

LESSON 5 Vertebrates on the Reef

Lesson at a Glance

Students will research vertebrates of the coral reef ecosystem. They will share their information with the rest of the class.

Lesson Duration

Two 60-minute periods

Essential Question(s)

What are the characteristics of vertebrates?

What vertebrates can be found in a coral reef ecosystem?

What is the role of vertebrates in a coral reef ecosystem?

Key Concepts

- A coral reef ecosystem has a variety of plants and animals and that live together. These organisms all have specific roles to play in the functioning of the reef ecosystem.
- Vertebrates are animals that have an internal bony skeleton and backbone. Examples of vertebrates found in a reef ecosystem are reef fishes, eels, stingrays and sharks.

Instructional Objectives

- I can list different vertebrates that live in coral reefs.
- I can make food chains of vertebrates found in a coral reef ecosystem.

Related HCPSIII Benchmark(s):

Science SC.5.3.1

Describe the flow of energy among producers, consumers and decomposers.

Science SC.5.3.2

Describe the interdependent relationships among producers, consumers, and decomposers in an ecosystem in terms of cycles of matter.

Assessment Tools

Benchmark Rubric:

Topic		Cycles of Matter and Energy	
Benchmark SC.5.3.1		Describe the cycle of energy among producers, consumers, and decomposers	
Rubric			
Advanced	Proficient	Partially Proficient	Novice
Explain and give detailed examples of the cycle of energy among producers, consumers, and decomposers	Describe the cycle of energy among producers, consumers, and decomposers	Describe a part of the energy cycle with an example (e.g., describe one or two parts of a food chain)	Recognize an example of part of an energy cycle
Topic		Interdependence	
Benchmark SC.5.3.2		Describe the interdependent relationships among producers, consumers, and decomposers in an ecosystem in terms of the cycles of matter	
Rubric			
Advanced	Proficient	Partially Proficient	Novice
Explain and give examples of how specific relationships among producers, consumers, and decomposers in an ecosystem affect the cycling of matter	Describe the interdependent relationships among producers, consumers, and decomposers in an ecosystem in terms of the cycling of matter	Identify a few relationships between producers, consumers, or decomposers in an ecosystem in terms of the cycling of matter	Recall, with assistance, that matter cycles in an ecosystem among producers, consumers, and decomposers

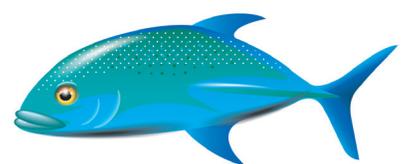
Assessment/Evidence Pieces

Lesson

- Student Worksheets *Vertebrates of Coral Reef City* and *Investigating Vertebrate Food Chains*

Materials Needed

Teacher	Class	Group	Student
<ul style="list-style-type: none"> • Method to project PowerPoint 	None	<ul style="list-style-type: none"> • Student worksheet: <i>Investigating Vertebrates Food Chains</i> • Scissors • Felt markers • Glue • Paper 	<ul style="list-style-type: none"> • Student Worksheet, <i>Vertebrates of the Coral Reef City</i>



Instructional Resources

Power Point: *Vertebrates of the Coral Reef*
 Student Worksheet: *Vertebrates of the Coral Reef City*
 Teacher Answer Key: *Vertebrates of the Coral Reef City*
 Student Worksheet: *Investigating Vertebrate Food Chains*

Student Vocabulary Words

algae: simple one celled or many celled organisms that photosynthesize, but lack true roots and leaves.

animal: a many celled organism that is a consumer. Includes all invertebrates and vertebrates.

carnivore: an animal that eats other animals.

consumer: an organism that eats other living things to get food for its energy and growth.

decomposer: special kind of detritivore that digests decaying matter and turns it back into the simple chemicals that made it up, like CO₂ and water.

detritivore: an organism that eats parts of dead organisms and waste products. Examples are earthworms and some crabs.

herbivore: an animal that eats only plants.

invertebrate: an animal that lacks an internal bony skeleton or backbone.

omnivore: an animal that eats both plants and animals.

organism: a living thing.

predator: organism that catches and eats other organisms (prey).

