

# Fidalgo Bay Aquatic Reserve Forage Fish Surveys from May, 2014 through December, 2015

A report for the Fidalgo Bay Aquatic Reserve Citizen Stewardship Committee



Note: In this sample are several recently hatched surf smelt along with numerous clear eggs in various stages of development and opaque ones that are probably dead. An egg is about one millimeter in diameter; the size of a pin-head. The sample was collected early in November from the beach right in front of the RV rigs at the Samish Fidalgo Bay RV Park.



## 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 20 months of this activity, more than 50 different individual volunteers have participated. Some infrequently, many often. We have conducted 80 two hour surveys, all year around. We have collected and processed 345 samples and found eggs in more than half of those; primarily during the April through October 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.

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 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 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 October. 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, like shown on the cover, 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.**





The blue dots are placed along stretches of beach and single locations 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. Two sites there are regularly sampled, with no significant results. 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 to 10. 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 five samples during a survey.



**Forage Fish Spawning Beach Survey** (see back for codes)

Month: 04 Day: 18 Year: 2015  
 Last High Tide: 0500 Time (24-hr): 0500 Elevation: 8.4"  
 2nd Effective High Tide: 1700 Time (24-hr): 1700 Elevation: 7.6"

Location: FIDALGO BAY WEST County: SEASIDE Page 1 of 1

Beach Station #	Time (24-hr)	Latitude (decimal degrees)	Longitude (decimal degrees)	Beach Upland	Width	Length	Sample #	Landmark	Sample Zone	Total Duration	Shading	Sample Type	Sand	Gravel	Rock	Photo #	Comments
1	0950	48.49121	122.59953	4	5	11	1	2	9	2	0	0	0	0	0		600' from 24th (see tagged area) floor
2	0935	48.48933	122.59989	3	5	21	1	2	20	1	0	0	0	0	0		400' from Magoon Spill
3	0951	48.48590	122.59208	3	5	23	1	2	15	1	0	0	0	0	0		400' from Magoon Spill (almost to 1st boundary)
4	1015	48.48328	122.58849	3	1	24	1	2	24	3	8	0	0	0	0		FW 11 (24th Spill)

Organization: DNR  
 Reviewer: [Signature]

Samplers: Scott, Peter, Margo, Chris, Jack  
 (print names here, sign back)  
 Random #s: 6, 4

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 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!





Winnowing happens three times and after each, the eggs and fine materials are scraped off and put in the sample jar. A little water and preservative and the tag from the sample bag are added and the top is labeled. 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.



An alternative, and more effective method to replace winnowing and scraping has been developed recently; 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 transferred to a sample jar, along with preservative and the sample tag. The result is much less material in the sample jar and a higher percentage of the possible eggs.







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.



Mass of eggs ...



Soft. Stuck.

