



Kachemak Bay National Estuarine Research Reserve
Alaska Center for Conservation Science
UNIVERSITY of ALASKA ANCHORAGE

Monitoring for Marine Invasive Species in Alaska: European Green Crab

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European Green Crab Early Detection & Monitoring Aquatic Invasive Species in Alaska



ANTHC LEO Network Webinar

May 19, 2020

Tammy Davis, ADF&G Invasive Species Program Coordinator

Invasive Species: What's the Problem?



Courtesy of the Maine Department of Marine Resources

Invasive Species



Definition: (EEO 13112) Organisms that

1. are not native to the ecosystem under consideration

Especially concerned with intentional or unintentional escape, release, dissemination or placement caused by human activity.

2. cause or are likely to cause harm to

- Environment
- Economy
- Human Health

Also sometimes commonly referred to as noxious, nuisance and exotic species

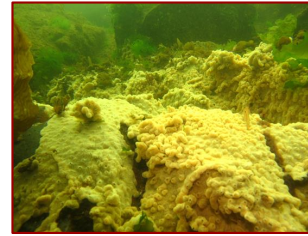
Key characteristics:

- Ability to grow and reproduce quickly outside their native range
- Competition: Prey on native species or compete with native species for food, take over or destroy habitats required by native species for food, reproduction, refugia.
- Alter ecological services: Disrupt nutrient cycling, change water dynamics and degrade water quality and alter flood regimes.
- Carry pathogens new to the system where native species have no immunity.

Invasive species reduce biodiversity and can cause extirpation of native species important for food, commercial and recreational economies, and customary cultural practices.

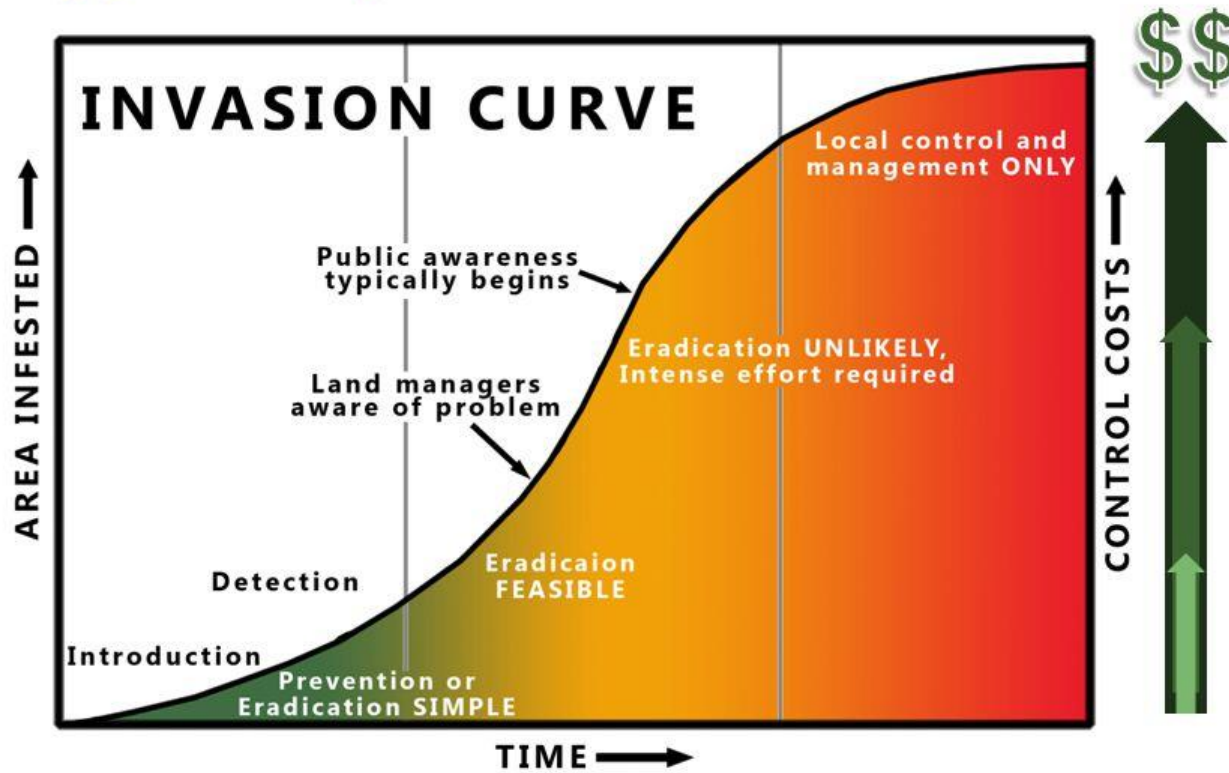


Alaska Laws



- **AS 16.35.210 Nonindigenous fish.** A person may not knowingly release, transport, possess, import, or export for the purpose of releasing into state waters, live nonindigenous fish or fertilized eggs without a permit.
 - Penalty: Up to \$25,000 fine and pay restitution to cover the costs of damage to fisheries resources and eradication of introduced fish.
 - “**Nonindigenous fish**” means a species of fish that is not native to the body of water in which the fish is released or intended to be released.
 - “**Ornamental fish**” means an aquatic finfish, commonly referred to as tropical fish, aquarium fish, an aquatic invertebrate or amphibian that is imported and/or sold in the state for viewing in aquarium (may not be used for human consumption.)
- **5 AAC 41.070 Prohibitions on importation and release of live fish.** No one may import live fish into the state with the purpose of stocking or rearing in state waters.
 - A person may not import, possess, breed, transport, distribute, release, purchase or sell within the state any species listed under 50 CFR 16.13 (the USFWS Lacey Act) as an injurious live or dead fish, mollusk, crustacean, or their eggs.
- **5 AAC 92.990. Definitions.**
 - “**Invasive Species**” means a nonnative species whose introduction does or is likely to cause economic or environmental harm or harm to human health; this includes deleterious exotic wildlife.

