

Invasive Species Super Sleuth

In the late 1860's, it seemed like a good idea: Let's start a silk industry in the United States! Silk is a valuable cloth, in demand all over the world. And insects do most of the work! All we need to do is import some Gypsy moths from France, then sit back and wait for the money to start rolling in!

So, the moths were imported. Unfortunately, they escaped. Today, Gypsy moths are a major threat to U.S. forests.

Gypsy moths are one example of invasive species, and there are many more. About 50,000 alien species are already in the U.S. What's the difference between "alien" and "invasive?" An alien species is not native to a particular ecosystem. If an alien species causes economic and/or environmental harm or threatens human health, then it is called invasive.

What's the big deal? Invasive species can seriously threaten native species and entire ecosystems. Plus, the costs of environmental damage, economic losses, and efforts to control invasive species average \$138 billion per year—more than the cost of all other natural disasters combined.

What can be done? NOAA's National Centers for Coastal Ocean Science are developing a group of experts that can help recognize alien species, hopefully before they become invasive. NOAA's National Sea Grant Office and state fish and wildlife agencies are partnering with the pet industry in the Habitattitude™ Campaign, which is about educating consumers about possible environmental consequences of aquarium and water garden hobbies, and how to be a responsible hobbyist. In addition, NOAA's Community-Based Restoration Program works with community groups to remove invasive plants as part of projects to repair damaged coastal habitats.

Here's how to learn a lot about aquatic invaders and have fun at the same time!



Lionfish are venomous fish from Indian and western Pacific oceans that have invaded East Coast waters Courtesy NOAA.

What You Will Need

Access to the internet.

How to Do It

Play *Nab the Aquatic Invader* and *Be a Sea Grant Super Sleuth* at www.iiseagrant.org/NabInvader/.

Want to Do More?

1. You can find a LOT more information on invasive species on the *Nab the Aquatic Invaders! Be a Sea Grant Super Sleuth* website (www.iiseagrant.org/NabInvader/). Click on "Information for Teachers" to go to all kinds of good links.
2. Visit the *GloBallast* web site archive.iwlearn.net/globallast.imo.org/globallast.imo.org/index.html and watch *Invaders from the Sea* a very informative IMO-BBC documentary about the transfer of harmful organisms in ballast water from ships. You can also find it on youtube: www.youtube.com/watch?v=u5JkRtMTedI.

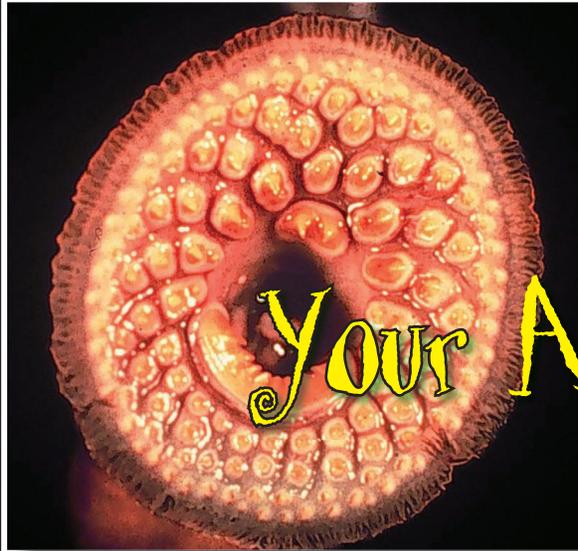
3. Visit oceanservice.noaa.gov/facts/invasive.html and www.noaa.gov/topic-tags/invasive-species and http://www.habitat.noaa.gov/pdf/best_management_practices/fact_sheets/ and click on "Aquatic Invasive Species Overview.pdf" for even more information!

What You Will Do

Play a game called "Nab the Aquatic Invader!"

You will be a private investigator working with other detectives to catch suspected invaders including Louie "Sucker Mouth" Sea Lamprey, Zeke "The Prowler" Zebra Mussel, Purple "Lucky" Loosestrife, and Rocco "Ravenous" Ruffe.

Courtesy USGS



Courtesy Leo G. Nico, USGS



Courtesy Justin Secrist, Washington DFW



Your Alien Dodecahedron



Courtesy California Interagency Ecological Program

If you have played the “Invasive Species Super Sleuth” game, you already know what invasive species are and why they are a big problem (so you can skip the rest of this paragraph!). Just in case you haven’t played the game yet, invasive species are plants, animals, or other living organisms that are not native to a particular ecosystem and cause economic harm, environmental damage, or pose a threat to human health. Invasive species can seriously damage native species and entire ecosystems, and cost an about \$138 billion per year (which is more than the cost of all other natural disasters combined). NOAA’s National Centers for Coastal Ocean Science are developing a group of experts that can help recognize alien species, hopefully before they become invasive. NOAA’s National Sea Grant Office and state fish and wildlife agencies are partnering with the pet industry in the Habitattitude™ Campaign (www.habitattitude.net/), which is about educating consumers about possible environmental consequences of aquarium and water garden hobbies, and how to be a responsible hobbyist. In addition, NOAA’s Community-Based Restoration Program works with community groups to remove invasive plants as part of projects to repair damaged coastal habitats.

