



Western Washington University
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Salish Sea Ecosystem Conference

2014 Salish Sea Ecosystem Conference
(Seattle, Wash.)

May 1st, 8:30 AM - 10:00 AM

Preliminary Remediation Success of a Forage Fish Spawning Beach at Custom Plywood in Fidalgo Bay, Anacortes, WA

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<https://cedar.wwu.edu/ssec/2014ssec/Day2/82>

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Remediation Success of a Forage Fish Spawning Beach

- Custom Plywood Fidalgo Bay, Anacortes, WA



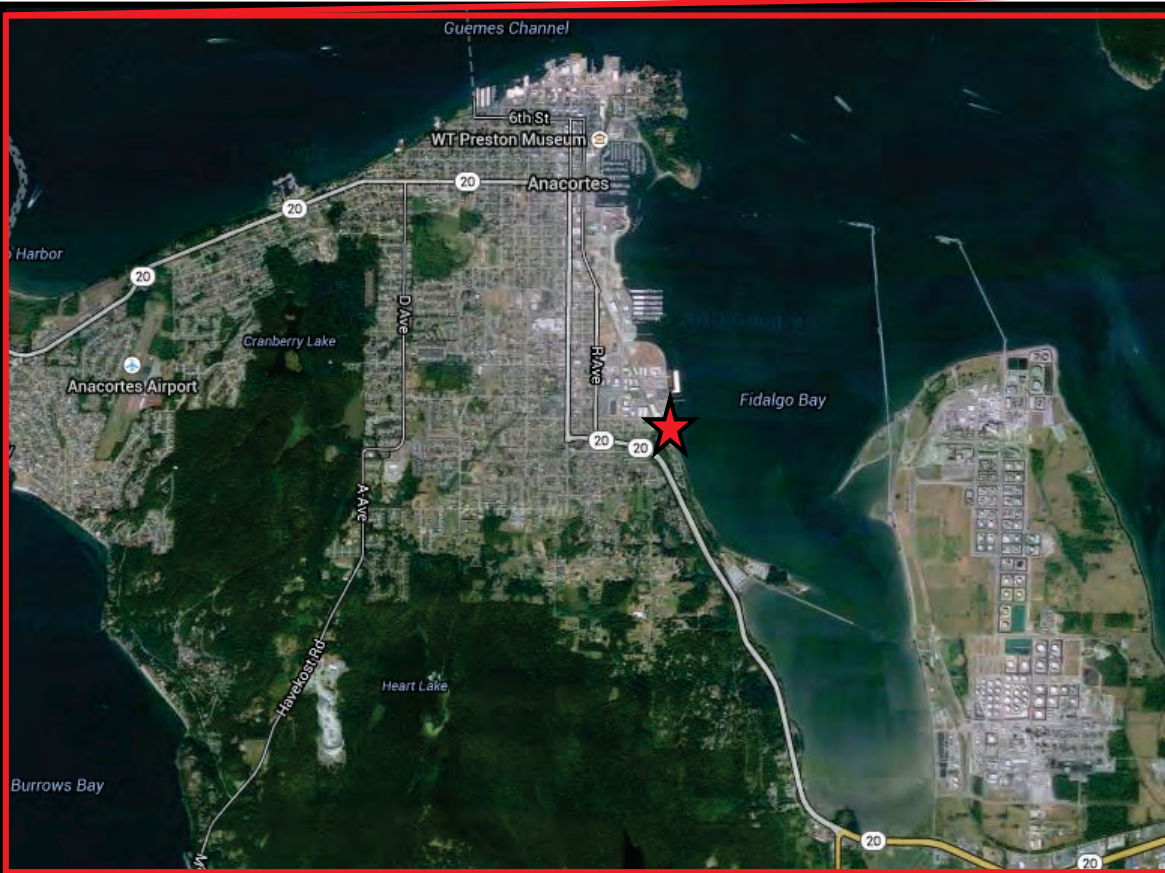
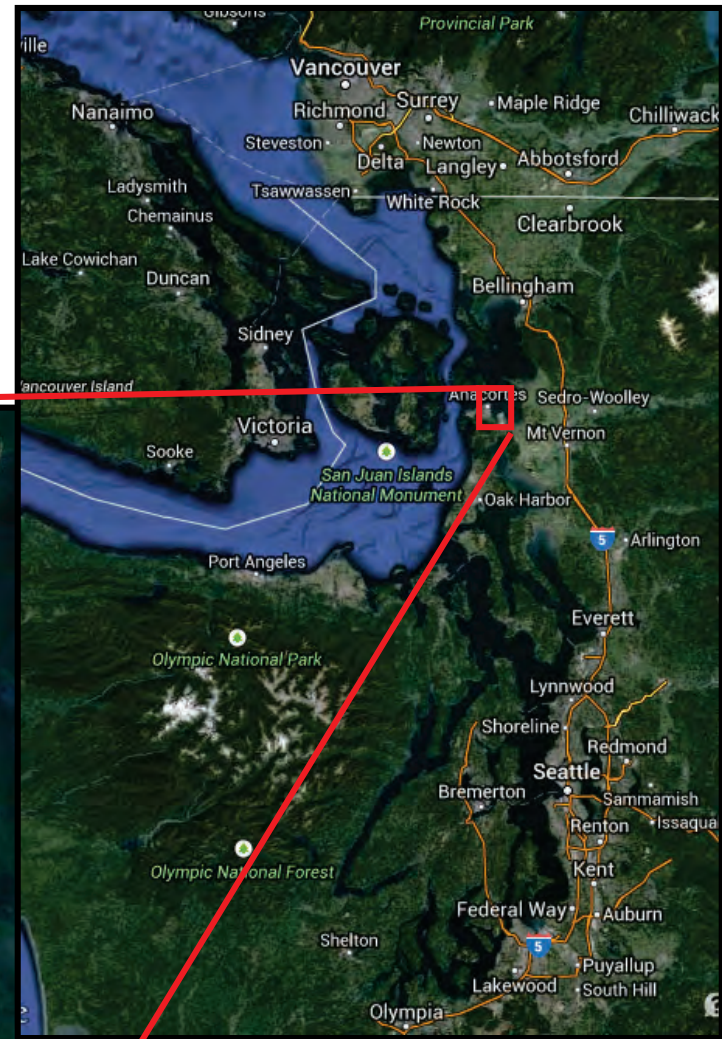
Jamey Selleck

