

Fish Resource Permit No. CF-21-033 Plate Watch 2021

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Introduction

The long range goal of the Plate Watch monitoring Program is to create a network of citizen groups to monitor and provide early detection of non-native marine species throughout Alaska. Specific objectives include: to measure the arrival and spread of non-indigenous marine invertebrate species in Alaska, establish baseline data to measure changes in the number of invasions and their consequences at multiple sites over time, and use tunicates and fouling community monitoring as an education and outreach tool to engage local communities in marine science, including schools and citizen groups. Smithsonian has been monitoring sites with the help of Alaskans since 2007, providing valuable baseline data on marine invertebrate communities. As climate change impacts the far north disproportionately, the lack of ice, warming water temperatures and increased shipping traffic could result in new introductions in the Arctic. Our hope is to expand our network into the Arctic region, to provide baseline data and monitor for any new species that might appear there.

Methods

Plate Watch Monitoring

At each site, 2-10 passive recruitment collectors (PVC plates suspended from docks) were deployed in the water from 1-3 times per year, roughly March 15, June 15, and Sept 15. Each quarter, plates were retrieved and the fouling community examined. Pictures were taken of each of the plates. When unknown or suspected target invasives were present, close up pictures were taken and sent to the coordinator for identification. In rare instances, samples may be dried or preserved in 95% ethanol in case examination is necessary to confirm the identification. After photographing, plates were scraped clean, disposing of the organisms on-land, by placing them in the garbage (thus killing them), and then left to dry for at least 3 months before being redeployed. Up to ten plates were deployed at each retrieval time point, so that at any given time, plates are in the water while others were drying for the next deployment. Temperature loggers were deployed each sampling period for continuous temperature monitoring and where possible, salinity is measured at deployment and retrieval. For a more detailed description of deployment and retrieval protocols, visit our website at <http://platewatch.nisbase.org>. New this year we will be posting this report on the website under a reports tab. A summary section is also available on the website accessible to all monitors, including an interactive map showing all non-native records by site, heat map with NIS records since inception, Botryllid tunicate records by site, and downloadable excel file of the records updated annually (Figure 1).

Outreach

Outreach is an important tool to inform citizens of Alaska of the risk of non-native species and monitors at many sites have educational programming that utilize the plates (Kachemak, Sitka, Petersburg, Hoonah). We presented on Plate Watch methods and outcomes at the 2021 ARCUS Conference – Community & Citizen Science in the Far North, Oct 5-7 (Monitoring for Invasives in the Arctic – Ashton et al, 2021), including a request for interested parties to participate in our program. We also continue to show case Plate Watch photos (with each site's permission) on our crowd sourced citizen science project on Zooniverse at: <https://www.zooniverse.org/projects/serc/invader-id>. The project provides a platform for teaching and learning about marine fouling communities and invasive species, and allows participants to communicate with other citizen scientists around the world.

Results

The continuing COVID-19 pandemic in 2021 meant that some of our sites were not able to participate this year. Despite this, we had 3 new sites come online, one in the Chukchi Sea at Red Dog Mine, Metlakatla in Southeast, and a third in the Aleutian chain at Adak. Monitoring for non-native fouling invertebrates occurred at 15 sites in Alaska in 2021 (see Table 1) including sites in the Bering Sea, the Aleutians, the Gulf of Alaska, central and southeast Alaska and our new site near the Arctic Circle. Invasive Botryllid tunicates (*Botryllus schlosseri* and/or *Botrylloides violaceus*) were noted from the photographs submitted at the following sites: Sitka, Ketchikan, Dora Bay, Metlakatla and Hoonah (Figure 1 and 2). Two of these sites, Sitka and Ketchikan, have had Botryllids for many years, but the other two sites represent new records, Dora Bay and Hoonah. Though we did note Botryllids on plates for the first time in Metlakatla, our monitor in Ketchikan had provided a photo of a Botryllid from Metlakatla in 2010, so it is not the first record. No other non-native species were seen at any site.

