

The Elizabeth River Project's **Dominion Energy**

Learning Barge



MISSION: Making restoration of the Elizabeth River a reality.

AWARD WINNING: Students learn by doing aboard the 120'x 32' steel deck barge designed by the University of Virginia and owned and operated by The Elizabeth River Project. The barge is a unique and powerful living laboratory for students to learn about river science, the Elizabeth River watershed, ecosystem, stewardship and restoration efforts. As America's Greenest Vessel, her "green" design demonstrates sustainable practices for home and school. Students come aboard thinking globally and leave equipped to make a difference in their community. The Learning Barge's education program received the 2011 Environmental Excellence Award from SeaWorld Busch Gardens, 2014 Governor's Gold Award for Sustainability and 2015 VA Env. Excellence Award from Dept. of Conservation and Recreation.

2018-2019 **GreenSTEM**
RIVER RESILIENCE

The Merry Mummichog



Fundulus heteroclitus

NEW PROGRAM: To foster river stewards and teach resilience, students perform a scientific field investigation to answer, "How can I help restore the Elizabeth River for animals including the mummichog fish while adapting and preparing to make our city resilient?"

To begin, students are divided into small groups and rotate to six learning stations performing hands-on activities, tallying and indentifying species for a mini-barge bioblitz, gathering and recording data and utilizing tools like field scopes, secchi discs, monoculars and water quality equipment.

This program complements a new 4th grade classroom curriculum, *The Not So Merry Mummichog* that includes 5 classroom and 1 schoolyard activity where students take care of their bottled river through scenarios of human and natural impacts including flooding, extreme weather and runoff. Available Fall 2019.



SAFETY: The barge is Coast Guard certified and stays tied to a dock during the entire program. One chaperone or teacher is recommended per 10 students.

IDEAL GROUPS

20-60, preK-university (90 maximum)
Public, private and home schools
youth organizations and scouts

TO SCHEDULE

Email Robin Dunbar, Deputy Dir. – Education
rdunbar@elizabethriver.org or call 757-392-7132
You can also fill out a Request Form found at
www.elizabethriver.org (Learning Barge Page)

Helpful information to provide when scheduling:

- 1.) How many students
- 2.) Grade level of students
- 3.) Season or month interested in
- 4.) Name of school and your contact info.

PROGRAM TIMES

Monday – Friday. Closed holidays.
Must reschedule if raining or extreme weather.

Typical time slots:

9:30-11am or 10-11:30am
11-12:30pm or 11:30-1pm

Seasons include:

Fall: Oct. 1 – Dec. 14
Spring: April 1 – June 7
Summer: To be determined.

TEACHER RESOURCES

Additional activities are available at
www.elizabethriver.org

PRICE (Sliding Scale – You choose.)

\$7-\$9 **1.5 hour** program

\$5 **1-hour** preschool & summer
program

Sliding scale based on your budget.
Teachers and chaperones are free.
Assistance may be available for Title 1
schools.

DOCKING SITE

Grandy Village Learning Center
2971 Kimball Loop Terrace
Norfolk, VA 23504

WHAT TO BRING

Sunscreen, water bottle, hat, jacket/
Raincoat, closed toe shoes.

SNAIL MAIL THE CREW

Students are encouraged to SNAIL MAIL
the barge crew by writing a letter and
sharing what they will do to support a
healthy river. Write: The Learning
Barge Crew, The Elizabeth River
Project, 475 Water Street, C103A,
Portsmouth. VA 23704.





VIRGINIA STANDARDS OF LEARNING

SCIENCE: **K:** 1,4, 5, 6, 8, 9,10 **1:** 1, 2, 3, 4, 5, 6, 7, 8 **2:** 1,4, 5, 6, 7, 8, **3:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
4: 1, 3, 4,5, 6,7,8 **5:** 1,4, 5, 6, 7 **6:** 1, 2, 3, 4, 5, 6, 7, 8,9 **LS:** 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12,
14, **PS:** 1, 2, 5,6, 10, 11 **ES:** 1, 2, 3, 7, 11, 13 **Biology:** 1, 5, 8, 9

MATH: **K:** 6, 8, 10, 13 **1:** 2, 5, 14 **2:** 1, 3, 5, 6, 14 **3:** 1, 3, 4, 13 **4:** 1, 4, 6, 7, 8, 13 **5:** 1, 2, 4, 5
6: 2, 6 **7:** 3 **8:** 3

