

Readings in Hudson River Natural History

Students will practice English language arts skills by listening to or reading and then responding to short articles about Hudson River nature, science, and history.

Objectives: Students will respond to articles in ways that require:

- reading, listening, and writing for information and understanding;
- understanding scientific concepts, principles, and theories pertaining to the physical setting and living environment.

Grade level: Elementary (Grades 3-5)

Subject Areas: English Language Arts, Science

New York State Learning Standards:

English Language Arts Standard 1

Mathematics, Science, & Technology Standard 4

Skills:

- Read and listen to acquire facts and ideas from texts.
- Gather and organize information about organisms and environmental phenomena.
- Write to interpret, apply, and transmit information.

Duration:

Preparation time: 5 minutes for each reading

Activity time: 20-40 minutes for each reading

Materials: Each student should have:

- A copy of the selected article
- Pencil or pen



Background:

The articles in this collection allow teachers to integrate instruction in reading and writing with study of the Hudson River. Their content relates to organisms, events, and phenomena addressed in other lesson plans included in the Hudson River Estuary Program's curriculum offerings. For example, the articles "The Atlantic Sturgeon of the Hudson River" and "Blue Claw" may be assigned to students who are also working on the math skills lessons "On the Trail of the Hudson's Migratory Fish" and "On the Trail of the Blue Crab." The article "From the Mountains to the Sea" is intended to serve as a general introduction to study of the Hudson. Similar lessons for kindergarten to third grade are available at <http://www.dec.ny.gov/education/77601.html>; they offer simple activities as well as questions on the readings.

Activity:

1. Introduce the topic covered in the article.
2. The articles can be read aloud to the class to practice listening skills or assigned as student reading, either in class or as homework.
3. The questions associated with each articles may likewise be covered with the class, or given out as in-class work or homework.

Assessment:

- Assess comprehension by having students share answers to questions about the articles, or collect and grade sheets.
- Make up additional questions about the content of the articles.

Resources:

These children's books cover the Hudson and related topics.

- Locker, Thomas. *Where the River Begins*. Puffin Books, New York: 1993. Appropriate for ages 4-8.
- Lourie, Peter. *Hudson River: An Adventure From the Mountains to the Sea*. Boyds Mill Press, Honesdale, Pennsylvania: 1998. Appropriate for ages 9-12.
- McKinney, Barbara. *A Drop Around the World*. Dawn Publications, Nevada City, California: 1998. Appropriate for ages 4-8.
- Wallace, Karen. *Think of an Eel*. Candlewick Press, Cambridge, Massachusetts: 2004. Appropriate for ages 4-8.
- Whitcraft, Melissa. *The Hudson River*. Franklin Watts, a Division of Grolier Publishing, New York: 1999. Appropriate for ages 9-12.



Vocabulary List:

adapt: to develop a way of dealing with conditions in a particular environment;

adaptation: a feature that allows an organism to deal with environmental conditions

alien: an organism from another part of the world

anadromous: lives in salt water but migrates back to freshwater to spawn

bay: an inlet or small body of water set off from the main body

behavioral adaptation: an adaptation involving the way an animal acts

brackish: mixture of fresh and salt water

brook: a small stream

burrow: to dig a tunnel for shelter; also the tunnel itself

camouflage: colors and patterns that let animals blend in with their surroundings

canal: a manmade waterway for boats

characteristic: a special quality or appearance that makes an individual or group different from others

current: water moving continuously in a certain direction

dam: a barrier that holds water behind it

displace: to take the place of

downstream: in the direction a stream is flowing

estuary: a body of water in which fresh and salt water meet

evergreen: a tree with leaves that remain green all year round

explorer: one who travels in search of new geographic or scientific information

fin: a thin extension of a water-living animal's body, used in guiding its movement

fresh water: water that is not salty (rainwater is fresh water)

gill: in fish and other animals living in water, an organ used to draw oxygen from water

habitat: the particular sort of place where a given plant or animal lives

harbor: a body of water protected and deep enough to be a safe place for ships

intertidal zone: an area covered by water at high tide and uncovered at low tide

invasive: likely to spread and take over

invertebrate: an animal without a backbone



Vocabulary List (continued):

lock: a water-filled enclosure used to lift or lower boats over a dam or along a canal

marsh: an area of shallow water with many plants growing through the water's surface

microscope: an instrument that uses lenses to magnify images of very small objects

migrate: to move from one place to another

molt: to shed the shell covering the body and legs

native: an organism born in a particular place, not brought there from elsewhere

organism: an individual living thing (plant, animal, bacteria, etc)

oxygen: a colorless, odorless gas found in the air and also dissolved in water; animals require it to breathe

permanent: unchanging; lasting

photosynthesis: process in which green plants use sunlight to make the chemical substances that sustain them

physical adaptation: an adaptation involving the form of an organism

pier: structure built out into the water for use as a docking place or walkway

predator: an animal that eats other animals

rapids: part of a river that flows fast over and around rocks that break the surface

