

Estuary Web of Life (Adapted from South Slough NERR “Web of Life”)

Time requirement: Describes minutes or class periods as well as prep time.

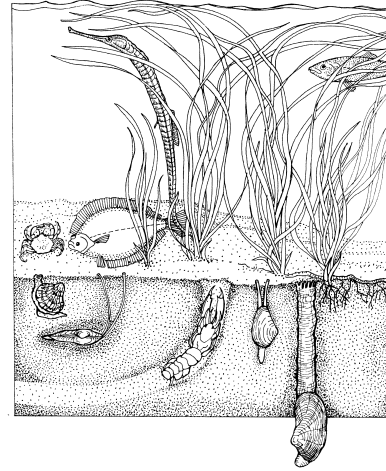
Summary of Activity: In this activity students will discover how the plants and animals of the estuary are connected to each other.

Concepts to Teach: Interactions & change, balance, food chains, community interactions, interconnectedness.

Standards Addressed: 3.2L.1, 4.2L.1, 5.2L.1

Instructional Strategy: Interactive group activity

Goal: Students will understand the interdependence of all living things in an estuarine ecosystem because of their shared food resources.



Specific Objectives:

- Students will collect information about various organisms in the estuary
- Create a simulated web of life using a ball of string
- Students will identify at least 1 of the following: producer, consumer (herbivore, omnivores & carnivores) and decomposers.

Vocabulary: (See glossary in Additional resources section)

photosynthesis, producers, herbivores, carnivores, omnivores, decomposers, food chain, food web, predator, prey, habitat.

Required Materials:

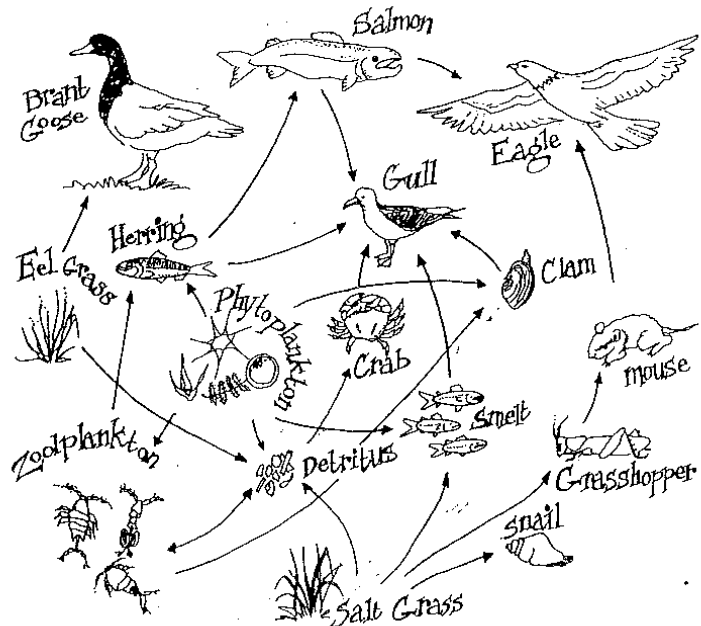
- Large sheets of paper or white board to make lists
- Ball of string or yarn
- Species cards (provided in the Resources section) or nametags for students to provide species for the web
- Optional: large paper or poster board to create a mural

Background

Estuary plants and animals are connected through a web of eating relationships. One primary function of an estuary, like any other ecosystem, is to produce and distribute energy. All life depends on the ability of green plants to use sunlight to synthesize simple sugars from carbon dioxide and water. This process is called **photosynthesis**. Plant eaters, or **herbivores**, eat the plants directly; meat eaters, **carnivores**, in turn eat primarily animals while **omnivores** eat both plants and animals. A **food chain** is a simplified way of showing energy relationships between plants and animals in an ecosystem. For example, sun → salt grass → vole → owl. However, rarely does an animal eat only one type of food. A food web describes the interconnection of the food chains in an ecosystem and provides a better picture of how plants and animals in an ecosystem are related to one another. **Predator** and **prey** relationships describe what each estuary resident consumes and what may consume it. Simplified food chains can be determined from these direct relationships while food webs are created based on multiple prey or predator species. **Decomposers** are those organisms that depend on dead or decaying matter

for energy. They are often a forgotten, but very important link in the estuary food web to recycle energy in the ecosystem.

In this activity, students will create a “web of life” to depict the relationships among members of an estuary ecosystem. This web includes eating relationships (as in a food web), but also shows the various other kinds of relationships found in an estuary (shelter, reproduction). The habitat in which the species lives in will help to determine these other relationships. **Habitat** simply describes where a species receives food, water and shelter. For example, salmon live in the eel grass beds of the estuary for protection, but they do not directly feed on the eelgrass. The web of life suggests that all living things are connected to all others, no matter how unrelated they may seem.



Preparation

Print and secure the species cards to string so that students can comfortably read the backside and everyone is able to view who each student represents. You may choose to have students create their own species cards as well.

Lesson Procedure/Activity Description

Introduction:

This activity is appropriate for either before or after a field experience in and estuary. The level of familiarity students have with the ecosystem and its residents will influence how the activity is introduced.

