Marine Invasive Species

Held on June 14 & 16, 2010

Powerpoint Presentations:

Aquatic Invasive Species in Rhode Island's Coastal Waters

The Physical Impact of Invasive Tunicates on Eelgrass

Handouts:
June 14 Agenda
June 16 Agenda

Volunteer Monitoring Announcement

Water Recreation Guide to Marine Invasive Species Brochure

Chinese Mitten Crab Alert

Potential Invasive Species Threats to Narragansett Bay

Aquatic Invasive Species Workshop

Thursday, June 14, 2012, 5:00 p.m. to 8:00 p.m.
URI Coastal Institute, Narragansett, Rhode Island

AGENDA

5:00 p.m. **Registration & Refreshments**

5:30 p.m. **Welcome & Introductions**
Cristina Bourassa, Aquatic Invasive Species Intern, Narragansett Bay Research Reserve

5:45 p.m. **Overview of Marine Invasive Species**
Kevin Cute, Marine Resources Specialist, RI Coastal Resources Management Council

6:15 p.m. **Q&A**

6:30 p.m. **Hands-on Species Identification**
Niels Hobbs, Marine Biologist and Instructor, University of Rhode Island

7:30 p.m. **Volunteer Monitoring Network & Roundtable Discussion**
Kevin Cute, Marine Resources Specialist, RI Coastal Resources Management Council

8:00 p.m. **Adjourn**

UNIVERSITY OF Rhode Island

Narragansett Bay Research Reserve
COASTAL TRAINING PROGRAM

CRMC
COASTAL RESOURCES MANAGEMENT COUNCIL

Speaker Biographies

Kevin Cute

Kevin is a Marine Resources Specialist with the Rhode Island Coastal Resources Council (CRMC). Kevin organized the first Rapid Assessment Survey of aquatic invasive species in Narragansett Bay in 2000, authored the Rhode Island Aquatic Invasive Species Management Plan, approved by the federal Aquatic Nuisance Species Task Force in 2007, and currently leads CRMC's ongoing marine invasive species monitoring project. Kevin is a charter member of the Northeast Aquatic Nuisance Species Panel, which coordinates aquatic invasive species activities in New England, New York, and the Canadian Maritime Provinces.

Niels Hobbs

Niels has studied the ecology of marine invasive species for almost fifteen years, particularly focusing on crustaceans of all shapes and sizes. He was a scientist on the first Rapid Assessment Survey of marine introduced species in Rhode Island waters in 2000, as well as the two surveys held since. He's also helped the RI Coastal Resources Management Council carry out their four year long monitoring of marine invaders, and presently teaches classes at the University of Rhode Island that focus on the numerous introduced animals now found along our coastline.

References

RI Marine & Estuarine Invasive Species Website
http://www.rimeis.org

Guide to Marine Invaders in RI Coastal Waters (Reference Cards)
http://www.crmc.ri.gov/invasives.html

RI Coastal Plant Guide
http://www.uri.edu/cels/ceoc/coastalPlants/CoastalPlantGuide.htm
(PDF: http://www.crmc.ri.gov/invasives/URI_Plantlist.pdf)

Coastal Plant Suppliers by Species
http://www.crmc.ri.gov/coastallandscapes/CoastalPlant_Suppliers.pdf

Invasive Plant Management Certification Program
http://www.uri.edu/cels/ceoc/ceoc_programs_clp_imcp.html

List of Certified Invasive Managers
http://www.crmc.ri.gov/invasives/Certified_IMs.pdf

Aquatic Invasive Species Workshop

Saturday, June 16, 2012, 8:30 a.m. to 11:30 a.m.
URI Coastal Institute, Narragansett, Rhode Island

AGENDA

8:30 a.m. **Registration & Refreshments**

9:00 a.m. **Welcome & Introductions**
Cristina Bourassa, Aquatic Invasive Species Intern, Narragansett Bay Research Reserve

9:15 p.m. **Overview of Marine Invasive Species**
Kevin Cute, Marine Resources Specialist, RI Coastal Resources Management Council

9:45 a.m. **Q&A**

10:00 a.m. **Hands-on Species Identification**
Niels Hobbs, Marine Biologist and Instructor, University of Rhode Island

11:00 a.m. **Volunteer Monitoring Network & Roundtable Discussion**
Kevin Cute, Marine Resources Specialist, RI Coastal Resources Management Council

11:30 p.m. **Adjourn**

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Coastal Plant Suppliers by Species
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Invasive Plant Management Certification Program
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CRMC Volunteer Monitoring Project For Aquatic Invasive Species!

