Alaska SeaLife Center Citizen Science Monitoring Program for Marine Invasive Species

Federer R., H. Ferren, and R. Hocking
Alaska SeaLife Center, 301 Railway Ave., PO Box 1329, Seward, Alaska 99664

Background

Marine invasive species (MIS) have had negative economic and ecological impacts worldwide. Alaska is well-positioned for early detection of these invaders because it has relatively few known infestations compared to other places. Through field monitoring and reporting from informed citizens, we can find and respond to new infestations early enough to take preventive action to protect our natural resources against MIS.

Introduction

As stewards of the marine environment, the Alaska SeaLife Center (ASLC) began its MIS program in 2008 with citizen science monitoring efforts following in 2009. The citizen science monitoring programs in the state focus on two aggressive types of MIS including invasive tunicates and European green crab. Tunicates are small sac-like animals that live in colonies on hard surfaces in the marine environment. They can reproduce asexually, which means that it takes only one tunicate to establish a new colony. Tunicates can smother mariculture gear or marine life, exhaust food and resources for native species, and form mats on the ocean floor that block food access for bottom-feeding species. Several tunicates are already here including the golden star tunicate, chain sea squirt, and glove leather tunicate. The glove leather tunicate was most recently found in 2010 during a community held Bioblitz in Sitka, Alaska.

Seward vessel traffic exposes Kenai Fjords National Park and its more than 400 miles of coastline to potential MIS invasion.

The European green crab is not known to have invaded Alaskan waters; however, their populations have been spreading northward along the West Coast of the US since the 1990's. These crabs are aggressive predators that have displaced native species worldwide through predation and competition, and have the ability to spread quickly geographically. Our citizen science program has involved the community, and has helped to improve public understanding of this important marine conservation issue.

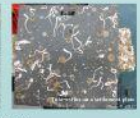
Objectives

- To conduct citizen science monitoring for marine invasive tunicates and European green crab in public use areas within Seward's Resurrection Bay.
- To promote citizen science monitoring involvement with the local schools, agencies, community organizations, and stakeholders.

Methods

Tunicate monitoring program

- Led by the Smithsonian Environmental Research Center (SERC) and San Francisco State University (SFSU) *Invasive Tunicate Network* through the SETL adopt-a-plate program that extends from California to Alaska's 14 networks
- In Seward, settlement plates are deployed and retrieved quarterly from 11 sites with both vessel and public traffic; areas that may be most susceptible to MIS
- Data is uploaded to: http://platewatch.nisbase.org



European green crab monitoring program

- There are 12 citizen science monitoring networks in the state
- Crab traps are deployed and retrieved after 24 hours once a month between May and September from 8 sites in Seward
- A database portal is currently being developed to report findings

Working with the community

- The ASLC works with Seward High School's marine science teacher Carlyn Nichols to incorporate MIS monitoring into her curriculum
- Other community partners include: National Park Service, Resurrection Bay Conservation Alliance, fishery plants, University of Alaska, and the City of Seward

"Partnerships between the school and the ASLC have been directly cited as motivation for students' pursuit of a marine science post-secondary education."

Seward High School Principal Trevor Walker

Results

Thankfully, no MIS have been reported in Seward's Resurrection Bay thus far. However, monitoring also provides us with valuable baseline information on intertidal organisms that use the habitat in our bay.

European green crab traps

- Crab bycatch: lyre crab, pygmy rock crab, helmet crab, hairy hermit crab, and the hairy shore crab; hermit crabs had the highest crab prevalence
- Other bycatch: fish, worms, and shrimp
- Sunflower stars, and masked and white-spotted greenlings had the highest prevalence overall

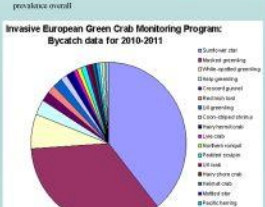


Figure 1: Total catch of all trapping events between 2010 and 2011 from Polar Seafoods and Icicle Seafoods Docks, Seward Marine Industrial Center, Seward Marine Center, Seward Small Boat Harbor (SBH), Seward Ship Terminal.

Tunicate plates

- Sites 3 and 5 had the highest species richness and sites 1 and 4 had the lowest
- Barnacles and tube worms were present at all sites and mussels, hydroids, and diatoms were found at five out of six of the sites
- Crabs, limpets, rock jingle, and sponges were only found at one site and amphipods, nudibranchs, and sea stars were found at two sites.

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Amphipods			x		x	
Barnacles	x	x	x	x	x	x
Bryozoans		x	x		x	x
Diatoms	x	x	x		x	x
Graceful kelp crab					x	
Hydroids	x	x	x	x	x	
Limpet						x
Mussels	x	x	x	x	x	
Nudibranch			x		x	
Rock jingle						x
Tube worms	x	x	x	x	x	x
Sea stars		x	x			
Sponge						x

Figure 2: Presence of gross species observed on tunicate settlement plates in 2010 and 2011 (Sites 1 – 5 = SBH, Docks W, K, E, N, Q and Site 6 = Seward Marine Industrial Center)

Future Outlook

Ultimately, the ASLC's citizen science monitoring program will contribute to prevention, early detection, and rapid response to MIS in the community of Seward and will promote education, outreach, and stewardship for the citizens of Seward and Alaska.

We plan to expand our field monitoring program and these partnerships in the coming years to:

- continue to foster our current local collaboration with the high school students, agencies, community organizations, and stakeholders
- employ professional technologies such as salinity and temperature data loggers and an underwater dive survey camera
- establish collaborations between monitoring programs and high school classes in coastal rural communities of Alaska by demonstrating our methods and collaborations with theses schools.
- hold a Seward MIS Bioblitz: where community members can learn about and search for MIS in our community

By implementing local citizen science monitoring programs we are taking necessary steps to protect Alaska's valuable natural resources from marine invasive species.

Acknowledgements

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