



“How inappropriate to call this planet Earth when it is quite clearly Ocean.”

Arthur C. Clarke

Ocean Explorer and Co-Writer of “A Space Odyssey”

Hoorah for Hoonah — A New Site Comes Online

The summer of 2020 we added a new monitoring site to the PlateWatch team in southeast Alaska at Hoonah. Lots of students helped with both deployment and retrieval. Fortunately, no non-natives were seen on any of their settlement plates. Welcome aboard Hoonah!

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Top Right: The Hoonah Environmental Youth Program (TRAYLS) crew led by Adrianna Lapke, sets out settlement plates to monitor for non-native species in Hoonah Harbor. Bottom Right: The Resilient Alaska Youth program led by Sean Williams and AmeriCorps member Rebekah Sawers worked with 8 students from Hoonah City Schools to retrieve the settlement plates from the harbor. Photo Credits: Sean Williams



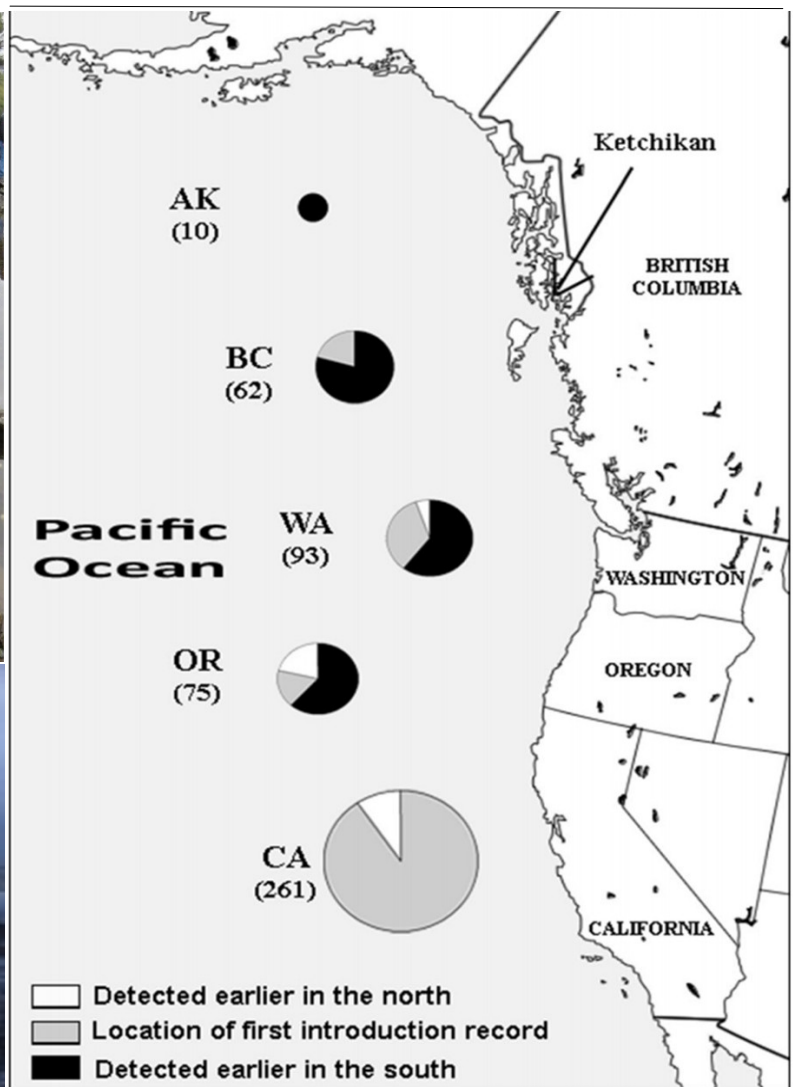
Sea Star on a plate in Ketchikan

Fouling in the Arctic — What we know

Our knowledge of the marine invertebrate fauna of the Alaskan Arctic is limited primarily to commercially important species such as King Crab and to sediment dwellers collected from bottom grabs and trawls. Information about communities on hard substrates called ‘fouling’ communities in the far north is even more limited. With many potentially harmful non-native fouling species already established to the south of Alaska and making their way north (see figure below), it’s important to establish baseline information about marine fouling invertebrates in these areas. To expand our knowledge of these communities, SERC’s PlateWatch has recently started monitoring in St Paul, Pribilofs in the Bering Sea and Dutch Harbor in the Aleutian chain at the gateway to the Arctic, but has no data from areas further north in the Alaskan Arctic.



