



NEMO

CLASSROOM CURRICULUM GUIDE
2021 - 2022



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Welcome to NEMO 2021 - 2022

Thank you for taking part in the NEMO program this year!

With our current funding, we are able to offer this virtual experience to your classrooms at no cost to you. If you would like to take part in this program, we will be happy to schedule you. One positive of this format is scheduling flexibility on our end. We are able to take Reservations M-F, between 9am and 4pm.

Optional pre-visit and post-visit lessons are available.

Ready to schedule? New to NEMO?
Have questions? Please contact us:
education@greaterclevelandaquarium.com

Erin, Matt & Lili

CLASSROOM CURRICULUM GUIDE

Connection to Ohio Learning Standards

These activities extend the Aquarium field experience and enhance the following Ohio Standards in Science:

Fourth Grade Life Science

Topic: Earth's Living History

4.LS.1: Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful.

Content Concepts:

- An animal's patterns of behavior are related to the environment. This includes the kinds and numbers of other organisms present, the availability of food and resources, and the physical attributes of the environment.
- Ecosystems are based on interrelationships among and between biotic and abiotic factors.

The NEMO lessons incorporate these content concepts and build on the study of habitats, and adaptations.

Fourth Grade Earth and Space Science

Topic: Earth's Surface

4.ESS.1: Earth's surface has specific characteristics and landforms that can be identified.

Current Topics

- About 70 percent of Earth's surface is covered with water and most of that is the ocean.
- Only a small portion of Earth's water is freshwater, which is found in rivers, lakes and groundwater.

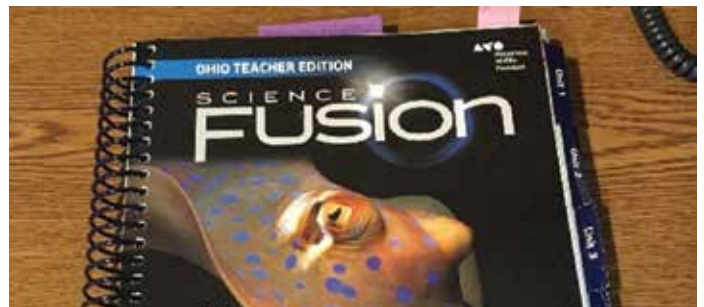
Fourth Grade: Science Inquiry and Application

- Observe and ask questions about the natural environment
- Plan and conduct simple investigations
- Employ simple equipment and tools to gather data and extend the senses
- Communicate about observations, investigations, and explanations
- Review and ask questions about the observations and explanations of others

Science inquiry and investigation skills are utilized throughout the NEMO experience. All lessons and activities are designed with these skills in mind.

Connection to Science Fusion

NEMO lessons correlate to Unit 4 of Ohio Science Fusion textbook: Living Things and their Environments (available in Science Fusion Grade 4 Ohio Teacher Edition on pages 165 to 210).



Specific connections to the Science Fusion textbook appear through the NEMO curriculum guide using the following format:

Science Fusion Connection: page 170-179

**Page numbers refer to Teacher Edition.*



Lesson 1: Habitat Investigation

In the habitat investigation, students explore several aquatic habitats and discover the biotic and abiotic factors that make each unique.

Review the term habitat and have students brainstorm habitats with which they are familiar. Did they include any aquatic habitats? If not, prompt them to extend the list. What makes one habitat different from another? Different habitats contain different living and non-living factors.

Use the NEMO Pre-visit Lessons PowerPoint (available on the Aquarium website).

This PowerPoint provides an overview of rivers & lakes, coral reefs and the open ocean. Using pictures, maps and brief descriptions, the PowerPoint introduces the habitats and summarizes a few characteristics of the fish that live in each.

After viewing the PowerPoint, review the difference between living factors and non-living factors. For each of the three habitats listed on the Habitat Investigation sheet (available on page A3), ask students to circle the living factors, box the non-living factors and cross out factors not found. (Answer key available on page A4).

Which habitats contain freshwater? Which habitats contain saltwater? Is there a factor unique to a coral reef? Students can work in small groups to discuss similarities and differences of each habitat.

Digital Variation.

For digital variations of this lesson (instead of a worksheet) click [Coral Reef Lesson](#) or [Lakes & Rivers Lesson](#) to get started.

Science Fusion Connection: page 168





Lesson 2: Aquatic Animal Adaptations

The mouth shapes, body shapes, tail shapes, and color patterns listed on the Aquatic Animal Adaptations sheets (page A1 & A2) will be referenced heavily during the virtual program.

Use the NEMO Pre-visit Lessons power point to practice identifying fish adaptations. It will walk you through a mouth shape, body shape, tail shape, and color pattern quiz

Do fish living in the same habitat have similar adaptations? Could a fish from the open ocean survive in a coral reef? Could a fish from rivers and lakes survive in the open ocean? Have students revisit the list of living and non-living factors in the habitats to explain why or why not.