You can help! Here are some pictures and more information about twelve invasive alien animals. You can use these images to make a twelve-sided object that will show these examples of invasive species. This twelve-sided object is called a dodecahedron (pronounced “doe - dek - ah - HEE - dron”). You can use your “Alien Dodecahedron” to help other people understand more about the invasive species problem. Once they start looking at the dodecahedron and the images on its twelve sides, you can tell them some of the facts about invasive species. Remember: Education and understanding are key to solving most environmental problems—including invasive species!

What You Will Do

Make a dodecahedron that shows pictures of twelve invasive animals

What You Will Need

- Color copy of images on the “Alien Dodecahedron Worksheet”
- Copy of “How to Fold a Dodecahedron” worksheet
- Scissors
- Glue for paper

Warning

Be careful with scissors; they are sharp!

How to Do It

1. Carefully cut out the pattern on the “How to Fold a Dodecahedron” worksheet. Be sure NOT to cut the dashed lines!
2. Fold all of the dashed lines away from you (backward), then unfold and flatten the pattern.
3. Cut out the twelve images on the color copy of the “Alien Dodecahedron Worksheet.”
4. Glue the images onto the dodecahedron pattern.
5. Fold the dodecahedron pattern along the dashed lines so that it makes a twelve-sided shape. Glue the tabs to keep the shape from unfolding.
6. Now you have an Alien Dodecahedron!

Look over the facts about each species on the worksheet. You will see that some alien invaders were deliberately brought to the United States for various reasons. Others arrived by accident, sometimes as part of “ballast water.” Ballast water is water that is pumped into large ships when they are not carrying cargo, so that they are more stable when sailing on the ocean. This means that water from one part of the Earth can be carried thousands of miles away before it is pumped out again. If small animals or larvae happen to be in the water when it is pumped into a ship, they get a free ride to another part of the world!

You will also see that one of the biggest problems with invasive species is that they compete with native species. Native species are the organisms that are normally found in a certain ecosystem. Often, native species do not have good defenses against invaders. Species like the zebra mussel cause other problems when they attach themselves inside pipes



Lionfish, Courtesy Paula Whitfield, NOAA

that carry water in and out of factories or power plants. Some invaders are dangerous to humans, such as the lionfish that has spines that contain a powerful venom.