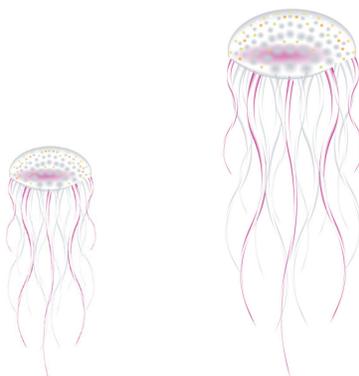
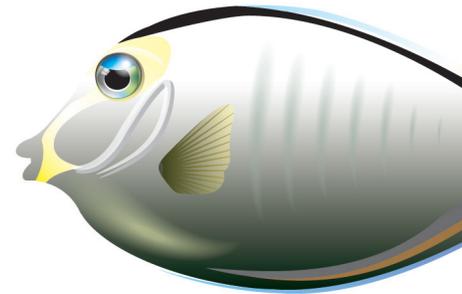
prey: organism that is caught and eaten by a predator.

producer: a green plant or plant like organism that can make food out of carbon dioxide and water by photosynthesis.

scavenger: an organism that feeds on dead organisms (but not waste products).

top predator: the predator that is able to avoid being eaten by any other organism in the ecosystem due to its size, strength, intelligence or other protections.

vertebrate: an animal that has an internal bony skeleton and backbone.



Lesson Plans

Lesson Preparation

- Read the Science Background provided in the Unit Overview.
- Preview PowerPoint presentation *Vertebrates of the Coral Reef* and make arrangements to project it.
- Preview and make copies of Student Worksheets *Vertebrates of the Coral Reef City* and *Investigating Vertebrate Food Chains*, one per student.
- Add new vocabulary to the Word Wall.

I. Classifying Reef Vertebrates

- Give each student a copy of Student Worksheet *Vertebrates of the Coral Reef City* and have them complete it as they view the PowerPoint *Vertebrates of the Coral Reef*.
- Have students work in pairs to go over the answers they came up with based on the PowerPoint information. Have student pairs share their responses with the class.

II. Vertebrate Investigations

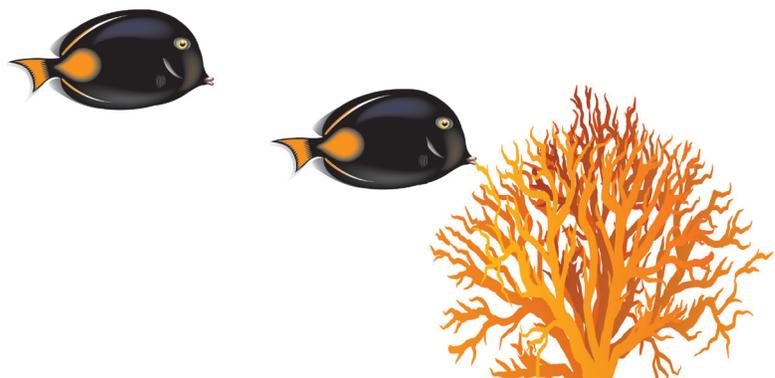
- Have students fill out the information on Student Worksheet, *Investigating Vertebrate Food Chains*. Assign each team 2-3 vertebrates. Have students fill out the worksheet and draw a food chain. As they create their food chains have students share within their group to check that different organisms are being used to form the chains.
- Ask each group to take their food chains and form a food web. Share their webs with the other groups. Discuss how these food chains or food webs are similar or different from the food chains of the invertebrates in Lesson #2.
- Have students make a drawing of their vertebrate. These animals have unique body shapes and appendages. Encourage students to include things that help the animal survive (coloration, spines, etc.)

III. Student Presentations

- Have students share their vertebrates and interesting facts with the rest of the class. Encourage students to take notes on their vertebrate charts.

IV. Coral Reef Mural

- Have students add examples of different kinds of vertebrates to the mural started in Lesson 1.



LESSON 5

Name: _____ Date: _____

Vertebrates of the Coral Reef City

On this chart you will find a list of common reef vertebrates, as well as what they eat, when they eat, where they eat and their Hawaiian names. In the final column you are to decide the type of consumer by putting:

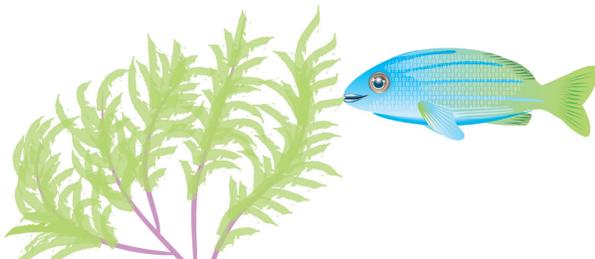
Herbivore (H) Carnivore (C) Omnivore (O) Detritivore (D) Top Predator (TP)

Note: The first column of this chart is not labeled phylum because there is only one phylum for vertebrates (Chordata).

