

WaterLife Game Study Measures

Questions to be addressed in the study include:

- *Does playing the game as part of their instruction develop students' understanding of the key concepts as well or better than instruction without the game?*
- *Do the two learning conditions affect student attitudes and intentions differently?*
- *What do students think about the experience of playing the games and its effect on their understanding and attitudes?*

The **design** of the study is a comparison group study with control and game classes of students taught the same content by the same teacher in the same amount of time.

Measures to be completed by both the control and game classes (except for additional questions for game study group on retrospective attitude survey). Note there are unique versions for each game)

For students

1. Retrospective student attitude survey Where Rivers Meet the Sea (p.2)
2. Retrospective student attitude survey Quest to the Nest (p.3)
3. Pre/post understanding – performance task – Where Rivers Meet the Sea (p.4)
4. Pre/post understanding – performance task – Quest to the Nest (p.4)
5. Pre/post knowledge Where Rivers Meet the Sea (p.5)
6. Pre/post knowledge Quest to the Nest (p.7)

For teachers

7. Teacher interview about use of game (separate document)

Measure 1: Retrospective Questionnaire for Students (Games group only)
Where Rivers Meet the Sea

Dear Student,

The purpose of this questionnaire is for you to tell us what you thought before and think after learning about estuaries and how studying the estuaries has affected you.

Teacher _____ Class _____ Date _____

Rate how much you agree with each statement.

1=strongly disagree 2=disagree 3=neutral 4= agree 5=strongly agree

Before		Now
	A lot of plants, animals and fish make their homes in the estuary	
	I understand why some estuaries are becoming polluted	
	I understand the importance of estuaries	
	I am interested in the life of estuaries	
	I think estuaries should be protected	
	There are things people can do to keep estuaries healthy	
	I would like to learn more about estuaries	
	I would like to help protect estuaries	
	I had fun learning about estuaries	

In your own words, describe the activities you did to learn about estuaries.

What would you tell someone you learned?

What would you like to know more about? Why?

If you did the game, "Where Rivers Meet the Sea" how did you like it?

What did you learn from it?

OMB Control No. 0648-0342
 Expires 12/31/2011

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Measure 2: Sea Turtles and the Quest to Nest Student Questionnaire (Games group only)

Dear Student,

The purpose of this questionnaire is for you to tell us what you thought before and think after learning about sea turtles.

Teacher _____ Class _____ Date _____

Rate how much you agree with each statement.

1=strongly disagree 2=disagree 3=neutral 4= agree 5=strongly agree

Before		Now
	Sea turtles are an endangered species.	
	They could become extinct.	
	The beaches where they lay their eggs are not as safe	
	They get caught in fishing nets	
	I am interested in learning more about why some species are endangered	
	I think sea turtles should be protected and helped	
	I would like to help protect the places sea turtles need to live	
	I had fun learning about sea turtles	

In your own words, describe the activities you did to learn about extinction and sea turtles.

What would you tell someone you learned about extinction from studying sea turtles?

What would you like to know more about? Why?

If you did the game, "Quest to the Nest" how did you like it?

What did you learn from it?

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Measure 3: Students will be asked to respond to a performance task pre/post:

Where Rivers Meet the Sea

The estuary near your house is changing. People aren't sure why or what to do. You have been asked to find out what is going on. What questions would you ask to solve the mystery?

Measure 4: Students will be asked to respond to a performance task pre/post:

Sea Turtles and the Quest to Nest

The beaches near your house are getting busy or polluted leaving fewer and fewer beaches for the sea turtles to lay their eggs. You have been asked to find out what is going on. What questions would you ask to solve the mystery?