Typical Species Invasion Curve



Courtesy of Bugwood.org

Aquatic Invasive Species in Alaska

Marine Species



Botryllid tunicates



European Green Crab



Didemnum vexillum

Freshwater Species



Signal Crayfish



Nonindigenous Fish (Carp-goldfish)



Elodea spp.

How do they get to Alaska?

Human Actions

- Ballast Water Discharge
- Hull Fouling
- Aquaculture
- Live Food Trade
- Pet Releases - Aquarium Dumps
- Intentional (Legal or Illegal) Stocking
- Release of Live Bait
- Hitchhikers on Boats and in Cargo
- Biocontrol Agents

Natural Dispersal

- Movement in Water Column
- Range Extension
- Marine Debris
- Wind Dispersal
- Habitat Restoration



Marine Species of Concern

- European Green crab – Transported by ballast water and live food trade, natural dispersal.
 - Heavily reduces native clams, mussels, small crustaceans and worms.
 - Destroys eelgrass beds and causes erosion.
 - Could impact Dungeness crab nurseries and oyster production.
- *Colonial tunicates- Transported on vessel hulls, aquatic farm gear, in-water infrastructure.
 - Smothers aquatic farm gear causing impacts to commercial production.
 - Carpets benthic habitats, covering non-motile organisms which provide food for native species.
- *Caulerpa taxifolia* (Killer algae) Green seaweed – Transported by boats, anchors, fishing gear and illegal aquarium dumps.
 - Replaces native plants and deprives marine life of food and habitat.
- *Spartina* spp. – Habitat restoration and then natural dispersal.
 - Degrades mudflats and eelgrass beds to marshes, traps sediment, raises shorelines causing a displacement of native plants animals.
 - Altered habitats unsuitable for fish, clams, and mussels.



Freshwater Species of Concern

- *Northern Pike – Illegal stocking then natural expansion during highwater events.
 - Top-level predators that decimate economically important fisheries.
- *Elodea spp. – Initial introduction by a aquarium then relocated by watercraft and floatplanes.
 - Outcompetes native aquatic plants creating monocultures, impedes movement of fish and wildlife.
- Zebra/Quagga Mussels- Transported on/in watercraft and other equipment, subsequently transmitted by natural dispersal in moving water.
 - Consume large amounts of plankton reducing available food for commercial and recreational fishes, destroy natural habitats, impact water infrastructure such as hydropower plants, irrigation systems.
- New Zealand Mudsnails – Accidental transmittal on fishing gear and with aquaculture equipment, followed by natural dispersal.
 - Outcompete and displace native snails, mussels and aquatic insects and disrupt food chain impacting native fish and aquatic organisms.
- Nonindigenous “fish” (Goldfish, fathead minnow, crayfish, etc.)– Aquarium dumps or intentional release into the wild.
 - Compete with native fish for prey and habitat.
 - Carry pathogens that can negatively effect native aquatic species.



What can you do?

Report unusual organisms and Invasive Species

Where to report?

- LEO Network
- ADF&G Invasive Species Reporter:
 - <https://www.adfg.alaska.gov/index.cfm?adfg=invasivespeciesreporter.main>
- ADF&G Invasive Species Hotline
1-877-INVASIV (1-877-468-2748)

Information to collect

- Note the location by GPS coordinates or landmarks
- Take pictures of the individual in the habitat it was found. Take photos of the population of the organism to aid in identification.
- Scan the area for more of the organism or any noticeable changes (fragments of the organism you found, other species in the same area, habitat, etc.)








Invasive Species Online Reporting

Overview **Methods of Introduction** Prevention Legal Requirements **Report an Invasive Species**

Invasive Species Reporter

Welcome to the State of Alaska invasive species reporter. If you are interested in reporting what you believe to be an invasive plant or animal, click on one of the buttons below to begin the online report. Your reports are important to us! Please include as much complete and detailed information as you're able. Upload digital photos, if you have them. Pictures really help us identify what you saw. A close up photograph of the individual and a photo of the organism in the setting in which you saw it can potentially help us identify the organism you're reporting. All reports go to ADF&G and ADNR invasive species coordinators.

What type of species are you reporting?
Select one of the species categories below to submit a report. If you are not sure which category to select, you may choose "Other."

