



Harmful and Shifting Species – Introduction

1



What is an Ecosystem, and
What is a Food Web?

2



What's an invasive species?
Where did they come from?

3



How Do Invasive Crabs Differ
from Native Crabs?

4



How Fast Do Invasives Multiply?

5



How has the Maine Coast
Changed?

Learning Outcomes

At the end of this activity, youth should be able to...

1. Define what an ecosystem is.
2. Explain the difference between native and invasive species.
3. Name two invasive species in the Gulf of Maine and describe how they negatively impact the ecosystem.
4. Explain ways the Gulf of Maine ecosystem has changed over the last 70 years.

The first activity in this kit has youth exploring ecosystems and species interactions. We present ecosystems as collections of species that interact with each other in order to survive. These interactions can take different forms. We have chosen to explore this topic with an ecosystem the youth are familiar with and use predator and prey relationships. Youth begin by looking at a land ecosystem found in many parts of Maine. In short, the sun provides energy to the grass, and then the grass is eaten and used as a home by insects and small animal species like the grasshopper. This grasshopper is then food for birds, and the birds are food for the foxes.

Sun → Grass → Grasshopper → Bluebird → Fox

Youth then expand on this to build a food web model. They then apply what they have learned to add marine and coastal species to their food web:

- Seaweed: an aquatic plant that lives close to the shoreline
- Puffin: a seabird
- Sea urchin: a small sea creature
- Oyster: a type of shellfish
- Clam: a type of shellfish
- Plankton: a microscopic plant or animal that is often eaten by "bottom feeders"
- Cod: a medium sized fish
- Shark: the big ones that live deep in the ocean

- Lobster: a Maine classic!
- Black sea bass: a medium sized fish
- Jonah crab: a crab native to Maine
- Green crab: a crab invasive in Maine
- Asian shore crab: a crab invasive in Maine

Youth explore marine species interactions in the same way they explored the land species interactions, by building a food web to demonstrate predator and prey relationships. They then explore what could happen if a species disappears from the ecosystem.

Building Upon Activity 1: Activity 2 and Beyond

It is important for the youth to come away from the first activity with an understanding of what an ecosystem is and how species are connected. This knowledge is used for the rest of the activities as youth explore how changes happening on the Maine coast affect the coastal ecosystem as a whole.

Multiple activities in this kit use a modified case study to show how the presence of introduced crab species has led to ecosystem changes. Asian shore crabs and green crabs are species not native to Maine; both cause harm to the ecosystem and are considered invasive species. These crabs are eating the food sources of other species causing the populations of native crabs to suffer. These invasive species do not have many predators in the Maine coastal ecosystem so their populations continue to grow unchecked.

The second activity in this kit allows youth to explore how these crabs made their way to the Maine coast with the help of humans. The following activity then explores how these crab species are different from the native crab species. Videos of native and invasive crab species are used to collect data about how the crabs walk and move at different temperatures. Through this activity youth learn about adaptations that can give the invasives an advantage over the native crab species.

After participants have a better understanding of how the invasive species differ, they will be introduced to how invasive species affect the growth rates of other species. The invasive species are often able to grow at a faster rate than native species. Activity 4 is a game-like exploration.

The final activity in this kit allows youth to investigate habitat changes driven by ocean water temperature changes. Two maps are provided, one that shows temperatures of the ocean of today and the other with temperatures from 70 years ago. Youth will investigate how the changing temperatures can affect the species in the Gulf of Maine.



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