

Lesson 3: North Carolina Aquaculture Species

Objectives:

By the end of this lesson, students will be able to:

1. Identify aquaculture species farmed in North Carolina.
2. Explain biological needs of and suitable habitat for an aquaculture species.

Overview:

Aquaculture is growing in North Carolina as seafood demand increases and aquaculture production methods improve. The types of aquaculture species that are grown vary greatly. Some are freshwater species, while others prefer a marine, or saltwater, environment. In this lesson, students will learn about aquaculture species that are grown in the state. They will identify key information about the species' biology, unique features and their historical use in aquaculture.

Science Standards:

EEn.2.8.2

- Critique the advantages and disadvantages of traditional agriculture/aquaculture techniques and compare with sustainable agriculture/aquaculture techniques. Include the economics and environmental impacts in this comparison.

EEn.2.2.1

- Explain the need for and consequences of various types of land use such as urbanization, deforestation and agriculture.

EEn.2.7.2

- Define the biosphere as all life on Earth.
- Explain biodiversity as including genetic variation within populations and variation of populations within ecosystems that make up the biosphere.
- Infer the relationship between environmental conditions and plants and animals that live within various biomes that comprise the biosphere.

Grade Level: 9-12

Duration: 2 class periods

Vocabulary:

abiotic: not involving or originating in living organisms; inorganic, abiogenic

biotic: of or relating to living organisms; caused by living organisms

Materials Needed:

- Poster-making supplies (e.g. poster board, markers, colored paper, glue)

Activity:

Invite students to imagine that they're aquaculture producers doing research on a species they're interested in farming. They will conduct a webquest on an organism selected from this list of aquaculture species grown in North Carolina:

black sea bass (*Centropristis striata*)

blue crab (*Callinectes sapidus*)

channel catfish (*Ictalurus punctatus*)

hybrid striped bass, which is a cross between striped bass (*Morone saxatilis*) and white bass (*Morone chrysops*)

Eastern oyster (*Crassostrea virginica*)

giant freshwater prawn (*Macrobrachium rosenbergii*)

grass carp (*Ctenopharyngodon idella*)

hard clam (*Mercenaria mercenaria*)

Nile tilapia (*Oreochromis niloticus*)

Pacific white shrimp (*Litopenaeus vannamei*)

rainbow trout (*Oncorhynchus mykiss*)

red swamp crawfish (*Procambarus clarkii*)

Russian sturgeon (*Acipenser gueldenstaedtii*)

yellow perch (*Perca flavescens*)

For the webquest, students can use websites like:

North Carolina Department of Agriculture
<https://www.ncagr.gov/markets/seafood/seafooddirect/directory.asp>

Aquaculture Extension, North Carolina State University
<https://appliedecology.cals.ncsu.edu/extension/aquaculture/>

U.S. Department of Agriculture
<https://www.usda.gov/topics/farming/aquaculture>

National Oceanic and Atmospheric Administration
<https://www.fisheries.noaa.gov/topic/aquaculture>

North Carolina Sea Grant: Marine Aquaculture
<https://ncseagrant.ncsu.edu/aquaculture>

Students should collect the following information on their species:

- Scientific name
- Native and/or suitable habitat in North Carolina
- Image of species
- Abiotic habitat requirements (e.g. temperature, salinity, space)
- Preferred food in the wild and feed used when cultured
- Density requirements or limits
- Life cycle stages
- Production statistics: volume (pounds, bushels or number) produced and economic value (dollar amount sold) over the past 10 years in North Carolina and in the U.S.
- Aquaculture history and methods (e.g., How long has the species been cultivated? When and where were production methods developed? What kind of production methods are used?)
- Potential positive or negative effects on the environment of farming the species
- Unique features

Students will create posters to display their webquest results. Once the posters are completed, students should place them around the classroom, like in an art gallery or at a conference. Next, students will tour the “gallery,” using sticky notes to write down questions they might have about each poster. Students should place each sticky note on or near the poster it references. The original poster creator will

eventually collect the sticky notes and answer the questions (to the best of their ability) in front of the class.

To grade the posters, teachers can use — and add onto — the following rubric. They can also enlist the students to grade the posters. For example, each student could be assigned to grade two other posters.

Poster Grading Rubric		
Circle the score that corresponds with each grading element and then add them up for a final score.		
Does not meet expectations	Meets expectations	Exceeds expectations
Poster only displayed information on half or less than half of the items requested. 1	Poster displayed information on a majority of the items requested. 2	Poster displayed information on all items requested and provided additional information. 3
Poster was disorganized and hard to read. Pertinent information was difficult to find. 1	Poster was somewhat organized, and somewhat easy to read. Pertinent information was somewhat easy to find. 2	Poster was organized and easy to read. Pertinent information was easy to find. 3
Add other grading elements below if desired.		
1	2	3
Add up the circled scores:		



After the poster gallery, the teacher will lead the students in a discussion to answer the following:

- Were there any facts about your aquaculture species that surprised you, and why?
- Is North Carolina a good place to grow your aquaculture species? Why or why not?
- After listening to your fellow students' presentations, which aquaculture species would you most like to raise and why?
- After listening to your fellow students' presentations, which aquaculture species do you think is the most challenging to raise and why?

Finally, students will compare an aquaculture species with an agricultural crop grown in the same region. For example, if they choose catfish, which is primarily grown in the eastern coastal plain, they could compare it with peanuts, which are grown in the same region. Students should use the worksheet found at the end of this lesson to compare the aquaculture species and agricultural crop.



North Carolina Aquaculture Species



Student Worksheet Name _____

Compare an aquaculture species with an agricultural crop grown in the same region. For example, if you choose catfish, which is primarily grown in the eastern coastal plain, you could compare it with peanuts, which are grown in the same region.

	Aquaculture species: _____	Agricultural crop: _____
What are its land and water resource needs?		
Are there any inputs needed (e.g., fertilizer, feed) to make it grow?		
How do you begin cultivation?		
Are there any concerns about pests or disease? What can you do about them?		
How long does it take until harvest?		
Where are the markets for this product? Where is it sold?		