

## Estuary Survival Activity

GRADE LEVEL: Middle School

### Teacher Background Information

#### What is an invasive species?

An invasive species is an alien species whose introduction does or is likely to cause economic or environmental harm or harm to ecosystem health.

#### What species have invaded Narragansett Bay?

The biggest concern is the Asian shore crab (ASC). The ASC, which is indigenous to China, Southern Russia and Japan, was first found in Narragansett Bay in 1992. Scientists think the ASC found its way to North America in ballast water; the first North American ASC was found in Cape May, NJ in 1988. The tenacious crustacean thrives in the rocky intertidal zone. It is thought the ASC is displacing the familiar European green crab.

Ironically, the green crab is also an invasive species. Green crabs, which are indigenous to Northern Europe, were discovered along the shores of the eastern Atlantic in the early 1800s. Presently the green crab invades the shorelines of California, Washington State, South Africa, Australia and Tasmania.

#### What is their impact? Should we be worried?

The Asian Shore crab's impact on life in Narragansett Bay is uncertain. There is concern that it will displace the green crab, impact bivalve populations, and, in general, upset the biological balance in the Bay.

#### What can teachers do to shed light on the phenomena of invasive species?

While humans expedite the movement of species to new habitats, it is any living thing's nature to expand and propagate. Reproduction is paramount to survival. There is, however, a natural order of checks and balances between predators and prey,

climate and range, promoting a healthy variety of lives. Humans must be careful not to upset this balance; we depend on a healthy planet to perpetuate our own lives.

**OBJECTIVE:** Students will investigate what invasive species are feeding on and how this may harm the species native to an estuary.

**METHOD:** Students will participate in an activity that addresses the relationships between native and invasive species in estuaries.

**BACKGROUND:** Discuss methods of invasive species being transported, especially by ballast water. Review different types of invasive species and what they feed on in the estuary. Discuss and develop a list of estuaries and their native and invasive species. (Used as a reference at the end of the activity).

**MATERIALS:** Jars (one for each row), multi-colored sequins/pipe cleaners, dixie cups, a master list (prepared by the teacher during the background discussion) of invasive species and what they feed on in their new environments, map of the world showing estuaries.

**ACTIVITY:** Each student will be assigned a country, which he/she will represent. Each will start off with 5 randomly chosen species that are native to their waters (these can be anything that will represent a species-different colored sequins or pipe cleaners will work well and could be chosen from a hat). The teacher will sprinkle different colored sequins into the jars to represent invasive species in ballast water. Starting with the first person in each row, the student will take a cup of water from the jar of ballast water and pass the jar back. Each student will end up with different amounts of colored sequins (invasive species) in their water but will not know what they stand for yet. Students will now add their 5 native species to their cup of ballast water. When everyone has mixed the two species, the teacher will reveal the invasive species by letting students know what species the colors represent. Students will use the master list of invasive species and which native species they prey on to discuss and figure out which of his/her native species will survive. Those with the most native species that survive will win that round. A good idea may be to have one winner per row and those few students can help set up for the next round.

**EXTENSIONS:** Use a world map to keep track of which estuaries are being taken over by invasive species according to the results of numerous rounds of the game.

**EVALUATION:** For every native species that was affected by an invasive species, name another native species that could have also been in danger.

**More information:**

Invasive species:

<http://omp.gso.uri.edu/doe/teacher/internt1.htm#inva>

<http://www.invasivespecies.org/resources/index.html>

Asian shore crab

[http://www.savebay.org/aboutus/winter\\_01/html/creature\\_feature.htm](http://www.savebay.org/aboutus/winter_01/html/creature_feature.htm)

Ballast water

<http://massbay.mit.edu/exoticspecies/ballast/fact.htm>

European green crab

<http://www.wa.gov/wdfw/fish/ans/greencrab.htm>

Potential impact of exotic crab species on juvenile bivalves

<http://www.mi.nmfs.gov/recentpub1.html>

Effects of the Asian Shore Crab, *Hemigrapsus sanguineus*, in New England: Changes in Resident Crab Populations?

<http://www.whoi.edu/seagrant/research/fa/0002.html>

Possible Predator-Prey Interactions Involving the Bio-Invader *Hemigrapsus sanguineus* in its New North American Habitat

<http://www.umassd.edu/org/sigmaxi/abstracts/DAB11546.html>