Example of a Vertebrate	Hawaiian name	What they eat	When they eat	Where they eat	Type of Consumer	Interesting Facts
Chubs	<i>Nenue</i>		day	reef		
Angelfish	none		day	reef		
Blennies	<i>Pao'ō</i>		day	reef		
Boxfish	<i>Moa</i>		day	reef		
Butterflyfish	<i>Kikakapu</i>		day	reef		
Cardinalfish	<i>upapalu</i>		night	reef		
Parrotfish	<i>Uhu</i>		day	reef		
Eels	<i>Puhi</i>		night	reef		

Example of a Vertebrate	Hawaiian name	What they eat	When they eat	Where they eat	Type of Consumer	Interesting Facts
Garden eels	none		day	bottom sand		
Big Eyes	<i>Aweoweo</i>		night	reef		
Damselfish	<i>Mamo</i>		day	reef		
Filefish	<i>O'ili</i>		day	reef		
Sea Horses	<i>none</i>		day	reef		
Wrasses	<i>Hinalea</i>		day	reef		
Flatfish	<i>Paki'i</i>		day	bottom sand		
Frogfish	none		day	reef		
Goatfish	<i>Kumu, munu,</i>		day	bottom sand		
Gobies	<i>O'opu</i>		day	bottom reef		
Squirrelfish	<i>Ala'ihī</i>		night	reef		
Surgeonfish	<i>Pualo, Palani, etc.</i>		day	reef		
Triggerfish	<i>humuhumu</i>		day	reef		
Lizardfish	<i>Ulae</i>		day	bottom reef		

Example of a Vertebrate	Hawaiian name	What they eat	When they eat	Where they eat	Type of Consumer	Interesting Facts
Needlefish	<i>Aba</i>		day	reef surface		
Giant Groupers	<i>Hapu'u</i>		day	deep reef, open ocean		
Hawkfish	<i>Pili-ko'a</i>		day	reef		
Jacks	<i>Ulua</i>		early & late day	deep reef, open ocean		
Pufferfish	<i>O'opu-hue</i>		day	reef		
Sting Rays	<i>Lupe, bihimanu</i>		day	bottom sand		
Sharks	<i>Mano</i>		late day, night	deep reef, open ocean		
Trumpetfish	<i>Nunu</i>		day	reef		
Scorpionfish	<i>nobu</i>		day	reef		
Snappers	<i>Ta'ape, uku ulaula</i>		night	reef		
Barracuda	<i>Kaku</i>		day	deep reef, open ocean		
Manta Rays	<i>Habalua</i>		night	reef		



LESSON 5 - Teacher Answer Key

Vertebrates of the Coral Reef City

On this chart you will find a list of common reef vertebrates, as well as what they eat, when they eat, where they eat and their Hawaiian names. In the final column students will decide the type of consumer by putting:

Herbivore (H) Carnivore (C) Omnivore (O) Detritivore (D) Top Predator (TP)

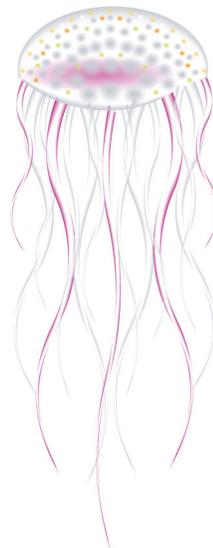
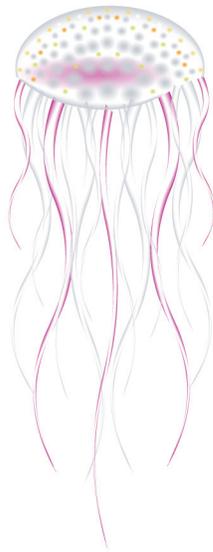
(Student answers are in the last two columns.)

Note: There is only one phylum for vertebrate (chordata), therefore, the 1st column will be titled, "Example."

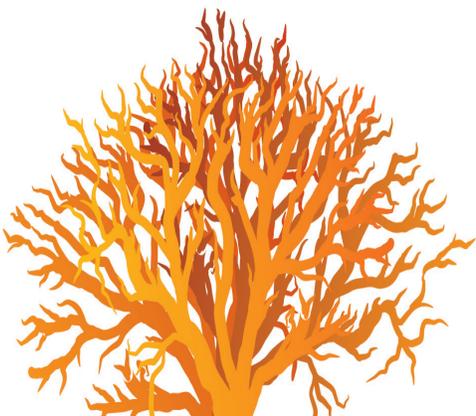
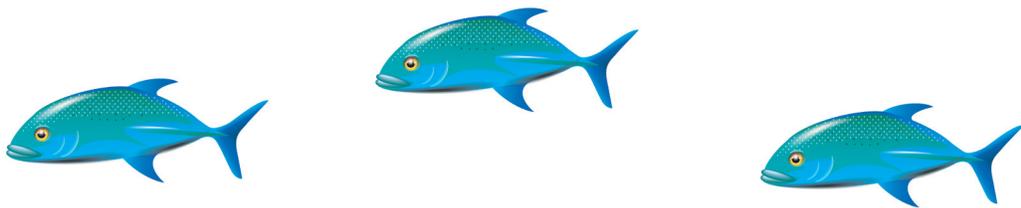
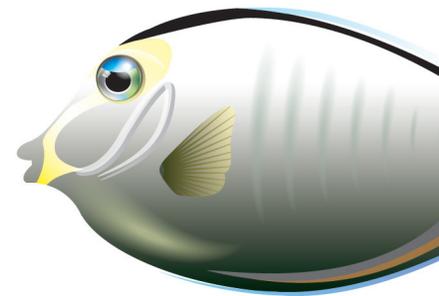
Example of a Vertebrate	Hawaiian name	What they eat	When they eat	Where they eat	Type of Consumer	Interesting Facts
Chubs	<i>Nenue</i>	algae	day	reef	H	
Angelfish	none	algae	day	reef	H	
Blennies	<i>Pao'o</i>	algae, parasites, scales	day	reef	O	
Boxfish	<i>Moa</i>	algae, sponges, worms	day	reef	O	
Butterflyfish	<i>Kikakapu</i>	algae, coral, zoo- plankton, worms	day	reef	O	

