

# LESSON 4 Invertebrates on the Reef

## Lesson at a Glance

Students will do research to learn about invertebrates. 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 invertebrates?

What invertebrates can be found in a coral reef ecosystem?

## Key Concepts

- A coral reef ecosystem has a variety of plants and animals that live together. These organisms all have a specific role to play in the functioning of the reef ecosystem.
- Invertebrates are animals that lack an internal bony skeleton or backbone.

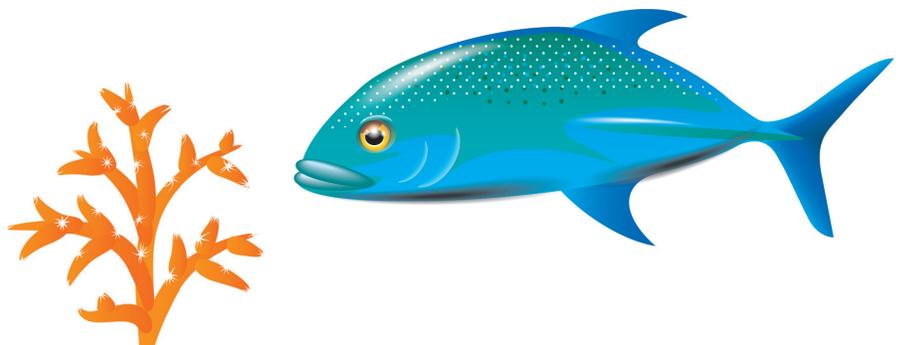
## Instructional Objectives

- I can describe different invertebrates that live in coral reefs.
- I can make food chains of invertebrates 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:

<b>Topic</b>		<b>Cycles of Matter and Energy</b>	
<b>Benchmark</b> <a href="#">SC.5.3.1</a>		Describe the cycle of energy among producers, consumers, and decomposers	
<b>Rubric</b>			
<b>Advanced</b>	<b>Proficient</b>	<b>Partially Proficient</b>	<b>Novice</b>
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
<b>Topic</b>		<b>Interdependence</b>	
<b>Benchmark</b> <a href="#">SC.5.3.2</a>		Describe the interdependent relationships among producers, consumers, and decomposers in an ecosystem in terms of the cycles of matter	
<b>Rubric</b>			
<b>Advanced</b>	<b>Proficient</b>	<b>Partially Proficient</b>	<b>Novice</b>
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 *Invertebrates of the Coral Reef City* and *Investigating Invertebrate Food Chains*

## Materials Needed

Teacher	Class	Group	Student
<ul style="list-style-type: none"> <li>Method to project PowerPoint</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>	<ul style="list-style-type: none"> <li>Materials to make invertebrate models</li> <li>Scissors</li> <li>Felt markers</li> <li>Paper</li> <li>Glue</li> </ul>	<ul style="list-style-type: none"> <li>Student worksheets: <i>Invertebrates of the Coral Reef City and Investigating Invertebrates Food Chains</i></li> </ul>

## Instructional Resources

Power Point: *Invertebrates of the Coral Reef*

Student worksheet: *Invertebrates of the Coral Reef City*

Teacher Answer Key: *Invertebrates of Coral Reef City*

Student worksheet: *Investigating Invertebrate 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 CO<sub>2</sub> 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.

**phylum:** first division of organism classification below kingdom, as in arthropoda.

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

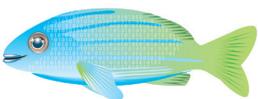
**prey:** organism that is caught and eaten by a predator.

