



## Lesson 2: Food Web Chain Reaction

### Theme: Threats to Florida's Coral Reef

Grade Levels: 3-5

Duration: 45 to 60 minutes

Students will learn about the human impacts and environmental stressors that threaten Florida's Coral Reef. They also will learn about food webs, how and when certain species' health and populations decline, and the domino effect that ripples throughout the rest of the food web.

### Next Generation Sunshine State Standards

<b>SC.3.N.1.1</b>	Raise questions about the natural world, investigate them individually and in teams through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.		investigations; and generate appropriate explanations based on those explorations.
<b>SC.3.N.1.6</b>	Infer based on observation.	<b>SC.4.L.17.2</b>	Explain that animals, including humans, cannot make their own food and that when animals eat plants or other animals, the energy stored in the food source is passed to them.
<b>SC.3.N.3.2</b>	Recognize that scientists use models to help understand and explain how things work.	<b>SC.4.L.17.3</b>	Trace the flow of energy from the sun as it is transferred along the food chain through the producers to the consumers.
<b>SC.3.N.3.3</b>	Recognize that all models are approximations of natural phenomena; as such, they do not perfectly account for all observations.	<b>SC.4.L.17.4</b>	Recognize ways plants and animals, including humans, can impact the environment.
<b>LAFS.3.RL.1.3</b>	Describe characters in a story (e.g., their traits, motivations or feelings) and explain how their actions contribute to the sequence of events.	<b>LAFS.4.RL.3.7</b>	Make connections between the text of a story or drama and a visual or oral presentation of the text, identifying where each version reflects specific descriptions and directions in the text.
<b>SC.4.N.1.1</b>	Raise questions about the natural world; use appropriate reference materials that support understanding to obtain information (identifying the source); conduct both individual and team investigations through free exploration and systematic	<b>SC.5.L.15.1</b>	Describe how, when the environment changes, differences between individuals allow some plants and animals to survive and reproduce while others die or move to new locations.

### OBJECTIVES

- Understand how a marine food web works.
- Describe specific threats to a coral reef food web, specifically in Florida.
- Model a coral reef food web and how it is affected by threats.

### MATERIALS

- Lesson 2 PowerPoint .
- Coral reef food web poster.
- Picture cards for species from food web poster.
- Roll of yarn.
- 1 pair of scissors (teacher use).
- Reflection question exit ticket sheet (1 per student).



## VOCABULARY

<b>MARINE DEBRIS:</b>	any manufactured items that are disposed of in the marine environment either intentionally or unintentionally
<b>POLLUTION:</b>	substances made by humans or elevated levels of naturally present substances (nutrients, metals, sediments) that are released into the environment
<b>OCEAN ACIDIFICATION:</b>	a chemical reaction in the ocean that lowers the pH of the water and makes it difficult for coral and other shell-building animals to survive
<b>CORAL BLEACHING:</b>	when corals are stressed, the algae (zooxanthellae) that live inside the coral go away, causing corals to lose their color and appear white
<b>ECOSYSTEM:</b>	a combination of living and nonliving things
<b>FOOD CHAIN:</b>	a group of organisms linked together in the order of the food they eat
<b>FOOD WEB:</b>	all food chains in a single ecosystem

## Background Information

### Local Stressors in Southeast Florida

Land-based sources of pollution can either be manufactured substances or elevated levels of naturally present substances, such as nutrients, metals and sediments. In Southeast Florida, land-based pollutants include nutrients, heavy metals, pharmaceuticals, herbicides/pesticides, carbon dioxide, sediments, bacteria and marine debris. Pollutant levels become unacceptable when they reach levels that degrade Florida's Coral Reef and the creatures that inhabit it. Learn more about land-based sources of pollution on the [DEP Coral Reef Conservation Program website](#).<sup>1</sup>

Maritime industry and coastal construction activities can increase sediment levels and stir up the water. Sediment particles or murky water block sunlight, which inhibits coral growth. Learn more about maritime industry and coastal construction impacts on the [DEP Coral Reef Conservation Program website](#).<sup>2</sup>

Dropping anchors and running a boat aground on the reef can cause physical damage to the reef. An anchor could crush a giant coral that took more than 300 years to grow in a matter of seconds. Learn more about the [DEP Reef Injury Prevention and Response Program](#).<sup>3</sup>

Incompatible fishing, scuba diving and snorkeling activities can stress reef resources. Stepping on corals with fins can damage them, and overfishing disrupts food webs that keep coral reefs healthy. Learn more about fishing, diving and other uses on the [DEP Coral Reef Conservation Program website](#).<sup>4</sup>

Marine debris like soda cans, plastic bags and fishing equipment can entangle reef creatures. They may mistake marine debris for food. Learn about the [DEP Marine Debris Reporting and Removal Program](#).<sup>5</sup>

Lack of awareness and appreciation of how important Florida's Coral Reef is threatens this underwater treasure. Many Florida residents do not know we have a coral reef so close to shore, which means they may not think about how their actions could negatively affect the reef. Through outreach and education, we can help reduce the threat of people harming Florida's Coral Reef.

