

Fidalgo Bay Aquatic Reserve Forage Fish Surveys from January, 2016 through December, 2016

A report for the Fidalgo Bay Aquatic Reserve Citizen Stewardship Committee



Here is a gravel sample taken in Fidalgo Bay during 2016. The little white dots are surf smelt eggs sticking to various sized pieces of gravel. For perspective, the sieve holding the sample is about 12 inches across. Most of them will be recovered into a sample jar during the rest of the process.



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 very 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 2016 12 months of this activity, more than 40 different individual volunteers have participated. Some infrequently, many often. We have conducted 50 two hour surveys, all year around. We have collected and processed 212 samples and found eggs in more than 70% of those; primarily during the April through December months. Of the beach areas we cover, eggs have been found at all possible sample sites, at least once, often many times and in huge amounts. Data later in the report suggests 2016 was a very good spawning year.

The Trail Tales Project of the Friends of Skagit Beaches designed and assembled an Interpretation Stand which was deployed where we are working more than 15 times during periods of nice weather and expectation of observers. More than 200 people were engaged.

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 are lying on beach material quite typical of what they like to spawn on.

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 in Fidalgo Bay between mid-April and mid-October.

Here is a huge mass of eggs spawned at high tide during the previous evening in May. This is in the rip-rap along the Tommy Thompson Trail at about where the “Otter” sculpture stands. The beach composition is not very suitable; the gravel is too large and quite compacted. But many eggs find their way into softer material tucked back up into the crevasses where it remains cool and shady.





**An extremely dense collection
of surf smelt eggs.**

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 beach.

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.