The **Coastal Resources Management Council** provides training for volunteers in species identification techniques and field sampling methods to identify non-native aquatic invasive species in Narragansett Bay. Once trained, individuals are invited to join the CRMC's Aquatic Invasive Species Volunteer Monitoring Project. To date, the CRMC has primarily monitored for aquatic invasive species found on floating docks at the following locations:

Point Judith Marina, South Kingstown
Save The Bay, Providence
Allen Harbor Marina, North Kingstown
Ft. Adams State Park, Newport
Roger Williams University, Bristol

Our sampling season for dock monitoring runs from **June through October** and each site is sampled once per month during this period. Consider joining us in 2012!

CRMC is beginning to expand its monitoring to search for the Oriental Shrimp *Palaemon macrodactylus* and the Chinese Mitten Crab *Eriochier sinensis*. Interested volunteers should contact Kevin R. Cute via email at kcute@crmc.ri.gov or phone at 401.783.3370.

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CRMC and the RI Aquatic Invasive Species Management Plan

The Coastal Resources Management Council (CRMC) is the lead state agency that protects Rhode Island's coastal resources and regulates the many uses and activities that occur within the state's coastal zone. Its statutory mission is *to preserve, protect, develop, and, where possible, restore the coastal resources of the state for this and succeeding generations.*

In recent years the CRMC recognized the problem of aquatic invasive species in Narragansett Bay and began to actively investigate their presence and distribution throughout its waters. In 2000, CRMC partnered with the Narragansett Bay Estuary Program and others to conduct the first survey of aquatic invasive species in the state's marine ecosystems. The results showed that nearly two dozen non-native invasive organisms were well established in Narragansett Bay and actively displacing native species from their habitats. This early effort to gather baseline information on aquatic invasive species in the Bay revealed the seriousness of the problem and pointed to the need for action. To this end the CRMC promulgated the state's first management plan to address marine aquatic invasive species: The Rhode Island Aquatic Invasive Species (RIAIS) Management Plan.

With the approval of the RIAIS Management Plan by the federal Aquatic Nuisance Species Task Force in 2007, Rhode Island became eligible for limited funding to implement its goals. Under the auspices of the RIAIS Management Plan, the CRMC has established a volunteer-based marine aquatic invasive species monitoring project, and provided funding to the Narragansett Bay Research Reserve to create the first marine aquatic invasive species website for the State (www.rimeis.org). In addition, the CRMC is currently drafting Rhode Island's first regulations to address marine aquatic invasive species; these regulations will provide the CRMC with the guidance and authorities required for the State to quickly and effectively respond to new invasions in order to control their impacts.

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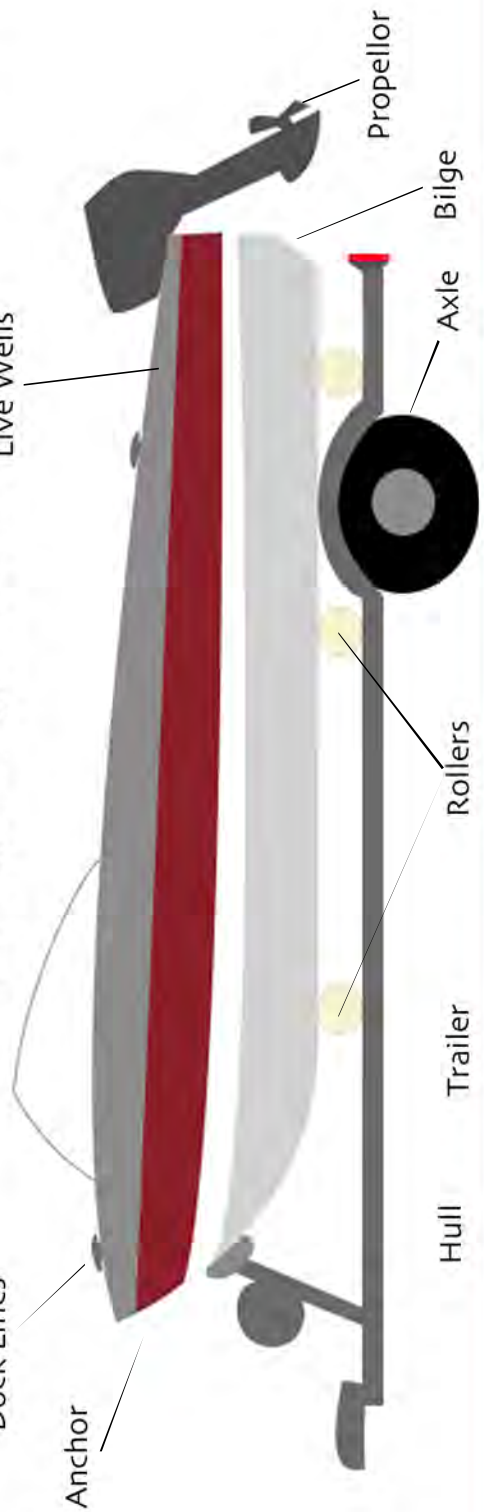
Check for Stowaways!