1. What animals live in an Oregon estuary? You may choose to have students work in small groups to answer this question, or brainstorm as a whole class depending on writing ability. Some examples are listed below:
Phytoplankton, zooplankton, salt grass, snail, lugworm, clam, crab, smelt, herring, salmon, great blue heron, osprey, brant goose, eelgrass, eagle, jelly, elk, banana slug, etc.
2. Using the list the class created start categorizing these animals and plants into three categories: Producers, Consumers, and Decomposers. Define these categories and sort out the species list giving examples of who may eat whom. This is an appropriate situation to introduce predator & prey relationships as well as introducing what plants “eat”. Decomposers are often forgotten, but are a really important part of making the estuary so productive!

3. If desired, have students work to categorize what habitats each resident lives in: Forest, freshwater wetlands, salt marsh, tide flats and open water channel. South Slough NERR has an excellent felt board that helps students to understand these relationships.

Main Activity:

1. Assign each child an organism from the list above (represented in the provided species cards). Each student will become that organism for the duration of this activity. You may wish to have each child act out some behavior of their organism to make the activity more fun and/or realistic
2. Starting with any student, begin the process of linking individuals who share a direct relationship (one eats the other) or an indirect relationship (salmon living in eelgrass) by stringing yarn between them. Yarn may be attached to an individual by wrapping it around a finger two times. Rely on students as much as possible to determine who links to who (use the diagram above to confirm these relationships if needed). With younger students help them determine relationships with the group. This is a great way to emphasize relationships either seen in the estuary or introduced before the activity started. After establishing many feeding relationships, overlapping yarn should resemble a web.
3. Recognize with students that this a model for the interaction of all living things, i.e., all things are connected. Where do humans fit into the web?

Conclusion:

1. Demonstrate the effects of one species on the ecosystem by tweaking the yarn and determining who could feel the vibration OR by removing the yarn from an individual's fingers and determine all the other organisms who are now holding slack yarn. (NOTE: removal of yarn will prevent further exploration in the web)
2. Provide scenarios for students that could affect the estuary web of life. Different organisms in an ecosystem are highly dependent on one another and if even one organism succumbs to habitat loss, pollution, over-harvesting, etc., the effects are widespread and potentially catastrophic to the ecosystem.
 - a. How would the web be affected if the eagle's nest tree blew over?
 - b. What would happen in the estuarine or marine environment if the phytoplankton suddenly bloomed or suddenly shrank?
 - c. What if an eelgrass bed was shaded out by a dock and no longer provided the protective habitat?
 - d. Alternatively ask students what species is the least important to the web staying together. They will visually see that all species are equally important in the web of life.
3. Please know your audience. It may not be appropriate to introduce "doomsday" situations to younger students while these topics can become great learning conversations for older audiences.
4. While wrapping up the yarn have students pile up their nametags and address any questions they had about the activity.

Optional Extension (appropriate for advanced student audiences)

1. Ask students to work in pairs to brainstorm all the components they think they would need to make a healthy estuary. Invite them to share their ideas with the class.
2. Make a class list of animals that live in the estuary. Some examples are Pileated woodpecker, Great blue heron, kingfisher, Glaucous-winged gull, Snowy Egret, Raccoon, Vole, Harbour seal, limpets, ribbon worms, oysters, clams, snails, sea star, mud shrimp, ghost shrimp, Dungeness crab, shore crab, grasshopper and other insects, trout, salmon, sculpin, rockfish, and Bay pipefish.
3. Make a class list of plants that live in the estuary. Some examples are eelgrass, pickleweed, yarrow, sea lettuce, sea plantain, arrow grass, salt grass, and foxtail barley.
4. Divide the class into teams of two to four students. Ask each team to select one estuary organism to study. Make certain that the groups select a variety of plants and animals.
5. Instruct groups to collect as much information as possible about their chosen organism.

Web of Life Mural

1. Ask groups to find or draw pictures of their plant or animal. Using these pictures, ask the class to create an estuary mural on large pieces of cardboard or heavy paper. ** You may wish to use the posters that were created in the "Who Lives Here?" activity.* The mural should also show important elements like sun, water, soil, and atmosphere.
2. When the mural is complete, introduce the web of life concept (see background information).
3. Place a push pin next to each organism. Then use yarn to connect each animal to other plants and animals with which it directly or indirectly interacts. Students can help by acting as experts on the species they researched. The completed mural forms a web of life for the estuary.
4. Discuss these questions:
 - What would happen if one element of the ecosystem were missing? (You can demonstrate by removing a push pin.)
 - What will happen to the other organisms?
 - What important elements are not included in our web?

Assessment

- Have student create their own web of life based on the estuary, another ecosystem or themselves. Have them demonstrate their knowledge by including at least 1 producer, consumer and decomposer in their 6+ species web with annotations.

Additional Resources:Glossary

- *Carnivores*- animal eaters
- *Consumer*- Any organism that depends on another organism for energy
- *Decomposers*- those that consume dead or decaying material
- *Food chain*- a simple energy transfer from the sun to producers to consumers, etc.
- *Habitat*- Where an animal obtains food, water and shelter.

- *Herbivores*- plant eaters
- *Omnivores*- plant & animal eaters
- *Photosynthesis*- Using sunlight to synthesize simple sugars from carbon dioxide and water.
- *Predator*- any animal that lives by preying on another animal
- *Prey*- any animal that is consumed by a predator
- *Producers*- any organism that can produce its own energy without consumption

Standards addressed

3.2L.1- Compare and contrast the life cycle of plants & animals

4.2L.1- Describe the interactions of organisms and the environment where they live

5.2L.1- Explain the interdependence of plants, animals, and the environment, and how adaptations influence survival.