Smithsonian Environmental Research Center

iTunicate Newsletter

March 2016

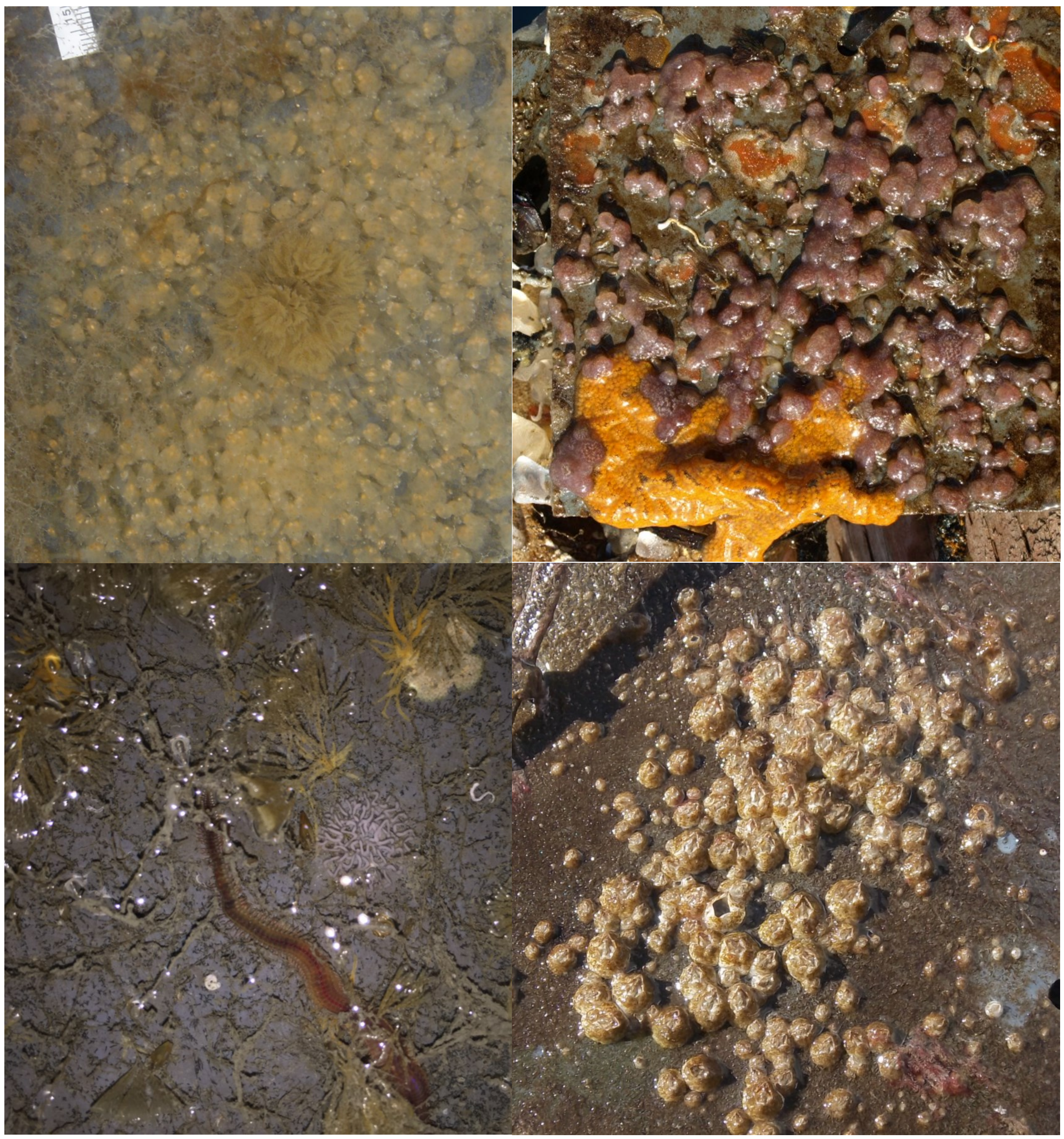
"Every time I slip into the ocean it's like going home." Sylvia Earle (see the dive story page 2)

Inside this issue:

Special points of interest:

- *D. vex* update
- Climate change and Invasive species

Panel Art—Can you recognize your harbor?