To help prevent the spread of invasive species, completely drain the water from your motor well, bilge, live well, and any other areas. Following up with a power or high-temperature wash will remove even the microscopic organisms in addition to any remaining plants and animals. When possible, use biocide-free antifouling paint on your boat's hull.



Narragansett Bay Research Reserve
Coastal Training Program

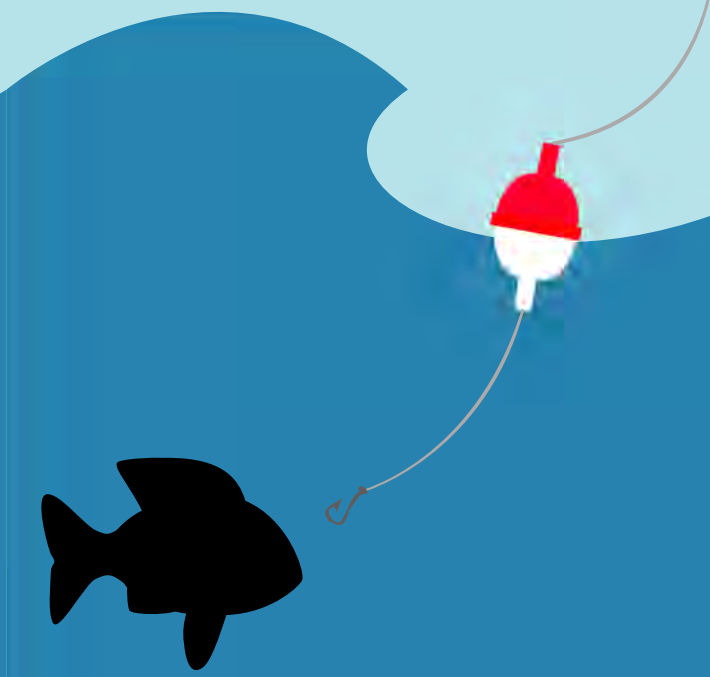
www.NBWCTP.org

For more information, please visit the RI Marine and Estuarine Invasive species website:
www.RIMEIS.org

Image Credits

Crab, Front Cover: LadyOak.com
Palaemon elegans center panel: http://www.natuurlijkmooi.net

Water Recreation Guide to Marine Invasive Species



Marine Invasive Species Facts

Marine invasive species are animals and algae that are found within an area ouside of their native range, and that can or do cause harm to our economy, environment, or human health.

Invasive species are often difficult to remove from an ecosystem, and cost the U.S. billions of dollars each year to control or eradicate.

Potential invaders in neighboring states pose significant risks should they reach RI waters.

Many native species cannot compete with invasive species, and are crowded out or eliminated from the area. This reduces the natural biodiversity and disrupts the basic ecological relationships that sustain a healthy and balanced marine ecosystem.

RI's Least Wanted!

Potential Invaders:

Chinese Mitten Crab
(Eriocheir sinensis)

Veined Rapa Whelk
(Rapana venosa)

European Rock Shrimp
(Palaemon elegans)

Killer Algae
(Caulerpa taxifolia)

Established Invaders:

Green Crab
(Carcinus maenus)

Asian Shore Crab
(Hemigrapsus sanguineus)

Grateloupia turuturu
(Grateloupia turuturu)

Orange Sheath Tunicate
(Botrylloides violaceus)

Didemnum Tunicate
(Didemnum vexillum)

Help Prevent the Spread of Invasive Species

Thoroughly clean and dry your gear after every trip, taking care to remove all visible animals and plants.

