/2024	Cline Spit	151	0	0	151
6/18/2024	Ediz Hook	**	**	**	**
6/18/2024	Elwha Beach West	0	0	0	0
6/19/2024	Cline Spit	**	**	**	**
6/24/2024	Elwha Beach East	**	**	**	**
7/23/2024	Ediz Hook	**	**	**	**
7/23/2024	Elwha Beach East	**	**	**	**
7/23/2024	Elwha Beach West	**	**	**	**
7/24/2024	Cline Spit	**	**	**	**
8/20/2024	Ediz Hook	**	**	**	**
8/20/2024	Elwha Beach East	**	**	**	**
8/20/2024	Elwha Beach West	**	**	**	**
8/21/2024	Cline Spit	**	**	**	**
9/16/2024	Cline Spit	**	**	**	**
9/17/2024	Ediz Hook	**	**	**	**
9/17/2024	Elwha Beach East	**	**	**	**
9/17/2024	Elwha Beach West	**	**	**	**

Appendix 2: History of the Project and Chosen Sample Sites

In 2016, Clallam MRC joined the Northwest Straits Commission's forage fish monitoring efforts. Three Clallam MRC members and the coordinator participated in a day long training provided by Washington Department of Fish and Wildlife (WDFW). Between October 2016 and March 2018 Clallam MRC conducted monthly surveys at two locations - Pitship Point adjacent to John Wayne Marina and at a public beach near Old Town east of Dungeness River. In April 2018 the sampling efforts were discontinued at these two sites and sampling was initiated at Cline Spit. Since then, monthly sampling has taken place at Cline Spit with one exception in April 2020 which was caused by the Covid-19 Stay-at-home order. These three sites are considered index sites by WDFW.

In April 2017, the sampling effort was expanded to include monthly sampling at two sites on Ediz Hook. The sites were selected by the Lower Elwha Tribe in an effort to document forage fish spawning in the newly restored area along the inside of the spit. Since sampling commenced the sediment along the inside of the spit has coarsened and as a result the sampling locations have been moved progressively further to the west. During the 2018 fall and winter months (October through March) the sampling effort on Ediz Hook was discontinued because of Lower Elwha tribe staffing limitation. The effort was restarted in April 2019 and sampling was carried out at the West Rowing Club and Tesoro Beach sites monthly except for October 2019 and April 2020. Sampling was not conducted in October because of Lower Elwha tribe staff limitation and in April 2020 because of Covid-19 Stay-at-Home order.

In January of 2021, sampling was started back up on both the West Rowing Club and Tesoro beaches. In July of 2021 West Rowing Club site was discontinued due to proximity of Tesoro Beach.

In previous years, forage fish sampling had been conducted at two sites on the beach east of the Elwha River mouth. Due to limited staff time, only one site was sampled on the newly restored Elwha beach east of the Elwha River mouth starting in July 2021. Due to only one rock sole egg found in 2022 and the shifting beach substrate, this site was no longer sampled after May 2023. In the Summer of 2021, we chose to also sample west of the Elwha River's mouth. In years past this beach was sampled for forage fish by WDFW and eggs were found. WDFW no longer samples there, so it was a good opportunity to sample both beaches at the Elwha's mouth.

Appendix 3: Educational Poster

The Clallam MRC developed and printed a new educational poster during this reporting period, focused on the forage fish project. This was a revision of an earlier poster, improving the content as well as adding up-to-date results.

EGGS UNDER OUR TOES?

Clallam County MARINE RESOURCES COMMITTEE

Surf smelt and Pacific sand lance are important food ("forage") for marine mammals, birds, and fish - including salmon. Understanding where forage fish spawn is one way to protect their populations so that their predators don't go hungry. Clallam MRC monitors several local beaches to aid in this understanding.



Herring Eggs

Eggs per Month

total for all sites

Summer surf smelt spawn



Since 2016, trained MRC volunteers have collected samples about once a month from just below the high tide line at key beaches: currently Ediz Hook, Elwha River mouth, and Cline Spit. Samples of beach sand (2 liters each) are delivered to a state lab to be analyzed for fish eggs.

The highest counts of eggs are in spring and summer months, indicating the season that forage fish spawn.

BENEFITS OF THE MRC'S WORK:

- Protects forage fish spawning areas from development
- Enhances understanding of the marine food web
- Provides data used to track trends



Funding and Support from:



WE'LL HELP EGG YOU ON VOLUNTEER TODAY! →



ClallamCountyMRC.org

Egg Photo Credit: Jeff Taylor