Overview

- Shoreline Modifications
- Custom Plywood
- Forage Fish Spawning
- Methods
- Field Results
- Summary



Custom Plywood Fidalgo Bay



Shoreline Management Guidelines

- PSP – No net loss of FF spawning habitat
- Bulkhead removal or soft armoring

1964



2006



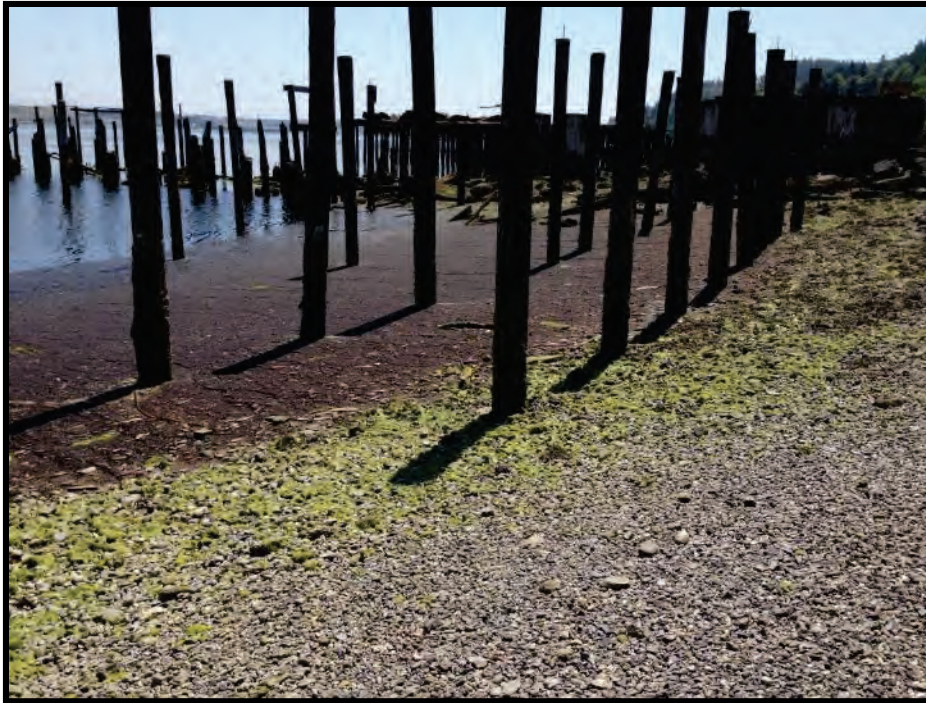
Custom Plywood – Fidalgo Bay

- In operation from early 1900-1991
- Fire in 1992 - heavily contaminated



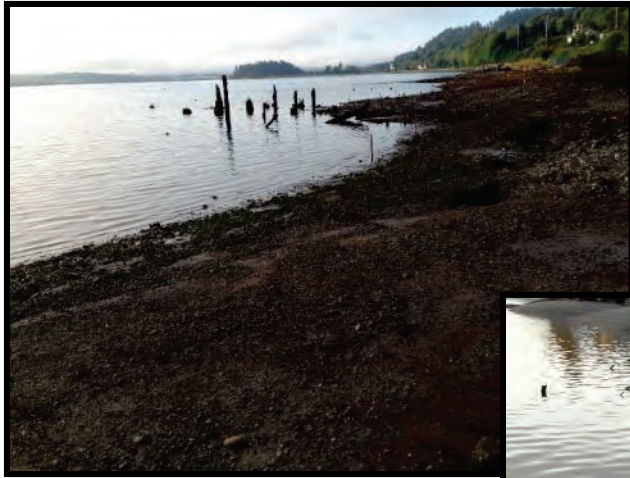
Custom Plywood