 Amphibians	 Birds	 Fish	 Insects
 Invertebrates	 Mammals	 Plants - Aquatic	 Plants - Terrestrial
 Reptiles	 Other		

What can you do? Become a Citizen Monitor

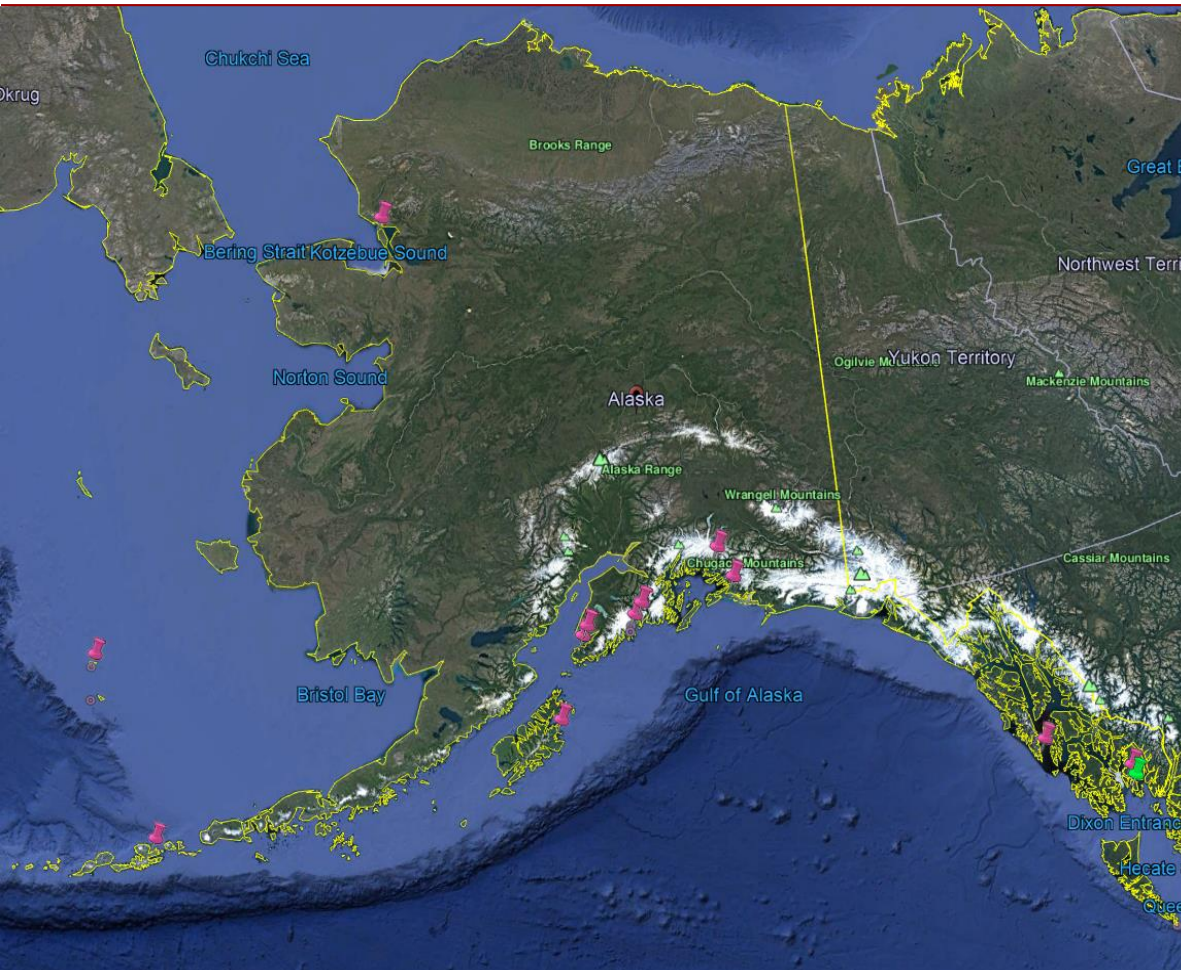


Image IBCAO
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
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Image Landsat / Copernicus

KEY



European Green Crabs
Colonial Tunicates



European Green Crabs

PARTNERS

Alaska SeaLife Center

Kachemak Bay
Research Reserve

Metlakatla Indian Community

National Park Service

Prince William Sound
Regional Citizens' Advisory Council

Sea Grant/University of Alaska

Seldovia Schools

Sitka Sound Science Center

St. Paul Island Schools

NOAA

Smithsonian Environmental Research Center

You Make the Difference

1. Report unusual or invasive species.
2. Make decisions to prevent introducing or spreading invasive species.
 - Clean, Drain, Dry boats, trailers, gear;
 - Don't dump your pets;
 - Don't move aquatic plants or animals.
3. Communicate with distributors, colleagues and friends about ways to prevent invasive species spread.
4. Encourage decision-makers to improve policies and fund invasive species management.



Questions ?

Call me:

Tammy Davis: (907) 465-6183

Email me:

tammy.davis@Alaska.gov

The ADF&G Invasive Species Program is funded by State funds and USFWS grants.



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KBNERR Marine Invasive Species Monitoring Program

Jasmine Maurer – KBNERR Harmful Species Program Specialist



This program is funded through ADF&G SWG grant.