Thoroughly inspect, rinse, and remove entangled vegetation from scuba gear after every dive.

Never release or throw unused bait into the water - dispose of it in a dumpster instead.

Avoid using felt-soled waders, as they have been known to facilitate the spread of invasive diseases and algae.

Early Detection and Rapid Response (EDRR) systems can mitigate negative effects of invasions quickly and at significantly lower costs than post-invasion management plans.

You can support successful EDRR by reporting invasive species sightings to CRMC, 401-783-3370 or to Narragansett Bay Estuary Program, 401-874-6233

Please Report Sightings of this Crab!

Chinese Mitten Crab

(Eriocheir sinensis)

Identification:

- Carapace (shell) light brown to olive green, up to 4 inches wide
- Dense fuzzy patches on claws (regenerated claws and claws of smaller juveniles may not have fuzz)
- Claws are equally sized and white-tipped
- Sharp-tipped walking legs over twice as long as carapace
- Four lateral spines on each side of carapace (shell); notch between eyes

Habitat:

- Catadromous life cycle (migrate from freshwater streams to brackish and salt water to reproduce)
- Burrow extensively in levees and banks, and can be found walking on land during their migratory period

If you catch a mitten crab:

- Do not throw it back alive!
- Freeze the animal, **keep it on ice**, or preserve it in rubbing alcohol as a last resort
- Note the precise location and date where the animal was found; **take a close up photo of the animal if possible**.
- **Report** the siting to CRMC at **401-783-3370** or the Narragansett Bay Estuary Program at **401-874-6233.**

REMEMBER THE LAW! Never transport a live Mitten crab across state boundaries.

Mitten Crabs in the Eastern U.S. Live Chinese Mitten Crabs (*Eriocheir sinensis*) have been caught in crab pots in Chesapeake Bay (2005-2007) and Delaware Bay (May 2007). These are the first confirmed reports for the eastern United States. We don't yet know whether the crab has established reproductive populations in these estuaries or spread to other locations along the eastern U.S.

The Chinese Mitten Crab is native to East Asia, and is a potential invasive that could have negative ecological impacts. Mitten Crabs are already established invaders in Europe and on the West Coast of the United States. The crab is listed as Injurious Wildlife under the Federal Lacey Act, which makes it illegal in the United States to import, export, or conduct interstate commerce of Mitten Crabs without a permit.

Please Report any New Sightings. To determine the status, abundance, and distribution of this species along the eastern U.S., we have established a Mitten Crab Network. The Network began as a partnership among several state, federal, and research organizations, with an initial focus on Chesapeake and Delaware Bays. We now are expanding the Network to include resources managers, commercial fisherman, research organizations, and citizens along the eastern U.S.

For additional information, including updated Mitten Crab reports, downloadable pamphlets on the Chinese Mitten Crab Survey Program, and how to distinguish a Mitten Crab from other crabs in the region, **please visit:** http://www.serc.si.edu/labs/marine_invasions/. For more information on the Chinese Mitten Crab Survey, go to the Smithsonian Environmental Research Center web site at http://www/serc.si.edu/ or http://www.dnr.state.md.us/fisheries/ or http://www.chesapeakebay.net/marp.htm.

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Potential Invasive Species
Threats to Narragansett Bay

Rockpool Shrimp *Palaemon elegans*	Killer Algae *Caulerpa taxifolia*
	
Where does it come from? Britain and Ireland **Introduction to the U.S.:** • Ballast water is the most likely vector **Where is it now?** • Presently expanding from established breeding population in Salem Sound and surrounding Gulf of Maine waters	**Where does it come from?** Indian Ocean **Introduction to the U.S.:** • Release from aquariums • Net fouling • Ballast water **Where is it now?** • Mediterranean Sea • Southern California (successfully eradicated)
Potential damage to the environment: • Likely to eventually become well-established in New England waters, both north and south of Cape Cod • Outcompete and replace native shrimp	**Potential damage to the environment:** • Spreads rapidly and easily crowds out and replaces native algae and seagrasses • Highly toxic to the herbivores who feed on the native algae that it replaces