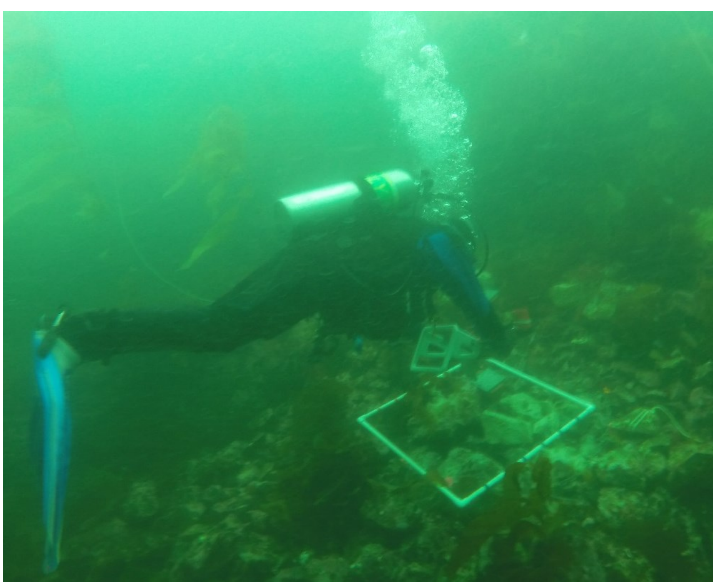


Plates clockwise from upper left: Tunicates *Distaplia occidentalis* and a bryozoan, likely *Bugula pacifica* in Homer, the tunicate *Distaplia alaskensis* and the non native *Botrylloides violaceous* in Ketchikan, *Amphibalanus* barnacles in Glacier Bay, and a Nereid polychaete, encrusting and branching bryozoans, Nudibranch eggs and folliculinid protozoans in Seward. Photos: Gary Freitag, Catie Bursch, Glacier Bay staff, Richard Hocking and Rebekka Fedderer.

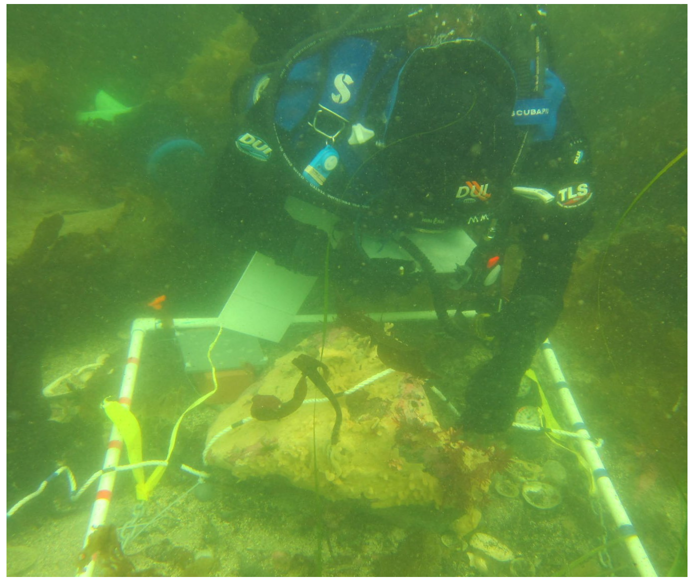
Diving into rock vomit - (D. vex) removal experiments in Sitka

Zipping up my dry suit, the top layer of my many protections against the cool 45 F degree water of Whiting Harbor, I listen as my dive buddy and colleague goes over the to do list for this dive. It is an extensive one, as usual: take measurements, identify and count animals, and photograph areas with the tunicate *Didemnum vexillum* (*D. vex*). Once all suited up and connected to our tanks, we dive in. Under the calm waters we find sunken treasures left over from past military bases, aquaculture farms, and more. This cold, treasure filled site is Whiting Harbor in Sitka, Alaska. I was surprised to see how similar the rocky shores of Alaska are to those of Northern California where I usually dive, but then I saw how much of this small cove was completely covered by *D. vex*.