Invasive
Tunicate
Monitoring
Program
2006 - Present



Mogula sp. photo by KBNERR



Smithsonian
Environmental Research Center

Tunicates

- Tunicates are filter feeders
- Spend their adult life attached in one place



K. Iken photo of *Aplidium coei*

Tunicates

- Tunicates are filter feeders
- Spend their adult life attached in one place
- Tunicates can be solitary



Iken/UA F/CoML

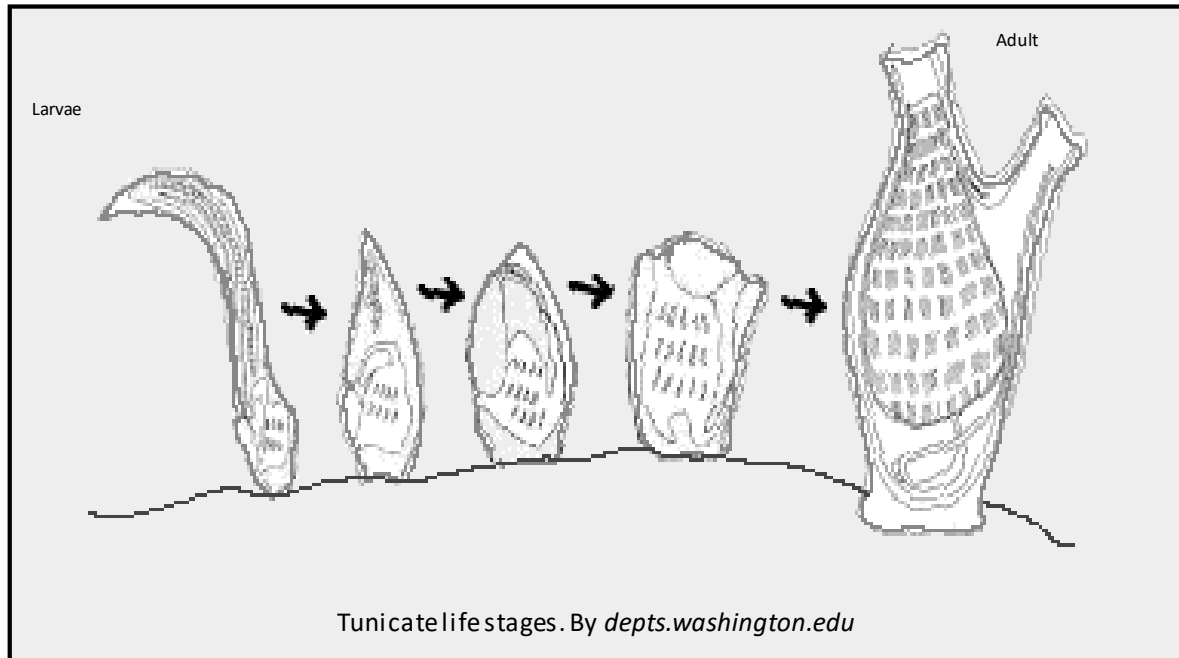
Tunicates

- Tunicates are filter feeders
- Spend their adult life attached in one place
- Tunicates can be solitary or colonial



Botrylloides violaceus (2000) photo by E. Gray

Life history of Tunicates



Invasive Tunicates in Alaska

Didemnum vexillum
(*D. vex*) found in Whiting
Harbor, near Sitka, in June
of 2010 during a Marine
Invasive Species BioBlitz.



KBNERR Invasive Tunicate Monitoring Program



KBNERR Invasive Tunicate Monitoring Program



Examples of Alaskan Tunicates

Check out this [Guide to Tunicates in Alaska](https://accs.uaa.alaska.edu/kbnerr/field-guides/) available on KBNERR's website.