Measure 5: Where the Rivers Meet the Sea

Where Rivers Meet the Sea concepts to be addressed by the released items

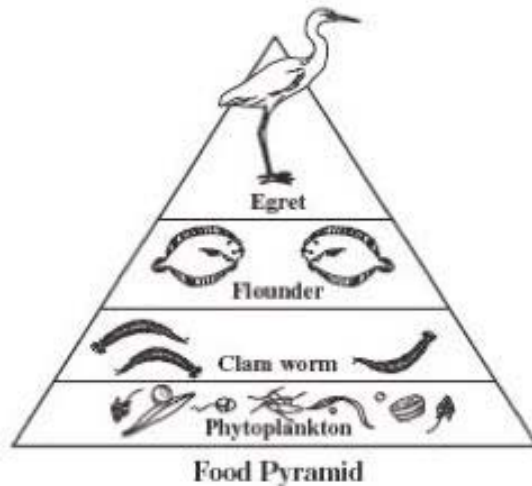
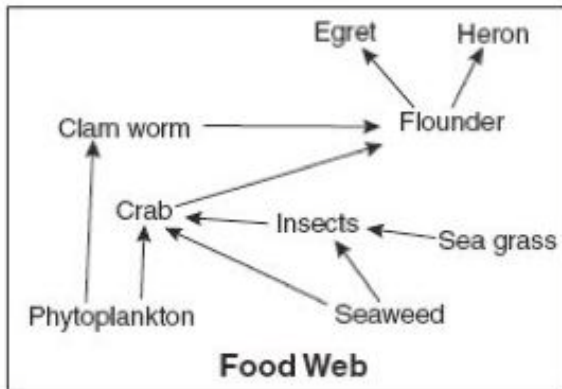
- Raise awareness and interest in topics dealing with estuaries, water quality, tides, marine debris, and what YOU can do to help
- Threats to environment and habitat
- Trash disposal and proper recycling
- What is an estuary, differences between a salt marsh and mangrove
- Habitat zones, tidal zones, water quality, food web, tides and water levels

Where the Rivers Meet the Sea Student Quiz

1. Which of the following has the largest population in the Indian River Lagoon ecosystem? (use the information and diagrams below)

- a. Crab
- b. Egret
- c. Flounder
- d. Phytoplankton

An estuary is a body of water in which fresh water draining from the land mixes with salt water from the ocean. The result of this mixture is an environment with abundant plant and animal life. The Indian River Lagoon is a 156-mile-long estuary on Florida’s eastern coast. It is a diverse estuary, supporting thousands of species of plants and animals. The food web and food pyramid shown below are examples of the relationships that exist in the Indian River Lagoon ecosystem.



2. In the Indian River Lagoon ecosystem, many organisms compete with one another for food sources. Which organisms in the food web compete with egrets for food?

- a. Clam worm
- b. Crab
- c. Flounder
- d. Heron

3. Which of the following statements most accurately describes the energy transfer between the levels of the food pyramid in the Indian River Lagoon?

- a. Energy travels up the pyramid
- b. Energy stays in the phytoplankton at the lowest level
- c. Energy is released into the environment only at the top level
- d. Energy moves from the flounder to both the clam worms and egret

4. Which of the following is best classified as a nonrenewable resource?

- a. Grass
- b. Aluminum
- c. Sunlight
- d. Oxygen

5. Some schools have programs to recycle paper products such as student papers, newspapers, and cardboard boxes. Which of these statements describes a positive effect of recycling paper products?

- a. Schools need to buy less paper.
- b. Fewer trees need to be cut.
- c. Landfills have less room for other trash.
- d. Recycling consumes more energy than making new paper.

6. An increase in which of the following factors will most likely result in an increase in the size of a population?

- a. Food
- b. Predators
- c. Competitors
- d. Temperature

Measure 6: Sea Turtles and the Quest to Nest concepts to be addressed by the released items

- Extinction
- Stewardship/conservation
- Resource extraction/economics (fishing)
- Reproduction
- Predator/prey relationships and adaptation
- Food chain
- Role of regulation

Sea Turtles and the Quest to Nest Student Quiz

1. The Outer Banks of North Carolina are composed of a string of long, thin islands off the coast. Ocean currents change the shape of the islands by causing erosion of the shorelines. Which of the following would be the most effective method to reduce erosion of the shorelines of the islands?

- Preventing tourists from visiting
- Planting native grasses on beaches
- Building more houses on the islands
- Removing native animals from the islands

2. A marine food web is shown on the right. Which chart correctly shows three of the organisms according to their roles in cycling matter in the marine food web?

a.

