



Diet-Food Web Lesson Plan 6-12



Objectives:

- To learn the diet and feeding habits of marine species in South Carolina waters using stomach contents data.
- Students should be able to fill in the food pyramid model and explain what would happen if prey abundance changed in a food web.
- Students will understand how scientists collect diet composition data and why it is important to understand the health of estuaries and different marine environments.
- Be able to describe the three basic trophic levels of an ecosystem: producers, consumers, and decomposers

Materials:

- ✓ Blank food pyramid
- ✓ Bottlenose Dolphin diet composition sheet
- ✓ Fish diet composition sheet
- ✓ Scientific name/common name sheet
- ✓ PowerPoint

Research Questions:

1. Write a few sentences describing the roles different organisms play in the estuary food pyramid.
 2. Why is it important for biologists to continue to study the diet composition of different marine species and what can you learn by this type of research?
 3. By looking at the Bottlenose Dolphin diet composition data, what observations can you make about them? List a few of their most common prey items they eat by looking at the highest frequency percentages for all the Dolphins and write both the scientific and common names.
- 1. POSSIBLE ANSWER: Student sentences should include discussions of the ultimate source of energy in an ecosystem (the sun), the role of producers, and the flow of energy that transfers from producers to primary consumers, secondary consumers, and so on.
 - 2. POSSIBLE ANSWER: Biologists always need more information to be able to understand local marine food webs and how to keep these populations healthy. Researching different species can help prevent overfishing, learn what different species eat which can determine where they live/what their habitat is, or looking at animals that have already died (ie: the dolphins in the study) they can determine if it was something they ate that caused their death, or if it was a different cause-and maybe find ways to help to better protect them. You can also learn where different prey species live, what type of impacts climate change or pollution or any other outside factors may have on these species over time and what changes biologists may have learned over time by doing continual research
 - 3. POSSIBLE ANSWER: The first question the answers will vary. The second part they could list any possible animal on there that has the highest frequency percentage in any of the categories on the dolphin data sheet under ALL dolphins.
 - Examples: *Stellifer lanceolatus* (Star Drum), *Brevoortia tyrannus* (Menhaden), *Lolliguncula brevis* (Atlantic Brief Squid), *Litopenaeus setiferus* (White Shrimp), *Opsanus tau* (Oyster Toadfish)

Instructions:

- Go through PowerPoint
- Stop at the slides where students need to fill out food pyramid/answer questions

Background Information:

In order for biologists to understand our marine ecosystem, they have to conduct research by using multiple different methods. There are several different vessels taken out by SCDNR for different forms of sampling. The biologists take samples to get a better idea of where animals live by trawling a large net behind the research vessel. This is the most common form of sampling and can be done offshore, inshore, in estuaries, in salt marshes, and up the rivers along our coast. By collecting animals in different areas, biologists not only learn where these animals live, but also if certain species live in multiple areas during different stages of their lives or if they are migratory. They do measurements of all of the animals they catch and keep a log of everything. They bring some fish back to the lab for dissections to be able to learn more about them. While looking at the internal anatomy of the fish, biologists always open the stomach to learn what these animals eat. This can tell you a lot about the animal including its habitat. These diet composition data sheets are from our researchers and biologists that have dissected multiple animals to determine their diet. They have to do this continually because of threats like climate change, pollution, habitat destruction, etc.. Where these animals live is always subject to change, and what they eat might also have to change depending on if they are forced to leave their environment. By doing this research, this is how we determine what fish and other animals are sustainable to commercially and recreationally harvest and why there are regulations. This also helps manage our fish populations so we can make sure to maintain healthy ecosystems.

Explaining how the food chain works:

- All food chains and food webs start with the **sun**.
- Producers** make up the first level of the food chain, which are plants. Plants make their own food by using a process called *Photosynthesis**
- Primary Consumers** are animals that eat plants, also known as *herbivores*.
- Secondary Consumers** are animals that eat other animals, also known as *carnivores*. They could also be animals that eat plants AND other animals, which are known as *omnivores*.
- The chain will eventually reach the top predator known as the **Apex Predator**. This consumer has the least number of natural predators.
- Finally, you have the **Decomposers**. These could be animals like the crab who is a scavenger, or bacteria and fungi. They complete the lifecycle and return nutrients back into the soil or oceans and the food chain starts all over again.

Food Pyramid: When animals eat plants or other animals in order to survive, there is a flow of food energy through the ecosystem. What starts out as energy from the sun becomes food energy created by the green plants that use photosynthesis to grow and reproduce. These plants are the producers and the base of food chains and complex food webs. As one thing eats another, the layers of the food pyramid narrow. These layers, called trophic levels, represent available energy. Animals at each trophic level depend on animals living in the levels below them for food energy. The largest amount of available food energy is found on the first trophic level, the base of the pyramid. Less than 10% of the amount of food energy from one level is available to the animals in the next trophic level above. This means each higher level has energy to support fewer and fewer organisms.