

Fidalgo Bay Aquatic Reserve Forage Fish Surveys from January, 2019 through December, 2019

A report for the Fidalgo Bay Aquatic Reserve Citizen Stewardship Committee



Here are some youngsters looking for surf smelt eggs on a Fidalgo Bay beach. Our Survey Team works with several local school classes with programs so they learn more about Forage Fish and their importance to the bigger ecosystem. Much thanks to their teachers and all the volunteers that help make that happen.



INTRODUCTION

Forage fish—particularly Surf Smelt—are an important inhabitant of the Fidalgo Bay Aquatic Reserve and attending to their well being is part of the Management Plan for the Reserve.

We are a group of trained volunteers that survey the beaches in the Reserve four times a month, since mid-2012, to collect information about them. Our detailed data resides with the State Departments of Natural Resources and Fish and Wildlife.

The survey purpose is mainly to document, in detail, where, when and how much the Surf Smelt spawn. We also take every opportunity to provide education, about the forage fish and our project, both on the beach and in formal presentations and this report. We have interacted with hundreds of people and hopefully advanced the awareness of the importance of this little silver fish. This report shows our tools, methods, and results.

During the 12 months of this activity in 2019, more than 27 different individual volunteers participated. Some infrequently, many often. We conducted 47 two hour surveys, all year around. (One survey was cancelled due to “stay-home” SNOW!) We collected and processed 198 samples and found eggs, every month, in more than 70% of the samples; primarily during May through December. Of the beach areas we cover, eggs were found at all 72 possible sample sites, at least once, often many times and in huge amounts. Data later in the report suggests 2019 was a very good spawning year.

The Trail Tales Project of the Friends of Skagit Beaches created an Interpretation Stand which was deployed more than 10 times in periods of nice weather when we expected observers.

More than 200 people were engaged.

An article about our work!

<https://www.eopugetsound.org/magazine/aquatic-reserves>

Many organizations and individuals have generously assisted us, with both information and training and also monetary support for equipment and supplies.





These dead Surf Smelt were stranded high on the beach during a massive spawning

Surf Smelt are schooling fish and are an important food source for birds, salmon, and other animals and fish. They are one of the several " Forage Fish. " Surf Smelt are caught recreationally, usually with dip nets but also by jigging. Many folks have fine ways to prepare them for eating. Surf Smelt are present all year and spawn heavily, at high tides, between mid-April and mid-October.

Here is a sprinkling of eggs spawned at high tide during the previous evening. Many have gotten washed under the pebbles where they will stay cool and moist. They have a little sticky spot so they stay attached!

They are about the size of a pin head which is one millimeter.





Part of our effort is to support High School Science work about forage fish. We supply our gear and procedures and many volunteers . Here is a Conway High School class.

Fidalgo Bay is a very prolific place for Surf Smelt to spawn. This happens along high tides mostly during April through December. They prefer a mix of sand and small gravel, which covers much of the Fidalgo Bay shoreline.

The fish come in large schools and the eggs and milt are mixed in the water and settle on the fine gravel and sand. Each egg has a small, sticky “foot ” which hopefully attaches to a piece of gravel or sand. Tidal action will then agitate them and some will become buried down where they might stay cool and moist. Incubation is about two weeks. Newly hatched fish will wash out to sea on the next high tide.

Most of the eggs are too exposed to sun and heat and do not survive. Perhaps 5%—10% hatch. No one knows what percentage actually become mature fish. Fidalgo Bay does not have much shade to protect the newly spawned eggs, and the summer sun covers most of the areas used. But even so, enough survive to provide for a continuing prolific spawning.

Trained volunteers, using State approved protocol and equipment, collect samples all year around from much of the portion of Fidalgo Bay that is within the State Aquatic Reserve. Samples are processed and recorded and data is provided to the State.

The following pages show pictures and descriptions of our work, along with summarized results.

Several volunteers use microscopes to count eggs and determine stages of development. A BIG thanks to the Padilla Bay Research Reserve for use of their room and microscopes



Fidalgo Bay Aquatic Reserve

Forage Fish Beach Spawning Habitat



WASHINGTON STATE DEPARTMENT OF
NATURAL RESOURCES



The thick blue lines are placed along stretches of beach where surveys are conducted. The light green is the actual Aquatic Reserve — shoreline and bedlands owned by the State. The portion **south** of the Tommy Thompson Trail and trestle is generally not suitable for spawning. Sample locations there, in the past, have had few results, but another location used this year has shown significant amounts of spawning.