- Recognized as PSI site
- MTCA clean-up by Dept of Ecology



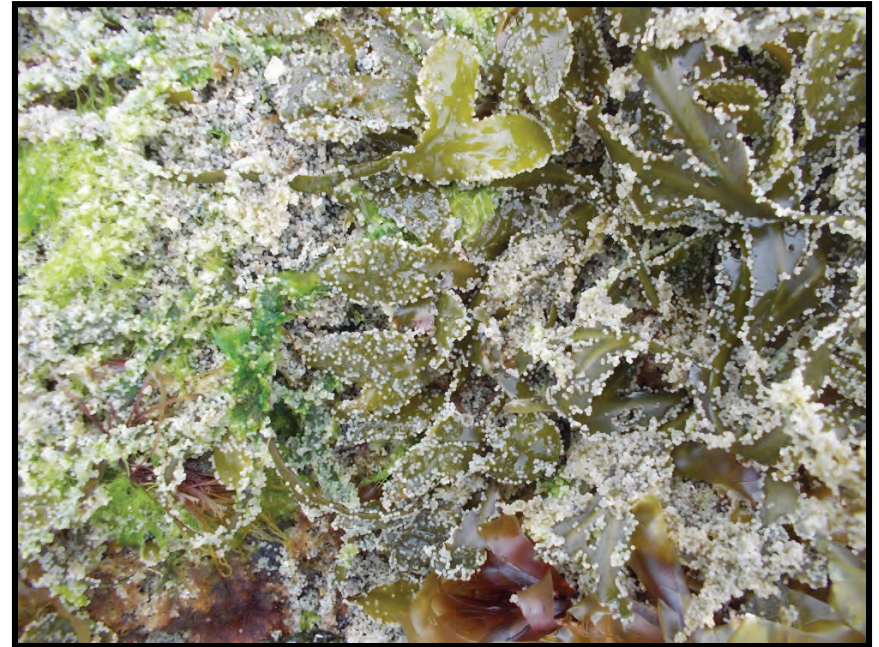
Custom Plywood

- 1,465 creosote pilings
- Dredged contaminated sediment



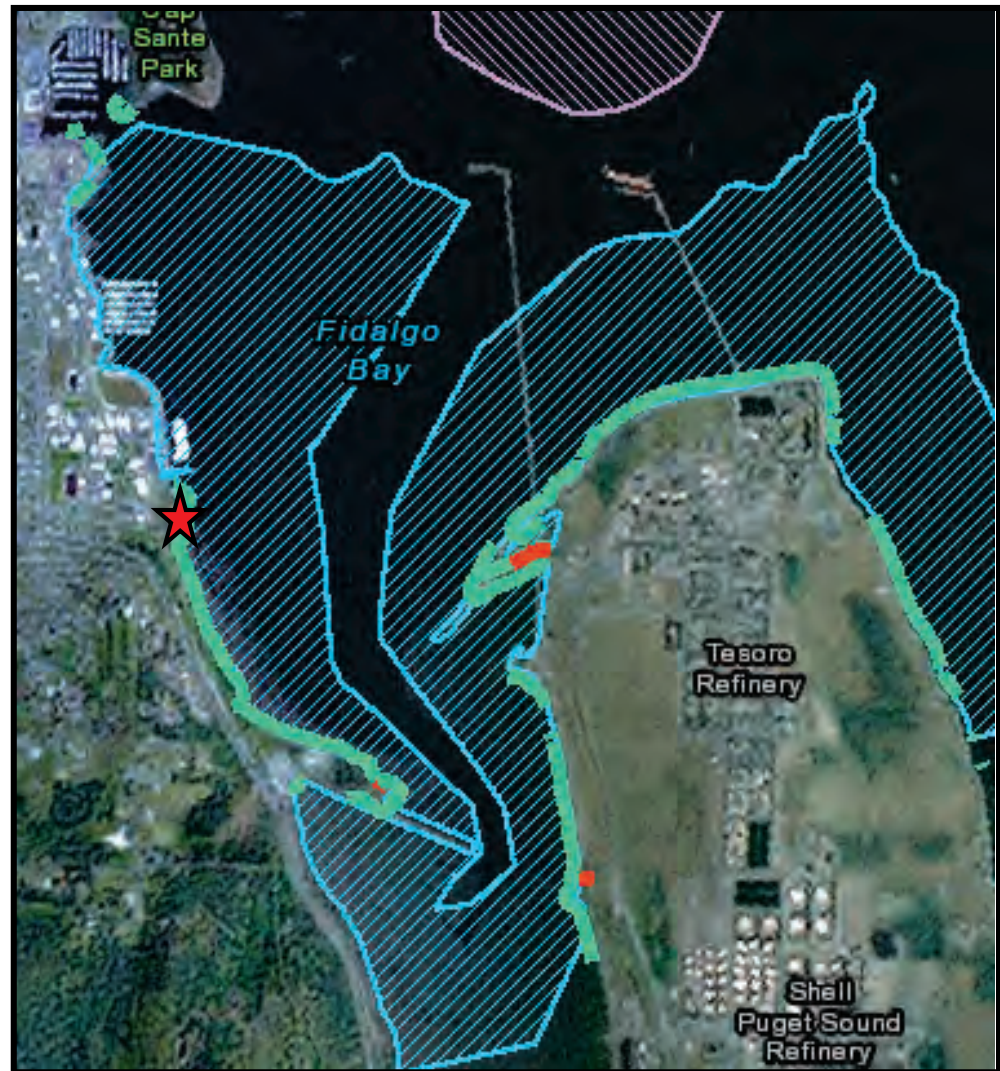
Forage Fish

- Primary food for marine fish, birds, and mammals
- Beach or shallow water spawning
 - Surf smelt at 4-8' MLLW
 - Pacific sand lance at 5-9' MLLW
 - Herring on SAV
 - Eulachon in river
 - Anchovy in open pelagic
- Eggs develop 2 weeks
- Populations in decline



