March 2018

Plate Watch

"In every outthrust headland, in every curving beach, in every grain of sand there is the story of the earth."

Rachel Carson

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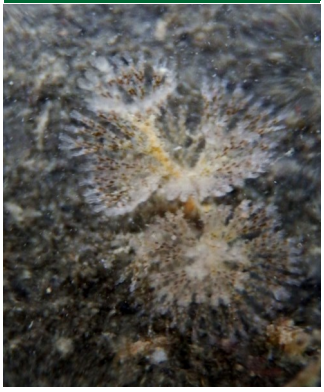


A bryozoan from St Paul, Pribilofs

Linda Shaw

New monitoring site in the Bering Sea — Pribilof Islands

Flying into the Pribilof Islands you cannot help but be mesmerized by the beauty of the landscape of the far north – the craggy mountain peaks, the glaciers of remote Alaska, the vast expanse of open ocean as you near this tiny little speck of rock in the Bering Sea. Of the 4 volcanic islands, only 2 are inhabited by the Aleut or Unangan people. The largest, St Paul, is home to about 400 souls. The life blood of the community is the protected harbor, that hosts many fishing vessels.

Unique underwater ecosystems surround the islands, but little is known about the marine invertebrates there. With increasing sea temperatures resulting in melting of the Arctic ice, shipping traffic through the area is also increasing, (see In the News pg 6) making it important to know more about the marine communities impacted by these changes. Volunteers with the Ecosystem Conservation Office of the Aleut community hung 10 settlement plates in St Paul in the summer of 2017, to establish monitoring for non-native marine invertebrates. We look forward to seeing what species colonize the plates in this outpost in the Bering Sea.

St. Paul, Pribilof Islands, fur seal observation platforms. Arctic fox—The subspecies in the Pribilof Islands is brown year round. Photo left: Linda McCann, right: Linda Shaw.

Plate Watch partners with Zooniverse

Smithsonian scientists are developing a method to use photographs of plates taken by volunteers, by crowd-sourcing identifications of the animals growing on the plates. The project will be hosted on the popular citizen science platform Zooniverse https://www.zooniverse.org/projects/serc/invader-id, and is set to go live on March 21st. The online citizen science project allows anyone to identify the marine invertebrates that grow on hard surfaces such as boats and docks. Their work will help our scientists move quickly through the hordes of photographs our volunteers send us.

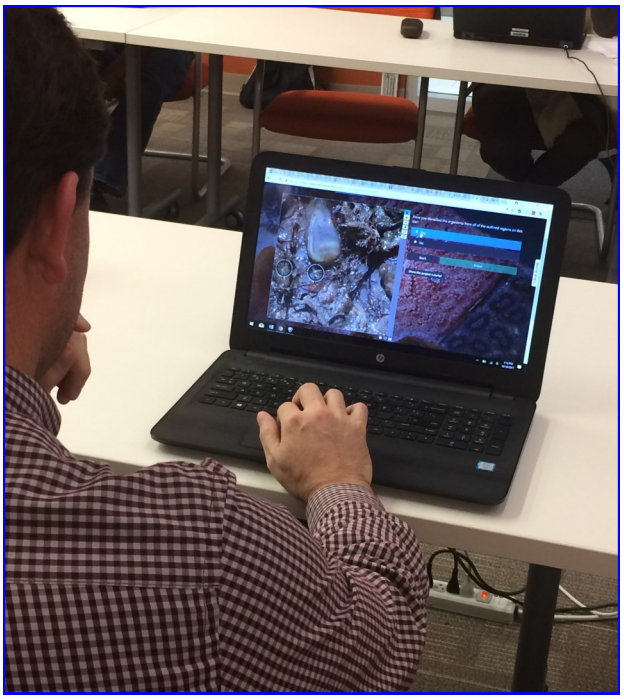
Although taxonomy is a difficult skill, there are keys we use to differentiate between the major types of animals we see. These keys, called dichotomous keys, breakdown identifications into simple questions like:

"Is it hard or soft?"
"Is it patterned or is it one color?"
"Is it long and skinny or fat and short?"

These kinds of questions will enable our volunteers to recognize the major groups of fouling invertebrates: Sponges, Barnacles, Algae, Anemones, Bryozoans, Tunicates, Mollusks, and Worms. By tracking changes in the types and abundances of different organisms, we can see how ecosystems are changing over time. It also gives us a chance to detect new invasive species before they become problematic.

The survey data also helps us understand whether or not efforts to prevent invasions or limit the impact of invasions are working. We share our findings with natural resource managers and policy makers so that they can implement the most effective strategies possible to deal with marine invasive species.

With the help of citizen scientists, we hope to increase the number of plates (and the amount of data) that we have to work with. We look forward to building a community of citizen scientists interested in how marine communities change – something that we predict will become more important as climate change affects coasts world-wide.