**Long, thin, “yellowish” lines of
eggs from the previous high tides.**

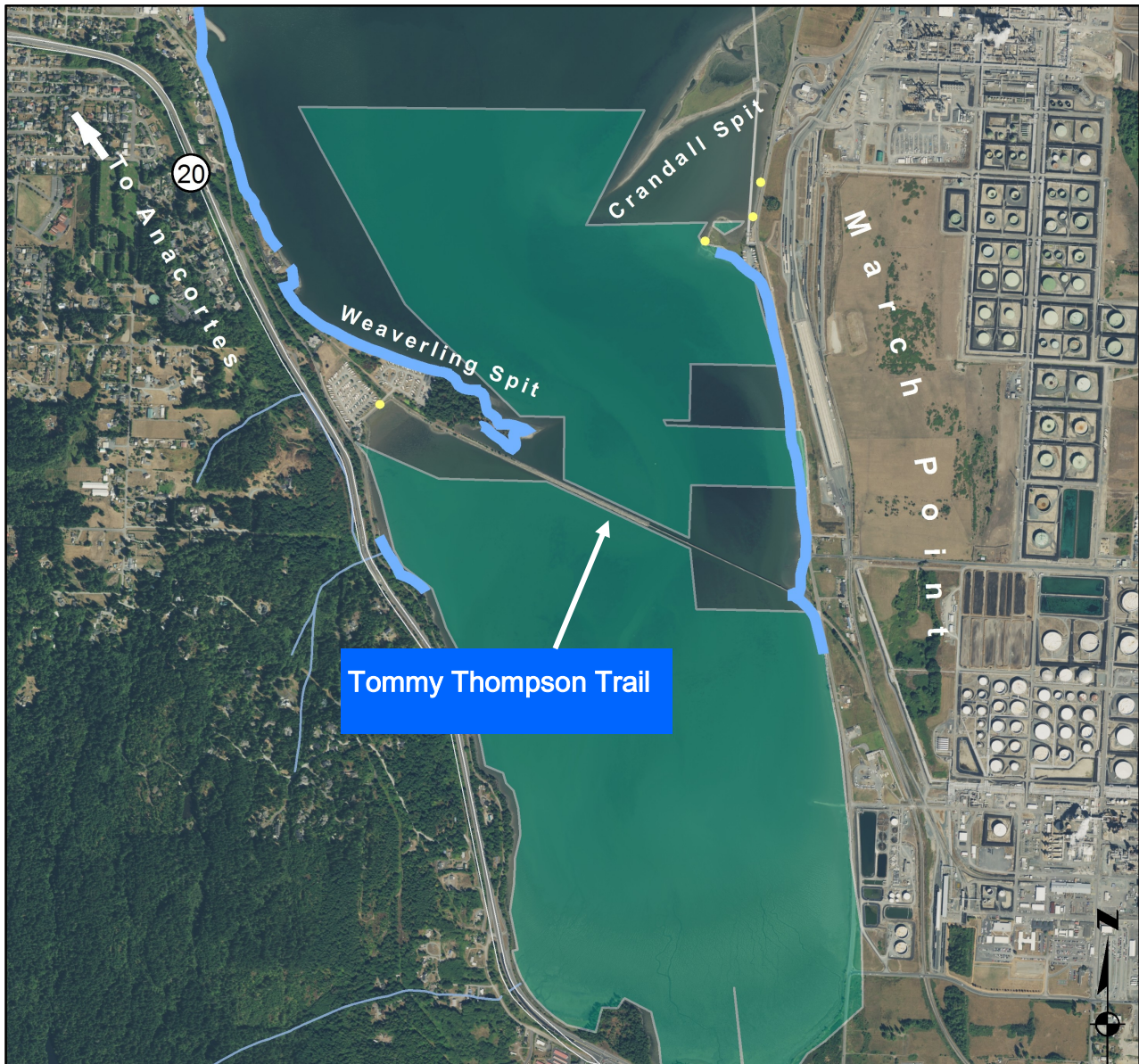


Fidalgo Bay Aquatic Reserve

Forage Fish Beach Spawning Habitat



WASHINGTON STATE DEPARTMENT OF
NATURAL RESOURCES



The light 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.



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

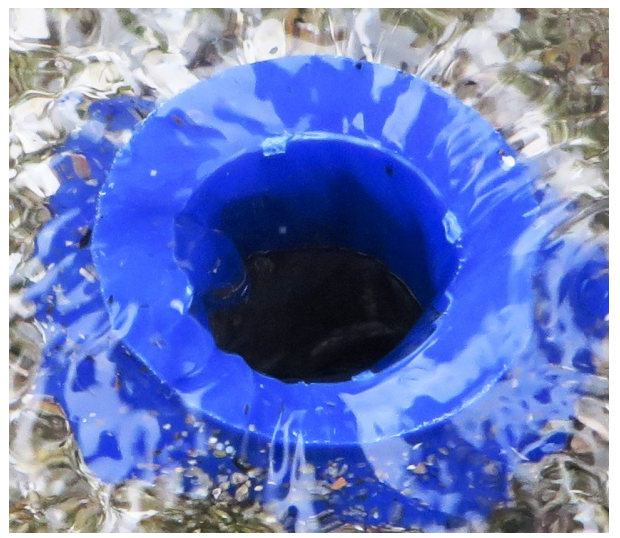
Three sieves with smaller and smaller mesh are stacked on the bucket. A sample bag of gravel is dumped in the top and rinsed with the hose. Eventually only the small particles, and eggs (if any) are trapped in the bottom half-millimeter mesh sieve.



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!





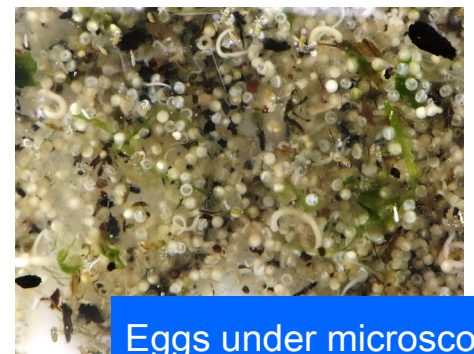
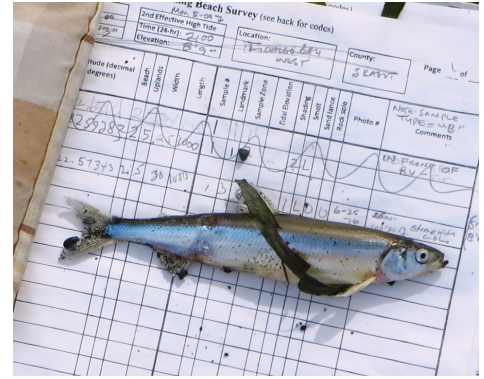
The sediment in the white tub is carefully rinsed into the “Blue Bowl.” A bilge pump in the lower tub of water shoots water through the black hose into the blue bowl and creates a vortex of water. By slowly stirring the material from the winnow tub, lighter particles and eggs float up and then down the 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.