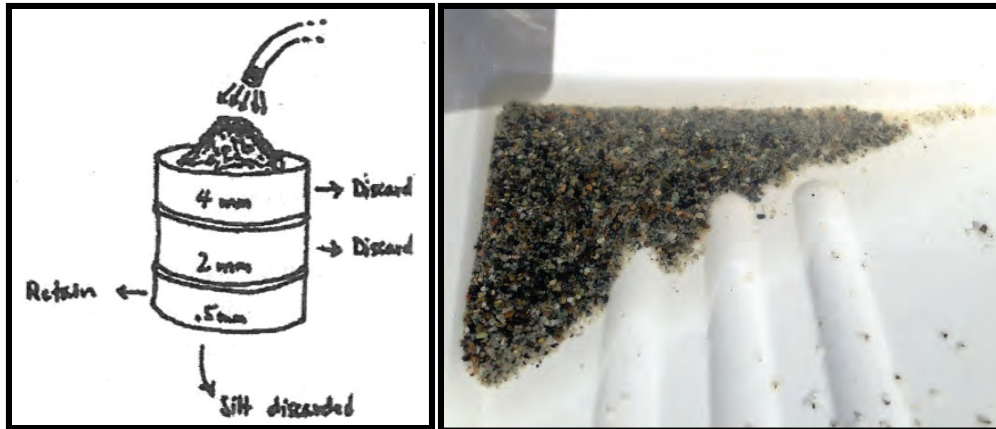
Spawning Since 1992

- Surf smelt - all year
- Herring - Jan-Jun
- Sand lance - Nov-Feb



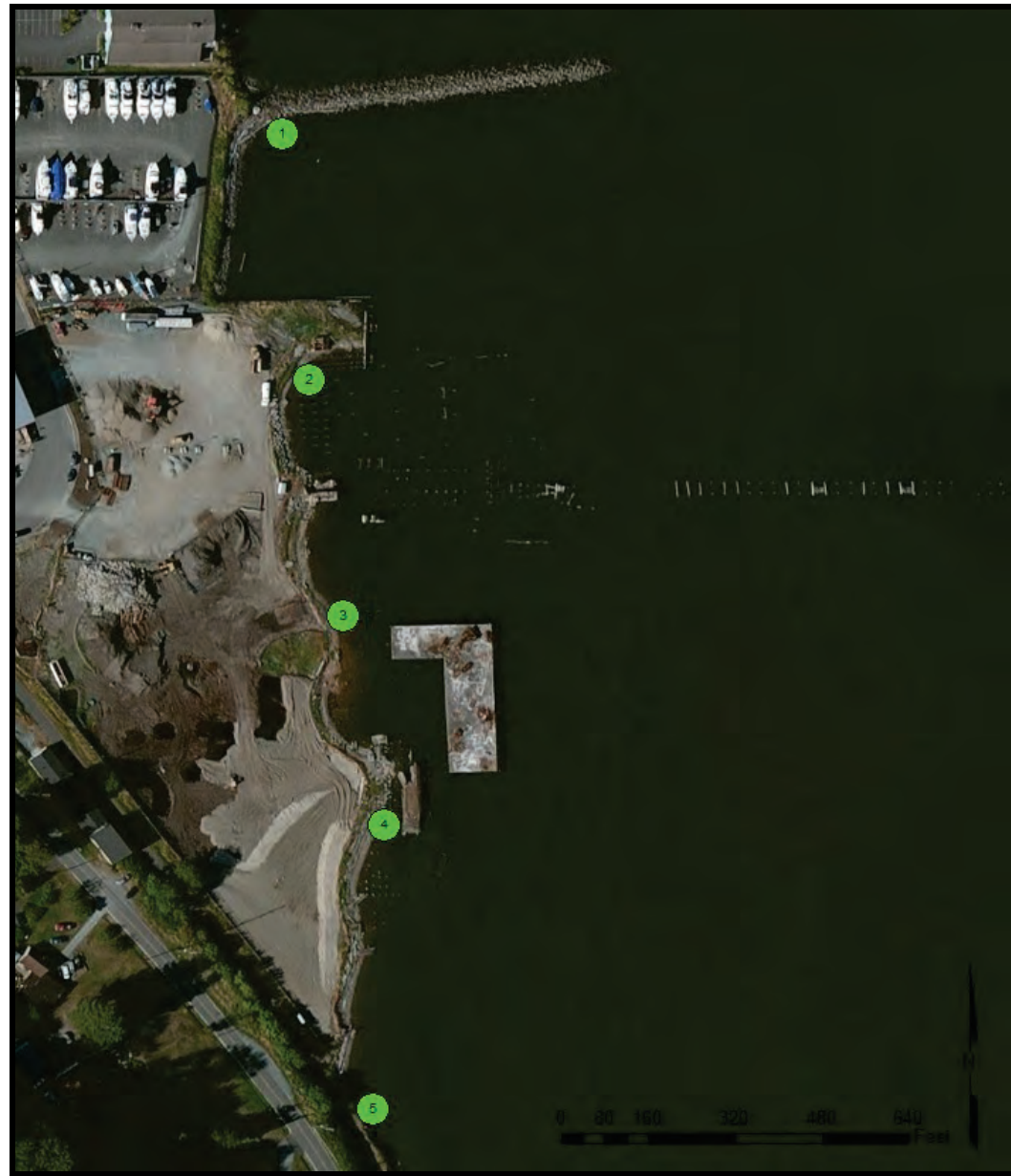
WDFW Intertidal Forage Fish Spawning Habitat Survey Protocols