On the west side there is a gap between survey beaches. This is where the large private residence is, with generally unsuitable spawning habitat. Each side of the Reserve has about 3500 linear feet of beach and this is where most of the survey work occurs.



Fidalgo Bay is divided into the West side and the East side and each side is surveyed twice a month. A schedule is published and distributed to volunteers early each month, with dates and times dependent on tides; we need to avoid extreme high tides in order to get onto the beach! Volunteers sign on for dates they want. A survey takes about two hours with one hour on the beach and one hour processing the material. For the East side we meet along March Point and at the Fidalgo Bay RV Park for the West side. The Samish Tribe has generously allowed us to use their clubhouse area to process our materials. From two to seven or eight volunteers typically help each time!

On the beach we collect 3/4 of a gallon of gravel at a sample site. We make four scoops about two inches deep along a 100 foot line a bit below the last high tide line. Sample sites are 1000 feet apart and the first site is determined by a random number from zero thru 9. We multiply that by 100 ft. and that is how far we start from the north end of the beach. We can get from three to six samples during a survey.



Sample #	Time (dd mm)	Latitude (decimal degrees)	Longitude (decimal degrees)	Length	Width	Area	Volume	Weight	Notes
1	01	48.49178	122.52587	35	12	420	1	1	Shady area
2	01	48.48965	122.52853	35	12	420	1	1	Shady area
3	01	48.48450	122.52338	35	12	420	1	1	Shady area
4	01	48.48347	122.52000	35	12	420	1	1	Shady area
5	01	48.48328	122.51849	35	12	420	1	1	Shady area
6	01	48.47999	122.52000	35	12	420	1	1	Shady area

There is a detailed field sheet to record much information about each sample site, such as shading, type and amount of suitable beach, coordinates, and location of sample zone. There is also a small tag with date, location, and sample number that goes in the gravel sample and stays with it for the rest of the process.



Here is some of the gear we use. Buckets, sample jars, hand-lenses, GPS unit, sieves, tubs for “winnowing,” preservative fluid, and some other things not visible including clip boards, recording sheets, pencils, scoops, and the Blue Bowl.



Three sieves with smaller and smaller mesh are stacked on the bucket. A sample bucket of gravel is dumped in the top and rinsed with the hose. Eventually only the small particles, and eggs (if any) are trapped in the bottom half-millimeter mesh sieve.



All the material from the bottom sieve is washed into a winnow tub.

The tub is sloshed vigorously to bring the eggs, which are light, to the top and one corner. This “winnowing” is a fine art! Some can, some can not!





The sediment in the white tub is carefully rinsed into the “Blue Bowl.” A bilge pump in the lower tub of water shoots water through the black hose into the blue bowl and creates a vortex of water. By slowly stirring the material from the winnow tub, lighter particles and eggs float up and then down the hole in the middle and into the fine-mesh sieve below the blue bowl. What is in that sieve is then rinsed into a sample jar, along with preservative and the sample tag. Jar lids are labeled with date and location. The result is much less material in the sample jar and a higher percentage of the possible eggs.



Those jars, along with the field sheet, will go to Olympia where they are analyzed with microscopes to count the eggs and determine mortality and various stages of development. A LOT of eggs in that middle picture.



Lots of folks stop to see what we are up to! Pretty amazing to see all the smiles, the education, the good times ... even in some pretty nasty weather. Often some glorious weather and fine sights too. Thanks to all who help and support.



For the BIG ones!



Surf smelt spawn high on the beach and will take up to 2 weeks to hatch. They need to be cool and moist. Shaded areas are most productive for hatching while unshaded beaches can result in immediate loss of eggs if a warm sunny day follows a spawning event. Most of the spawning beach areas in Fidalgo Bay are unshaded and represent an opportunity for ways to provide more shade.



Beside just sampling, we have many chances to bring kids of all ages to the beach and participate along with us. Some are formal school programs and some are more ad hoc. All worthwhile!