**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.



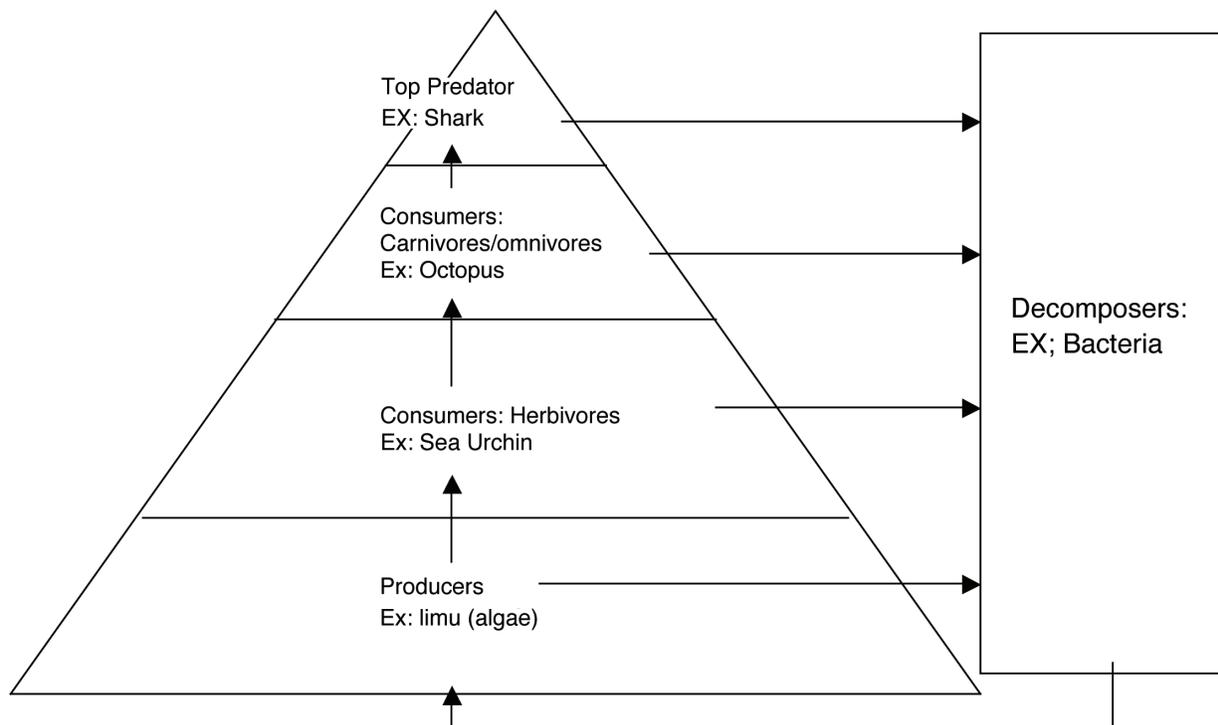
## Lesson Plan

### Lesson Preparation

- Read the Science Background provided in the Unit Overview.
- Preview PowerPoint *Invertebrates of the Coral Reef* and make arrangements to project it.
- Review and make copies of Student Worksheets *Invertebrates of the Coral Reef City* and *Investigating Invertebrate Food Chains*, one copy per student.
- Add any new vocabulary from this lesson to the Word Wall.

### I. Classifying Reef Invertebrates

- Give each student a copy of *Invertebrates of the Coral Reef City*. Ask them to fill out the column that asks what type of consumer each organism is and any other interesting facts about these organisms based on the information presented in the PowerPoint *Invertebrates of the Coral Reef*.
- After the PowerPoint go over the chart, *Invertebrates of a Coral Reef City*, with the whole class.
- Assign each team an invertebrate. Have them draw a food chain and share their ideas. Clarify that the direction of the arrows is very important. The arrows should point to the direction that the energy (stored chemical energy used to maintain life) is flowing (e.g. algae to manini). Discuss the similarities in the different examples.
- To help students draw their food chains, make a class size chart paper of the graphic organizer below. Have them add arrows to show the flow of energy.



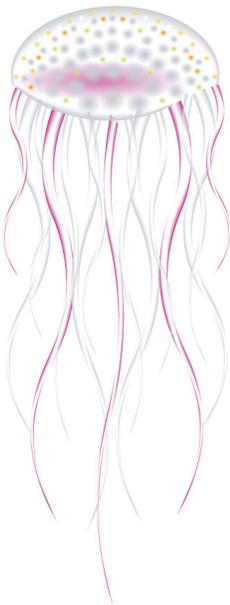
- E. Pass out copies of *Investigating Invertebrates Food Chains* to each student. This could be used as a formative assessment.

## II. Invertebrate Investigations Activity

- A. Have students fill out the information on the student worksheet, *Invertebrates of the Coral Reef City*.
- B. Student Presentations. Have students share their invertebrates and interesting facts with the rest of the class. Encourage students to take notes on their invertebrate charts.

## III. Coral Reef Mural

Have students add examples of different kinds of invertebrates to the mural (model) started in Unit One.