<https://accs.uaa.alaska.edu/kbnerr/field-guides/>



E. McKittrick photo of *Styela yakutatensis*



C. Bursch photo of *Synoicum irregulare*



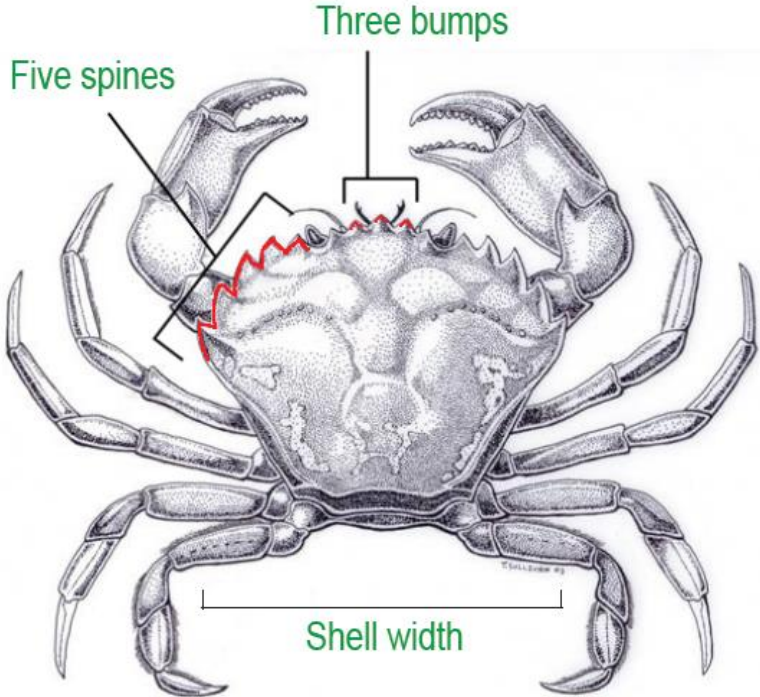
S. Harper photo of *Boltenia villosa*

EUROPEAN GREEN CRAB MONITORING

Kachemak Bay National
Estuarine Research Reserve
Presented by Jasmine Maurer



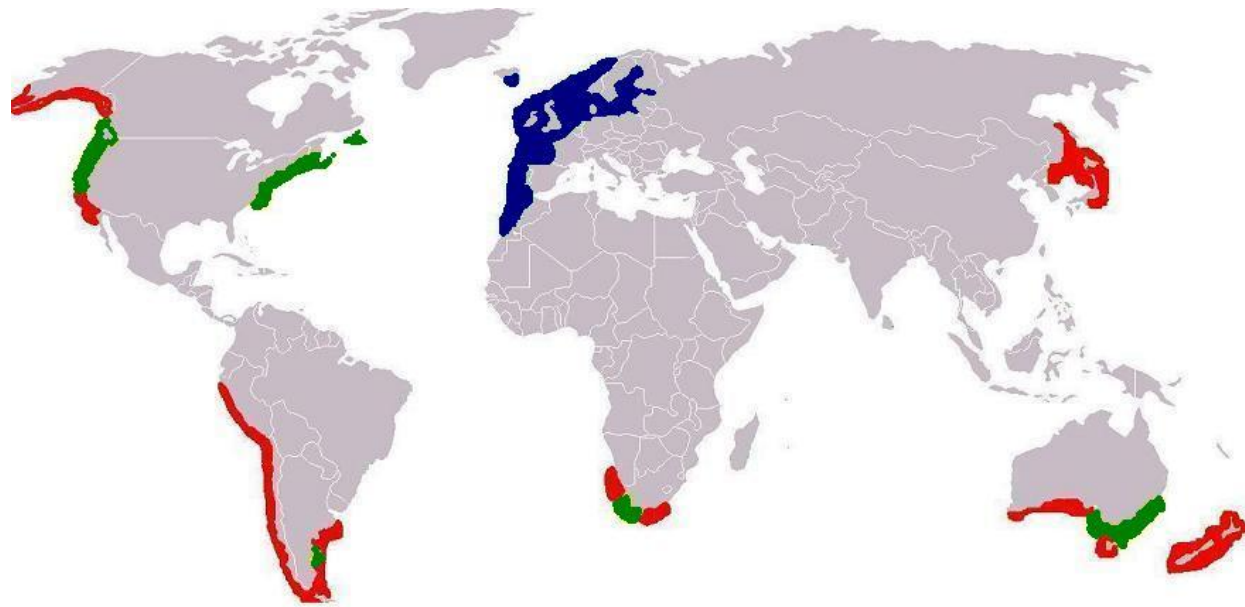
EUROPEAN GREEN CRAB



Green crabs can be identified by their unique shell shape. Adults can have shells up to four inches across in width.