Above: Kids searching for non-native species during a Marine Invasive Species Bioblitz in Dutch Harbor. Photo: Gail Ashton
Right: Shoreline of Barrow, Alaska, at the junction of the Chuckchi and Beaufort Seas. Photo: Andy Chang

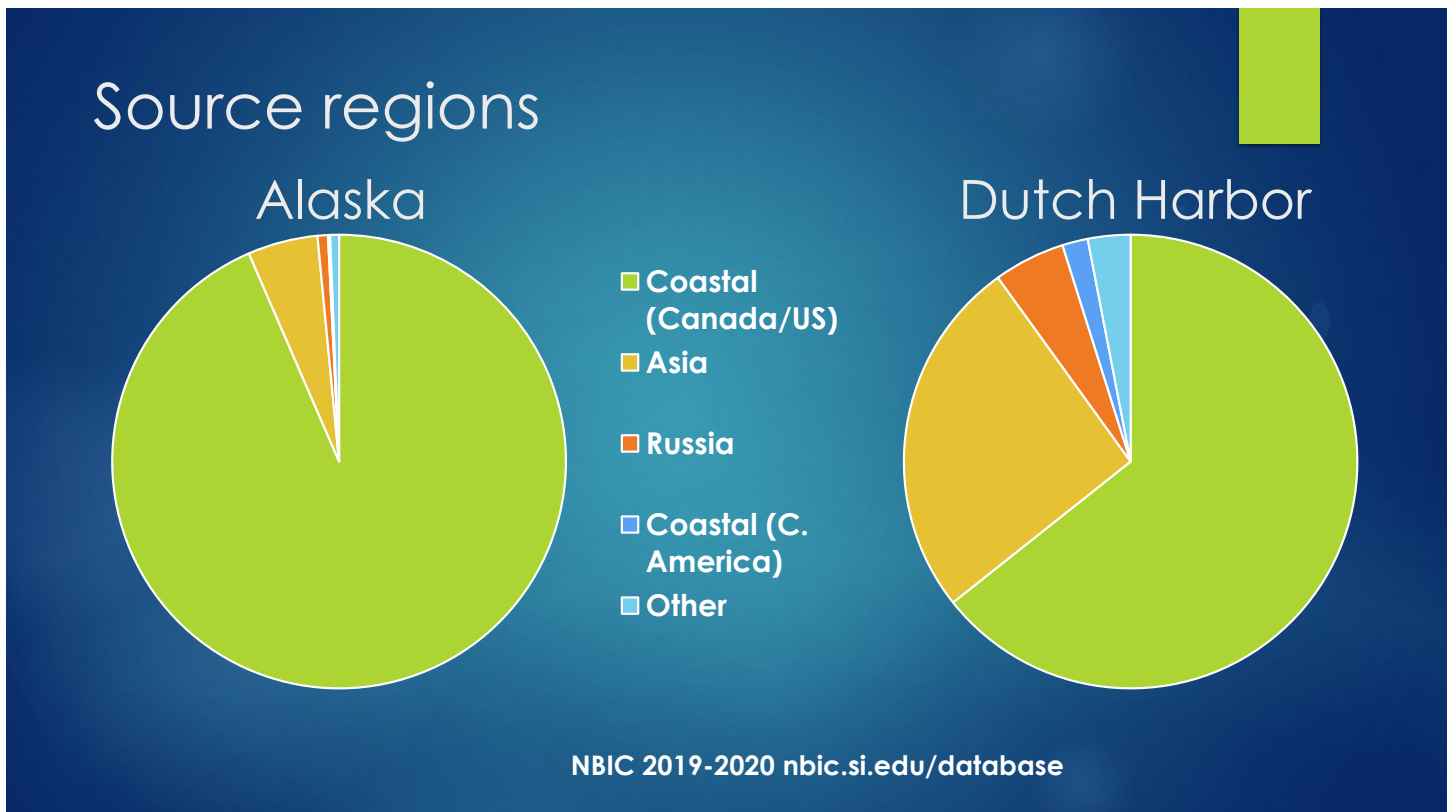


Above: From Ashton et al. 2013. Latitudinal trend of introductions of marine non-native invertebrate species to the Pacific coast of North America.

And what we don't know....

Attempts to monitor in the far north in Kotzebue, Nome and Barrow (photo opposite page) have had limited success due to challenges not faced at localities in Central and Southeast Alaska, including a lack of floating docks from which to monitor, unpredictable ice and harsh conditions most of the year. This means redesigning our whole approach to monitoring!