repel: to resist and push away

river: a natural stream of water larger than a brook or creek

salt water: seawater or other water that contains salt

school: a number of fish swimming together as a group

scientist: a person skilled in science

sea level: the average height of the ocean

seawater: salty ocean water

senses: parts of an organism that make it aware of its surroundings; usually sight, smell, taste, hearing, touch

shoreline: the line where a body of water touches the shore

spawn: to lay eggs; usually refers to animals that live in water

spiny: having stiff, thorn-like points

stream: a small body of running water



Vocabulary List (continued):

symbol: something that stands for something else

threatened: an animal or plant that exists in such low numbers that care must be taken to keep it from dying out

tidepool: a pool of water left when the tide recedes

tides: the alternate rising and falling of the surface of the ocean

transmitter: a device that sends out signals

transparent: see-through

upstream: in the direction from which a stream is flowing

voyage: a journey, usually by water, from one place or country to another



From the Mountains to the Sea: ANSWER KEY

1. This article is **mostly about**
 - a. how people use the Hudson River
 - b. the kinds of fish that live in the Hudson River
 - c. the course of the Hudson River**
 - d. Lake Tear of the Clouds
2. Where did the Hudson River get its name?
 - a. from an explorer**
 - b. from a Native American
 - c. from a fish found in the sea
 - d. from an estuary
3. What is an **estuary**?
 - a. a stream with rapids and waterfalls
 - b. a place where fresh water and salt water mix**
 - c. a kind of ship
 - d. a water route to Asia
4. Where does the Hudson River begin its journey?
 - a. the City of Troy
 - b. the Adirondack Mountains**
 - c. the Hudson Highlands
 - d. the Atlantic Ocean
5. Do you think the Hudson goes over any waterfalls between the dam at Troy and the Atlantic Ocean? Why or why not?
No waterfalls. The Hudson is at sea level from Troy to the Atlantic; tides go all the way to the Troy dam.
6. **Challenge question:** Why do you think Henry Hudson decided that this river did not lead all the way to China?
The river water changed from being salty like seawater to being fresh. Rapids and waterfalls blocked Hudson's ship.



Atlantic Sturgeon of the Hudson River: ANSWER KEY

1. This article is mostly about
 - a. fish that lay eggs
 - b. a fish called the Atlantic sturgeon**
 - c. different shapes and sizes of fish
 - d. striped bass and American shad

2. What does it mean to be an **anadromous** fish?
 1. a fish that eats at the bottom of the river
 2. a fish that lives more than sixty years
 3. an animal living in the water
 - 4. a fish that migrates between fresh water and the ocean**

3. What does it mean for fish to **spawn**?
 - a. fish swim to the ocean
 - b. fish swim into the Hudson River
 - c. fish lay eggs**
 - d. fish eat crabs, mussels, worms, and insects

4. According to the article, which of these statements are true?
 - a. The Atlantic sturgeon is the largest fish in the Hudson. **TRUE**
 - b. The Atlantic sturgeon spawns in the Atlantic Ocean. **FALSE**
 - c. The Atlantic sturgeon dies after spawning only once. **FALSE**
 - d. The Atlantic sturgeon is an anadromous fish. **TRUE**



Bald Eagles of the Hudson River: ANSWER KEY

1. What is this article mostly about?

- a. migration
- b. the bald eagle**
- c. fish
- d. the Hudson River

2. Which definition best describes migration?

- a. to stay in one place
- b. to live on the Hudson River
- c. to move from one place to another**
- d. to find plenty of food

3. According to the article, how many days would it take an eagle to migrate 1,000 miles between its nesting area in Canada and its winter home on the Hudson?

Eagles may travel up to 100 miles in a day, so it would take 10 days. Younger students can count by 100s to find the answer. Older students might use multiplication or division.

4. Why do you think bald eagles cannot find their favorite food in northern Canada during the winter?

Ice prevents eagles from catching fish.

5. **Challenge question:** Hold your arms straight out to both sides. Have a partner use a tape measure to measure the distance between your fingertips - your "wingspan." Is your wingspan more or less than an eagle's? How much more or less?

An eagle's wings may measure seven feet from tip to tip. (It may be helpful to convert feet to inches first - seven feet equals 84 inches.) If a student's "wingspan" is less than an eagle's, subtract it from seven feet to find out how much less. In the (unlikely) event that a student's wingspan exceeds an eagle's, subtract seven feet from the student's wingspan to find out how much greater the student's wingspan is.



The Eel's Incredible Journey: ANSWER KEY

1. This article is **mostly about**
 - a. the Sargasso Sea.
 - b. *the life cycle of the American eel.***
 - c. different shapes of fish.
 - d. glass eels.
2. Based on the article, when an eel's color turns silvery, the fish is ready to
 - a. migrate from the Sargasso Sea to the coast of North America.
 - b. become an elver.
 - c. *migrate to the Sargasso Sea to spawn.***
 - d. swim up rivers into fresh water.
3. Scientists know that the eel **spawns** in the Sargasso Sea because
 - a. *that is where the smallest baby eels are found.***
 - b. silver eels have been caught there.
 - c. eel eggs have been found there.
 - d. elvers have been seen there.
4. According to the article, which of the following statements are true?
 - a. The American eel is a kind of snake. **__FALSE__**
 - b. American eels live in both fresh and salt water. **__TRUE__**
 - c. Some American eels live for more than twenty years. **__TRUE__**
 - d. Glass eels are brown, green, or yellow in color. **__FALSE__**

5. Do you know of any other fish that migrate?

The Atlantic sturgeon (subject of another ELA article in this lesson plan series), striped bass, and American shad are among the Hudson River fish that migrate. Some students will likely be familiar with the migration of salmon, which are not native to the Hudson.