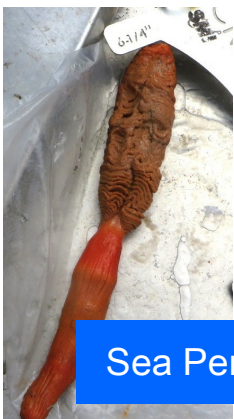
Those jars, along with the field sheet, will go to Olympia where they are analyzed with microscopes to count the eggs and determine mortality and various stages of development. A LOT of eggs in that middle picture.



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.



Eggs under microscope



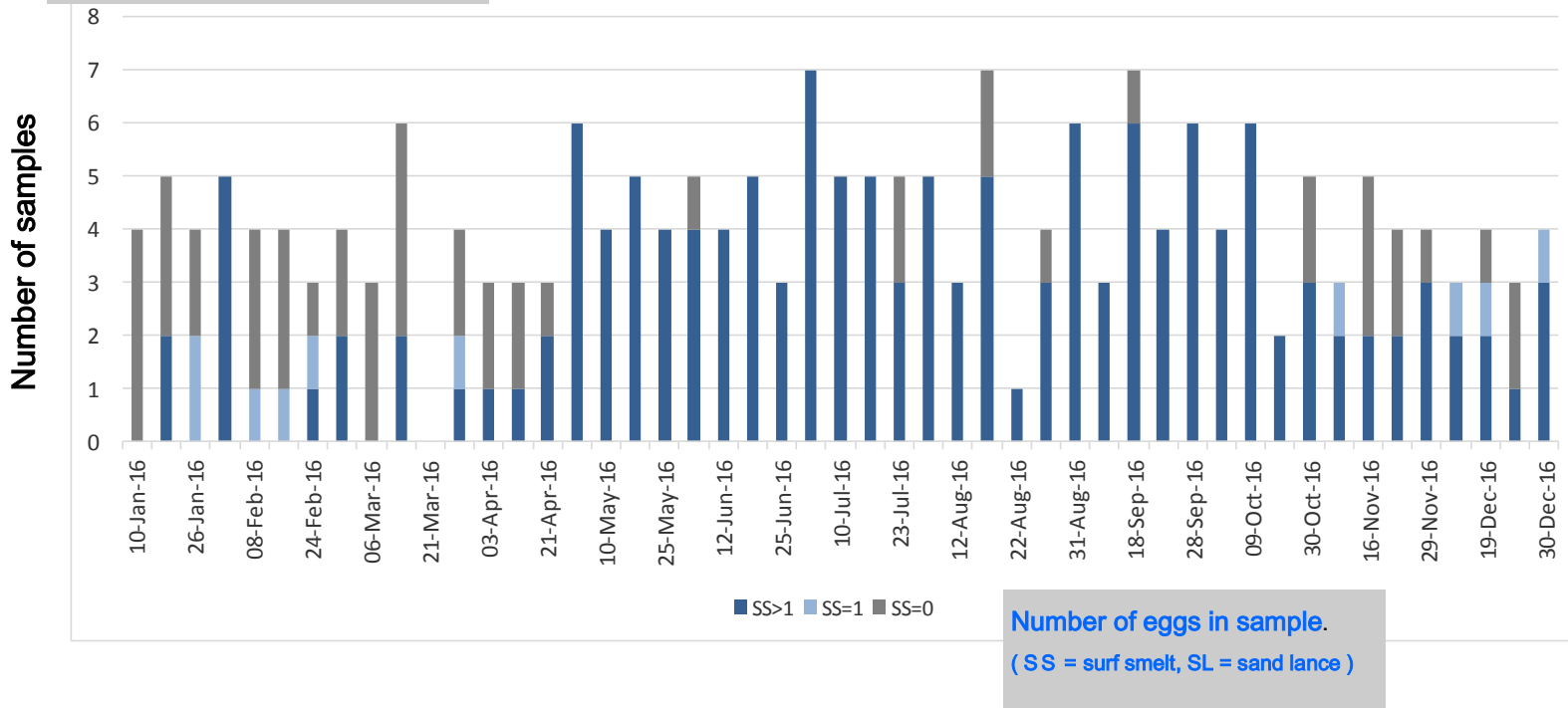
Sea Pen



Blue bars show number of locations sampled that had eggs.