- Sample beach material
- Sieve out large rocks
- Winnow eggs from sand
- Search under microscope



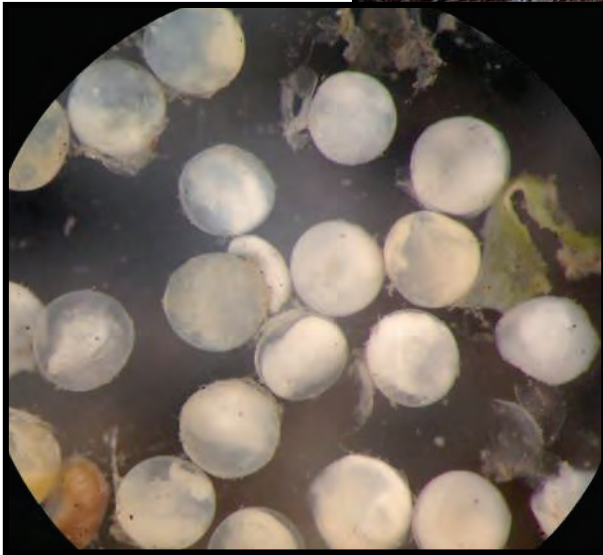
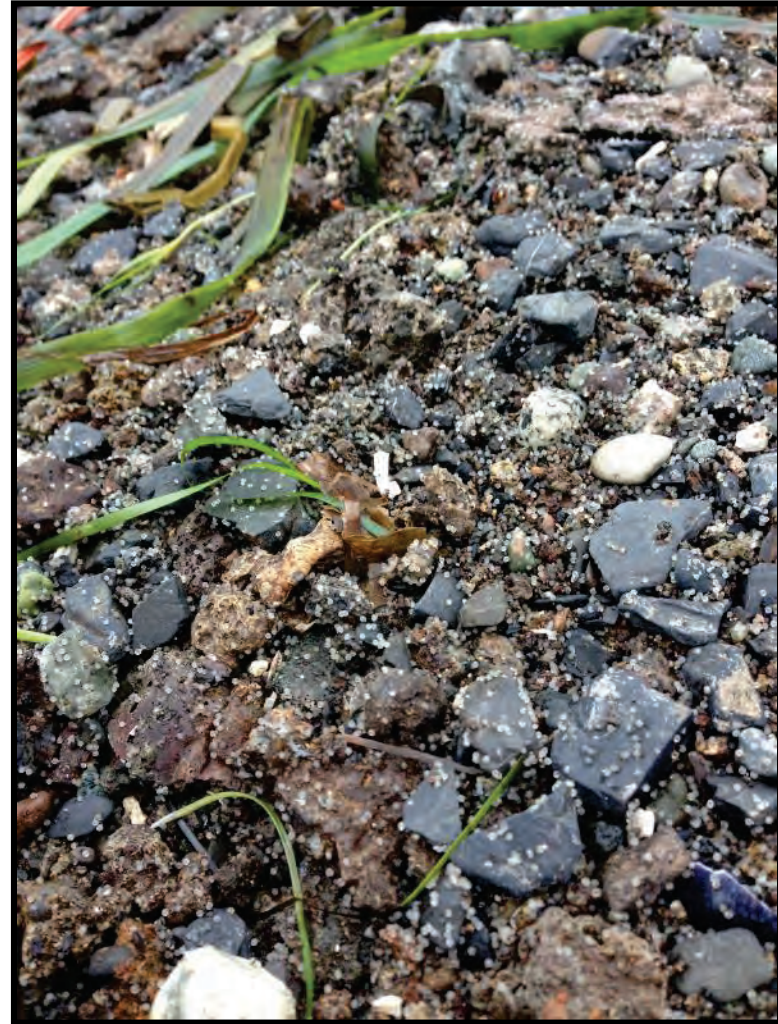
Beach Surveys