**EUROPEAN GREEN
CRAB**

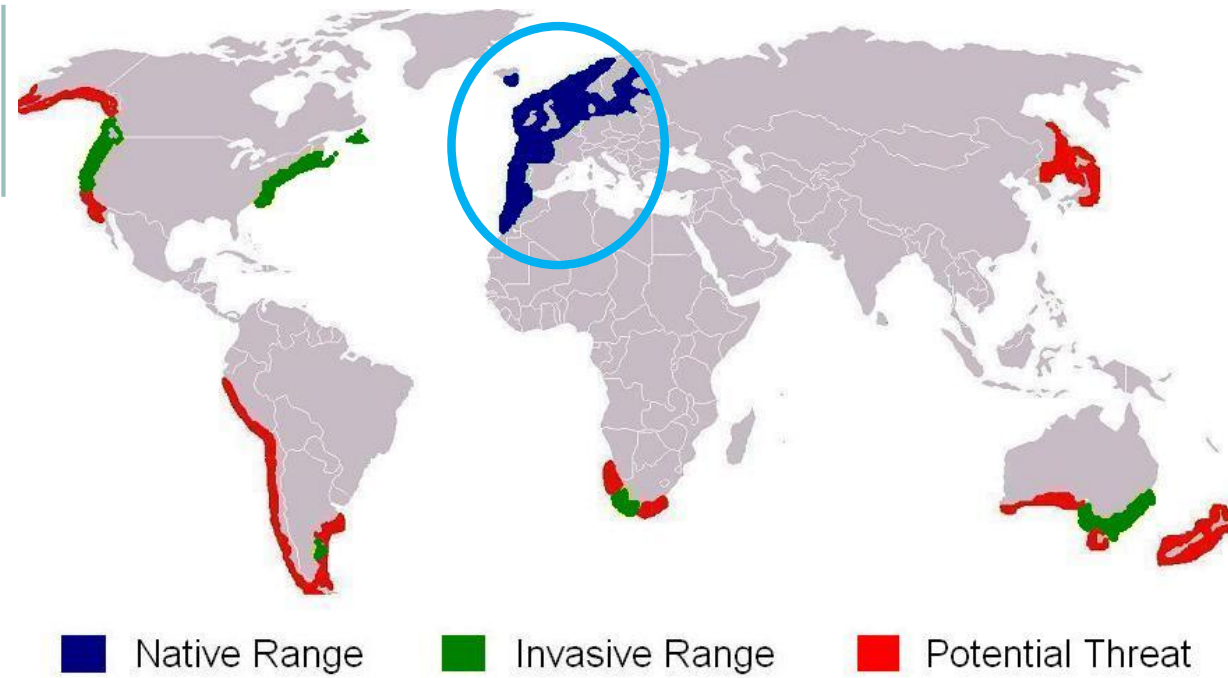




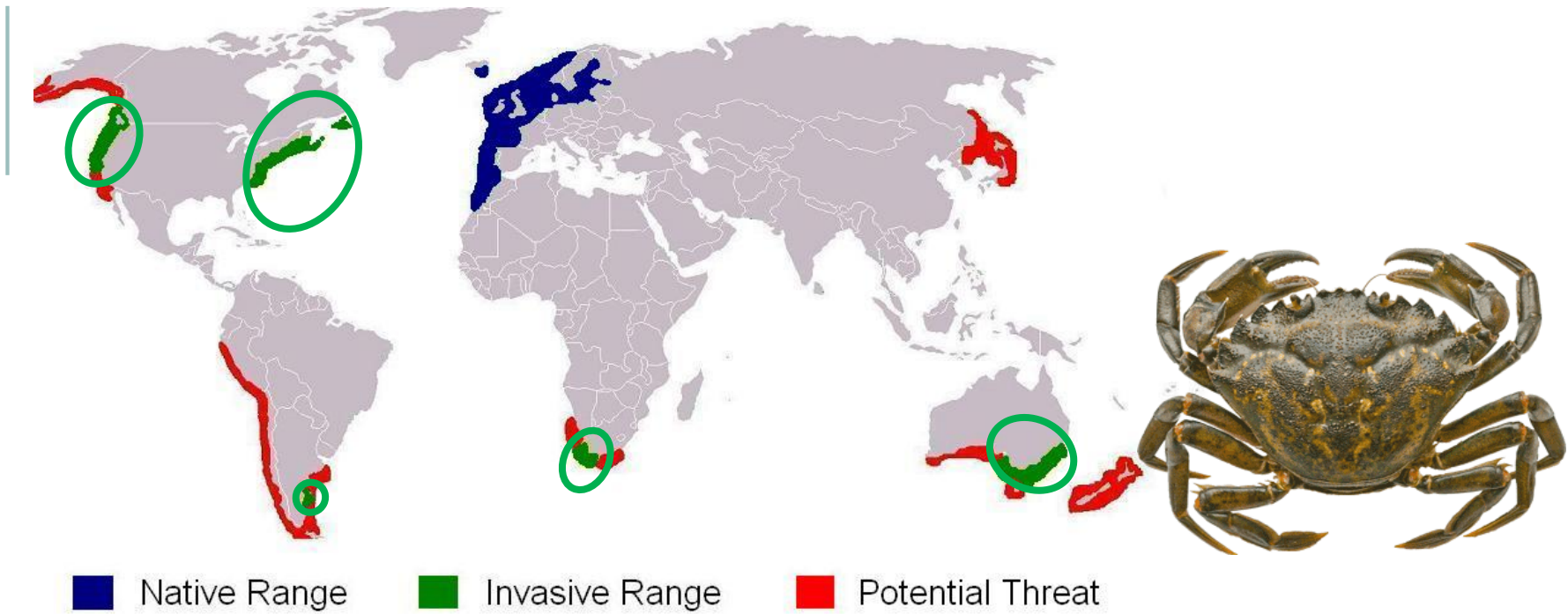
■ Native Range ■ Invasive Range ■ Potential Threat