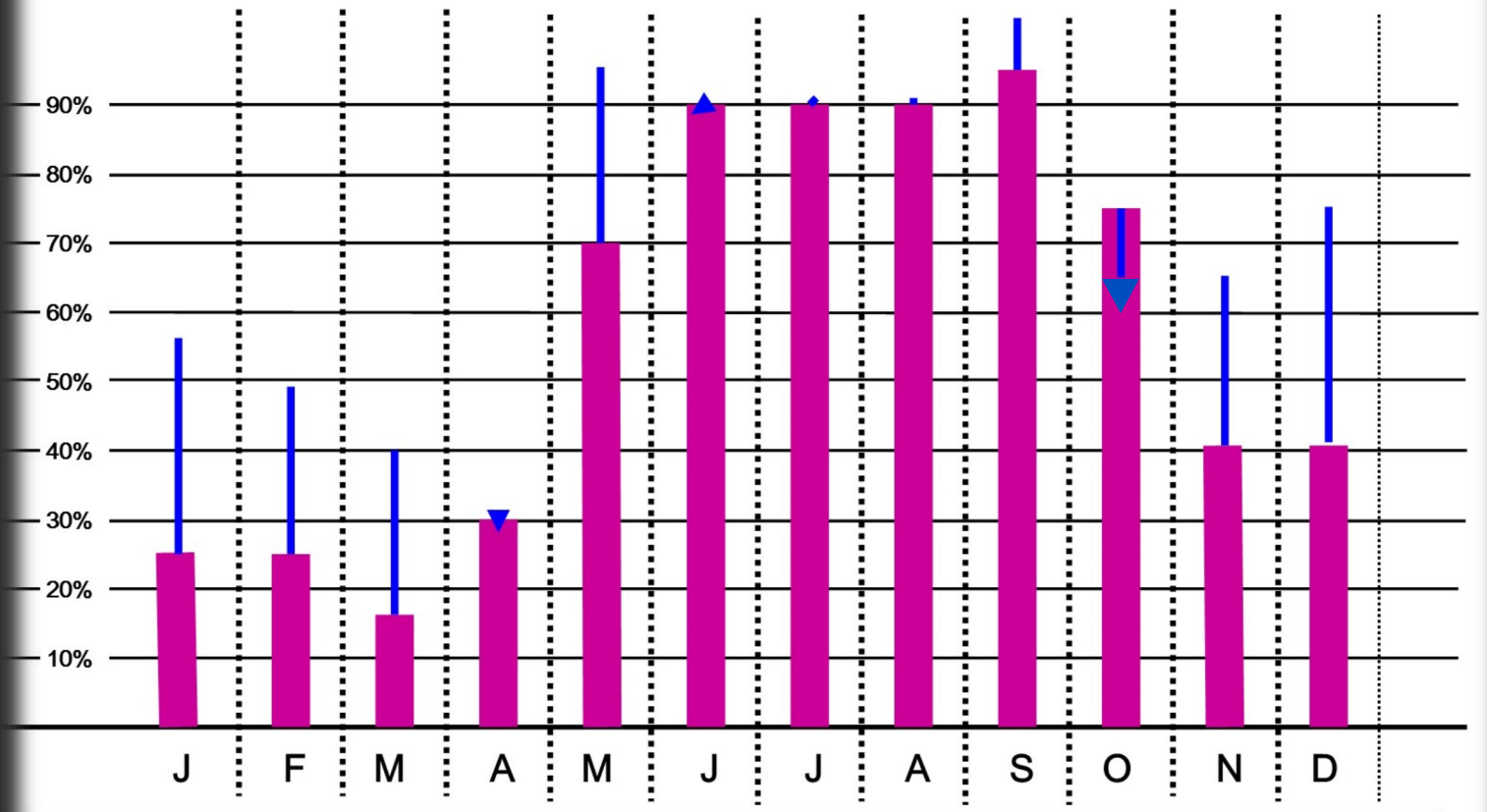
And last - a **BIG THANKS** to our team of volunteers who fear **NO** weather and to our fabled **red scooping goblet** reserved for special participants and occasions!

Fidalgo Bay Surf Smelt Spawning

SAMPLES WITH EGGS: BY MONTH (2013—2019 avg.)

(15 — 20 samples per month)

Blue line is 2019 only



This chart shows the percent of samples that had eggs in them.

It compares 2019 (blue lines) with the average for all the years from 2013 through 2019 (purple bars.)