Learn more about awareness and appreciation projects on the [DEP Coral Reef Conservation Program website](#).<sup>6</sup>

## Global Stressors

What else affects Florida's Coral Reef? Warming ocean temperatures and other stressful environmental conditions can cause coral bleaching. Ocean acidification also makes it difficult for corals to build their skeletons.

## Lesson Procedure

### Coral Reef Threats

In the last lesson, we learned what corals are and how they form. In this lesson, we will focus on the coral reef ecosystem. There is an intricate food web that helps maintain the health of the coral reef and there are currently many threats that coral reefs face. These threats affect the food web and ultimately the entire coral reef ecosystem

**Do you know what a food web or a food chain is?**

A food web consists of all the food chains in an ecosystem. A food chain is a group of organisms linked together in the order of the food they eat. The food chain begins with producers, then moves to consumers, to predators, then decomposers.

*Provide examples of simple food chains. See PowerPoint.*

Each species in the food chain connects with others to create a food web. Think about the different foods you consume. On the reef, there's a full menu of food available to each species. Each species plays an important role in the food web.

**What do you think would happen if one of these species was taken away from the web?**

If one species ceases to exist in the food web, then it can affect the existence of other species.



Photo by FWC Fish and Wildlife Research Institute

**Domino effect. Video in PowerPoint.**

**What are some things you think could be harmful to a coral reef or the organisms that live there?**

- Physical damage, like boaters dropping their anchors on the reef and people kicking or standing on the reef while snorkeling or scuba diving.
- Marine debris.
- Pollution that originates on land and flows into the ocean and out to the reef.
- Overfishing.
- Coral bleaching.
- Ocean acidification makes it tough for corals to grow.

[Let's take a look at this interactive coral reef.](#)<sup>7</sup>

*This highlights several species and the threats that they face. You can project this from your board or if students have devices, split them into groups and have them review each species as a team.*

### **Coral Reef Food Web Game**

**Now that we are familiar with food webs, we are going to create a human model of a web.**

- Hand out species cards to each student.
- Have students take two minutes to review their species' facts on the back of the card.
- Have the entire class form a large circle around the room.
- Explain to the students that they are going to connect their species together in a food web.
- Call out each species name, one at a time.
- Ask students to look at their cards to see what species they should connect to.
- Pass the yarn around to connect with each species.
- Once all species are connected, you will have created a large web.

**Can you believe how each of these species is connected? What can you tell by looking at our model?**



Photo by FWC Fish and Wildlife Research Institute

Each species depends on others within an ecosystem. Every species is connected in some way, from the largest predators (the sharks) to the smallest organisms (bacteria, fungi). They rely on each other and keep the reef healthy.

**Now that we have built this healthy food web, let's see what can happen when some of the threats we've learned about come into this coral reef ecosystem.**

Read threats one by one. When you read a threat, have students raise their hand if their species is affected. Cut the yarn when they raise their hand.

**What do you notice has happened each time a threat comes into the food web?**

Several species are affected. If one organism is taken away, this hurts the food supply for others. This can cause the entire ecosystem to be unbalanced.

**If these threats continue, what can happen to the coral reef ecosystem?**

The reef will eventually die off, forcing species to relocate or potentially become extinct.

**How can we help? Review PowerPoint slide.**

- Be mindful of how we operate boats and where we anchor.
- When we are enjoying snorkeling on a coral reef, don't touch, step on or break the corals. Look with your eyes not your hands.
- To minimize marine debris, reduce our use of plastic and dispose of it correctly when we do use it.
- Purchase fish that is sustainably sourced.
- Reduce our use of fertilizers and pesticides that can contribute to polluted runoff.
- Write letters to government officials encouraging their support of Florida's Coral Reef and measures to protect it.



Photo by FWC Fish and Wildlife Research Institute

## **Hyperlink Web Addresses**

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- <sup>1</sup> [FloridaDEP.gov/RCP/coral/content/land-based-sources-pollution-focus-area](https://www.floridadep.gov/RCP/coral/content/land-based-sources-pollution-focus-area)
- <sup>2</sup> [FloridaDEP.gov/RCP/coral/content/maritime-industry-and-coastal-construction-impacts-focus-area](https://www.floridadep.gov/RCP/coral/content/maritime-industry-and-coastal-construction-impacts-focus-area)
- <sup>3</sup> [FloridaDEP.gov/RCP/coral/content/reef-injury-prevention-and-response-program](https://www.floridadep.gov/RCP/coral/content/reef-injury-prevention-and-response-program)
- <sup>4</sup> [FloridaDEP.gov/RCP/coral/content/fishing-diving-and-other-uses-focus-area](https://www.floridadep.gov/RCP/coral/content/fishing-diving-and-other-uses-focus-area)
- <sup>5</sup> [FloridaDEP.gov/RCP/coral/content/southeast-florida-marine-debris-reporting-and-removal-program](https://www.floridadep.gov/RCP/coral/content/southeast-florida-marine-debris-reporting-and-removal-program)

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- <sup>6</sup> [FloridaDEP.gov/RCP/coral/content/awareness-and-appreciation-focus-area](https://www.floridadep.gov/RCP/coral/content/awareness-and-appreciation-focus-area)

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- <sup>7</sup> [CoralReef.NOAA.gov/interactivereef/interactivereef.html](https://www.coralreef.noaa.gov/interactivereef/interactivereef.html)