Primary consumer	Secondary consumer	Decomposer
Bacteria	Fish	seal

b.

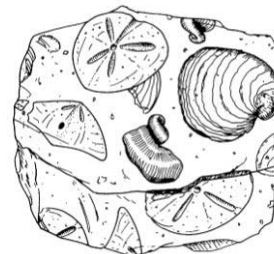
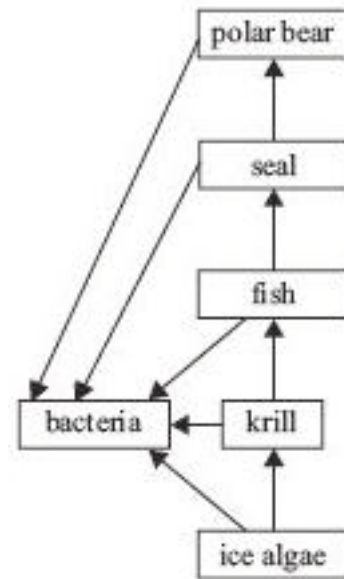
Primary consumer	Secondary consumer	Decomposer
Fish	Seal	Polar bear

c.

Primary consumer	Secondary consumer	Decomposer
Krill	Fish	Bacteria

d.

Primary consumer	Secondary consumer	Decomposer
Ice algae	Krill	Fish

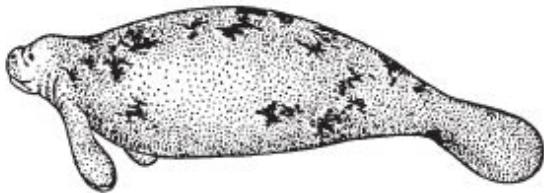
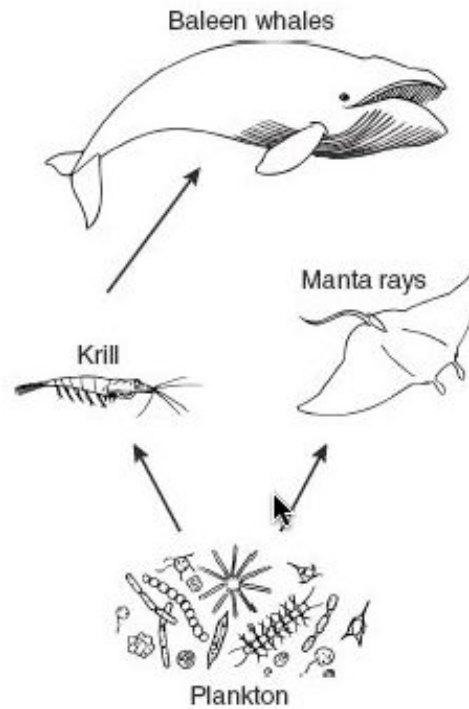


3. The rock in this picture was most likely formed in a:

- Large freshwater lake
- Shallow ocean bay
- Flowing mountain stream
- Deep marine trench

4. An example of a predator-prey relationship would be
- Tree - water.
 - Cow - grass.
 - Hawk - mouse.
 - Tick - dog.

5. Which of the following changes would most likely benefit baleen whales?
- An increase in the krill population
 - A decrease in the size of plankton
 - An increase in the size of manta rays
 - A decrease in the plankton population



Manatees are mammals that live in the warm, clear water environment of Florida's shallow rivers. They are large, peaceful, gentle, curious creatures and slow-moving swimmers. They spend many hours each day feeding on water plants. Manatees must surface to breathe every 15 minutes. The manatee's environment is changing because of hotels and homes being built along Florida's rivers, and the change is affecting them in a negative way. Noise and activity from people and boats scare them. Manatees can be seriously injured by powerboat propellers because the manatees cannot tell the direction from which the boats are coming. The water plants the manatees use for food are being destroyed. As a result of these and other changes in their surroundings, manatees are on the endangered species list and may one day be gone from Florida's rivers.

6. List two environmental conditions that might lead to the disappearance of manatees from Florida's rivers.
- 1.
 - 2.

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