With the expectation that as the climate warms there will be more shipping, and more man-made structure in the Arctic in the future, it is important to establish baseline data on marine invertebrates in the Arctic, and to have measures in place to detect and respond to future introductions. Recent funding to SERC and NMNH through the BOEM Program seeks to do just that. Unfortunately, no sampling can be done yet due to COVID, but existing information about the invertebrate fouling fauna in the Alaskan Arctic is being compiled for reference, from available Museum collections, to publications, and past and present scientific projects in the area. Ultimately, the project hopes to incorporate local traditional knowledge into planning and development of both a monitoring plan for fouling marine invertebrates, as well as a response plan for handling non-natives if they are detected.



Above: Source regions for ballast water in ships entering all Alaskan ports (left) and Dutch Harbor (right) for 2019-2020. Dutch Harbor ranks 5th in the State for ship traffic (arrivals). Data from SERC's NBIC database at <https://nbic.si.edu/database/> presented at the 2021 AMSS. Transport in ships ballast water and on ships hulls is one of the primary means for non-natives to arrive in Alaskan waters.

Detecting Non-natives Using Genetics —

Alaska has a big coastline (from 34,000—66, 000 miles depending on the source) and a small population making it difficult to monitor coastal waters everywhere, but new genetic techniques could make it easier to detect newly arrived species. There are several efforts underway in Alaska to monitor for marine invasive species using either metagenetics (a concentrated sample of organisms such as a plankton tow or settlement plate), or eDNA (a water sample). Metagenetic sampling to look for non-native species in the water column began in 2016 in Valdez. A collaboration of PWSRCAC, MLML and SERC, this effort is carried out annually during the summer. Since SERC has sampled the fouling community there several times, the genetic signature of the invertebrates in the water can be compared to that of the known fouling community present in the Valdez area to look for any newly arrived non-natives. The advantage of this method is that you can look at the whole invertebrate community at once, and because you have DNA from whole



Above: Austin Love and Nellie Vandenberg washing down a plankton tow taken in Valdez harbor for metagenetics. Photo credit: Kim Holzer. Acronyms in text: PWSRCAC—Prince William Sound Regional Citizens' Advisory Council, SERC—Smithsonian Environmental Research Center, MLML—Moss Landing Marine Laboratory.

Metagenetics and eDNA

animals, the quality and quantity of the DNA can lead to better barcoding results. In contrast, eDNA techniques monitor for the ‘fingerprint’ of species (secretions, pieces of exoskeleton or shed parts) in the water column, one species at a time, from a simple water sample, making it relatively quick and easy to do. Multiple fingerprints can be monitored from one sample. To date, eDNA sampling has been focused on European green crab, an invasive species now present about 60 miles from the Alaskan border. Sampling efforts began last summer at Little Port Walter Research Station on Baranof Island as a collaboration between NOAA NMFS and Alaska Fisheries Science Center’s Auke Bay Laboratory. Standard trapping to look for green crabs was conducted at the same time, with traps provided by Alaska Fish and Game. NOAA NMFS also plans to launch eDNA sampling in Metlakatla this summer, working with the Metlakatla Indian Community, Department of Fish and Wildlife. It’s hoped that the technique can be used to screen for a variety of organisms in marine habitats in Alaska.



Above top: European green crab. Above right: In the lab at Auke Bay Charlie Waters filtering a water sample for eDNA and bottom left: Dan Nicolls putting out crab traps in Little Port Walter. Photo credits: crab SERC staff, crab trapping photo by Charlie Waters and lab photo by Dave Nicolls. NOAA NMFS-National Oceanic and Atmospheric Administration National Marine Fisheries Service.

Monitor Spotlight

The Seward docks, normally bustling with out of towners, tour boat and cruise ships coming and going, were quiet and calm last summer as Richard Hocking, Aquarium Curator at the Alaska SeaLife Center, deployed plates for invasive species monitoring. This was Richard's 13th year assisting the PlateWatch program and not even a pandemic could prevent him from putting plates out in 2020. Richard is always ready and willing to help, attending workshops to learn more about invasives, tracking down questionable invertebrates (see the photo to the right of a new non-native species record for Seward collected on a settlement plate in 2020), and even providing photos and samples, and sleuthing out possible origins of a potential non-native tunicate when it showed up living in a tank at the Aquarium there a few years ago (see story in last year's PlateWatch Newsletter). Richard also heads up the green crab monitoring efforts in Seward. He enjoys working on the docks and being a 'science ambassador' to locals and tourists alike. Hats off to Richard for his many years of dedication to invasive species monitoring in Alaska!

Top right: Richard Hocking deploying settlement plates for Platewatch in Seward Harbor. Bottom: The non-native bryozoan *Schizoporella japonica* on a plate, the first record for Seward. Photo credits: Richard Hocking



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We're on the web at <http://platewatch.nisbase.org>