



Virtual Field Trip On Board the Schooner SoundWaters Teachers Guide and Supporting Materials

Welcome to the SoundWaters Virtual Field Trip on board the 80' SoundWaters.

This Virtual Field Trip focuses on the animals of the Long Island Sound. The adventure begins with SoundWaters Educator Jess Castoro on the deck of the schooner, and Jess narrates the experience for students. Throughout the Field Trip other SoundWaters Educators present compelling videos about topics such as the food web, animal digestion, vascular systems, aquatic locomotion and animal senses. To help you organize your lesson plan the order of the presentation and the start and end time of each section, along with the relevant NGSS standards, are listed below.

Also below are resources that you may choose to use with your students. Specifically you will find:

- Field trip video link: <http://bit.ly/VFT168>
- Worksheets to reinforce the material presented in the Field Trip.
- Answer keys for worksheets.
- A sample quiz.
- A quiz answer key.
- Links to an app and online resources that students can use to enhance their knowledge.
- Links to additional articles and readings to help your students learn more about the animals of Long Island Sound.

We trust you will find this Virtual Field Trip to be a valuable learning tool for your students and a terrific way to connect them with the natural world. If you would like to pursue this subject matter in a more significant way please reach out to us to discuss bringing a SoundWaters Educator into your classroom via videoconference. We can customize a program that will support you desired learning outcomes for your students. For more information please contact Olena Czebiniak at olena@soundwaters.org or 203-406-3319.

Content, Timing and NGSS Standards

Food Web

- Start – 2:44
- End – 12:54
- NGSS – Matter and Energy in Organisms and Ecosystems – MS-LS2-2, MS-LS2-4

Digestive System

- Start – 13:05
- End – 19:27
- NGSS – From Molecules to Organisms: Structures and Processes – MS-LS1-4, MS-LS1-3

Vascular System

- Start – 19:47
- End – 26:00
- NGSS – From Molecules to Organisms: Structures and Processes – MS-LS1-4, MS-LS1-3

Aquatic Locomotion

- Start – 26:17
- End – 33:25
- NGSS – From Molecules to Organisms: Structures and Processes – MS-LS1-4, MS-LS1-3

Animal Senses

- Start – 33:43
- End – 40:58
- NGSS – From Molecules to Organisms: Structures and Processes – MS-LS1-4, MS-LS1-3

FOOD WEB

Use arrows to complete the food web

What would happen to this food web if we removed the snake?



Fill out the trophic levels table:

Producer/ Autotroph	Primary Consumer	Secondary Consumer	Tertiary Consumer	Apex Predator	Decomposer

THE DIGESTIVE SYSTEM

In the video you learned that animals have specialized structures that help them break down their food so they can get the nutrients they need to stay alive. **Seastars and brittle stars eat different types of food. Explain how their digestive system is designed to help them do this.....**



The seastar eats live food, but it has a very small mouth so it....



The brittle star is a scavenger that has to crawl on top of its food and.....

VASCULAR SYSTEMS



Based on what you learned in the video, fill in the table below comparing the cardiovascular system to the haemal system

	<u>CARDIOVASCULAR</u>	<u>HAEMAL</u>
What types of organisms have this system?		
What liquid moves around in this system? What are the components (cells) in that liquid?		
What are the important structures/anatomy for this system? What do they do?		
What is carried around in the liquid for this system?		
Why is this system ideal for the types of organisms that have it?		

ANIMAL LOCOMOTION

The way animals move is based on their specific body parts.

For example, humans have long jointed legs that allow us to walk and run in different directions.

Column A	Column B
Octopus	Invertebrate, can move its arms freely to change its shape
Lobster	Legs for walking surrounded by hard shell, tail to swim backwards
Flounder	Tail like a paddle, swims in up and down movement (not side to side)
Diamondback Terrapin	4 legs, nails, webbed feet

From the table, select an animal from column A and a DIFFERENT method of locomotion from column B. Explain how the animal would have to change the way it moves and where it lives (if that applies).

Name: _____



SoundWaters
Protecting Long Island Sound through Education

ANIMAL SENSES

In Long Island Sound, some animals live on the bottom and others actively move around in the water column

Which types of receptors would be most helpful for living in each area? Make sure to explain your answer!

Auditory receptors, Mechanoreceptors, Chemoreceptors, Photoreceptors

<u>Bottom Dwelling Animals</u>	<u>Actively moving around in water column</u>

Which of your senses would be most important to you if you lived in the water? Explain your answer.