If you are a monitor for Plate Watch, or you tune in to KCAW radio in Sitka, you have probably heard of *D. vex*, or as it is affectionately called "rock vomit". For a quick recap, *D. vex* is a colonial tunicate native to Japan but is now found worldwide. *D. vex* can form expansive monocultures covering the seafloor and overgrowing many organisms. In 2010, scientists and citizens from Alaska discovered a population of this tunicate in Whiting Harbor, Sitka. Thanks to efforts by Alaska Department of Fish and Game and the cooperation of locals, this tunicate appears not to have spread outside of this area. Scientists from the Smithsonian Environmental Research Center (SERC), Alaska Department of Fish and Game, Bureau of Land Management, and other agencies are now trying to come up with a game plan to remove *D. vex* before it has a chance to spread further in Alaska's coastal waters.



Ian Davidson placing quadrats on the sea floor and photographing for later analysis. Photo:M. Marraffini



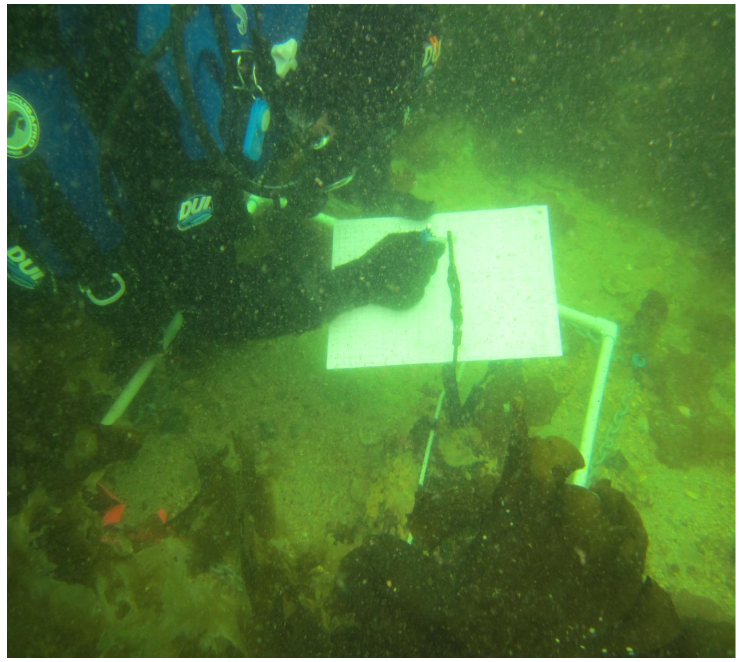
Michelle Marraffini doing point counts of organisms contained in the quadrat. Photo: Ian Davidson

We spent much of our summer under water, monitoring the tunicate's populations in this small embayment outside Sitka Harbor. We aimed to find out if D. vex coverage and abundance had changed since a dive survey in 2011, and to begin testing methods to remove it from the seafloor. ADFG and Smithsonian divers placed dome enclosures about the size of a 1-2 person camping tent (see photo) over *D. vex* on the seafloor, to see if salt, chlorine, or lime dust (all methods that killed the tunicate in small scale bucket trials), could kill the tunicate.

Our goal was to determine which method might be scaled up to a removal attempt in the whole harbor. I know what you're thinking, if this stuff kills *D. vex* won't it kill everything else too? Well that answer has two parts, 1) yes, things that can't move out of the way could die, but things that can swim are usually scared off by the weird blue tent so they escape; 2) once the *D. vex* is gone, all of the animals and algae can recolonize the open space from nearby. Remember that *D. vex* often covers the seafloor and overgrows other organisms (this can be extended to almost any and all surfaces in Whiting Harbor), by covering a lot of the seafloor it uses up the habitat that other organisms would normally use. Our hope is that once the *D. vex* is gone, all of the native animals and algae can move back in and form a healthy ecosystem once again.

