

OYSTERS

A TOOL FOR A PLACE-BASED APPROACH TOWARDS LEARNING

Waquoit Bay National Estuarine Research Reserve, Woods Hole Oceanographic Institution, Stonehill College, Town of Falmouth

Thursday, August 8, 2019 & Tuesday, November 12, 2019

COURSE DESCRIPTION

This course will introduce teachers of grades 3-12 to oyster natural history and research. Oysters will serve as a vehicle to explore salt marsh and estuary ecology including human uses and impact. Teacher participants will visit the oyster aquaculture research site at Waquoit Bay National Estuarine Research Reserve in Falmouth to make observations, collect data, and learn about the project and the organisms from the scientists themselves. They will participate in grade level appropriate activities based on the Massachusetts Science, Technology, and Engineering standards. The course will include field and classroom activities, grade appropriate trade book literature, small group work, discussions, and mini presentations by content experts, with plenty of time for questions and answers. There will be a final afternoon/evening class in the fall so teachers can share how they've implemented what they learned with their students. Course content and activities align with grade 3-12 Massachusetts State Science Technology and Engineering Standards.

GRADE LEVELS

The course is designed for teachers of grades 3-12 teaching STEM.

SCHEDULE

Thursday, August 8, 2019 - 8:30am-5:00pm

Tuesday, November 12, 2019 - 4:30pm-8:00pm

LOCATION

Waquoit Bay National Estuarine Research Reserve, 131 Waquoit Highway, Waquoit, MA 02536

INSTRUCTORS

Nancy Church, K-12 School Program Coordinator, Waquoit Bay National Estuarine Research Reserve (508-457-0495 x125, nancy.church@state.ma.us)

Dr. Virginia Edgcomb, Woods Hole Oceanographic Institution and Falmouth Academy

Christina Lovely, Town of Falmouth MES Shellfish Department

Chuck Martinsen, Town of Falmouth MES Shellfish Department

Joan Muller, Education Coordinator, Waquoit Bay National Estuarine Research Reserve (508-457-0495 x107, joan.muller@state.ma.us)

Dr. Daniel Rogers, Stonehill College

SUPPORT

Each participant will receive grade appropriate resources to use with their classes.

LODGING AND MEALS

Snacks and lunch are provided. This workshop is one day in the summer and one day in the fall so we expect most teachers to commute, however, those students traveling from beyond commuting distance may stay in the Reserve's dorm on campus (bunk beds, shared bathrooms), camp on Washburn Island (need own camping equipment and boat, canoe or kayak for transportation from the island to the Reserve's headquarters on the mainland where the class will be held), or find their own lodging for the night before the workshop. Check www.waquoitbayreserve.org for more info on camping. Reservations must be made for the dorm or camping. Please contact Joan Muller- joan.muller@state.ma.us

APPLICATION

Space is limited. Teachers of grades 3-12 may apply on Reserve's website www.waquoitbayreserve.org. If you don't get an e-mail message within a week that your application was received, please follow up with Joan Muller via e-mail joan.muller@state.ma.us or phone 508-457-0495 x107.

COURSE OUTCOMES

Participants will be able to:

1. Use simple graphical representations to show that species have unique and diverse life cycles. Describe that all organisms have birth, growth, reproduction, and death in common but there are a variety of ways these happen. (3-LS1-1)
2. Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction. (4-LS1-1)
3. Obtain and combine information about ways communities reduce the impact on the earth's resources and environment by changing an agricultural, industrial, or community practice or process. (5-ESS3-1)
4. Develop a model of a food web to describe the movement of matter among producers, primary and secondary consumers, decomposers, and the air and soil in the environment. (5-LS2)
5. Construct an argument supported by evidence that human activities and technologies can mitigate the impact of increases in human population and per capita consumption of natural resources on the environment. (7.MS-ESS3-4).
6. HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, aesthetics, and maintenance, as well as social, cultural, and environmental impacts.
7. Access and use the <https://coast.noaa.gov/estuaries/> website, the on-line Estuaries 101 curriculum, Oysters in the Chesapeake Bay curriculum <https://oceanservice.noaa.gov/education/oysters-in-the-chesapeake-bay/> and other NERRS/NOAA educational products with students.
8. Teach basic estuarine concepts by guiding students in using field and laboratory research techniques analogous to those used at Research Reserves.

ESTUARINE PRINCIPLES AND CONCEPTS: TEACHERS WILL BECOME FAMILIAR WITH THESE CONCEPTS.