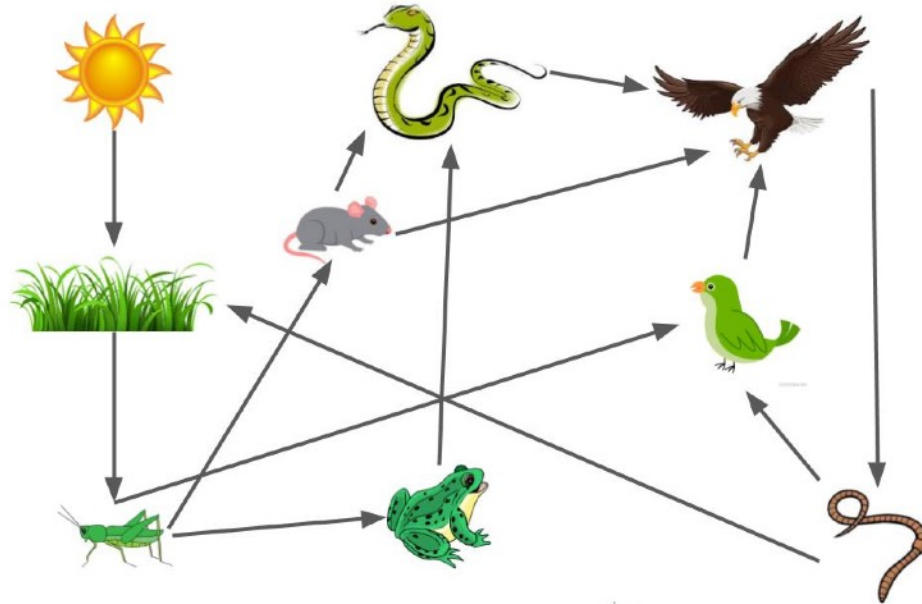
If an animal did not have any eyes, how could its other senses change or adapt to help it survive?

Name: _____

Worksheet Answer Sheets

FOOD WEB

Use arrows and complete the food web



Name: _____



THE DIGESTIVE SYSTEM ANSWER KEY



In the video you learned that animals have specialized structures that help them break down their food so they can get the nutrients they need to stay alive. **Seastars and brittle stars eat different types of food. Explain how their digestive system is designed to help them do this.....**



The seastar eats live food, but it has a very small mouth so it....

Uses 2 different stomachs, the cardiac goes outside of the body and starts to digest because they cannot pull the clam into the seastar.

Then the pyloric stomach pulls in the partially digested food and then digestive glands in each arm break it down further



The brittle star is a scavenger that has to crawl on top of its food and.....

Uses its 5 teeth to pull material off of the dead body of the animal it is eating. They use their arms to anchor onto the food.

Their stomach takes up most of the inside of their body cavity and has specialized pouches with a lot of surface area to digest and absorb the food

VASCULAR SYSTEMS ANSWER KEY



Based on what you learned in the video, fill in the table below comparing the cardiovascular system to the haemal system

	<u>CARDIOVASCULAR</u>	<u>HAEMAL</u>
What types of organisms have this system?	humans	seastars
What liquid moves around in this system? What are the components (cells) in that liquid?	Blood containing red blood cells, white blood cells, and platelets	Water - no types of cells since it is water and not blood
What are the important structures/anatomy for this system? What do they do?	Heart - pumps blood Vein - return blood to heart Artery - carry blood w/ oxygen from heart to body	Madreporite - brings water into animal Canals - tubes that carry water out to arms
What is carried around in the liquid for this system?	Nutrients and gases	Nutrients and gases
Why is this system ideal for the types of organisms that have it?	Humans have a complex body system that requires blood be pumped far from the heart, so strong muscular heart makes that possible plus pushing it through lots of small tubes	Seastars do not have a heart or need water to be pumped really far from the center of its body so the madreporite can easily bring in water and push it through like a hydraulic system

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<u>Bottom Dwelling Animals</u>	<u>Actively moving around in water column</u>
<p><i>Example</i></p> <p>Bottom is often dark - less likely to be visual for most animals Instead other senses are heightened to make up for it</p>	<p><i>Example answers, could be others</i></p> <p>Wide open area to observe</p> <p>Mechanoreceptors (lateral line), Chemoreceptors (smelling organisms around) Auditory (echolocation)</p>

Which of your senses would be most important to you if you lived in the water? Explain your answer.

Answers vary

If an animal did not have any eyes, how could its other senses change or adapt to help it survive?

Answers vary, some examples are...

Other senses are heightened to make up for it. They may also have specialized body parts that help with smell, taste, hearing, or touch that differs from animals that can see. It may develop other defenses to protect it (sea anemone)

Name: _____



TEST YOUR KNOWLEDGE

1. Where do benthic animals live in Long Island Sound?
 - a. Swimming around in the water column
 - b. Floating at the top of the water
 - c. Living at the bottom
 - d. All of the above

2. Match the parts of the trawl net to what they do.
 - a. Tickle Chain
 - b. Floats
 - c. Cod End
 1. This part is where all the animals collect
 2. This part keeps the net up in the water column and keeps the mouth of the net open
 3. This part helps bring animals up off the bottom so they get caught in the net

3. Which of these is the correct order of trophic levels as energy moves UP a food web?
 - a. producer primary consumer - apex predator - secondary consumers
 - b. primary consumer - apex predator - producer - secondary consumer
 - c. apex predator - secondary consumer - primary consumer - producer
 - d. producer - primary consumer - secondary consumer - apex predator

4. How do primary producers get their energy?
 - a. By eating dead organisms
 - b. By making their own food
 - c. By eating plant material
 - d. By catching and eating live organisms

5. What is a trophic level?
 - a. The position an organism fills in a food web.
 - b. The total number of organisms in a food web.
 - c. The amount of sunlight that an area gets.
 - d. The level of vitamins in an organism's body.