After months of hard work we were able to test 60 domes for our experiment with mixed of results. Our treatments were most effective when the dome was secured to the seafloor and almost created a vacuum seal. This happened when *D. vex* was on a collection of rocks that was surrounded by flat sand. The only snag is that *D. vex* doesn't always grow in these 'convenient' places. It is also found on enormous boulders, vertical surfaces, and covering the rubble filled causeway that forms the perimeter of the harbor. In these places it is hard to get that vacuum seal, making the treatments less effective. Some creative thinking will be required to address these areas.

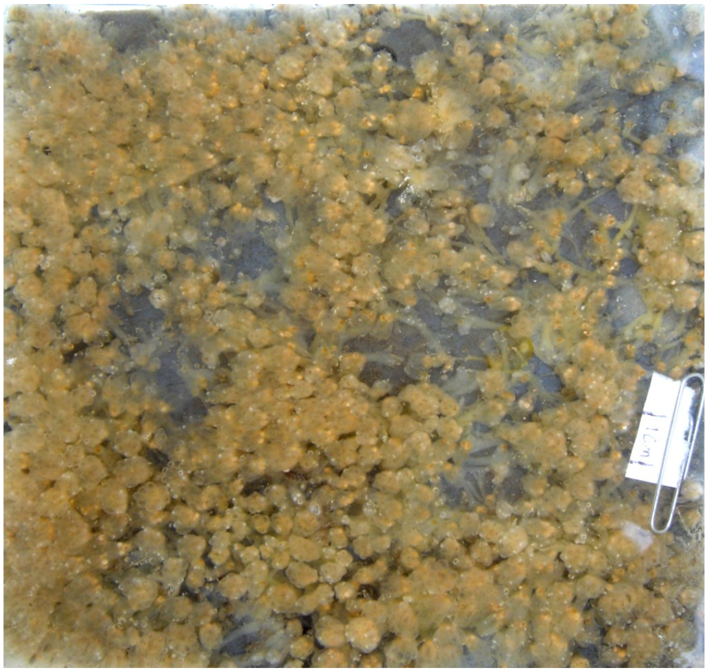
Even after exhausting days of diving turned into long nights of science, turned into weeks away from home, there is still a bit more work to do to see if we can remove all of the *D.* vex from Whiting harbor. Despite this work load, Sitka is still one of my favorite diving experiences and not a bad place to call an office.



D. vex enclosure dome in place on the bottom housing the salt treatment. Above Photo: Ian Davidson.
Taking Data underwater. Right Photo: Ian Davidson

View of the mountains through the clouds as we leave the 'office' for the day. Photo: Michelle Marraffini

How do Marine Invertebrate Communities Respond to Climate Change — A Plate Watch Perspective