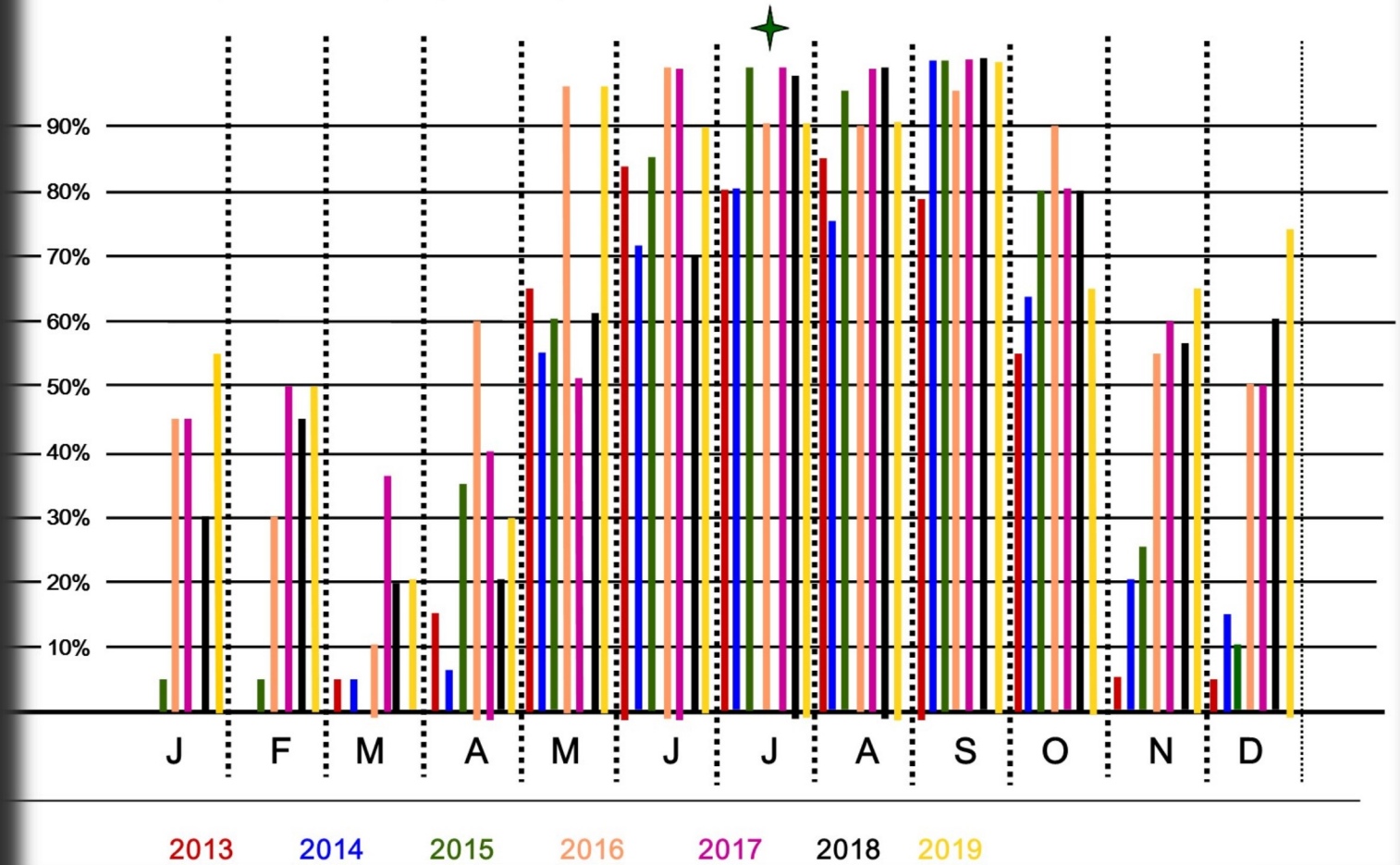
This is a view of what was quite a good (and different) spawning year.

Fidalgo Bay Aquatic Reserve Surf Smelt Spawning

★ "Blue Bowl" vortex method begins July, 2015.

Percent of Samples with Eggs: by Month and Year

(15 — 20 samples per month)



This data (yellow bars) suggests that 2019 was another good year for Spawning, especially in early and late months.

November and December especially, and this is when eggs have better chances of survival to hatching. Because it is cooler, moister, and with less direct sun.