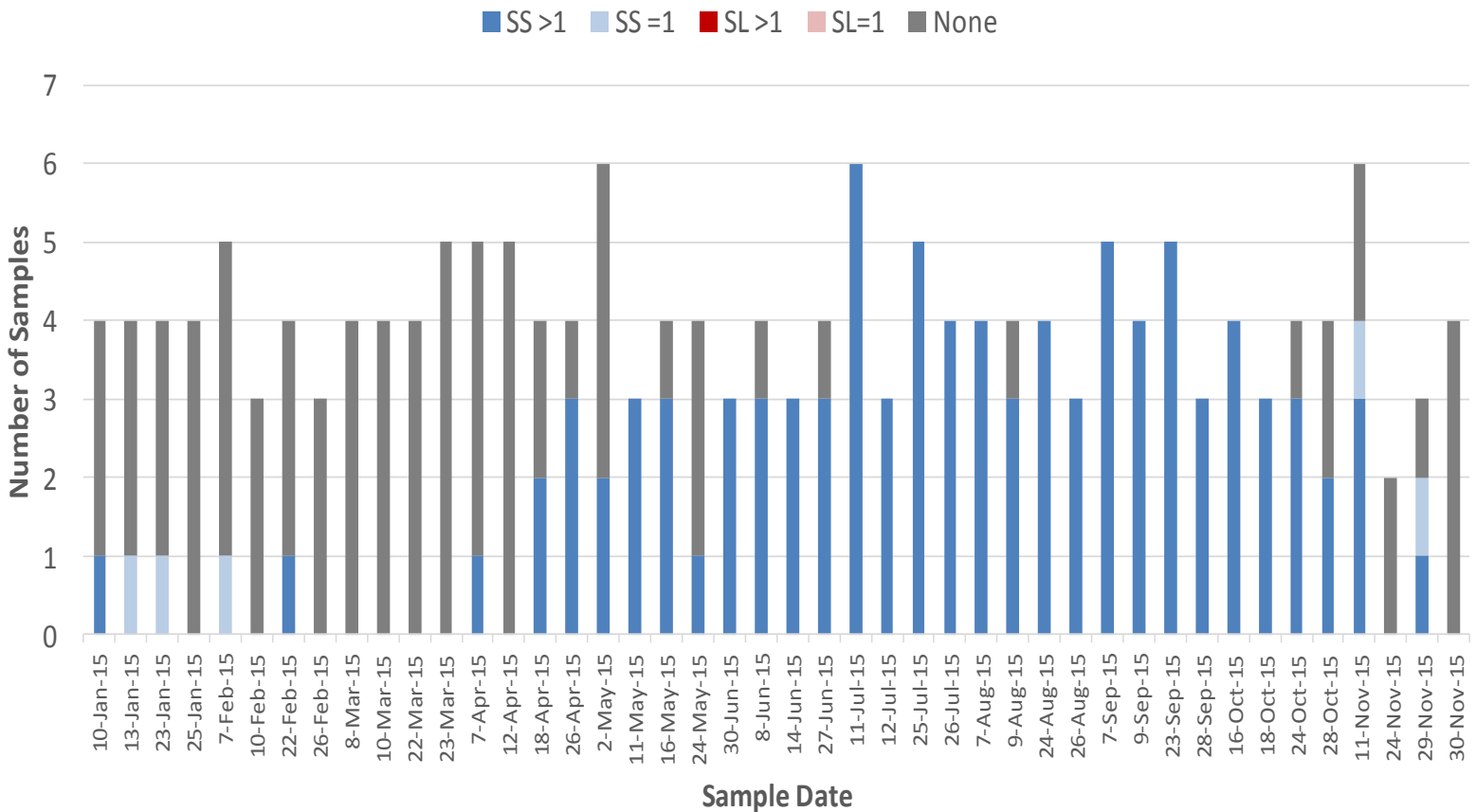
Spawning began earlier in 2016

Fidalgo Bay Samples Collected 2016