# LESSON 4

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Invertebrates of the Coral Reef City

On this chart you will find a list of common reef invertebrates, as well as what they eat, when 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)

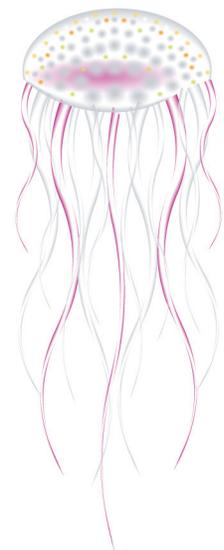
*Note: An interesting fact is anything that doesn't fit in any of the other columns.*

Phylum	Example	Hawaiian name	What it eats	When it eats	Type of Consumer	Interesting Facts
Cnidaria	coral	<i>Ake'ake'a</i>	zooplankton	night		
	jellyfish	<i>Pololia</i>	zooplankton, fish, invertebrates	day or night species		
	sea anenome	<i>Okole</i>	fish, crustacean	day & night		
Porifera	sponges	<i>Upi</i>	food particles	day & night		
Platyhelm-inthes	flatworm	none	zooplankton, coral, worms	night		
Nemertina	ribbon worms	<i>Ko'e kai</i>	invertebrates	night		
Annelida	fireworm	<i>Aha huluhulu</i>	coral, zooplankton, small invertebrate	day		

Phylum	Example	Hawaiian name	What it eats	When it eats	Type of Consumer	Interesting Facts
	spaghetti worms	<i>Kauna'oa</i>	food particles on bottom	day & night		
Mollusca	chitons	<i>Pupu Mo'o</i>	algae	day & night		
	opihi limpet	<i>Opihi</i>	algae	day & night		
	periwinkles	<i>Pipipi</i>	algae	day & night		
	cowries	<i>Leho kupa</i>	algae	day & night		
	sea hares	<i>Kualakai</i>	algae	night		
	nudibranchs	<i>Pikokai</i>	flatworms, sponges, coral	day or night species		
	octopus	<i>He'e</i>	crabs, mollusks, fish	day or night species		
	squid	<i>Muhe'e</i>	fish	night		
	triton	<i>Pu'ole</i>	sea stars, urchins	day		
	Oysters	<i>Pa</i>	food particles	day & night		
	purse shells	<i>Nahawele Pa Pawa</i>	food particles	day & night		

Phylum	Example	Hawaiian name	What it eats	When it eats	Type of Consumer	Interesting Facts
	cone snails	<i>Pupu'ala</i>	worms, snails & fish	night		
	helmet snail	<i>Pu'puhi</i>	sea Urchins	day		
Echinoderm-ata	brittle stars	<i>Hoku kai</i>	food particles	night		
	sea urchin	<i>Wana, Ina</i>	algae	day & night		
	helmet urchin	<i>Ha'ukeuke kaupali</i>	algae	day & night		
	sea cucumber	<i>Loli</i>	food particles on bottom	day & night		
	sea stars	<i>Pe'a</i>	clams, mussels, coral, sponges, anenomes	day & night		
Crustaceans	lobsters	<i>Ula</i>	mollusks, invertebrates, fish	night		
	urchin crab	none	sea urchin feces	night		
	hermit crab	<i>Una una</i>	algae & small invertebrates	day & night		
	true crabs	<i>Papa'i</i>	algae, urchins, cowries	day & night		
	pond shrimp	<i>Opae ula</i>	algae, zooplankton, bacteria	day & night		

Phylum	Example	Hawaiian name	What it eats	When it eats	Type of Consumer	Interesting Facts
	hingeback shrimp	<i>Opae</i>	coral	night		
	harlequin shrimp	<i>Opae</i>	sea stars	day & night		
	cleaner shrimp	<i>Opae</i>	scales & parasites	day or night species		
	coral shrimp	<i>Opae</i>	zooxanthellae	night		
	mantis shrimp	<i>Alo'alo</i>	worms, snails, crabs, shrimp & fish	day		
	barnacles	<i>Pi'oe'oe</i>	food particles	day & night		



# LESSON 4 - Teacher Answer Key

## Invertebrates of the Coral Reef City

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

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

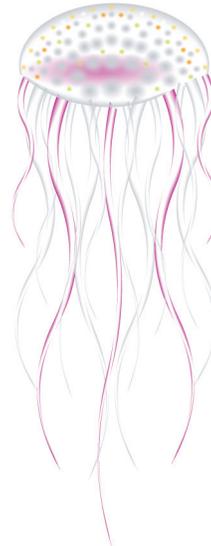
(Student answers are in the last two columns.)