HISTORY: **K:** 2, 3, 4, 5, 8, 9 **1:** 1, 4, 5, 7, 8, 10, 11, 12 **2:** 3, 5, 6, 7, 10 **3:** 2, 4, 6, 7, 8 **VA:** 1, 2
Geography: 1

LANGUAGE

ARTS: **K:** 1,2, 3, 4, 6, 10 **1:** 1,2, 3, 4, 9, 11,12 **2:** 1,2, 3, 6, 7, 8,9,11 **3:** 1,2,5,6 **4:** 1, 2,3 **5:** 1, 2
6: 1 **7:** 1 **8:** 7

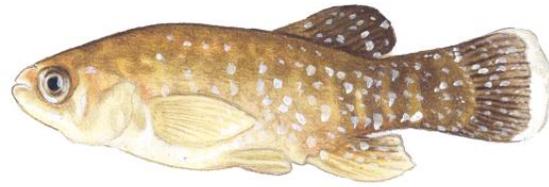
ART: **K:** 2, 3, 5, 8, 10, 11, 12, 13, 14, 15, 18 **1:** 2, 3, 4, 5, 8, 9,12, 15, 16, 18, 19, 20 **2:** 4, 5, 6, 9, 10,
13, 14, 18, 22 **3:** 2, 4, 5, 10, 14, 16, 17, 23, 24, 26, 27, 28 **4:** 2,3,5, 6, 8 10, 13, 20, 23, 24 **5:** 1,
2, 3, 4, 9, 10, 16, 25, 29 **6:** 2, 6, 15, 17, 18, 21 **7:** 3,4,9,10,24, 27 **8:** 5,
6. 13. 14. 16. 20

21st CENTURY SKILLS

Students rotate through six multidiscipline learning stations that:

- are designed to excite youth about their home river;
- offer an opportunity to discover and explore;
- are research-based utilizing real-world restoration projects;
- utilize critical thinking and problem-solving to stimulate senses and spark curiosity;
- foster a generation of stewards empowered to care for the Elizabeth River.

Curriculum addresses Virginia Standards of Learning in science, language arts, math, history and art. Students explore, analyze, map, gather data, graph, identify, predict and compare results. Program begins with a research question and concludes with reflection.



THE MUMMICHOG

- **The mummichog fish are abundant in the Elizabeth River** and are indicator species for the river's health. They live in a small 50 yard area their entire life and scientists have noted high rates of cancer in these fish where the river bottom is polluted.
- **They grow up to 5 inches** (130 mm) and are year round residents.
- **The native American name means "they go in great numbers"** - schools of fish.
- **Mummichogs are an important food source for larger fish** and are often used as bait.
- **These fish are omnivores** and feed on insects, small fish, crustaceans and plants.
- **They can tolerate a wide range of salinities and high temperatures** up to 93 degrees Fahrenheit at 14 ppt salinity.
- **During the winter, mummichogs burrow into the mud** up to 8 inches to avoid freezing temperatures. They emerge from the mud in the spring as the water warms.



STATION 1
RIVER REFLECTIONS
Connecting to the Elizabeth



STATION 6
RAIN, RUNOFF & RESILIENCE
Impacts of humans and nature

STATION 2
FISH HAWKS
Impacts of warming temperatures

STATION 5
RIVER LAB
Water Quality

STATION 4
WETLANDS
Value & Journaling

STATION 3
BIOBLITZ
Exploring for diversity

6 LEARNING BARGE STATIONS

LEARNING STATIONS

RIVER REFLECTIONS: Team art, oil pastels and competing ideas on what to use to represent the river water based on how they view it.

While on the dock, students use their senses to answer, “*What is my vision of the Elizabeth River?*” They are prompted to get a broad panoramic and a narrow view while learning to use monoculars and then using a bucket, they hoist up river water to examine its true color. Students then reflect and using oil pastels begin to create a masterpiece titled, “*Eyes on the River.*” Each student will pick up where the last student left off resulting in six students working on each picture. Schools are encouraged to display the artworks for continued reflections.



Students reflect upon their vision of the Elizabeth River and use oil pastels and recycled cardboard to create a team picture, *Eyes on the River.*



Manmade Osprey platform is located by the Learning Barge on the Eastern Branch.

FISH HAWKS: Air temperature as environmental cue for migratory animals.