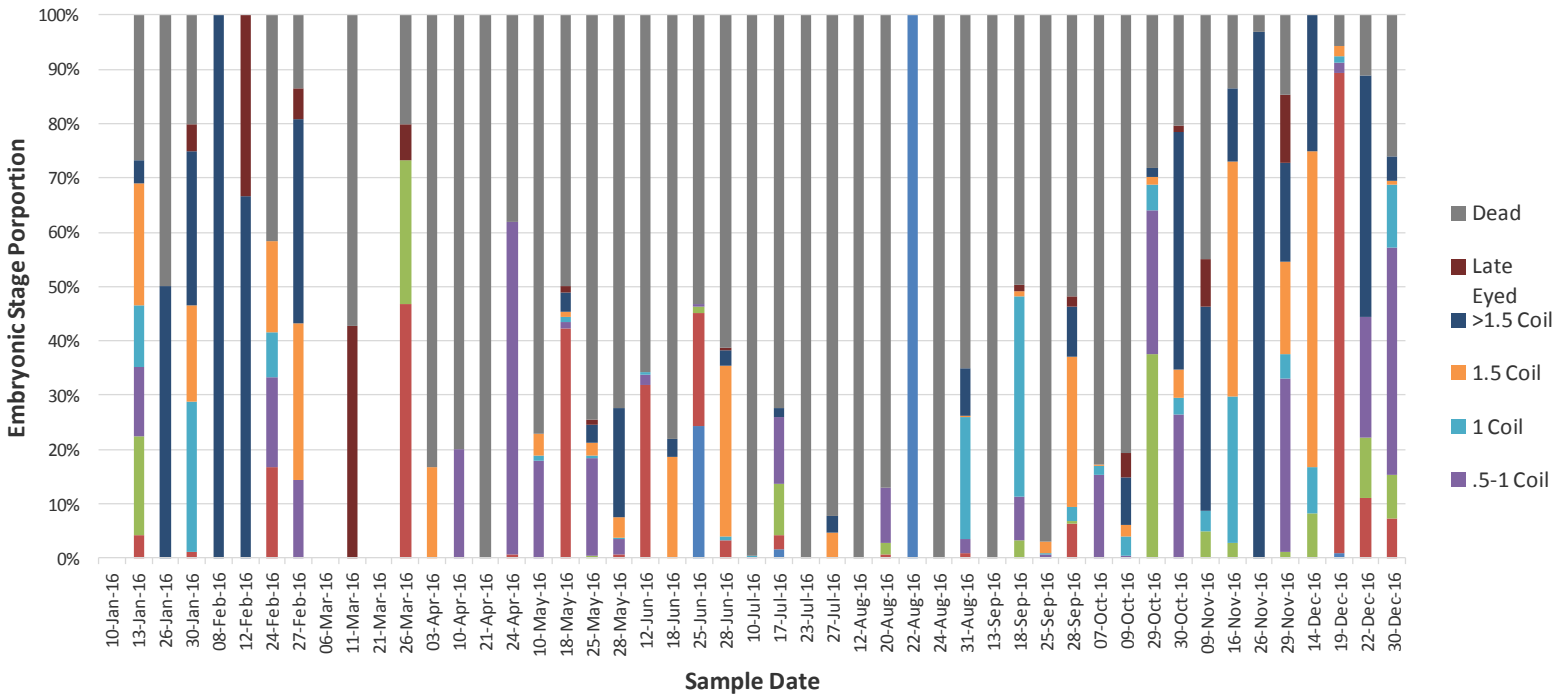


Number of eggs in sample.
(SS = surf smelt, SL = sand lance)