Potential Invasive Species Threats to Narragansett Bay

Chinese Mitten Crab *Eriocheir sinensis*	Veined Rapa Whelk *Rapana venosa*
	
Where does it come from? East Asia **Introduction to the U.S.:** • Ballast water • Illegally introduced to San Francisco Bay for human consumption **Where is it now?** • Individuals, including reproductive females, have been found in New York, New Jersey, Delaware, and Canada (Saint Lawrence Seaway and beyond)	**Where does it come from?** Western Pacific Ocean **Introduction to the U.S.:** • Unknown, but likely ballast water **Where is it now?** • Established population in Virginia since 1998
Potential damage to the environment: • Outcompetes native species for food and space • Can displace or eliminate native species **Potential damage to the economy:** • Consumes fish bait • Clogs gear • Weakens stream banks and levees to the point of collapse **Potential harm to human health:** • An intermediate host for the oriental lung fluke, which can be transmitted to humans when improperly prepared or undercooked crabs are consumed	**Potential damage to the environment:** • Causes decline in populations of native mollusk species (i.e. oysters and clams) • Potential to decimate the local shellfish population, threatening the health of the benthic environment **Potential damage to the economy:** • Serious negative impacts on shellfishing and aquaculture industries

Rhode Island Aquatic Invasive Species Volunteer Monitoring Project

Aquatic Invasive Species In Rhode Island's Coastal Waters

Narragansett Bay National Estuarine Research Reserve
Coastal Training Program
June 16, 2012

Kevin R. Cute
Marine Resources Specialist
Coastal Resources Management Council

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Rhode Island Aquatic Invasive Species Volunteer Monitoring Project

What is an Aquatic Invasive Species?

- *Non-native*
- *Accidentally or intentionally introduced*
- *Causes harm:*
  - *environmental*
  - *economic*
  - *human health*

http://woodshole.er.usgs.gov/

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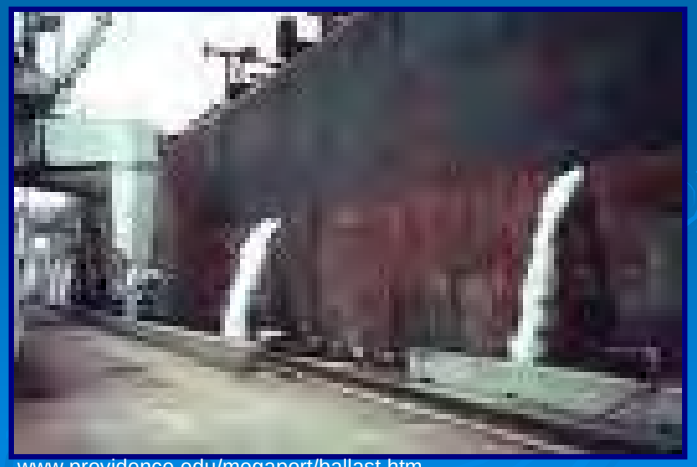
How Do They Get Here?

- Commercial shipping
- Recreational boating
- Marine research institutions
- Aquarium and nursery trades
- Seafood and bait trade
- Aquaculture
- Internet



www.providence.edu/megaport/ballast.htm

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Ecological Roulette

Not all introduced species survive;
Not all survivors become invasive;

However…

The small fraction that becomes invasive causes enormous economic and environmental damage

– SUBCOMMITTEE ON ENVIRONMENT, TECHNOLOGY, AND STANDARDS
COMMITTEE ON SCIENCE, U.S. HOUSE OF REPRESENTATIVES

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Volunteer Monitoring Project

Why So Nasty?