Digital Variation

Study the adaptations, and then practice using this [online adaptations game](#).

Science Fusion Connection: page 170 - 179 & page 182A

Lesson 3: Virtual Visit to Greater Cleveland Aquarium

What better way to learn about fish and aquatic habitats than by visiting the Aquarium!

Reservations should be made through the Education Department (contact information on page 1). During the Zoom program, students will interact with an Aquarium team member in real time and ask questions as the program is presented live. See a wide variety of fish from rivers, lakes, coral reefs, and open ocean. Practice identifying fish adaptations, and discover what fish survive best in different habitats.





UPTURNED MOUTH

- These fish eat food overhead from the top of the water
- Some can shoot water out of their mouth to catch flying insects



DOWNTURNED MOUTH

- These fish eat food below from the bottom of the water
- Many also have BARBELS (whiskers) to help the fish feel and taste in the dark



TERMINAL MOUTH

- These fish eat food straight in front of them
- Fish with mouths in the middle of their head can eat at the top, middle, or bottom of the water



GULPING MOUTH

- Gulping mouths are usually very large
- Fish with gulping mouths often eat other fish whole
- These fish are very good at hunting and striking quickly

MOUTH SHAPES

BODY SHAPES

NOODLE BODY

- Long, skinny shape
- Great for fitting in small places like caves
- Slow swimmers



ROCKET BODY

- Torpedo shaped
- Fast swimmers
- Often paired with a fast-swimming tail



FLAT-BELLIED BODY

- Low, flat shape
- These fish live at the bottom of the water
- Some can bury themselves in the sand to hide
- Use camouflage instead of speed for survival



TALL PANCAKE BODY

- Flat from side to side
- These fish make fast turns in the water
- These fish can swim in small spaces between rocks and corals



TAIL SHAPES

WEDGE TAIL

- These fish swim with short bursts of speed
- Great for swimming around rocks, plants, and corals



FORKED TAIL

- Great for very fast swimming
- Most fish with forked tails swim non-stop
- The deeper the fork, the faster the fish



ROUNDED TAIL

- Great for slow swimming
- These fish use camouflage instead of speed to escape from predators



UNEVEN TAIL

- Top of the tail fin is longer than the bottom
- Great for non-stop swimming in open water
- Many sharks have a uneven tail shape



COUNTERSHADING

- Dark on top, light on the bottom
- Helps fish hide from top and bottom
- These fish can hide in open water



STRIPES

- Striped fish can swim in schools together to confuse predators
- Stripes can help fish blend in with plants or corals



SPOTS

- Spots help fish blend into corals, plants, or rocks in their habitat
- These fish may be easily seen in open water



MOTTLED

- Speckled, blotchy pattern
- It can help fish blend into rocks, corals, and plants

COLOR PATTERNS

HABITAT INVESTIGATION

For each habitat listed below:

- Draw a **circle** around the **living** factors found in that habitat.
- Draw a **box** around the **non-living** factors found in that habitat.
- **Cross out** the factors that are **not found** in that habitat.

Rivers & Lakes



Freshwater

Temperature

Logs

Saltwater

Rocks

Sand

Fish

Frogs

Sunlight

Plants

Pollution

Eels

Sharks

Sea Stars

Algae

Turtles

Plankton

Mud

Coral Reefs



Freshwater

Temperature

Logs

Saltwater

Rocks

Sand

Fish

Frogs

Sunlight

Plants

Pollution

Eels

Sharks

Sea Stars

Algae

Turtles

Plankton

Mud

Open Ocean



Freshwater

Temperature

Logs

Saltwater

Rocks

Sand

Fish

Frogs

Sunlight

Plants

Pollution

Eels

Sharks

Sea Stars

Algae

Turtles

Plankton

Mud

HABITAT INVESTIGATION ANSWER KEY

For each habitat listed below:

- Draw a **circle** around the **living** factors found in that habitat.
- Draw a **box** around the **non-living** factors found in that habitat.
- **Cross out** the factors that are **not found** in that habitat.

Rivers & Lakes



Freshwater	Temperature	Logs
Saltwater	Rocks	Sand
Fish	Frogs	Sunlight
Plants	Pollution	Eels
Sharks	Sea Stars	Algae
Turtles	Plankton	Mud

Coral Reefs



Freshwater	Temperature	Logs
Saltwater	Rocks	Sand
Fish	Frogs	Sunlight
Plants	Pollution	Eels
Sharks	Sea Stars	Algae
Turtles	Plankton	Mud

Open Ocean



Freshwater	Temperature	Logs
Saltwater	Rocks	Sand
Fish	Frogs	Sunlight
Plants	Pollution	Eels
Sharks	Sea Stars	Algae
Turtles	Plankton	Mud