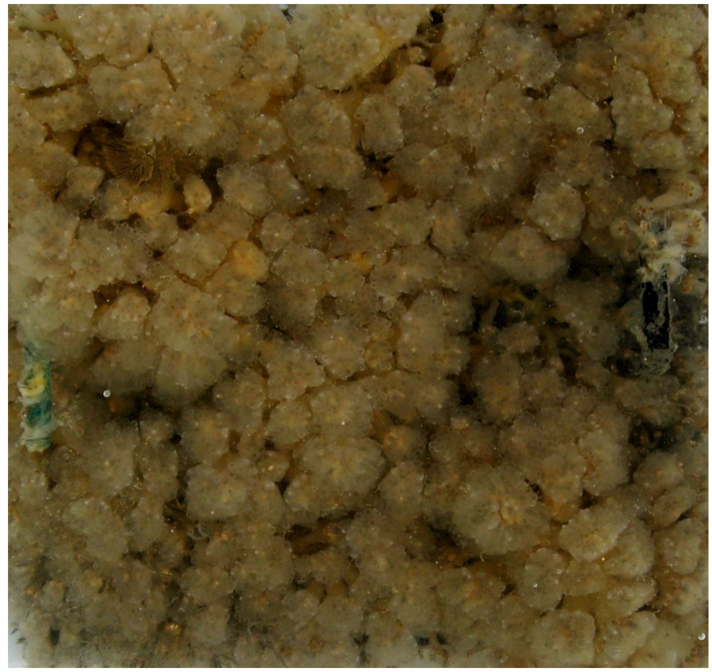
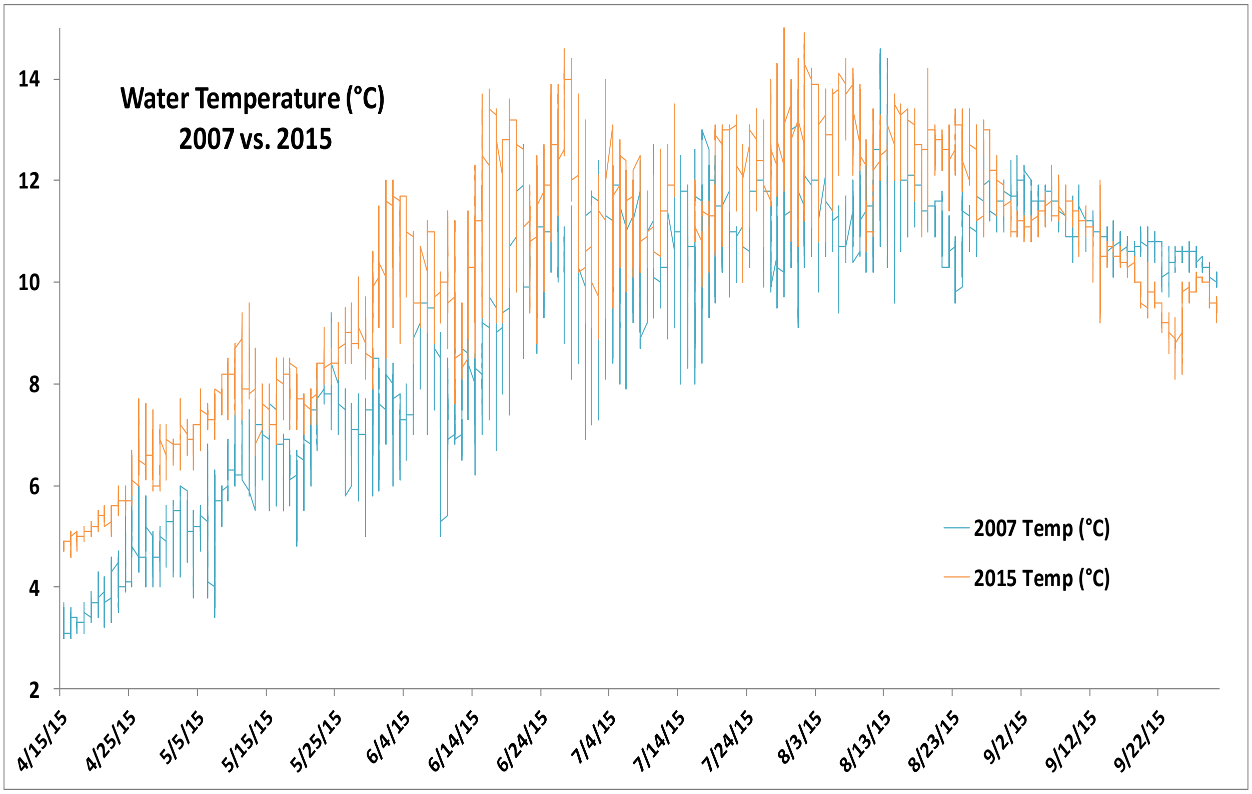