Approximately 50 tunicates, 80 bryozoans, 100 barnacles, 150 hydroids, 20 marine worms and 30 molluscs were collected and sacrificed during the plate monitoring. Table 2 shows a list of the species and taxonomic groups photographed on plates in 2021.

Species reports

Botrylloides violaceus was reported from Sitka and Ketchikan again this year, as well as at 2 new locations: Hoonah and Metlakatla (Figure 2, Table 2). *Botryllus schlosseri* was also found in Sitka and Ketchikan again this year, though it was only detected from visual surveys at both sites. It was also detected at a new site not far from Ketchikan, in Dora Bay. The encrusting bryozoan *Schizoporella japonica* and the amphipod *Caprella mutica* were not identified from photos this year, however it is difficult to identify this bryozoan from plate photos, and the amphipod is a small, mobile species that requires a knowledgeable observer to detect. It is not a species that we generally ask our monitors to look for. Other non-native species of note that have been seen in the past include *Ciona savignyi*, *Bugula neritina* and *Didemnum vexillum*, none of which were encountered on plates or in visual surveys by monitors at any site this year. *Didemnum vexillum* is still present in Whiting Harbor and monitors in the Sitka area continue to do informal visual surveys in addition to plate monitoring at marinas to detect any movement of this species out of Whiting Harbor.

Discussion and summary

This year we had 2 new sites with Botryllid tunicates, Dora Bay and Hoonah, both in Southeast. In addition we confirmed the continued presence of *Botrylloides violaceus* in Metlakatla by the plate monitoring. One photo suggested that *Botryllus schlosseri* may also be there, but the photo was not clear enough to know for sure. Metlakatla is just across the channel and a short ferry ride from Ketchikan where both Botryllid species occur, so it is not surprising that either species would be detected there. SERC has plans to do a full survey in Ketchikan this summer that likely will include Metlakatla to understand the full extent of its presence there.

The record in Dora Bay is of particular interest as it marks the first time we have seen a non-native at a very remote site that sees very little boat traffic and human activity. Our monitor in Ketchikan has indicated that there are very few homes out there and the number of times a boat has come to the dock where the species was detected over the course of a year can be counted on one hand! Given that Botryllid larvae are generally in the water only a short time and settle near adults, this is an unfortunate development and suggests the continued movement of non-native species by boats.

On the positive side, the other non-native species currently present in Alaska were not detected at new sites, including no new records of *D. vexillum*. This highly invasive tunicate species is still only known from Whiting Harbor just outside of Sitka. We also have found no new specimens of the most recently detected non-native species, the bryozoan *Bugula neritina* and the tunicate *Ciona savignyi* found in

Ketchikan in 2015 and 2016 respectively. Though we cannot conclude that any of these species are not established given the small area that the plates sample, we are encouraged by the continued absence of all of these non-natives on our plates throughout Alaska.

We continue to work to establish monitoring at additional sites, particularly in the Arctic. We were happy to have 3 new sites begin monitoring this summer, including one in the Chukchi Sea where so little is known about the marine invertebrate fouling fauna. This site and those in the Pribilofs and the Aleutians are helping us to establish baseline information in the near Arctic.

The Plate Watch Program has been an effective tool to monitor for targeted non-native marine invertebrates in Alaska (Cohen et al. 2011; Jurgens et al. 2018). As rising temperatures in oceanic waters is increasing shipping and human activity in the Arctic there is increased risk of additional species arriving to Alaska. Monitoring increases the likelihood of early detection of new arrivals to the state.