Example of a Vertebrate	Hawaiian name	What they eat	When they eat	Where they eat	Type of Consumer	Interesting Facts
Cardinalfish	<i>upapalu</i>	zooplankton, crustaceans, fish	night	reef	C	
Parrotfish	<i>Uhu</i>	algae and coral	day	reef	O	
Eels	<i>Puhi</i>	fish, shrimp, crabs	night	reef	C	
Garden eels	none	zooplankton, particles	day	bottom sand	C,D	
Big Eyes	<i>Aweoweo</i>	zooplankton	night	reef	C	
Damselfish	<i>Mamo</i>	zooplankton & algae	day	reef	O	
Filefish	<i>O'ili</i>	fish & algae	day	reef	O	
Sea Horses	none	crustaceans	day	reef	O	
Wrasses	<i>Hinalea</i>	fish, zooplankton, invertebrates	day	reef	C	
Flatfish	<i>Paki'i</i>	fish & crustaceans	day	bottom sand	C	
Frogfish	none	shrimp, fish	day	reef	C	
Goatfish	<i>Kumu, munu</i>	worms, mollusks	day	bottom sand	C	
Gobies	<i>O'opu</i>	algae, invertebrates, detritus	day	bottom reef	O,D	
Squirrelfish	<i>Ala'ibi</i>	zooplankton, crabs, shrimp	night	reef	C	
Surgeonfish	<i>Pualo, Palani, etc.</i>	algae	day	reef	H	

Example of a Vertebrate	Hawaiian name	What they eat	When they eat	Where they eat	Type of Consumer	Interesting Facts
Triggerfish	<i>humuhumu</i>	coral, crustaceans, echinoderms	day	reef	C	
Lizardfish	<i>Ulae</i>	fish, invertebrates	day	bottom reef	C	
Needlefish	<i>Aha</i>	fish	day	reef surface	C	
Giant Groupers	<i>Hapu'u</i>	lobsters, stingrays, sea turtles, fish	day	deep reef, open ocean	C	
Hawkfish	<i>Pili-ko'a</i>	fish, crustaceans	day	reef	C	
Jacks	<i>Ulua</i>	fish	early & late day	deep reef, open ocean	C	
Pufferfish	<i>O'opu-hue</i>	fish	day	reef	C	
Sting Rays	<i>Lupe, hihimanu</i>	fish, crabs	day	bottom sand	C	



Example of a Vertebrate	Hawaiian name	What they eat	When they eat	Where they eat	Type of Consumer	Interesting Facts
Sharks	<i>Mano</i>	fish, turtles	late day, night	deep reef, open ocean	C	
Trumpetfish	<i>Nunu</i>	fish	day	reef	C	
Scorpionfish	<i>nobu</i>	fish, invertebrates	day	reef	C	
Snappers	<i>Ta'ape, uku ulaula</i>	fish	night	reef	C	
Barracuda	<i>Kaku</i>	fish	day	deep reef, open ocean	C	
Manta Rays	<i>Hahalua</i>	zooplankton	night	reef	C	



LESSON 5

Name: _____ Date: _____

Investigating Vertebrate Food Chains

Explore 2 food chains by selecting 3 different vertebrates to focus on. Fill in the information for the 3 selected organisms, using data from the vertebrates table. On the back of this sheet draw 2 different food chains for your 3 vertebrates. Be sure arrows are pointing in the direction of the flow of energy.

Note: Organisms were added to column one to help complete the food chains, although they are not vertebrates.

Vertebrate Investigated	Description	Where is it found?	How does it protect itself?	Interesting Facts
Producer:				
Detritivore:				
Vertebrate: Herbivore				
Vertebrate: Carnivore				
Vertebrate: Omnivore				
Vertebrate: Top Predator				