6. How do phytoplankton get their energy?
 - a. By eating zooplankton
 - b. By using sunlight to make food
 - c. By breaking down other animals
 - d. By filtering out pollution

7. Which of these statements about food webs is FALSE?
- Decomposers get energy from several trophic levels in a food web.
 - The largest biomass of living things is found at the lowest trophic level in a food web.
 - A food web contains all the food chains in an area.
 - If you remove one type of living thing from the food chain, the other living things would not be affected.
8. Which of the following is TRUE about digestion in seastars?
- The seastar's stomach is at the end of its tube feet.
 - Seastars are able to eat food much larger than they are by using external digestion.
 - The seastar uses one stomach to digest its food.
 - Seastars digest their food very quickly.
9. Fill in the blank. In _____ fish, it takes _____ to digest because their food is more fibrous.
- Carnivore; shorter
 - Carnivore; longer
 - Herbivore; shorter
 - Herbivore; longer
10. How does an ambush predator get its food?
- They attach to other animals and steal food from them.
 - They hide in their surroundings and wait for their prey to come to them.
 - They put out a mucus net around their habitat to catch their prey.
 - They chase after their food until it is tired and cannot get away.
11. The vascular system transports _____ around the body.
- Gasses
 - Nutrients
 - Blood
 - All of the above
12. Fill in the blanks. Animals like a horseshoe crab have a(n) _____ circulatory system because _____.
- Open; their blood has to travel very far away from the heart to get to all the organs.
 - Open; their blood does not have very far to travel from the heart to get to all the organs.
 - Closed; their blood has to travel very far away from the heart to get to all the organs.
 - Closed: their blood does not have very far to travel from the heart to get to all the organs.

13. Why is it important for the horseshoe crab's blood to clot?
- The clot helps move food around the body.
 - The clot captures oxygen from the water.
 - The clot protects the horseshoe crab from bacteria in their blood.
 - The clot helps the horseshoe crab get copper into its blood.
14. Why is the haemal system of a seastar different than the cardiovascular system of a fish?
- Animals with a haemal system do not have a heart, but they do have canals to move fluid around.
 - Animals with haemal system have a heart, but do not have blood vessels.
 - Animals with a haemal system do not have a heart and do not need to bring any fluid into their body.
 - Animals with a haemal system have two hearts that pump blood around their body.
15. Which of these statements best describes the body parts and movement of a diamondback terrapin?
- They have flippers that help them swim fast and only live in the water.
 - They have big wide feet that help them run fast and only live on land.
 - They have webbed feet and nails to move on land and in the water.
 - They have small feet and a large tail to help them move on land and in the water.
16. Which animal uses a muscular foot for aquatic locomotion?
- Diamondback terrapin
 - Blue Crab
 - Mud Snail
 - Lobster
17. Which of these statements is TRUE about the horseshoe crab's senses?
- The flabellum is a chemoreceptor, that helps them taste the quality of the water.
 - The tail is a mechanoreceptor to help locate food and predators.
 - They have auditory receptors on their gills.
 - They have one type of photoreceptor, called compound eyes.
18. Fish use their _____ to help detect water pressure and swim in schools, which is an example of a _____.
- Antennae; chemoreceptor
 - Lateral line; mechanoreceptor
 - Swimmerets; chemoreceptor
 - Dorsal line; mechanoreceptor

TEST YOUR KNOWLEDGE ANSWERS

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 - b. **3. This part helps bring animals up off the bottom so they get caught in the net.**
 - c. Floats
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 - e. Cod End
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 - b. Primary consumer - apex predator - producer - secondary consumer
 - c. Apex predator - secondary consumer - primary consumer - producer
 - d. **Producer - primary consumer - secondary consumer - apex predator**
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Apps and Online Resources

(Click on the title to learn more!)

- [iNaturalist](#)
 - ➔ Download this app to contribute to science! Become a citizen scientist and use the app to record and share all your encounters with nature. iNaturalist helps you identify the plants and animals around you. By recording and sharing your observations, you'll create research quality data for scientists working to better understand and protect nature.
- [Aquatic food webs](#)
- [Horseshoe crab facts](#)
- [Horseshoe crabs and the full moon](#)
- [Invertebrate facts](#)
- [Plankton in the Arctic](#)
- [Invent an animal](#)

Books and Readings

Books

- **Shark Whisperer** by Ellen Prager

Articles (Click on the title to open the article)

- [Do animals taste the same things as humans?](#)
- [Carnivore sharks have a stomach for greens.](#) (*Lexile level is adjustable*)
- [What animal has the weirdest heart?](#)