- *Robust environmental tolerance*
- *Rapid growth & reproduction*
- *Effective dispersal*
- *Outcompete native species*
- *Predators and diseases lacking*

http://www.sgnis.org

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AIS *Impacts*

- ***Threats to H2O dependent business***
  - Crabs - shellfishing & aquaculture
- ***Threats to recreational sectors***
  - Codium - beaches
- ***Degradation of environmental quality***
  - Membranipora - kelp beds

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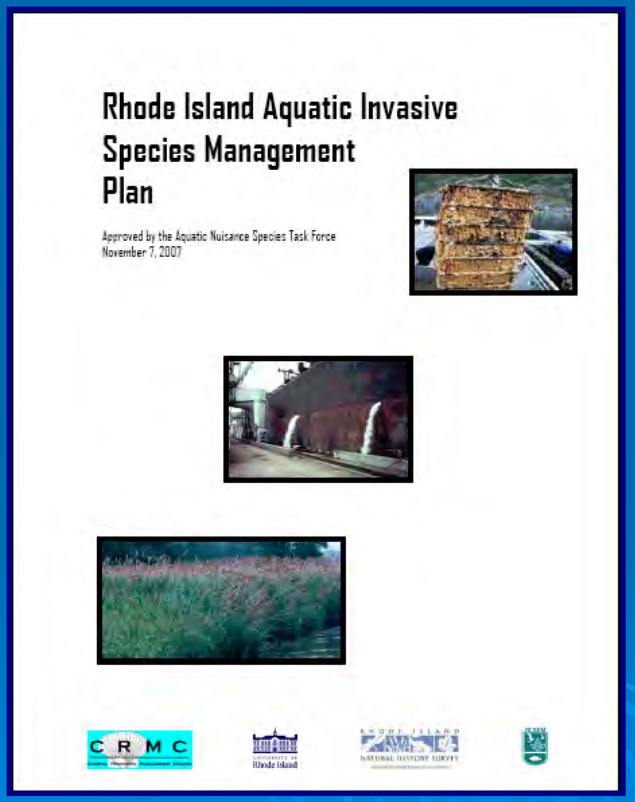
National Invasive Species Act

NEANS
Northeast Aquatic Nuisance Species Panel

www.northeastans.org/



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Rhode Island Aquatic Invasive Species Volunteer Monitoring Project

Task 2A: Monitor the Introduction and Spread of AIS in Coastal Ecosystems

…develop a long-term monitoring program that includes RAS and volunteer monitoring programs to ensure comprehensive coverage of Rhode Island's coastal habitats.

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Rhode Island Aquatic Invasive Species Volunteer Monitoring Project

Dock Monitoring Project

- *Sites selected along salinity gradient*
- *Monitor each site at least five times per season*
- *Follows RAS protocols*

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Volunteer Monitoring Project

CRMC Marine AIS Monitoring Sites

- Save The Bay / Pt. Edgewood Marina
- Allen Harbor Marina
- Roger Williams University
- Pt. Judith Marina
- Fort Adams State Park

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Dock Monitoring Protocols

- *Visual assessment survey*
- *Sample within arm's reach for one hour*
- *Record presence/absence of priority species*

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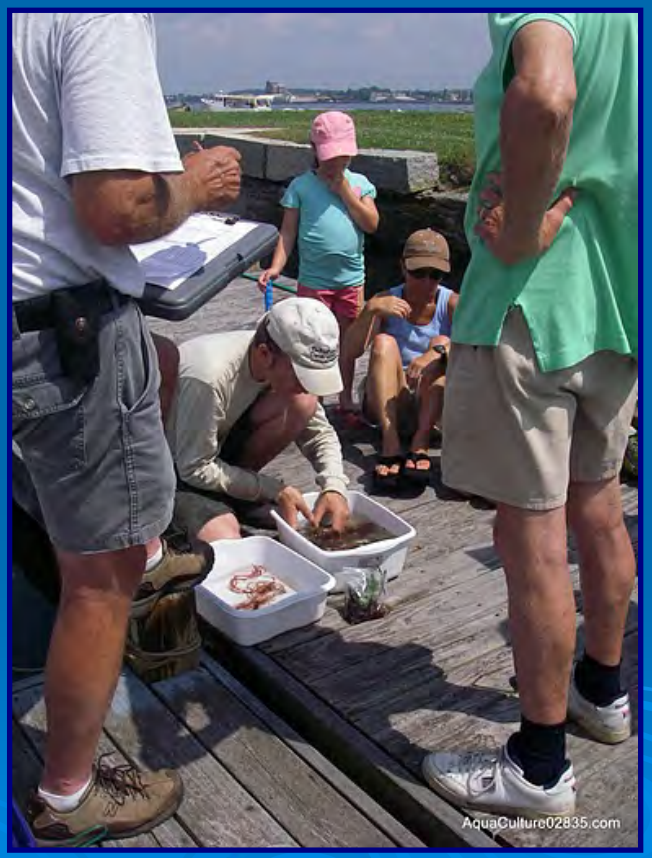
Field Sampling