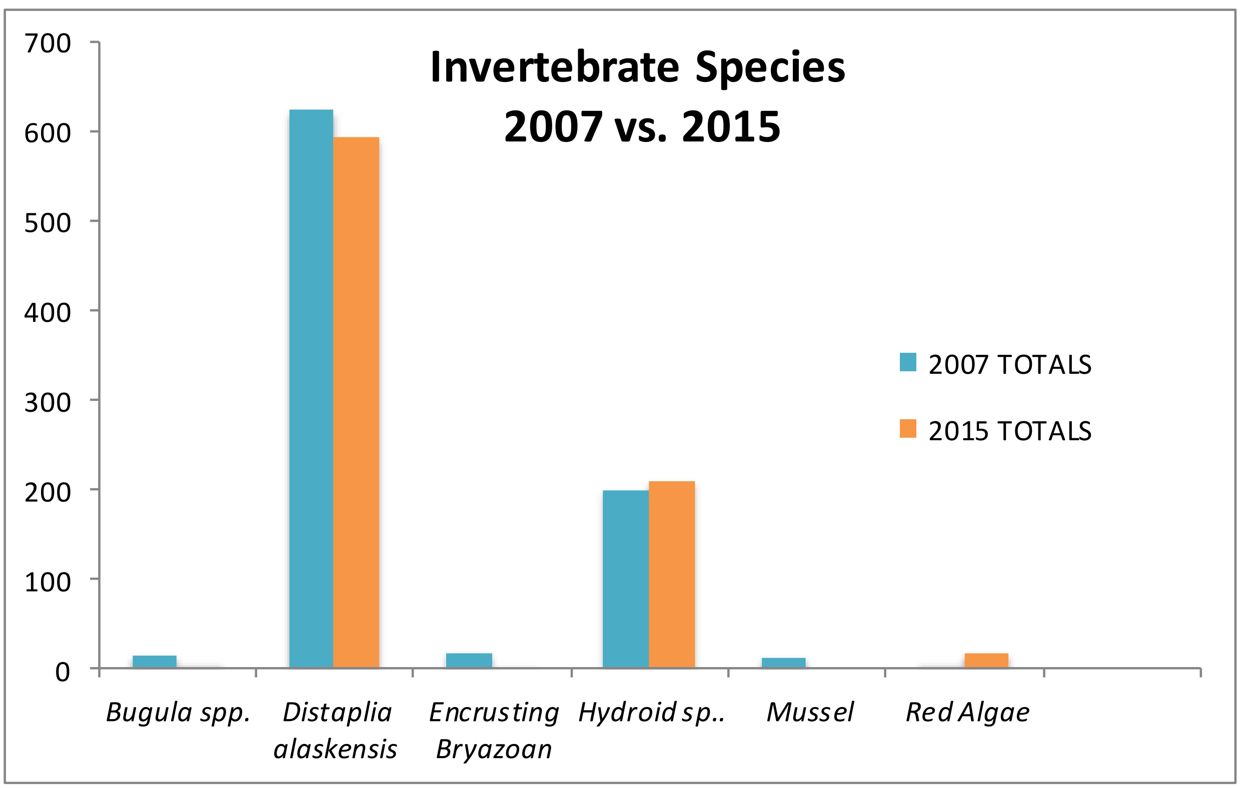
Plate on the left was collected summer of 2007 an unseasonably cold summer, the plate on the right in summer of 2015, an unseasonably warm year in Homer, Kachemak Bay. Note that the tunicate *Distaplia alaskensis* grew much larger in the warmer summer over the same time period. Photos: C. Bursch

Climate Change—We've all heard about it, the glaciers are melting and the oceans are warming, but what does it mean for the animals that live in the sea— like a tunicate or a bryozoan for example? Do some species die off and new ones appear? Or do their ranges change? Do they grow bigger in warmer water? These are some of the questions we can begin to answer with settlement plates Plate Watch monitors deploy each summer.