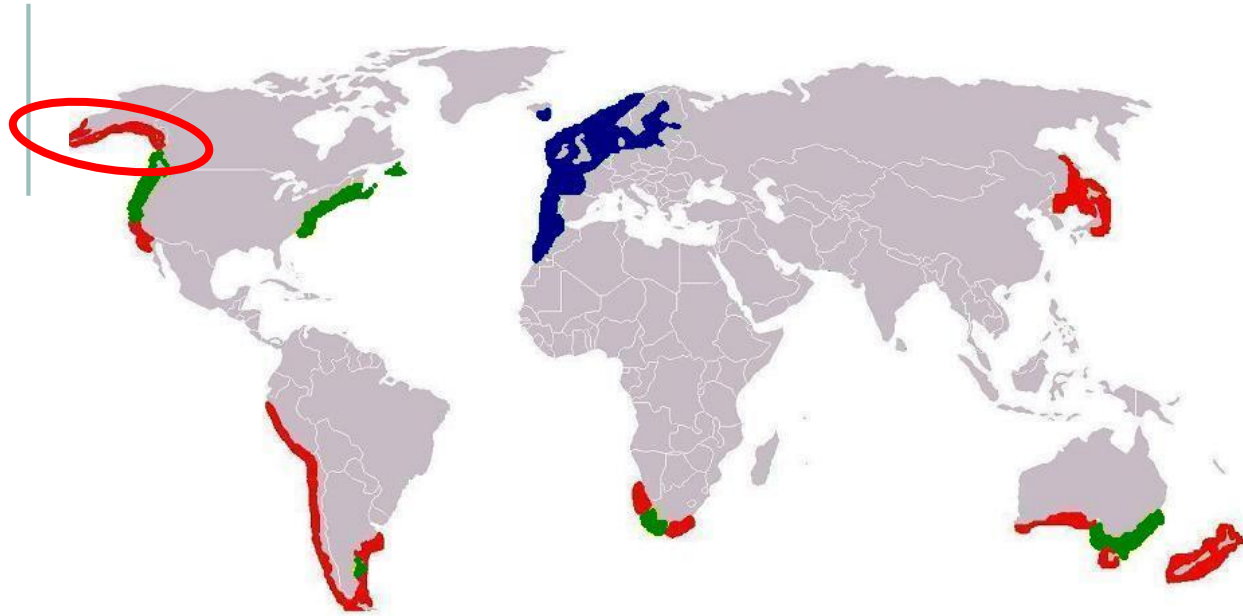
EUROPEAN GREEN CRAB RANGES



EUROPEAN GREEN CRAB RANGES



EUROPEAN GREEN CRAB RANGES



■ Native Range ■ Invasive Range ■ Potential Threat



EUROPEAN GREEN CRAB RANGES

EUROPEAN GREEN CRAB

Burrowing animals



<https://www.theseashore.org.uk/>

EUROPEAN GREEN CRAB

Burrowing animals

Eat a lot



scotdir.com

EUROPEAN GREEN CRAB

Burrowing animals

Eat a lot

Can live in a wide range of
environmental conditions



EUROPEAN GREEN CRAB

Burrowing animals

Eat a lot

Can live in a wide range of
environmental conditions

Mature very quickly

Very aggressive



From Wells National Estuarine Research Reserve

EUROPEAN GREEN CRAB

Burrowing animals

Eat a lot

Can live in a wide range of environmental conditions

Mature very quickly

Very aggressive

Resilient



GREEN CRAB MONITORING

School Groups

- *Fall & Spring*

Volunteer teams

- *Summer*



GREEN CRAB MONITORING

Gear and Deployment

- *6 folding traps*
- *Baited*
- *24 hour soak time*



GREEN CRAB MONITORING

At each trapping event we record

- Site
- Date
- The catch

All native crabs and bycatch are
released alive at site



GREEN CRAB MONITORING

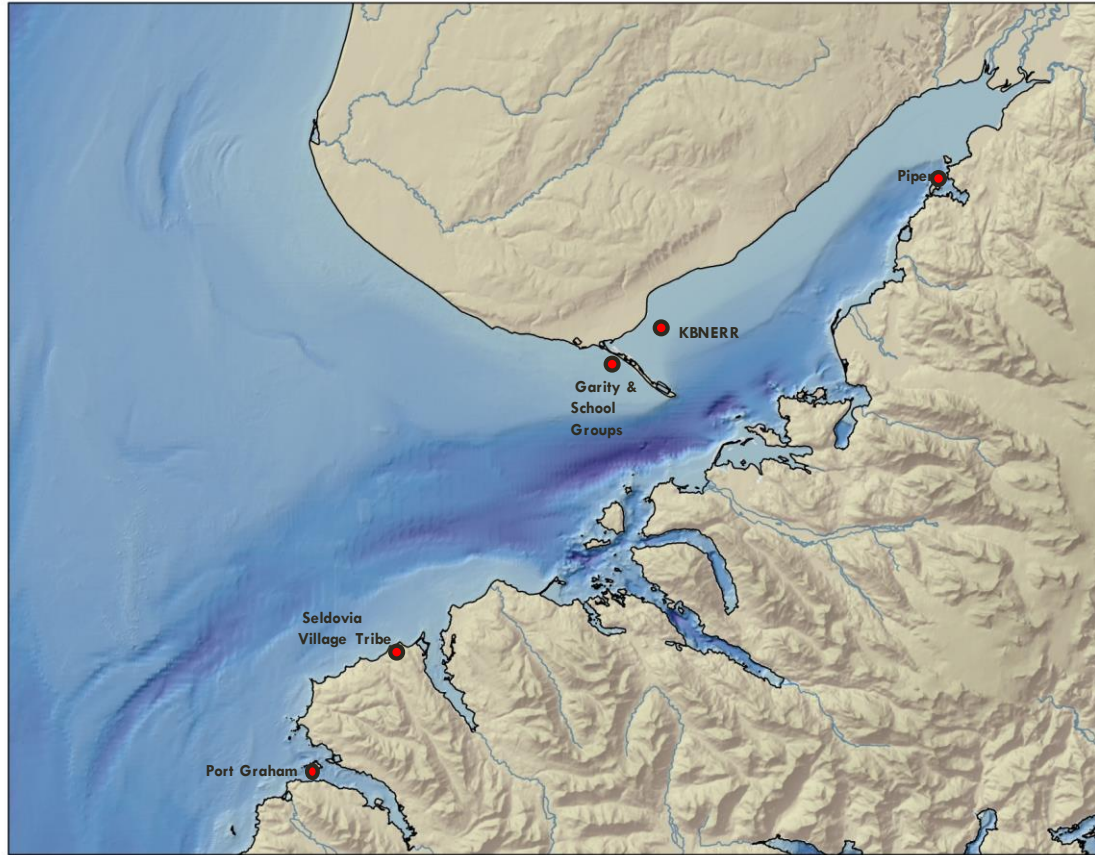
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European Green Crab Monitoring in Kachemak Bay