Courtesy Judith Dibello



Courtesy Judith Dibello

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Volunteer Monitoring Project

Colonial Tunicate, *Botrylloides violaceus*

- Northwest Pacific origin
- First introduced 1970's
- Widely established

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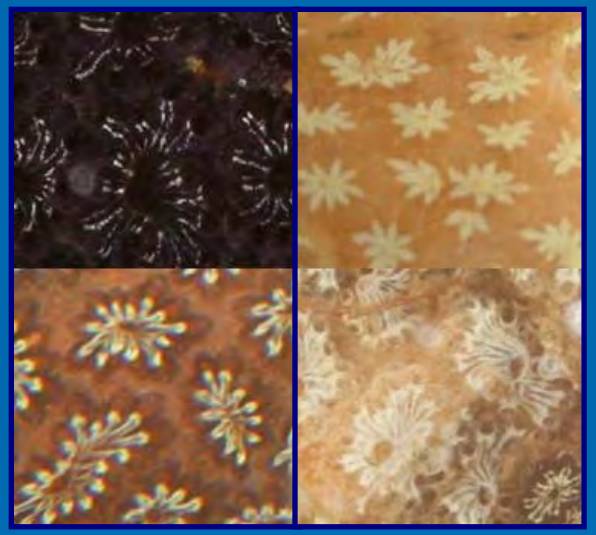
Colonial Tunicate, *Botryllus schlosseri*



- European origin
- First introduced 1841
- Widely established

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Colonial Tunicate, *Diplosoma listerianum*

- European origin
- First introduced 1990's

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Colonial Tunicate, *Didemnum vexillum*

- Pacific origin
- First introduced 1980's
- Aggressive

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Solitary Tunicate, *Styela clava*

- Pacific origin
- First introduced 1970's

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Solitary Tunicate, *Ascidiella aspersa*

- European origin
- First introduced 1980's

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European Green Crab, *Carcinus maenas*

- European origin
- First introduced 1800's
- Widely established

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Asian Shore Crab, *Hemigrapsus sanguineus*

- Pacific origin
- First introduced 1988
- Widely established

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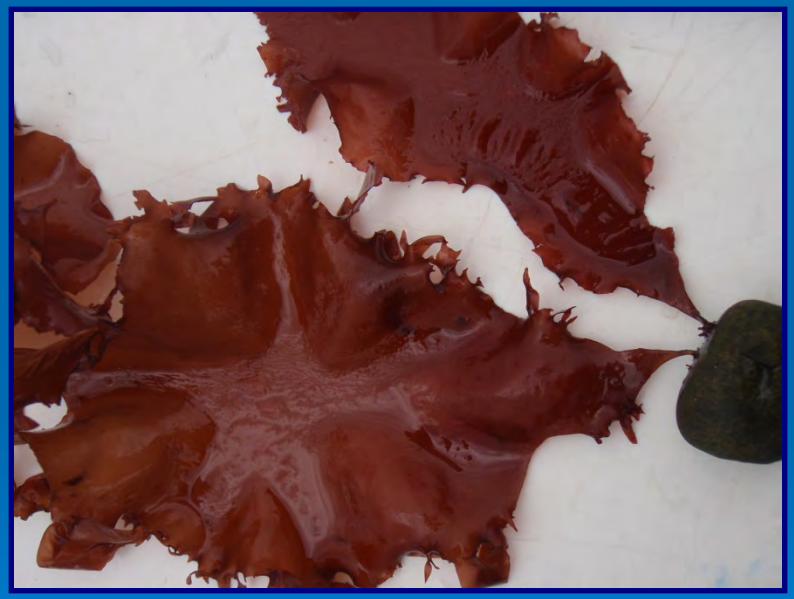
Red Algae, *Grateloupia turuturu*



- Pacific origin
- First introduced 1996
- Expanding populations

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Rhode Island Aquatic Invasive Species Volunteer Monitoring Project

Codium fragile ssp. fragile

- Pacific origin
- First introduced 1990's

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Volunteer Monitoring Project