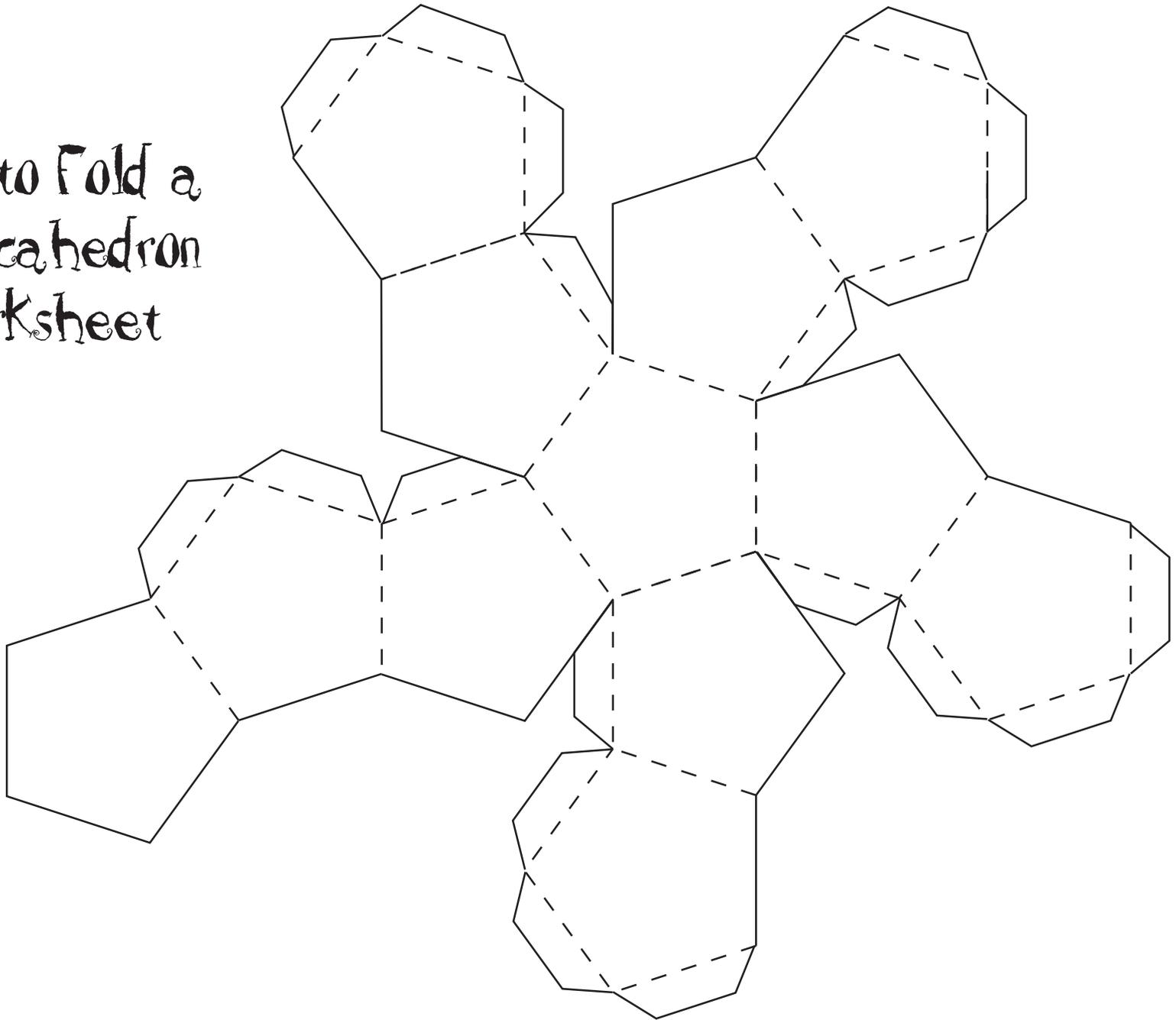
Show your Dodecahedron to other people and tell them about the invasive species problem. You can also play a game with your Dodecahedron: Players take turns, and the player who is “It” gently tosses the Dodecahedron onto a flat surface, then looks at the picture that is face down. Time the player to see how long it takes to correctly name the species and what damage it causes (or whatever other facts you want to include in the game). If the face-down image has already been named by another player, the player who is “It” tosses the Dodecahedron again until a new image is face-down.

Want to Do More?

See www.habitat.noaa.gov/restoration/programs/invasivespecies.html and coastalscience.noaa.gov/research/pollution/invasive/ to find out more about invasive species and what is being done about them.

The National Invasive Species Information Center Web site, www.invasivespeciesinfo.gov/index.shtml has a lot of information about invasive species, including links to images.

How to Fold a Dodecahedron Worksheet



Alien Dodecahedron Worksheet

Alewife



Courtesy NOAA Restoration Center, Jim Turek

What Is It?

*A fish called an Alewife (also called mulhaden, grey herring, golden shad); its scientific name is *Alosa pseudoharengus**

Where Did It Come From?

Atlantic Ocean

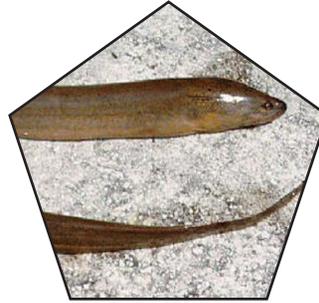
How Did It Get Here?

Deliberately introduced to Lake Erie

What Does It Do?

Competes with native species

Asian Swamp Eel



Courtesy Leo G. Nico, USGS, Gainesville, FL

What Is It?

*A fish called an Asian swamp eel or rice eel; its scientific name is *Monopterus albus**

Where Did It Come From?

Asia

How Did It Get Here?

Brought to the U.S. for aquariums and fish markets, accidentally released

What Does It Do?

Competes with native species

Chinese Mitten Crab



Courtesy of California Interagency Ecological Program

What Is It?

*A crab called the Chinese mitten crab; its scientific name is *Eriocheir sinensis**

Where Did It Come From?

China

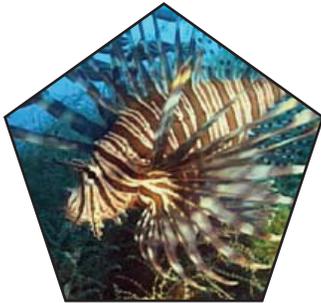
How Did It Get Here?

In ballast water of ships; possibly deliberately released

What Does It Do?