Blue Claw! ANSWER KEY

1. Including claws and paddles, how many legs does a blue crab have?
Ten.
2. As a crab **molts**, which of the following things happen?
 - a. Its body grows larger.
 - b. It sheds its shell.
 - c. Its body becomes soft.
 - d. *All of the above things happen.*
3. The blue crab's large claws are used for
 - a. *catching food and defending itself.*
 - b. swimming.
 - c. walking.
 - d. molting.
4. According to the article, which of the following sentences are true?
 - a. Blue crabs can swim. TRUE
 - b. When molting, the body of a blue crab may change form. TRUE
 - c. A tiny baby blue crab looks like its parents. FALSE

5. Challenge question: When going out to eat seafood, you might see soft-shelled crabs listed in the menu. These are actually blue crabs, not a different kind of crab. These crabs would just have gone through what part of their life cycle? Use facts from the article to explain your answer.

Soft-shelled crabs are adult crabs that have just molted. Their bodies feel like soft rubber. People who are very familiar with blue crabs can recognize crabs that are about to molt, and larger seafood companies will keep these crabs in holding pens. When they molt, these crabs are sold as soft-shelled crabs.



Adaptations - Designs for Survival: ANSWER KEY

1. What is an adaptation?

Something that helps an organism do the things it must do to survive in its environments.

2. Give two examples of animal adaptations from the article. Explain how each helps the animal survive.

Catfish whiskers have taste buds that allow the fish to find food in the dark. The patterns and colors of an owl's feathers allow the bird to blend in with its surroundings. Monarch butterflies have warning coloration to remind predators of their bad taste. Monarchs also migrate to avoid winter. Shad swim in schools, in which the large number of swirling fish can confuse predators.

3. Is each of the following a **physical** or **behavioral** adaptation?

(All of these organisms live in the Hudson Valley.)



(a) a map turtle's shell.
A physical adaptation that protects the turtle's body.



(b) beavers building dams.
A behavioral adaptation that creates ponds to shelter the beaver from predators.



(c) prickly pear cactus spines.
A physical adaptation that protects the cactus from being eaten or disturbed by large animals.



(d) a black bear's deep winter sleep.
A behavioral adaptation for surviving winter.



Adapting to Estuaries: ANSWER KEY

1. This article is mostly about
 - a. plants of the Hudson River
 - b. how animals and plants adapt to habitats in the Hudson estuary**
 - c. the tides in the Hudson River
 - d. fish migration
2. Which of the following cause conditions in Hudson River **habitats** to change?
 - a. tides
 - b. seasons
 - c. salty seawater entering the estuary
 - d. all of the above**
3. Fill in the blank to complete the following sentences.
 - a. Barnacles close their shells to keep water inside when the tide is low.
 - b. Yellow perch live in fresh water.
 - c. The osprey migrates south when winter comes to the Hudson.
 - d. Spatterdock plants can survive being covered with water at high tide and exposed to the air at low tide.
4. According to the article, why do plants grow where they do in the Hudson?
Where a plant grows along the Hudson depends on how well it can survive being flooded at high tide or being out in the air at low tide.

5. **Challenge questions.** Extend what you learned from the article to answer questions about the Hudson River animals pictured below. Explain your answers.



- a. Where does the map turtle spend the winter?

This turtle burrows into the mud of the river bottom.



- b. The pearly mussel breathes underwater. How does it survive being exposed to the air at low tide?

At low tide, it closes up tight to keep water inside its shell.



- c. The green heron eats fish and frogs. When winter comes, what does it do to survive?

The heron migrates south to places where ice doesn't cover the water in winter.



Alien Invasion! ANSWER KEY

1. This article is **mostly about**
 - a. aliens from outer space.
 - b. ***an invasive plant.***
 - c. animals that live in water chestnut mats.
 - d. the dangers of water chestnut seeds.

2. What does it mean to be an **alien species**?
 - a. one that damages the environment.
 - b. one that lives in Europe or Asia.
 - c. one that is invasive.
 - d. ***One that grows in a place where it didn't live until people brought it there.***

3. Water chestnut is an **invasive species** because
 - a. ***it displaces native plants that grow in shallow waters of the Hudson.***
 - b. the spines of the water chestnut seed can stab people's feet.
 - c. it comes from Europe and Asia.
 - d. its leaves float on the surface of the water.

4. According to the article, which of these statements are true?
 - a. It is dark beneath thick mats of water chestnut leaves. **__TRUE__**
 - b. Many insects, crustaceans, and worms live on water chestnut. **__TRUE__**
 - c. Water chestnut is found in salt water. **__FALSE__**
 - d. "Devil's heads" are the seeds of the water chestnut plant. **__TRUE__**

