SETL Project: Monitor the Growth of Non-Native Species

The Issue: Non-Native Species

Invasive Species = non-natives with no/limited natural predators

- Exponentially increasing in population size
- Second leading cause of biodiversity loss
  - Invasive species out-compete native species
The Issue: Non-Native Species

Realities:

- Hundreds of new non-native species arrive in the United States every day
- Impossible to predict the impact of non-native species to the environment and economy (e.g. fishing)
Non-Native Species in New England

Asian shore crab

lacy crust bryozoan

colonial tunicates

green fleece
Studying and monitoring the distribution of known and new non-native species is critical for addressing the current and future effects of invasive species.
Anemoon Foundation
SETL Project

- Adriaan Gittenberger established and international program for monitoring invasive species.

- By 2009 the project will be in effect in temperate waters off every continent.

For more information on this project, please visit Anemoon’s website at http://www.anemoon.org/setl
Likely To Find

- Fouling organisms
- Early settlement organisms (first of a succession of species)
- Natives, established non-native species, and possibly new non-natives
Potential Fouling Organisms

Barnacles

Mussels

Hydroids

http://a1410.g.akamai.net/f/1410/1633/7d/images.enature.com/seashore/seashore_m/SC0001_1m.jpg

http://www.climatechange.umaine.edu/Research/Expeditions/2004/Greenland/blue-mussel.jpg

http://stellwagen.noaa.gov/education/adulted/images/invert_id/m-59.jpg
Also

Native Seaweeds:

Sugar Kelp – *Laminaria saccharina*

Native? Tunicates:

Sea Grapes - *Molgula manhattensis*
Non-Native Solitary Tunicate

**GUIDE TO MARINE INVADERS IN THE GULF OF MAINE**

*Ascidiella aspersa*
European sea squirt, tunicate

**PHYSICAL DESCRIPTION**
- Thin, grayish, semi-translucent, exterior with pinkish hue, often covered with debris
- Firm, rigid surface with tiny bumps (papillae)
- Two prominent siphons: a fluted oral siphon at top, and fluted atrial siphon located 1/3 of the way down the side of the body
- Variable shape; typically ovoid or egg-shaped
- Adheres to substrate on one end by basal attachment
- Grows up to 2 in (5 cm)

**HABITAT PREFERENCE**
- Found in shallow, subtidal waters attached to docks, pilings, ropes, and other submerged structures
- Prefers calm, protected waters with steady current
- Occurs in both marine and estuarine waters
Non-Native Solitary Tunicate

**Styela clava**
club tunicate (sea squirt, ascidian)

**GUIDE TO MARINE INVADERS IN THE GULF OF MAINE**

**PHYSICAL DESCRIPTION**
- Club-shaped with two siphons; anchored to substrate by a stalk
- Tough, leathery, bumpy exterior; often covered with other organisms
- Up to 8 in (20 cm) with stalk approximately 1/3 of its total length

**HABITAT PREFERENCE**
- Found in shallow subtidal waters on hard surfaces
- Abundant within sheltered areas like docks and harbors

[Images of Styela clava]
Non-Native Colonial Tunicate

**Botryllus schlosseri**
star tunicate (colonial tunicate, ascidian)

**GUIDE TO MARINE INVADERS IN THE GULF OF MAINE**

**PHYSICAL DESCRIPTION**
- Colonies of zooids (individual animals) arranged in conspicuous starlike systems
- Each zooid 0.06 in (2-4 mm) across with 5-20 zooids in a system
- Colonies grow up to 3-4 in (7.5-10 cm) wide
- May form lobes when mature
- Color variable: green, violet, blue-black, brown and yellow

**HABITAT PREFERENCE**
- Grows on a variety of stable substrates including algae, rocks, docks, pilings and ships
- Primarily subtidal; occasionally found in lower intertidal zone
- Can survive in estuaries with low salinities (18 ppt or less)
Non-Native Colonial Tunicate

Botrylloides violaceus
orange or red sheath tunicate

GUIDE TO MARINE INVADERS
IN THE GULF OF MAINE

PHYSICAL DESCRIPTION
- Dense clusters of individual animals (zooids) sometimes forming extensive colonies
- Zooids (0.1in) arranged in loose circles, rows, or dense colonies
- Forms firm gelatinous covering; sometimes forms lobes
- Color variable: typically bright orange, red, or dull purple