Plate Watch monitors in Kachemak Bay took a look at some of these questions this year. Their data set stretches back to 2007 and encompasses summers both warmer, and colder, than the norm. By looking at what settled on their plates under different climatic conditions, we can start to tease apart what climate change might mean for Alaskan coastal fouling communities. To do this, Catie Bursch and Tricia Bhatia KBRR, examined temperature records from the last decade from KBRR sonde data and identified an unusually cold year (2007) and an unusually warm year (2015 was the warmest year on record globally!). They analyzed photographs of plates that were out over the summer (deployed in June and retrieved in September) in both these years. A 10 X 10 grid was overlain on each plate and the organisms under each point were identified to generate a point count for each plate (see the website for detailed instructions on how to do point counts from photographs at http://platewatch.nisbase.org/page/documents). They found that the species composition was nearly identical in both years, but the size of the dominant species was larger in the warmer year (2015). Similar analyses are being done for Seldovia (Kachemak Bay), and Sitka. We hope to continue monitoring for changes and comparing what we find across sites through out Alaska to get a clearer picture of what we might expect with warming ocean waters.



A comparison of water temperature measurements outside Homer Harbor measured every 15 minutes for the spring and summer of 2007 (blue) and 2015 (orange). Data from KBRR buoy



The species present and their abundances on plates in Homer harbor the summer of 2007 and 2015. The species composition was not significantly different in the 2 years.

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Monitor Spotlight

Students in the 6th grade in Petersburg, Alaska got down and dirty this summer, peering over the side of the harbor dock at the artificial collectors they'd deployed there. Some of them started monitoring for invasive species as 5th graders, looking for a target list of invasive marine invertebrates. So far they haven't found any, which is good news for Petersburg. When asked what they learned, here are some of their responses:

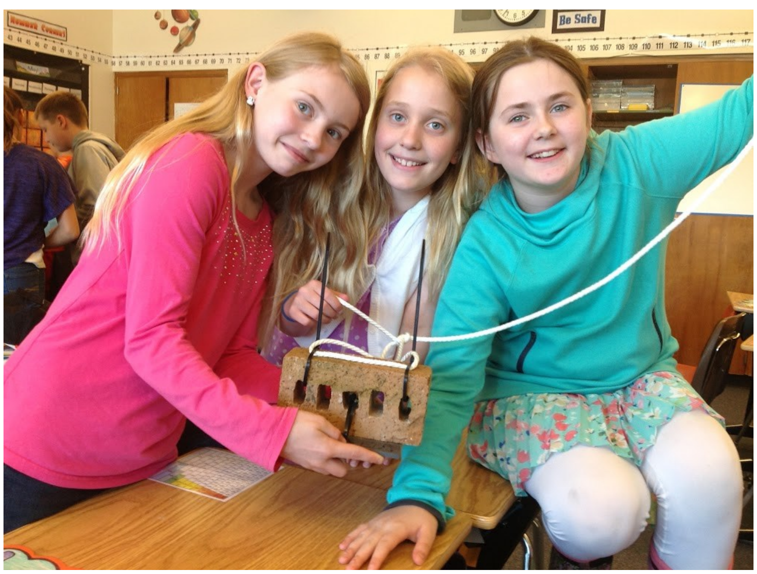
"I learned a lot about tunicates, before we did it I didn't even know what a tunicate was."

"I learned that invasive tunicates are a threat to the Alaskan ecosystem."

"I learned that there are many different types of species."

"I learned what some invasive species looked like and what some of our native species looked like."

The plates act as "a make-shift home" for young recruits to settle on and help us detect new invaders. Volunteers are a vital part of monitoring for invasives in Alaska. With so few people spread out over many miles of coastline, we count on them to be the scientists eyes and ears in all these coastal areas.



Top: Students deploying a Plate Watch settlement plate in Petersburg Harbor. Bottom: Students deploying more plates in the Harbor.. Left: Part of the plate construction crew.

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http://platewatch.nisbase.org