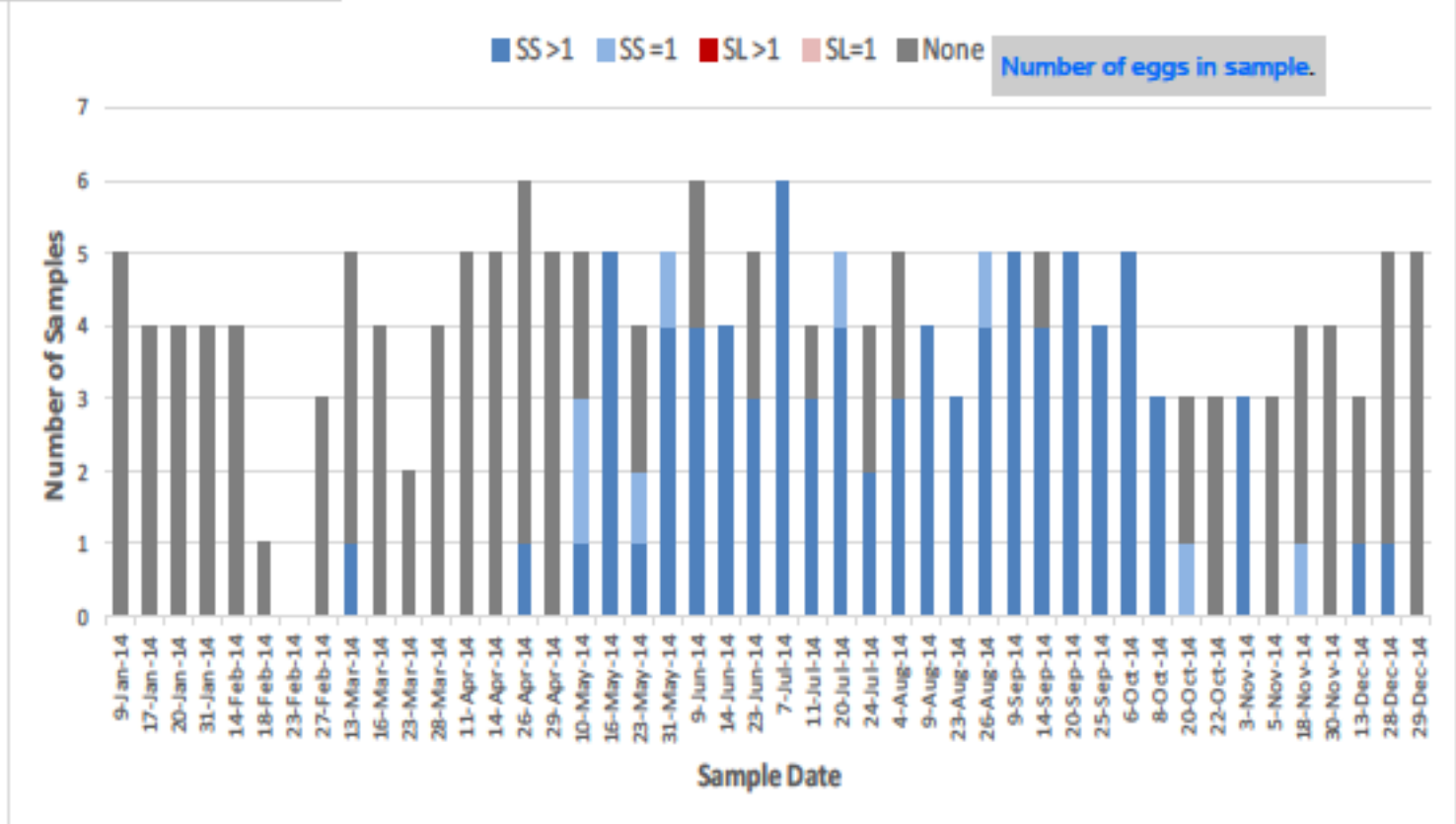


Oyster Catchers.



Blue bars show number of locations sampled that had eggs.