Fidalgo Bay Samples Collected 2015

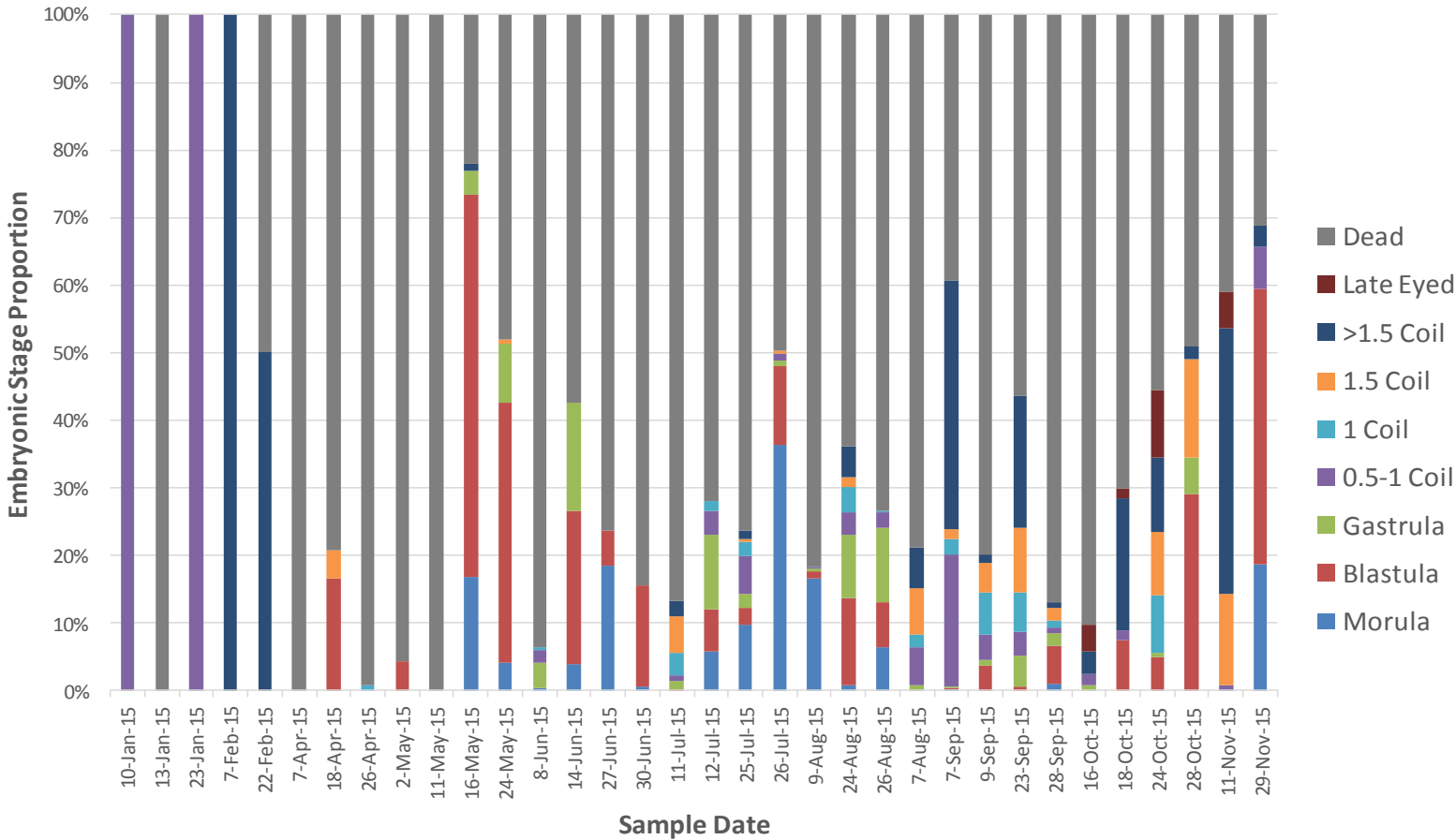


Embryonic Stage Proportions of Collected 2016 Surf Smelt Samples



The grey portion of a bar represents percent of eggs “dead” when collected. Mortality much higher in hot summer months.