Phylum	Example	Hawaiian name	What it eats	When it eats	Type of Consumer	Interesting Facts
Cnidaria	coral	<i>Ake'ake'a</i>	zooplankton	night	C	
	jellyfish	<i>Pololia</i>	zooplankton, fish, invertebrates	day or night species	C	
	sea anenome	<i>Okole</i>	fish, crustacean	day & night	C	
Porifera	sponges	<i>Upi</i>	food particles	day & night	D	
Platyhelm-inthes	flatworm	none	zooplankton, coral, worms	night	C	
Nemertina	ribbon worms	<i>Ko'e kai</i>	invertebrates	night	C	
Annelida	fireworm	<i>Aha huluhulu</i>	coral, zooplankton, small invertebrate	day	C	
	spaghetti worms	<i>Kauna'oa</i>	food particles on bottom	day & night	D	
Mollusca	chitons	<i>Pupu Mo'o</i>	algae	day & night	D	

Phylum	Example	Hawaiian name	What it eats	When it eats	Type of Consumer	Interesting Facts
	opihi limpet	<i>Opihi</i>	algae	day & night	H	
	periwinkles	<i>Pipipi</i>	algae	day & night	H	
	cowries	<i>Leho kupa</i>	algae	day & night	H	
	sea hares	<i>Kualakai</i>	algae	night	H	
	nudibranchs	<i>Pikokai</i>	flatworms, sponges, coral	day or night species	H	
	octopus	<i>He'e</i>	crabs, mollusks, fish	day or night species	C	
	squid	<i>Mube'e</i>	fish	night	C	
	triton	<i>Pu'ole</i>	sea stars, urchins	day	C	
	Oysters	<i>Pa</i>	food particles	day & night	C	
	purse shells	<i>Nahawele Pa Pawa</i>	food particles	day & night	D	
	cone snails	<i>Pupu'ala</i>	worms, snails & fish	night	C	
	helmet snail	<i>Pu'puhi</i>	sea Urchins	day	C	

Phylum	Example	Hawaiian name	What it eats	When it eats	Type of Consumer	Interesting Facts
Echinoderm-ata	brittle stars	<i>Hoku kai</i>	food particles	night	D	
	sea urchin	<i>Wana, Ina</i>	algae	day & night	H	
	helmet urchin	<i>Ha'ukeuke kaupali</i>	algae	day & night	H	
	sea cucumber	<i>Loli</i>	food particles on bottom	day & night	D	
	sea stars	<i>Pe'a</i>	clams, mussels, coral, sponges, anenomes	day & night	C	
Crustaceans	lobsters	<i>Ula</i>	mollusks, invertebrates, fish	night	C	
	urchin crab	none	sea urchin feces	night	D	
	hermit crab	<i>Una una</i>	algae & small invertebrates	day & night	O	
	true crabs	<i>Papa'i</i>	algae, urchins, cowries	day & night	O	
	pond shrimp	<i>Opae ula</i>	algae, zooplankton, bacteria	day & night	O & D	
	hingeback shrimp	<i>Opae</i>	coral	night	C	
	harlequin shrimp	<i>Opae</i>	sea stars	day & night	C	

Phylum	Example	Hawaiian name	What it eats	When it eats	Type of Consumer	Interesting Facts
	cleaner shrimp	<i>Opae</i>	scales & parasites	day or night species	D	
	coral shrimp	<i>Opae</i>	zooxanthellae	night	H	
	mantis shrimp	<i>Alo'alo</i>	worms, snails, crabs, shrimp & fish	day	D	
	barnacles	<i>Pi'oe'oe</i>	food particles	day & night	D	



# LESSON 4

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Investigating Invertebrate Food Chains

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

Invertebrate Investigated (circle two)	Description	Phylum	Where is it found?	How does it protect itself?	Interesting Facts
Producer:					
Detritivore:					
Invertebrate: Herbivore					
Invertebrate: Carnivore					
Invertebrate: Omnivore					
Top Predator:					