References

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Figure 1. Heat map of the number of Plate Watch NIS (non-indigenous species) records at each site since inception of the monitoring program. (# NIS indicated in blue, monitoring periods in gray)

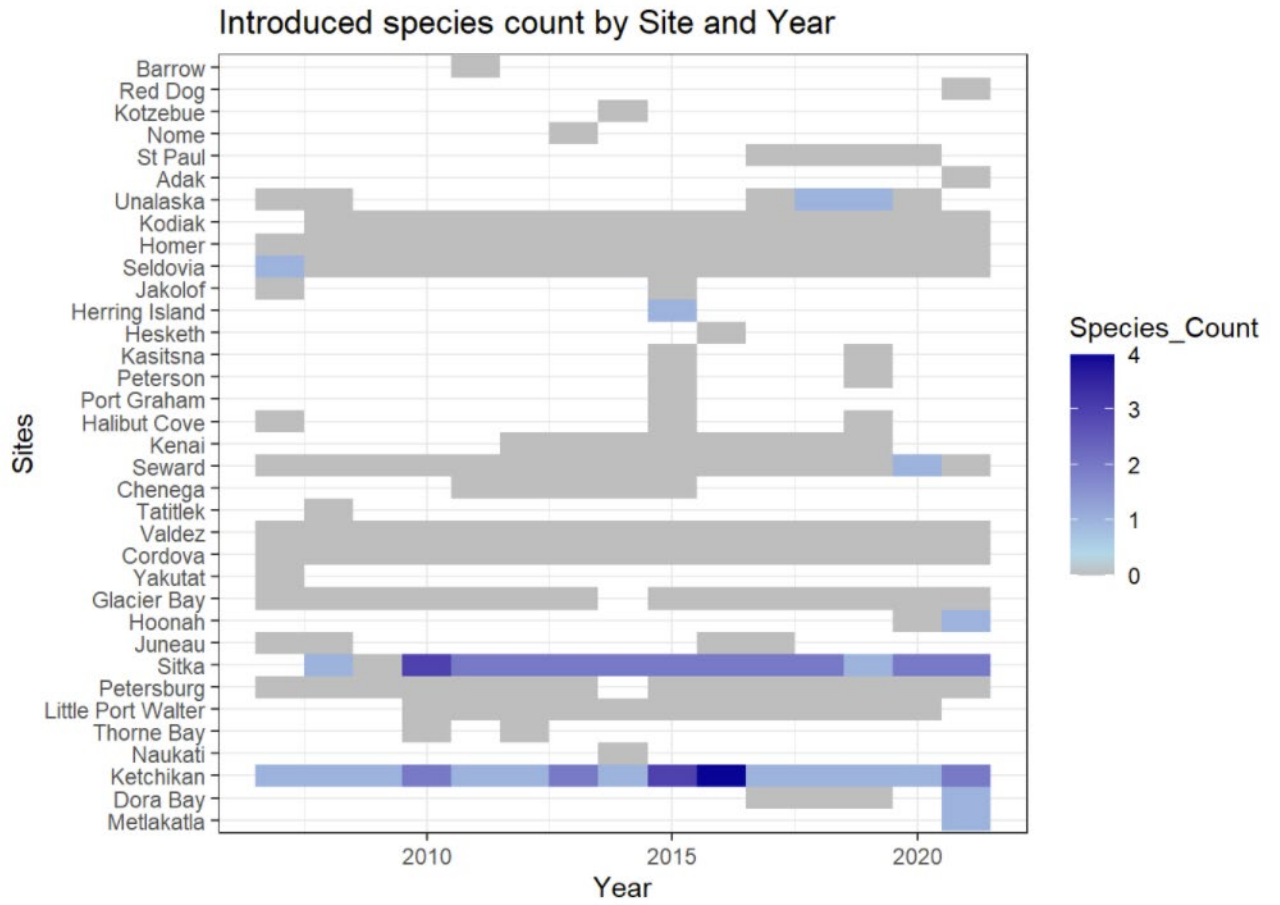


Table 1. Plate Watch Monitoring Regions in Alaska 2021

| | |
|---------------------------------|---|
| Southeast Alaska | Metlakatla Glacier Bay Ketchikan Sitka Hoonah Petersburg |
| Prince William Sound, Alaska | Cordova Valdez |
| Kachemak Bay Alaska | Homer Seldovia |
| Kenai | Seward |
| Bering Sea | St Paul, Pribilofs |
| Gulf of Alaska | Kodiak |
| Aleutian Islands | Adak |
| Chukchi Sea | Red Dog Mine |