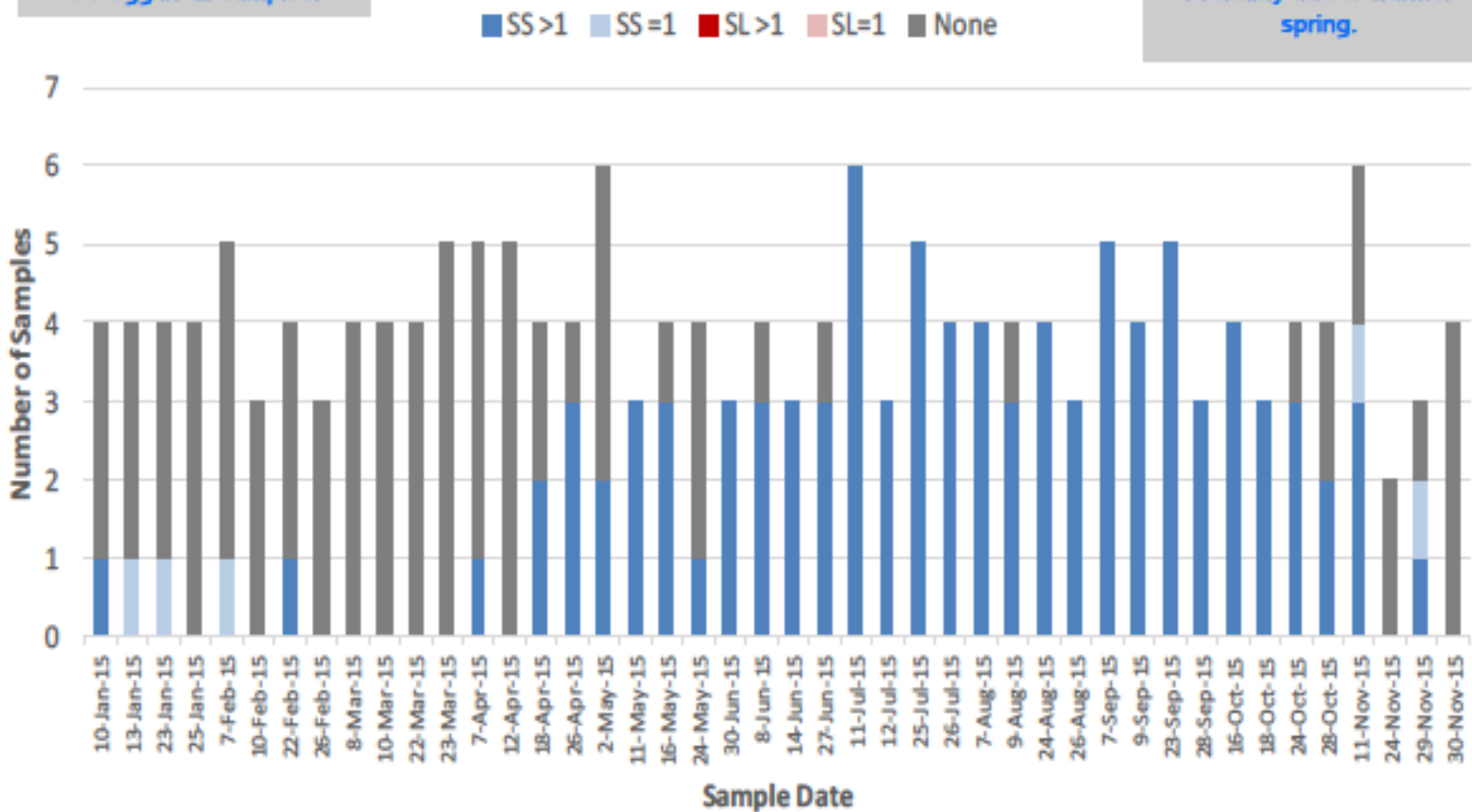
## Fidalgo Bay Samples Collected 2014



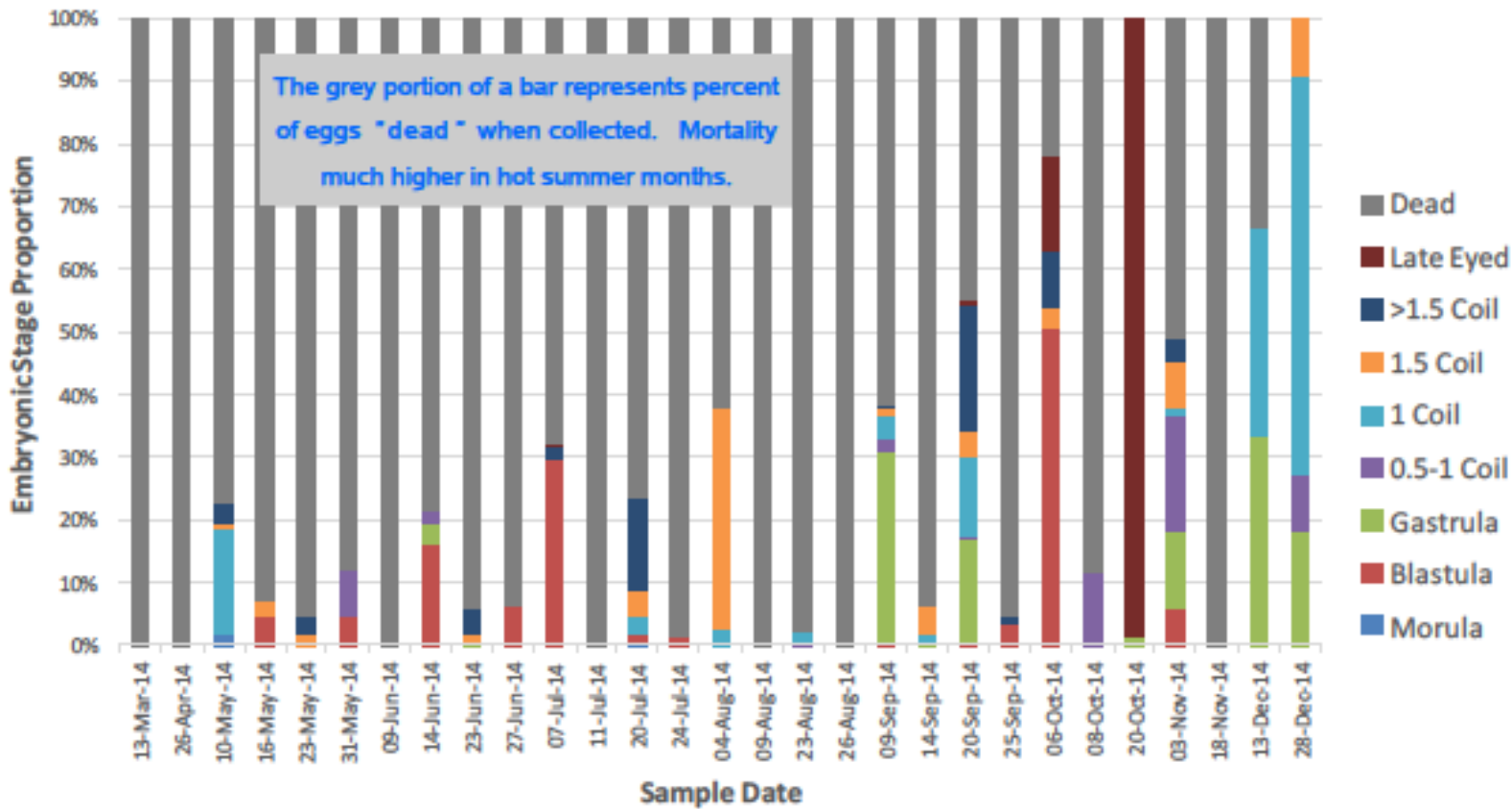
Note that for 2015, many more sample dates had > 1 SS egg in all samples.