Orange-Striped Anemone, *Diadumene lineata*

- Pacific origin
- First introduced 1890's

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European Oyster, *Ostera Edulis*

massbay.mit.edu

Molecular Ecology Research Group

- European origin
- First introduced 1950's

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Lacy Crust Bryozoan, *Membranipora membranacea*

Peter Jonas

- European origin
- First introduced 1980's

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Skeleton shrimp, Caprella mutica

- Pacific origin
- First introduced 2003

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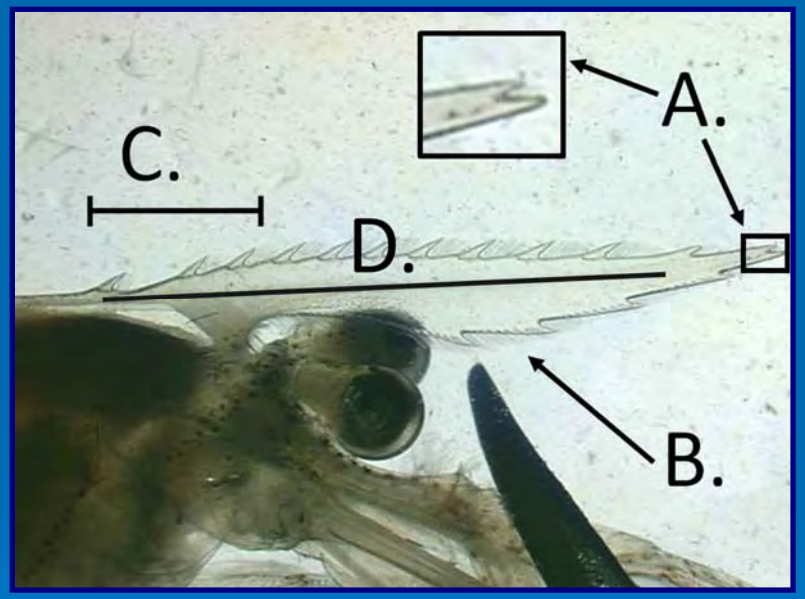
Asian shrimp, Palaemon macrodactylus



- **Pacific origin**
- **First introduced 2001**

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Volunteer Monitoring Project

Purple bushy bryozoan, Bugula neretina

- Tropical or subtropical
- First introduced ?

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Red lionfish, Pterois volitans

Photograph courtesy NOAA.
Photographer Paula Whitfield.

- **Pacific origin**
- **First introduced 2006**

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Veined Rapa Whelk, Rapana venosa

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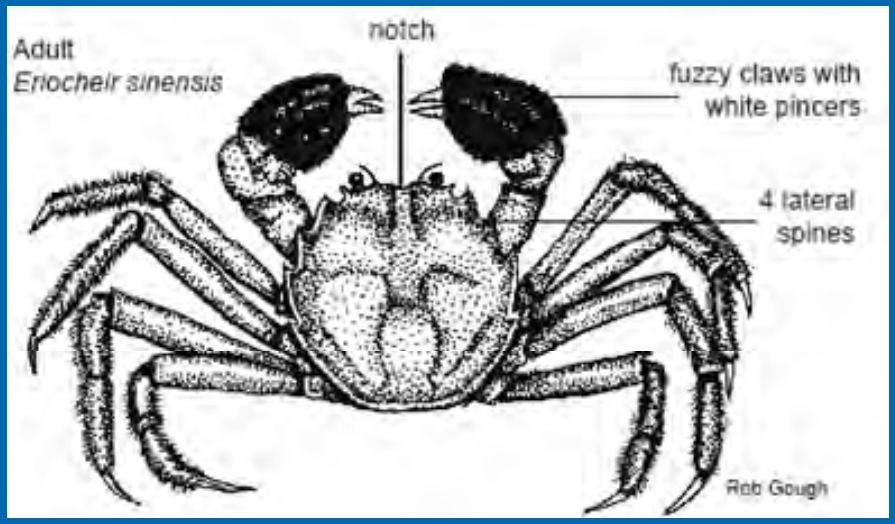
Volunteer Monitoring Project

Chinese Mitten Crab, *Eriocheir sinesis*



- Catadromous
- First reported on east coast in 2005
- Has been found as far north as Albany, NY

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Caulerpa taxifolia

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European rock shrimp, Palaemon elegans

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Thank you!
Any questions?

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