1. Estuaries are interconnected with the world ocean and with major systems and cycles on Earth.
2. Estuaries are dynamic ecosystems with tremendous variability within and between them in physical, chemical, and biological components.
3. Estuaries support an abundance of life, and a diversity of habitat types.
4. Ongoing research and monitoring is needed to increase our understanding of estuaries and to improve our ability to protect and sustain them.
5. Humans, even those living far from the coast, rely on goods and services supplied by estuaries.
6. Human activities can impact estuaries by degrading water quality or altering habitats; therefore, we are responsible for making decisions to protect and maintain the health of estuaries.

COURSE EXPECTATIONS

Participants will be expected to:

1. Attend all days of the course.
3. Complete in-class assignments and participate in activities and discussions.
4. Participate in evaluation of the workshop.
5. Implement at least one STEM activity with their class(es) related to what they've learned in the class, using resources from the workshop, and hand in a write up.
6. Share information, projects, photos, or videos of student activities/projects.

SCIENCE CONCEPTS

This workshop will focus on Science and Engineering Practices and the following Disciplinary Core Ideas from the Next Generation Science Standards:

1. Interdependent Relationships in Ecosystems
2. Cycle of Matter and Energy Transfer in Ecosystems
3. Natural Resources/Human Impacts on Earth Systems
4. Ecosystem Dynamics, Functioning and Resilience

SCIENCE AND ENGINEERING PRACTICES

1. Asking questions and defining problems
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanation and designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

DRAFT COURSE OUTLINE: OYSTERS

AUGUST 8, 2019

Low tide: 12 pm

Meet at WBNERR boathouse. We will be getting our feet wet so teachers should come dressed appropriately in layers. Bring hiking shoes/sneakers as well as another pair of footwear that can get wet.

8:30-9:00 Coffee, sign in, materials

9:00-9:15 Introductions and overview

Morning: Oysters: The Basics and their place in the world of shellfish
(*Christina Lovely, Town of Falmouth Shellfish Department*)
Life cycle, anatomy- dissection, oyster ecosystem activity
Growing oysters to eat and for cleaning the water
(water filtration demo and video)

Break

Tour aquaculture site, how to measure oysters, data collection- (oyster count, mass and length, salinity, water temperature, DO, salinity).

Take sediment cores and water sample.

Introduction to oyster research project, oyster role in nitrogen cycle
(*Dr. Daniel Rogers, Stonehill College*)

Lunch (provided)

Afternoon: Data analysis (*Dr. Virginia Edgcomb, WHOI, Falmouth Academy*)
Plot data from morning data sheets.
Analyze oyster data from previous years.
Determine Nitrate and Ammonium in samples from Waquoit Bay, South Cape Beach, and groundwater.

Additional grade level activities and resources

(*Joan Muller and Nancy Church, WBNERR education staff*)

Split into 2 groups:

Elementary: Trade books, additional interdisciplinary oyster activities

Middle/High School: Additional on-line activities

Break

How to incorporate into classroom? What standards can they meet?

Break into Elementary and Middle High School groups Share plans

Wrap up, evaluations, and future expectations

HW: Look over websites and check out videos and other resource on resources link sheet.

TUESDAY, NOVEMBER 12, 2019

4:30-8:00 PM

(light supper included)

- 4:00-4:30 Gather, snack, sign in, put on foot wear/waders
- 4:30-5:15 Harvest oysters, learn how to shuck
- 5:15-5:45 *Dinner*
- 5:45-7:45 Teachers share what they did with their students.
- 7:45-8:00 Evaluation

COURSE REQUIREMENTS

Participants will:

1. Complete in-class and homework assignments and participate in activities, discussions, and accessing and using NOAA websites.
2. Incorporate information, curriculum, and resources about STEM topics provided in class into their own classroom teaching and provide a written reflection upon the experience.
3. Participate in evaluation of the course.
4. Share information, photos, projects, or videos of student work.

Assignments should be sent to Joan Muller via e-mail at joan.muller@state.ma.us. Final reports will be due by the last day of class at the final session, November 12, 2019.

RESOURCES THAT WILL BE USED

NERRS/NOAA Estuaries 101 curriculum: <https://coast.noaa.gov/estuaries/curriculum/index.html>

NOAA Oysters in the Chesapeake Bay curriculum

<https://oceanservice.noaa.gov/education/oysters-in-the-chesapeake-bay/welcome.html>