Students view a migratory map of the Osprey and discuss. With thermometers students take air temperature to begin to answer, “*How can warming temperatures impact migratory animals like the Osprey?*” They then learn why researchers at the Virginia Institute of Marine Science are studying these birds of prey that live almost exclusively on fish and how warming waters can impact their life source. Students also learn how birds use solar heat to keep warm in the winter and compare to the barge’s solar panels that harness heat and energy. Students then work as a team to mimic building an osprey nest with simple tools in a mock osprey platform and they measure the Osprey’s wingspan.

RIVER LAB: Estuaries & Water Quality

Students test the Elizabeth River to answer, “*How could sea level rise affect the Elizabeth River’s water quality?*” They learn how to get a water sample, measure water temp, pH, salinity, Dissolved Oxygen and bacteria.



RAIN, RUNOFF & RESILIENCE: Impacts of Humans and Nature

Students roll out maps, discover the watershed and how runoff travels while answering, *“What are the impacts of heavy rain and flooding?”* Students measure the depth of the river, use secchi discs to measure the clarity and learn how the barge capture rain for reuse. They learn how single use plastics are harmful and alternatives, strategies to address flooding and ways to reduce our carbon footprint.



BIOBLITZ: Identify and tally species and learn importance of biodiversity.

Students discuss how important it is for the river to have all kinds of species and

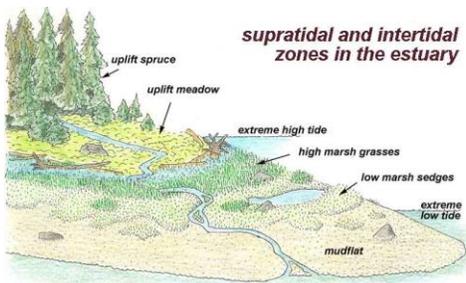
“How can sea level rise affect aquatic animals?” Students perform a barge

bioblitz by noting what kind of birds, insects, plants and mammals they see. They hoist up habitat cubes, minnow traps and various seining nets to see how many aquatic species they can identify, tally and measure. Students are introduced to species guides, scales, and counting tools while

learning about the different zones in the river for feeding, habitat, shelter and breeding. They also explore mud for tiny animals and learn more about the mummichog fish including their history, anatomy and tolerance for environmental changes. They also learn they were the first fish sent into space on Skylab in 1973.



Students have close encounters with Mummichog fish, *Fundulus heteroclitus*



WETLANDS: Native grasses, wetland value and function and nature journaling.

Students play a game learning the different intertidal zones and what animals live in them. They learn how to answer, *“How do wetlands play a role in addressing flooding and sea level rise?”* as they explore how the barge’s wetlands function and learn to identify the native grasses. They use magnifying glasses and probes to get a closer look at the periwinkle snails and note how the grass blades have salt on them from the brackish waters.

Together they build a mini-city noting the best placement of buildings, streets, trees and wetlands. They then look at examples of scientists nature journals and using colored pencils, draw native wetland grasses, label the species and measure how tall it is and write a few descriptive words about what they see and how they feel, etc.

Dominion Energy

**Batten Educational Achievement Fund of Hampton Roads
Community Foundation**

**Environmental Literacy Grant from
National Oceanic Atmospheric Administration**

Hampton Roads Community Foundation

**Chesapeake Bay Restoration Fund Advisory Committee – Made possible by
the Sale of Chesapeake Bay License Plates**

**Colonna's Shipyard
Dollar Tree Foundation**

Norfolk, Portsmouth, Chesapeake & Virginia Beach Public Schools

**Norfolk Redevelopment and Housing Authority
Norfolk Southern Foundation
Virginia Natural Gas**

The Maintenance Advisory Committee's generous in-kind support keeps our barge floating!

**BAE Systems - Norfolk Ship Repair
Coastal Services**

**Crofton Industries & Diving
Earl Energy, Inc.**

**East Coast Steel Fabrication, Inc.
Ireland Marine, Inc.**

**Marine Chemist Atlantic
Matherne Marine Design, Inc.**

MHI Ship Repair and Services

**Michael Petrus and Phoebe Crisman
Norfolk Tug Co., Inc.**

**Robbins Maritime, Inc.
Solar Services, Inc.**

**Virginia Ship Repair Association
Yacht Systems Services**



**475 Water Street, C103A
Portsmouth, VA 23704**

MORE INFORMATION

**Robin Dunbar, Deputy Director-Education
rdunbar@elizabethriver.org**

757-392-7132

www.ElizabethRiver.org