## Fidalgo Bay Samples Collected 2015

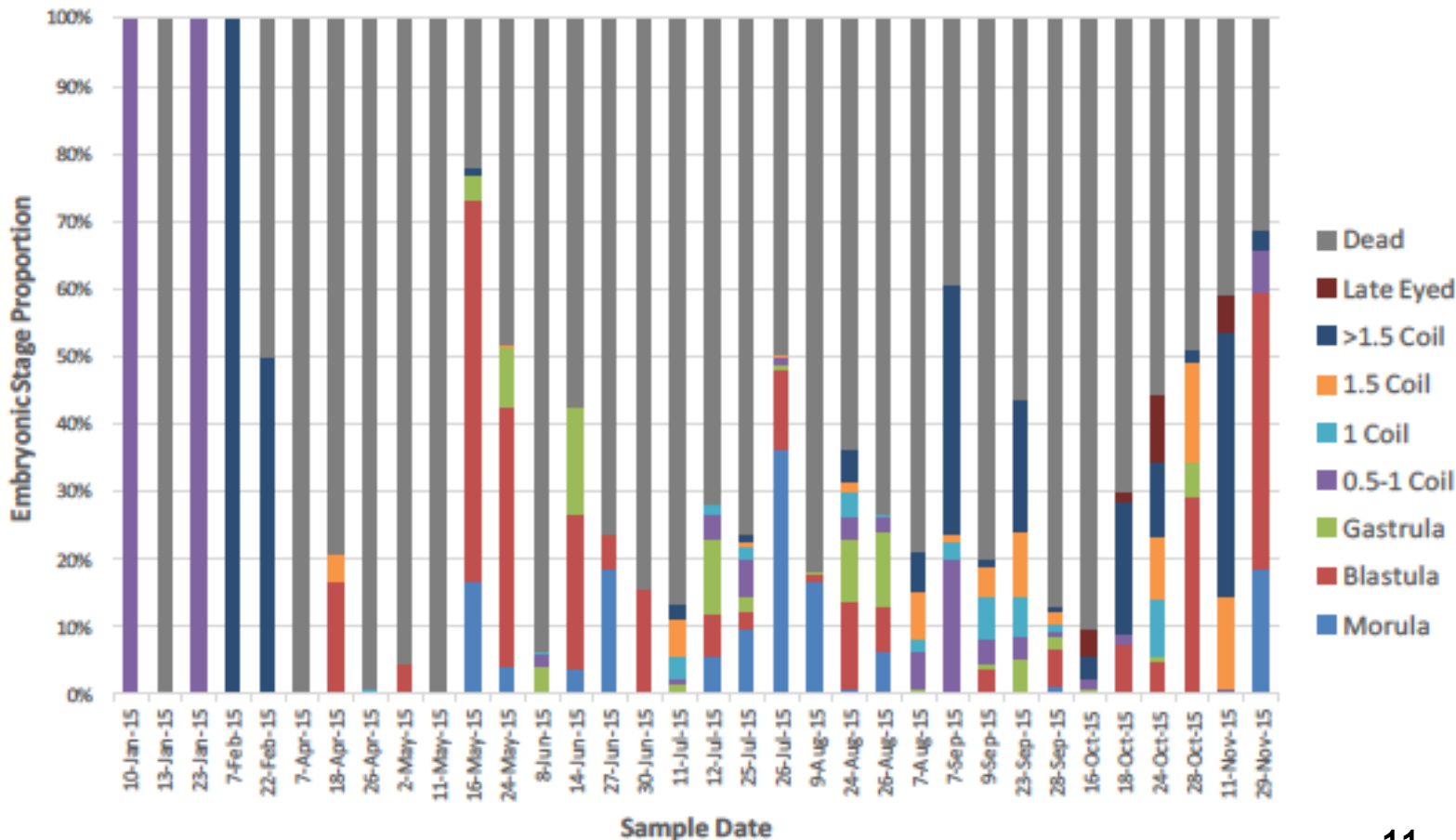
Spawning began earlier in 2015, and went a bit longer. Probably due to warmer spring.



## Embryonic Stage Proportions of Collected 2014 Surf Smelt Samples



## Embryonic Stage Proportions of Collected 2015 Surf Smelt Samples



# Percent of Samples with Eggs; By Month and Year.