Embryonic Stage Proportions of Collected 2015 Surf Smelt Samples

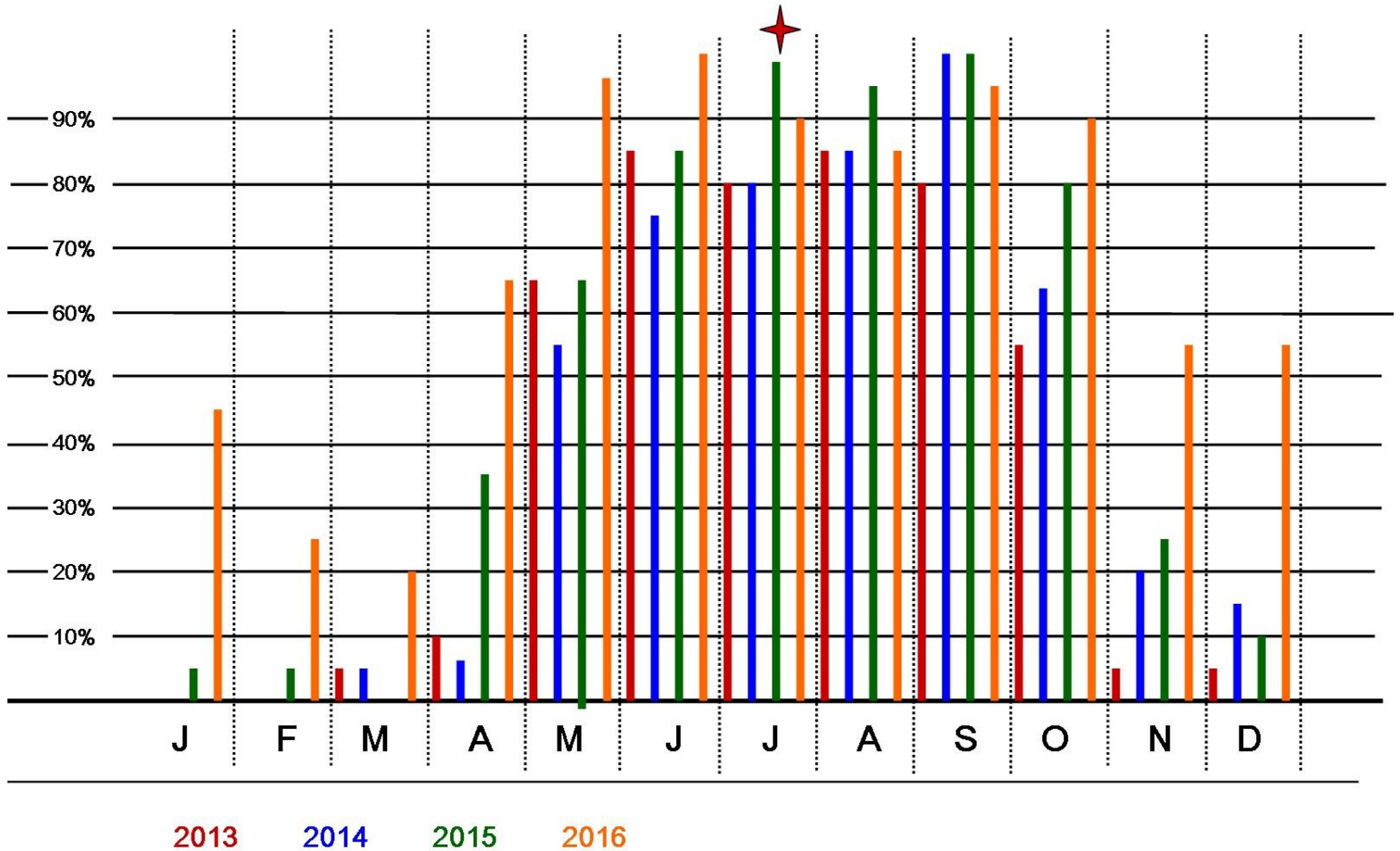


Fidalgo Bay

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

SAMPLES WITH EGGS: BY MONTH AND YEAR

(15 — 20 samples per month)



This data suggests that 2016 was a very good year for spawning.

In general, a higher percentage of samples had eggs in them and more spawning was detected early in the year.

The data from 2017 will be a good comparison.