Top: Volunteer from a focus group working through a test of the project. Bottom: Photographing a plate underwater. Photos: Katy Newcomber and the SERC Invasions lab

The good, the bad and the ugly tunicates — An update to the Invertebrate Field Guide

Catie Bursch (Kachemak Bay NERR) takes a tiny pair of scissors and cuts into the flesh of a small, marine invertebrate called a tunicate, to try to identify the species. Tunicates, or sea squirts, do not give up their secrets easily and more often than not, delicate cuts into the body are necessary to find out who they are. We are pleased to announce that our monitor in Kachemak Bay, Catie Bursch, secured funding from Bureau of Ocean Energy Management (BOEM) to update "The Guide to Some Common Fouling Invertebrates of Alaska with a focus on known and potential invasives". The new additions are all native tunicates that are encountered in the Homer area. Over the years she has been monitoring, Catie has built up considerable expertise on tunicates which she was able to utilize for this project. All of the species in the guide have been vetted by a tunicate taxonomist (Gretchen Lambert) for accuracy and though a few could not been taken to species, we hope that their inclusion will lead to more accurate accounting of tunicates in the region. Please have a look at the new guide at: http://platewatch.nisbase.org/pages/fieldguide and http://accs.uaa.alaska.edu/field-guides/. The NERR will also be putting together a summary of Plate Watch and green crab monitoring efforts for the year that can be found at: http://accs.uaa.alaska.edu/kbnerr/marine-invasive-species/

Three species newly included in the guide clockwise from right: *Styela yakutatensis*, *Riterella pulchra*, and *Boltenia echinata*, all native to Alaska. Photos by C. Bursch

Latitudinal Predation Experiment

Sitka PlateWatch monitor, Lynn Wilbur, was overrun with plates and cages during summer 2017, as Sitka was one of four sites to be included in a pilot predation experiment. Researchers at SERC are interested to investigate mechanisms structuring the increase in biological diversity from the poles to the equator, i.e., the latitudinal diversity gradient (LDG). The scientists are particularly interested in the relative influence of predation in driving marine community composition across latitudes.

The experiment was based upon the same protocols as PlateWatch, using PVC plates as monitoring devices, and using minnow cages to exclude predators. Two other treatments were also trialled: a partial cage to provide the 'cage-effect' without actually excluding predators, and a cage that was removed two weeks before the end of the experiment to investigate the difference between predation on early-settling communities, and those that were longer established. Lynn Wilbur, our PlateWatch monitor in Sitka deployed the experiment there, and took photos of the panels every two weeks, changing over or cleaning the cages at the same time to prevent build up of any fouling on the cages.

Eight replicates of the four treatments were deployed at four sites (Sitka, San Francisco, Bocas del Toro and Panama City) and retrieved after twelve weeks. The last set of photos from one set of Sitka replicates is shown on Page 5.

SERC intern Jamie Buchholz prepares cages for deployment in San Francisco Bay. Photo: Gail Ashton

Half Cage (left) and Full Cage (right) deployed in Panama. Photo: Janina Seemann.

Many of the fouling organisms will be familiar to PlateWatch contributors: the clear/white tunicate is the common *Corella inflata,* and several yellow/orange colonies of *Botryllloides violaceus* can also be seen. The white squiggles are serpulid worms and anyone with a magnifying glass may be able to see spiralling spirorbid worms and possibly identify the brown/beige bryozoan colonies. You can clearly see the Control panel has fewer solitary and colonial tunicates, but the differences between the other 3 treatments are less visually distinct.

Each of the photos from all of the sites were overlaid with a grid and point counts were done to assess species diversity and abundance. Using these data we are able to look for latitudinal trends in diversity, but also differences in the impact of predators with latitude. The results are being analysed for presentation at the World Marine Biodiversity Conference in Montreal in May, and the investigators plan to expand to more latitudes over the next few years. (Images from Sitka by Lynn Wilbur)

In the News

New Regulations: Beginning January 1, 2018, California is requiring that all ships implement a vessel specific Biofouling Management Plan that is consistent with IMO guidelines.

***D. vex* experiments:** Final permits are anticipated in the next few weeks for a demonstration project to control the invasive tunicate *D. vex* in Whiting Harbor, Sitka, Alaska. This summer, the goal is to increase the scale of chlorine treatments on the sea floor to 10's of square meter plots, using turbidity curtains. The project is a collaboration of ADF&G, SERC, BLM and is funded by the North Pacific Research Board.

Tsunami debris: The culmination of years of research following the 2011 tsunami in Japan, analysis by a consortium of institutions, including SERC, suggest that a large number of species (289) from almost all marine invertebrate groups, are capable of surviving the stress of open ocean transport, traveling the 1000's of miles from Japan to the west coast of North America. Data are presented in a Special Issue of Aquatic Invasions at:

http://www.aquaticinvasions.net/2018/issue1.html

Arctic climate change impacts: First transit of the Arctic by a commercial vessel unaided by an icebreaker—Aug, 2017 and more significantly, in midwinter by another vessel in Feb 2018 (*The Independent*, Feb 14, 2018). Nations make plans to send commercial vessels through the Arctic on a regular basis.

Photo left: Dock washed up on the Oregon coast. Oregon Parks Dept/Corbis via Getty. Photo above: Bryozoans attached to a ship hull that crossed the Pacific. The Maritime Executive

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