



Education and Research: Testing Hypotheses

#FlatFishNeedLove

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Summary

By learning about the sawfish habitat, students are able to understand how survivability of the juvenile sawfish is crucial to not only the survival of their own species, but to all species along the food chain which includes the mangrove forests and the all of the organisms that rely on that area in their lifespans.

Key Concepts/Standards

SC.8.N.1.1

Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

SC.8.N.1.3

Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.

SC.8.N.1.4

Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.

SC.8.N.1.5

Analyze the methods used to develop a scientific explanation as seen in different fields of science.

SC.8.N.1.6

Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.

Ocean Literacy Standard Checklist attached

Objectives

- **Describe & identify** the environmental conditions in a mangrove forest.
- **Record** information pertaining to the life cycle of the sawfish, reproductive methods, habitat, and food sources.
- **Demonstrate** understanding of how the quality of habitat determines the survival of

juvenile fish populations, which therefore affects future fish populations and other species that depend on them. Students will link this understanding to the larger picture of how survival of juvenile fish populations ultimately the survivability of the species of sawfish.

- **Communicate** what affects the survival of juvenile sawfish and what affect the survivability of the juvenile sawfish will have on the sawfish population as a whole through production of a poster.

Materials

- Computers with internet access, poster paper, markers and other writing utensils, science notebooks

Time

- 1-2 weeks

Procedure

1. **Essential Question:** Why does the survival of juvenile sawfish matter? How does the survival of juvenile fish affect the survivability of the sawfish? What affects the survival of juvenile fish?
 - Display these essential questions in your classroom. Use them as a pre-assessment by having students respond to them in their science notebooks. Tell students that this assessment is to find out what they know now and that they will answer these again after several learning activities. After students have had enough time to respond to the questions, have them share their responses for a class discussion.
 - Post a list of student responses under each Essential Question. (This could be done before next day's activity.)
2. **Vocabulary:** Juvenile fish, habitat (food, water, shelter, space), mangrove forest, estuary, salinity, survivability, ovoviviparous, rostrum,

General information on sawfish: <http://www.elasmoworld.org/sawfish.html>
http://www.biologicaldiversity.org/species/fish/smalltooth_sawfish/natural_history.html
<https://www.nwf.org/Wildlife/Wildlife-Library/Amphibians-Reptiles-and-Fish/Sawfish.aspx>

3. Brainstorm Humans' Connection to Fish

- Have students share their own personal connections with subsistence, sport or commercial fishing, and brainstorm jobs that are indirectly linked to fishing.
- Homework: Have students collect headlines from current events that are in any way related to fish and jobs. Students add to classroom collection on display.

4. **Habitat Observations (Field Trip):** Go on a virtual fieldtrip to Florida mangrove forests. <https://www.youtube.com/watch?v=4mSDrAQp4dQ>
<https://www.youtube.com/watch?v=rolfvEnPnNA>

Have students sketch habitat in their science notebooks. Have students record their observations. What do they notice about this habitat's living and non-living factors (rocks, silt, grass, depth, light characteristics, shoreline trees, trees, tides...). What questions do they have? Where do they predict juvenile fish would most likely prefer to live? Why?

5. **Qualitative Data:** In your science notebook use this site to find the average salinity, oxygen availability, and physical attributes of the mangrove.
<https://www.flmnh.ufl.edu/fish/southflorida/mangrove/adaptations.html>

Compare data from different habitats (bay, ocean, lake, rivers)

- **3-2-1 Response Post Activity:** This is a quick way to check for understanding. In science notebooks have students:

List 3 new facts or words that you have learned today,

List 2 ideas or concepts that are new to you

List 1 question you still have.

(After reading responses in notebooks, teacher can add any new knowledge or questions under the Essential Questions display in classroom.)

6. **Become a juvenile sawfish:** Have students visualize being a juvenile fish in the habitat they have investigated. What will they do to increase their chance of survival in this habitat? What are the living and non-living factors that will increase or decrease their chance of survival? Have them think about water temperature, turbidity, currents or wave action, predators, food, shelters, ... Students sketch their visualization in their science notebooks with key components labelled.

Do all juvenile fish species have the same needs? Students can do a brief research to find out about a particular local species.

7. **Community History:** Have students ask older community members (family members, Native elders, commercial fisherman...) to describe what the bay, sound, and/or Gulf were like in the past compared to now. If possible, invite an Elder, scientist, fisherman, or other knowledgeable person to the classroom.
- Have any physical characteristics changed due to natural causes? Have humans' use of it changed (culturally, recreationally, or commercially)? Students can learn how these waters have changed over the years physically and productively.
8. **Mystery:** Introduce the mystery of the Steller Sea Lion to your students. Have students predict why they think there has been a change in their populations. Is there a connection between survival of juvenile fish to sea lion populations?

http://www.sciencecases.org/sea_lions/sea_lions.pdf

Assessment

- **Performance**
 - Students show knowledge of habitat conditions through their illustrations and recorded data in their science notebooks and poster.
 - Students will show growth in their understanding of Essential Questions between their pre and post responses in their science notebooks.
 - Students' predictions for stellar sea lion mystery include reference to availability of fish.
 - Students write a reflection of their learning at end of the unit using the 3-2-1 Response format.
- **Product—Students will choose one of these options and collaborate in a small group.**
 - Students will create a dramatic simulation of a juvenile sawfish trying to survive in its environment. Simulation will have students act out with dialogue their part in the particular ecosystem. Simulation should include the living and non-living factors that affect survivability of the juvenile sawfish.
 - Students will create an artistic representation of a juvenile sawfish in its habitat.
 - Students will write a descriptive narrative from the point of view of the juvenile sawfish.
 - Students create a poster showing relationships between natural environment, juvenile sawfish, other marine life, and people.

Enrichment Activities:

- Visit local museum to learn about traditional Native culture fishing technology.
- Visit NOAA lab for introduction to Gulf of Alaska ecosystem project.

Additional Resources

Mangrove powerpoint
Scale for poster/notebook