Competes with native species

Lionfish



Courtesy Paula Whitfield, NOAA Center for Coastal Fisheries and Habitat Research, Beaufort, NC

What Is It?

*A fish called the lionfish; its scientific name is *Pterois volitans**

Where Did It Come From?

Pacific Ocean

How Did It Get Here?

Brought to the U.S. for aquariums; accidentally or deliberately released

What Does It Do?

Eats native species and has venomous spines that are poisonous to humans

Northern Snakehead



Courtesy U.S. Geological Survey, Florida Integrated Science Center]

What Is It?

*A fish called the Northern snakehead; its scientific name is *Channa argus**

Where Did It Come From?

Asia

How Did It Get Here?

Brought to the U.S. for fish markets; accidentally or deliberately released

What Does It Do?

Feeds aggressively on amphibians, fish, birds, and small mammals; can survive in waters that contain very little oxygen and can travel across land

Nutria



Courtesy Justin Secrist, Washington Department of Fish and Wildlife

What Is It?

*A mammal called a Nutria (also called a coypu, coypu rat, nutria rat, or swamp beaver); its scientific name is *Myocastor coypus**

Where Did It Come From?

South America

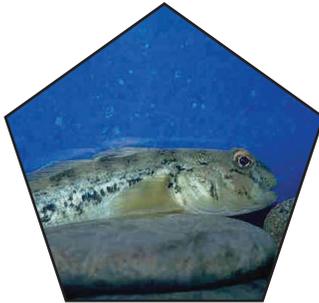
How Did It Get Here?

Brought to the U.S. for fur production

What Does It Do?

Damages vegetation and destroys wetland habitats

Round Goby



Courtesy D. Jude, University of Michigan

What Is It?

A fish called the Round Goby; its scientific name is Neogobius melanostomus

Where Did It Come From?

Eurasia

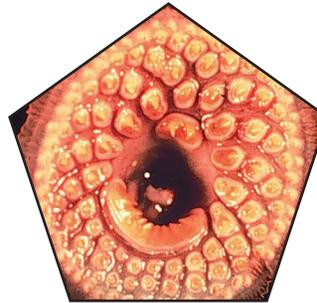
How Did It Get Here?

In ballast water of ships

What Does It Do?

Feeds on native species

Sea Lamprey



Mouth of a sea lamprey
Courtesy USGS, Great Lakes Science Center

What Is It?

A fish called a Sea Lamprey; its scientific name is Petromyzon marinus

Where Did It Come From?

Atlantic Ocean

How Did It Get Here?

Entered the Great Lakes through man-made canals

What Does It Do?

Feeds on native species

Sea Squirt



Courtesy Dann Blackwood, U.S. Geological Survey

What Is It?

An invertebrate called a Sea Squirt (also called an ascidian, colonial tunicate, or compound sea squirt); its scientific name is Didemnum lahillei

Where Did It Come From?

Europe

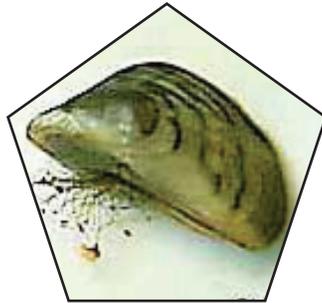
How Did It Get Here?

In ballast water and attached to the hulls of ships

What Does It Do?

Forms dense mats that smother native species

Zebra Mussel



Courtesy of Ohio Sea Grant College Program

What Is It?

A mussel called the Zebra Mussel; its scientific name is Dreissena polymorpha

Where Did It Come From?

Eurasia

How Did It Get Here?

In ballast water of ships

What Does It Do?

Competes with native species, and clogs pipes of factories located on rivers and lakes

Veined Rapa Whelk



Courtesy of Julia Harding, Virginia Institute of Marine Science

What Is It?

A snail called the Veined Rapa Whelk; its scientific name is Rapana venosa

Where Did It Come From?

Pacific Ocean

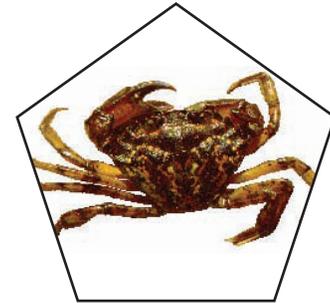
How Did It Get Here?

In ballast water of ships

What Does It Do?

Eats commercially important bivalves, such as clams and oysters

European Green Crab



Courtesy of California Interagency Ecological Program

What Is It?

A crab named the European Green Crab; its scientific name is Carcinus maenas

Where Did It Come From?

Europe

How Did It Get Here?

In ballast water of ships

What Does It Do?

Eats commercially important bivalves, such as soft shell clams and scallops