BENEFITS TO COMMUNITY MONITORING

- Education and community skills building
- More eyes looking
- Increases sampling footprint with limited funds
- Stewardship
- Builds relationships with community and partners



RESOURCES TO SHARE

Guide to Some Tunicates of Alaska
Crab Identification Guide
KBNERR Annual Reports





 Kachemak Bay National Estuarine Research Reserve
Alaska Center for Conservation Science
UNIVERSITY of ALASKA ANCHORAGE



2181 Kachemak Drive
Homer AK 99603
<http://accs.uaa.alaska.edu/kbnerr>





Kachemak Bay National Estuarine Research Reserve
Alaska Center for Conservation Science
UNIVERSITY of ALASKA ANCHORAGE



Introduction to Alaska Center for Conservation Science & Kachemak Bay National Estuarine Research Reserve

Rosie Masui – KBNERR Harmful Species Program Coordinator

Alaska Center for Conservation Science



University of Alaska Anchorage

'ACCS is a center for research, education, and scholarship at the University of Alaska Anchorage that is committed to providing the public, industry, and agency partners with information to facilitate effective biological conservation and management of the state's natural resources.'

Focus Areas

University of Alaska Anchorage: ACCS

- Aquatic ecology
- Botany and vegetation ecology
- Wildlife ecology
- Landscape ecology
- Invasive Species



Kachemak Bay National Estuarine Research Reserve



NOAA



NERRS

+



UAA Alaska
Center for
Conservation
Science

=



*Fostering stewardship through
integrated research &
education*



NATIONAL
ESTUARINE
RESEARCH
RESERVE
SYSTEM



Enhance understanding and appreciation of Alaskan coastal ecosystems to ensure that they remain healthy and productive.



Monitoring



Research



Education



Training

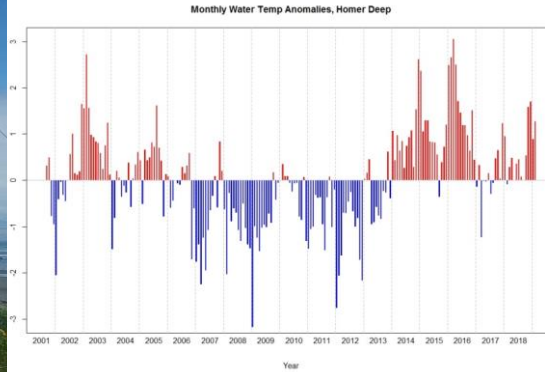


Research





Monitoring



Monitoring: Harmful Species Program







Education

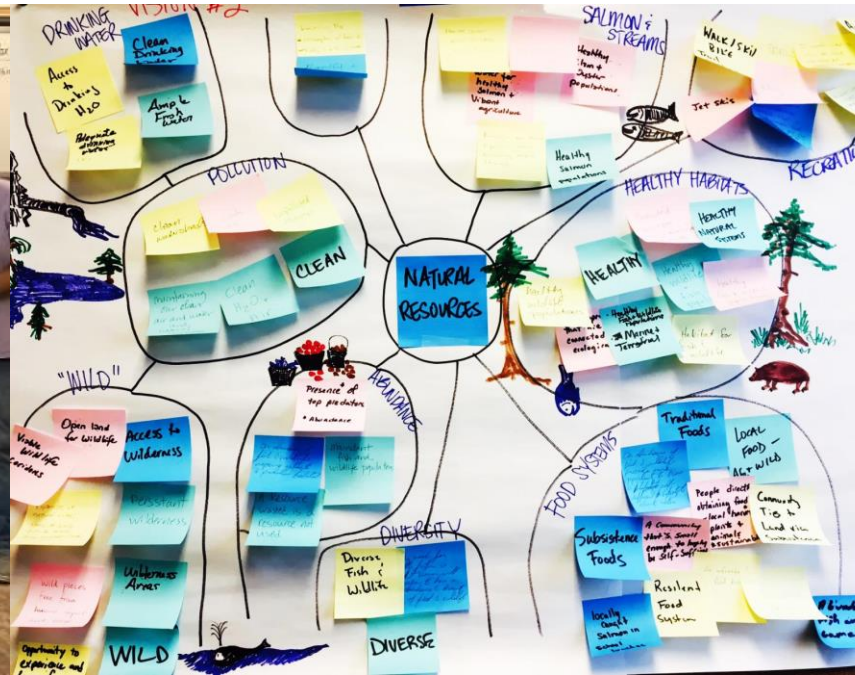




Training



Working with partners





❖ Partnerships

❖ Student Opportunities:

❖ Semester by the Bay

❖ Hollings Scholars

❖ Margaret A. Davidson Fellowship

❖ Community Council

❖ Lunch Lectures

❖ Marine Ecosystem Work Group

RESOURCES TO SHARE

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Crab Identification Guide
KBNERR Annual Reports



THANK YOU!



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