HABITAT PREFERENCE
- Found primarily in the subtidal zone; occasionally in protected areas within the intertidal zone
- Attaches to submerged structures, algae, slow moving organisms
Non-Native Colonial Tunicate

GUIDE TO MARINE INVADERS IN THE GULF OF MAINE

Didemnum sp. (colonial tunicate, ascidian)

PHYSICAL DESCRIPTION
- Dense colonies of microscopic zooids (individual animals)
- Color variable, including cream, white, tan, or yellow
- On hard substrates, may form long hanging, rope-like lobes, or beard-like colonies
- On sea floor, may form low, undulating mats with short lobes on surface

HABITAT PREFERENCE
- Found on hard substrates including docks, pilings, moorings, ship hulls, and rocks
- Primarily a subtidal species; may occur from lower intertidal zone to continental shelf
Non-Native Seaweed

GUIDE TO MARINE INVADERS IN THE GULF OF MAINE

Codium fragile ssp. tomentosoides
green fleece, dead man's fingers

PHYSICAL DESCRIPTION
- Green, spongy seaweed with cylindrical branches
- Attaches by a broad, sponge-like holdfast
- Upright when small, but droops as it gets larger, up to 36 in (91 cm) in length
- Juvenile stages appear as fuzzy, moss-like mats
- Bleaches white when washed onto shore

HABITAT PREFERENCE
- Attaches to hard surfaces, e.g. rocks, shells, ship hulls
- Inhabits subtidal zone
- May be found in permanent tidepools and in shallow waters along the coastline
On the Lookout!
Potential New Introduced Species

**Corella eumyota**
Tunicate

**GUIDE TO MARINE INVADERS IN THE GULF OF MAINE**

**PHYSICAL DESCRIPTION**
- Grayish, semi-translucent tunic (exterior skin) revealing internal gut and gonads, but occasionally covered with debris
- Rounded, oval or egg-shaped body
- Two prominent siphons: an oral siphon at top, and an atrial siphon located 1/3 of the way down the side of the body
- Often found adhering very tightly to one another in clumps
- Typically grow to 1.5 in (4 cm) in length

**HABITAT PREFERENCE**
- Found in shallow, subtidal waters attached to docks, pilings, ropes, and other submerged structures
- Prefers calm, protected waters
Building the SETL Sampling Plates
SETL Materials

- Brick with holes
- PVC plate
- Washing/clothing line
- Cable ties
  - 2 long and 4 short
- Electric Sanding Device
- Scissors
- Pliers
- Measuring Tape
- Electric Drill
Steps 1-3:

- Roughen one side of the plate with sandpaper. Drill 4 holes 3.3 cm (1.30 in.) and 5.5 cm (2.17 in.) from each corner (see diagram).
Steps 4-6

- **Step 4:**
  - Pull a short cable tie through each pair of holes. (Use the pair of holes with a distance of 7.4 cm (2.91 in.); make sure the two loose ends are not on the rough side of the plate).

- **Step 5:**
  - Attach the two ends of each cable tie. (Do not tighten them).

- **Step 6:**
  - Place brick between the two cable ties.
Steps 7-10

Place two short cable ties around each side of the attached cable ties, then thread each one through one holes of the brick to the other side, around the second cable ties and attach.
Steps 11-15

Step 11:
Tighten all the cable ties with pincers to firmly attach the brick to the plate.

Steps 12-15:
Cut away excess ends of cable ties.
Steps 16-18:

- Pull long cable ties through each top corner hole of brick and thread both ties through one loop of the line. Close the ties, but do not tighten.
Steps 19-23:

- Cut away excess ends of cable tie. Hide connections of cable tie in holes of the brick.
Step 24:

- Make sure the effective length between plate and the top end of line is 1 m. (3.28 ft.).
Possible Attachments in the Field:

Attached to harbor wall

SETL plates must always be submerged by one meter.
Floating Dock
SETL plates must not rest on the bottom
or be exposed at low tide
Steel Construction
Schedule for Deployment

- SETL plates are put in the water in December
- Removed three months later and examined
  - Each plate is photographed
  - Data sheet filled in and entered on website
  - A specimen of each organism is preserved & labeled
- New SETL plates are put in at the same time
- This process is repeated indefinitely
  - December 15 – March 15 – June 15 – September 15
SETL Plate Examples
Thanks for joining in this Global Effort to understand marine fouling organisms

For more information on this project, please visit Anemoon’s website at www.anemoon.org/setl
and Salem Sound Coastwatch www.salemsound.org/chimp.htm