Lionfish Invasion

New England Aquarium
Protecting the blue planet

Materials:
- Lionfish Invasion Worksheet
- Craft materials (Optional)
- Access to YouTube (Optional)

Background info:
- **Invasive species** are plants or animals that are not native to a specific area. They can cause a great deal of harm to the natural balance of an ecosystem. **Lionfish** are considered to be a very invasive species off the east coast of the United States and are typically native to coral reefs in the Indian and Pacific Oceans. Lionfish are tropical marine predators with highly venomous spines all over its body. They are adapted to feed on a wide range of **prey** and can survive major changes in food supply. It is thought that they were released into the Atlantic Ocean from a home aquarium and since the lionfish has no known **predators** in the Atlantic, they have been able to thrive and multiply. This has created a huge issue for **native species** and the fishing industry. Your task today will be to help solve this problem. It may seem like a daunting task, but researchers have started looking into ways we can capture the lionfish out in the wild to help prevent the invasion from spreading. Below is a link to a PBS video about an invention researchers created called a "Robotic Zapper". The video is optional, but I recommend watching before starting the activity to help you brainstorm.
- https://youtu.be/44GaC-YsAtQ

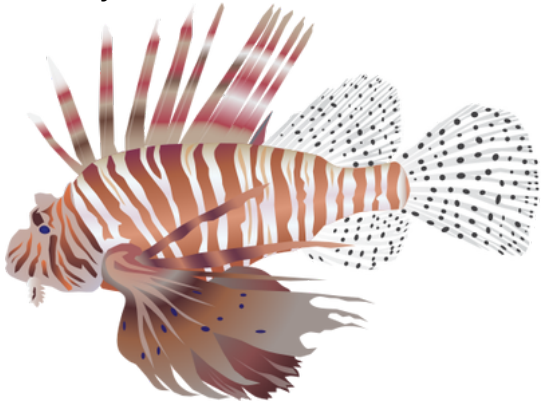
Vocabulary:
- Invasive Species
- Native Species
- Lionfish
- Predator
- Prey

Learning level:
- 6-12

Duration:
- Variable ~30 minutes

Procedure:
- Today your challenge will be to use your creativity and engineering skills to design an invention that will capture lionfish.
- Using the attached worksheet work through the engineering design process.
- You can either write your answers on a printed copy of the worksheet or you can work on a separate sheet of paper.
- Be sure to keep in mind the lionfishes adaptations while designing your invention. For example, they have venomous spines all over their body.
- Once you have sketched your design, use the comic strip template to model how your invention will work in action!
- When you've completed your design be sure to share a picture with us on Facebook, Instagram, or Twitter @neaq

Extensions and Variations:
- You can build a prototype of your invention using everyday household items or crafts.
- Use the associated worksheet to document your engineering design process.
- After you have completed the challenge you can write a short pitch that could be used to explain and create support for your invention.



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Name_____

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Before starting this challenge, let's review the engineering design process that researchers use:

1. Ask: What problem are you trying to solve?
2. Imagine: Develop Possible Solutions
3. Plan: Select a Promising Solution
4. Research the Problem
5. Develop a plan (Sketch it out)
6. Create: Build a Prototype
7. Test and Evaluate Prototype
8. Improve: Redesign as Needed

*Today you won't be able to complete steps 7-8, but you will be able to experience how the process gets started!

1) Let's identify the problem. In the space below write down why you think lionfish in the Atlantic Ocean are a problem.

2) Let's develop possible solutions. In the space below write down some ideas you may have on how to capture and transfer the lionfish. (Try to think of at least 3)

3) Let's select a promising solution. In the space below write down the solution you have decided to focus on and why you think it's the best option.

4) Let's conduct some research. In the space below write down the materials you might need to physically create this model. Get creative, if you could have access to any materials in the world what would you use to create your invention?

5) Let's develop a plan. In the box provided below draw out what your model will look like. Be sure to label your design.

In the comic strip template below, draw out your design in action. Illustrate how your design will approach, collect, and transfer the lionfish. Feel free to write a description for each step.

Approaching Lionfish	Capturing Lionfish	Transferring Lionfish

(Optional):
6) Let's build a prototype of your invention. Use everyday household items or craft supplies to represent the material you would use to build your invention.

Extension: If you want to test your prototype, find a small object to represent a lionfish (like a marshmallow with toothpicks in it) and see how many you can collect.

a) What parts of your prototype worked best?

b) What parts could be improved?

c) Make changes to the drawing of your model and see if you can improve your prototype.