- 5 sites, one reference
- Began prior to construction
- Weekly surveys during construction
- Construction completed in late November
- Continued monitoring post-remediation



Surf Smelt Spawning

- On bolder, brick, and cobble
- On wood waste



Surf Smelt Spawning

- Reference site
- Consistent spawning
- Egg survival in July
- Shade



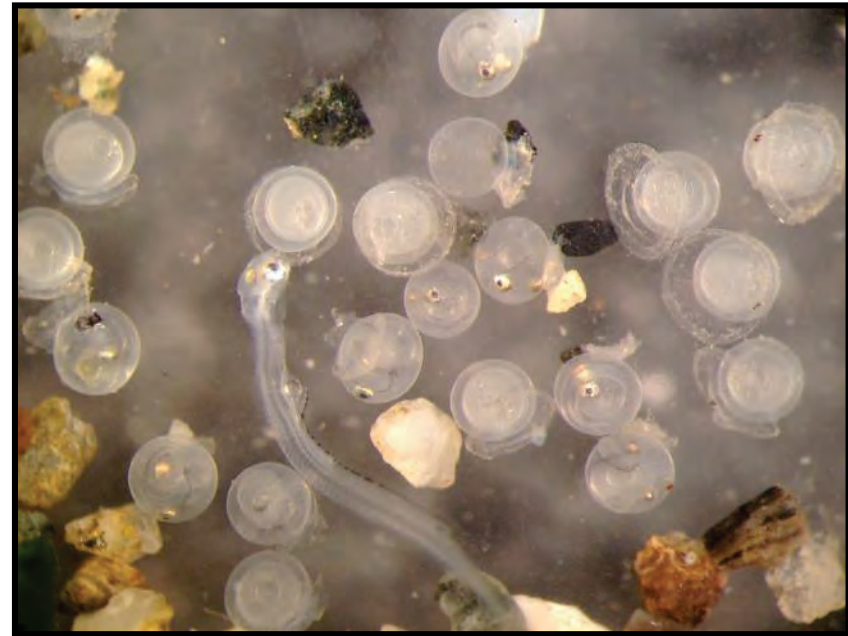
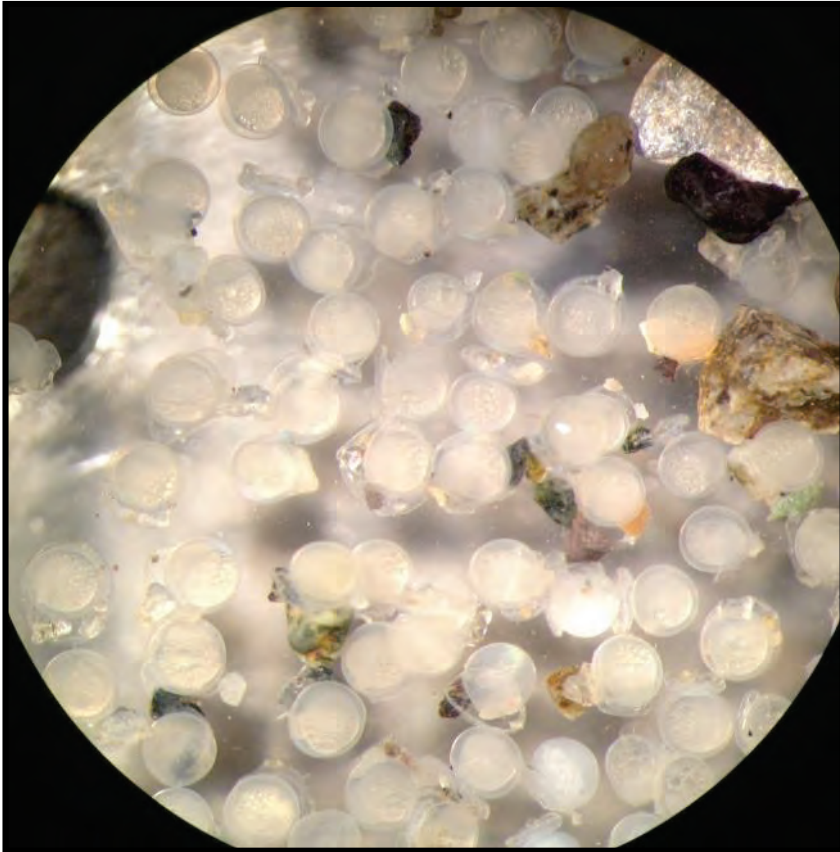
Surf Smelt Spawning