Table 2. List of Taxa found during monitoring in Alaska

Common species from plate photographs, with NIS detected in 2021

| Classification | genus | species | Status | NIS Localities |
|----------------|---------------------|----------------------|--------|---|
| Tunicata | <i>Ascidea</i> | sp. | | |
| Tunicata | <i>Botrylloides</i> | sp. | | |
| Tunicata | <i>Botryllus</i> | <i>schlosseri</i> | NIS | Sitka, Ketchikan, Dora Bay, Metlakatla? |
| Tunicata | <i>Botrylloides</i> | <i>violaceus</i> | NIS | Sitka, Ketchikan, Hoonah, Metlakatla |
| Tunicata | <i>Ciona</i> | <i>savignyi</i> | NIS | Not detected |
| Tunicata | <i>Corella</i> | <i>inflata</i> | | |
| Tunicata | <i>Corella</i> | sp. | | |
| Tunicata | <i>Didemnum</i> | <i>vexillum</i> | NIS | Sitka- Whiting Harbor only |
| Tunicata | <i>Distaplia</i> | <i>alaskensis</i> | | |
| Tunicata | <i>Distaplia</i> | sp. | | |
| Tunicata | <i>Molgula</i> | <i>retortiformis</i> | | |
| Tunicata | <i>Styela</i> | sp. | | |
| Tunicata | <i>Halocynthia</i> | sp. | | |
| Tunicata | | spp | | |
| Echinoderm | <i>Pisaster</i> | sp | | |
| Echinoderm | | spp | | |
| Mollusca | <i>Mytilus</i> | <i>cf trossulus</i> | | |
| Mollusca | gastropoda | spp | | |
| Mollusca | <i>Onchidoris</i> | <i>bilamellata</i> | | |
| Mollusca | <i>Hermisenda</i> | <i>crassicornis</i> | | |

| | | | | |
|-----------------|------------------------|------------------------|-----|--------------|
| Mollusca | <i>cf Pododesmus</i> | sp | | |
| Mollusca | <i>Hiatella</i> | <i>arctica</i> | | |
| Hydroids | thecate | spp | | |
| Anemone | | spp | | |
| Amphipoda | Gammaridae | spp | | |
| Amphipoda | Caprellidae | <i>Caprella mutica</i> | NIS | Not detected |
| Isopoda | | spp | | |
| Barnacle | | spp | | |
| Barnacle | <i>Amphibalanus</i> | <i>crenatus</i> | | |
| Decapoda | | spp | | |
| Algae | green | | | |
| Algae | brown | | | |
| Algae | red | | | |
| Polycheata | Sabelliidae | | | |
| Polychaeta | Serpulidae | | | |
| Polychaeta | Spirorbidae | | | |
| Polychaeta | | spp | | |
| Nemertean | | spp | | |
| Platyhelminthes | | spp | | |
| Porifera | Fiberglass | | | |
| Porifera | | spp | | |
| Porifera | <i>cf Halichondria</i> | sp | | |
| Bryozoan | <i>Alcyonidium</i> | sp. | | |
| Bryozoan | <i>Schizoporella</i> | <i>japonica</i> | NIS | Not detected |
| Bryozoan | <i>Bugula</i> | <i>neritina</i> | NIS | Not detected |
| Bryozoan | <i>Bugula</i> | <i>pacifica</i> | | |
| Bryozoan | <i>Bugula</i> | <i>californica</i> | | |
| Bryozoan | <i>Tegella</i> | <i>aquilirostris</i> | | |
| Bryozoan | | spp | | |