- Graded sand/pebble/cobble mix
- Nighttime summer spawners
- August spawn on new mix
- No eggs found in February



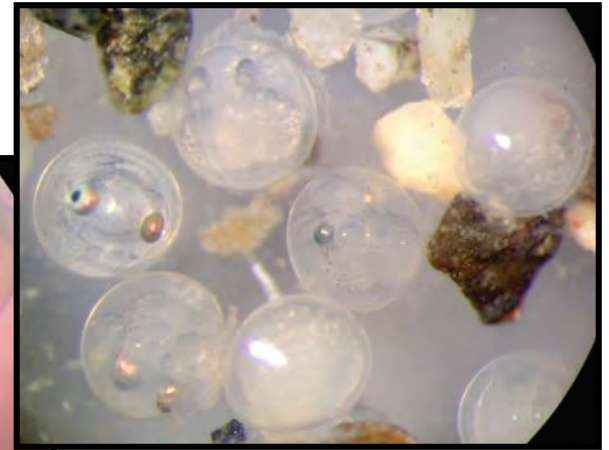
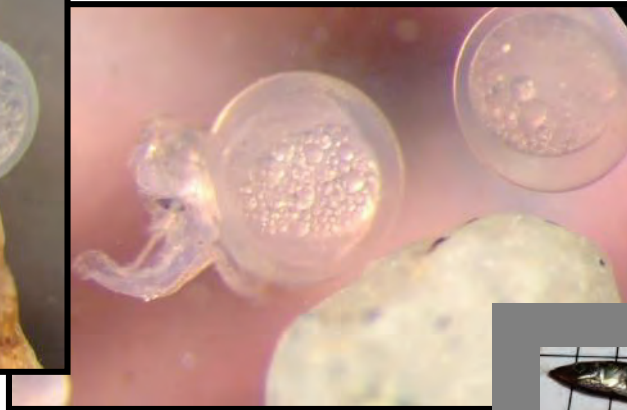
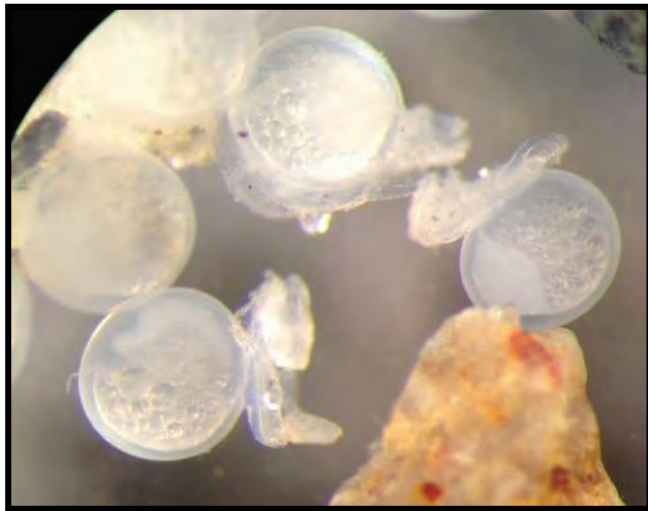
Surf Smelt Spawning

- Egg development improved from June to September



What's next?

- Continued monitoring into 2016
- Long-term plans for 10-year monitoring
- Track egg development (summer)



- Sand lance spawning?



Success!

- Returned surf smelt spawning habitat
- Large part of Fidalgo Bay Restoration
- WA Dept of Ecology
 - Hun Seak Park
 - Peter Adolphson
 - Sandra Caldwell
- KPFF and CHE
- Other talks today
 - Diane Hennessey
 - Emily Duncanson

