

# TEACHERS ON THE ESTUARY AND THE WAMPANOAG CIRCLE OF LIFE

Mashpee Public Schools, Wampanoag Tribe Education Department and  
Waquoit Bay National Estuarine Research Reserve  
2019

**Course description:** This course will introduce teachers of grades 3-5 to salt marsh and estuary ecology (specifically life cycles, food webs, and adaptations) through the lens of Cape Cod Wampanoag culture, as well as research scientists and experienced coastal educators. The instructors and guest presenters will use 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. The interdisciplinary nature of the course leads us to call it a STREAMSS (Science, Technology, Reading, Engineering, Art, Math, and Social Studies) course appropriate for any teachers of grades 3-5 including classroom teachers, art teachers, music teachers, physical education teachers, and special education teachers. Preference will be given to grade 3-5 teachers. Others are welcome to apply as long as they can adapt the materials and may be admitted if space permits.

This course is part of the Teachers on the Estuary (TOTE) teacher professional development, a program offered at National Estuarine Research Reserves across the nation. It was developed to improve teachers' and students' understanding of the environment using a place-based, local approach. TOTE workshops also provide resources and experiences to support the incorporation of watershed and estuary topics into classroom teaching to promote scientific literacy and stewardship of the coast. See <https://coast.noaa.gov/estuaries/> for further information on the national TOTE program. Teachers will learn how to use the Cape Cod coast to help their students learn about animal and plant life cycles and adaptations as well as weather and coastal processes. Teachers will explore estuary/salt marsh, kettle pond, forest, garden, and river habitats.

In addition, Kitty Hendricks-Miller, Indian Education Coordinator, Mashpee Wampanoag Tribe, will co-teach the course and expose participants to many aspects of modern Wampanoag culture as well as insights into history and traditions. Teachers will visit the Mashpee Wampanoag Indian Museum and the Tribal Center to receive a behind the scenes look at the museum and grounds and Tribal Center, as well as participate in native traditions. Local, traditional, Wampanoag food will be served during the sessions and traditional crafts that teachers can do with their students will be included.

Course content and activities align with grade 3-5 Next Generation Science Standards and Massachusetts State Science Technology and Engineering Standards, as well as Social Studies.

**Credit:** The course is offered for 2 graduate credits. Graduate credit is optional and is available from Framingham State College for \$75.00 per credit (PRDV 75324). 30 professional development points are available at no cost through Mashpee Public Schools.

**Grade levels:** The course is designed for elementary school teachers of grades 3-5 in all disciplines.

<b>Schedule:</b>	Tuesday, June 25	9:30 am – 8:00 pm
	Wednesday, June 26	9:00 am – 5:30 pm
	Thursday, June 27	9:00 am – 4:00 pm
	Saturday, November 2	9:00 am – 3:30 pm

**Instructors:**

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

Kitty Hendricks-Miller, Indian Education Coordinator, Mashpee Wampanoag Tribe, 508-477-0208 x143 ([ghendricks@mwtribe.com](mailto:ghendricks@mwtribe.com) )

**Locations:** Waquoit Bay National Estuarine Research Reserve, 131 Waquoit Highway, Waquoit, MA 02536

Mashpee Wampanoag Indian Museum, 414 Main Street, Mashpee, MA 02649

Mashpee Tribal Center, 483 Great Neck Road South, Mashpee, MA 02649

**Support:** Each participant will receive trade books and other resources to use with their classes.

*Native Science: The knowledge held by indigenous people around the world that has been gathered, adapted, refined, and transmitted following precise protocols, traditions, and values maintained since before written history. The core of Native science is interdependencies and relationships that make up the whole. (Adapted from The Native Science Academy definition, <http://www.silverbuffalo.org/NSA-NativeScience.html>)*

**Lodging and meals:** Snacks and lunch are provided. 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. Check [www.waquoitbayreserve.org](http://www.waquoitbayreserve.org) for more info on camping. Reservations must be made for the dorm or camping.

**Application:** Space is limited. Teachers of grades 3-5 may apply on the Reserve's website [www.waquoitbayreserve.org](http://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](mailto: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. Construct a claim with evidence that changes to a landscape due to erosion and deposition over long periods of time result in rock layers and landforms that can be interpreted today. Use evidence from a given landscape that includes simple landforms and rock layers to support a claim about the role of erosion or deposition in the formation of the landscape. (4-ESS1-1)
4. 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)
5. 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: a. show that plants produce sugars and plant materials, b. show that some animals eat plants, c. show that some organisms, including fungi and bacteria break down dead organisms and recycle some materials back to the air and soil. (5-LS2)
6. Access and use the <https://coast.noaa.gov/estuaries/> website, the on-line Estuaries 101 curriculum, and other NERRS/NOAA educational products with students.
7. Teach basic estuarine concepts by guiding students in using field and laboratory research techniques analogous to those used at Research Reserves.
8. Identify the Wampanoags and their leaders at the time the Pilgrims arrived, and describe their way of life" (Grade 3 Learning Standards)
9. Describe the diverse nature of the American people by identifying the distinctive contributions to American culture of several indigenous peoples in different areas of the country. We will focus on the Wampanoag people but teachers will have a homework assignment to learn about the native people in their own area. (grade 5 learning standards).

**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. Review pre-course materials from on-line sources.
2. Attend all days of the course.
3. Complete in-class assignments and participate in activities and discussions.
4. Participate in evaluation of the course including a focus group/sharing session at the last session and exit and follow up on-line surveys.
5. Complete an independent learning experience to learn more about the native people in their own area.
6. Implement at least one STEM activity with their class(es) (preferably including an outside component) related to what they've learned in the class and hand in a write up.
7. Share information, projects, photos, or videos of student activities/projects.

**Science Concepts:** This TOTE 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

### Teachers on the Estuary and the Wampanoag Circle of Life June 25-27, November 2, 2019

**Tuesday, June 25**

#### **Introduction to WBNERR, NERRS, Watersheds, and Estuaries**

low tide- 12:15 pm      high tide: 7:30 pm

- 9:00-9:30am      Arrive, sign in, give out materials, coffee, snack
- 9:30-noon      Circle: Introduction to theme of course, participants and presenters  
Walk to bay overlook- intro to estuary and why estuaries are important to the Wampanoag),  
Walk to watershed sign – assess prior knowledge.  
Kiosk: Waquoit Bay Reserve, the National Estuarine Research Reserve System, Mass State Parks  
Maushop Cape Cod creation story  
How was Cape Cod Formed?  
Groundwater activity from *Watersheds at Bay* curriculum
- Noon-1:00pm      Lunch on bluff around wetu
- 1:00-4:00pm      Meet in boat house  
Explore <https://coast.noaa.gov/estuaries/>  
Teachers will rotate through three stations focusing on a particular organism. Current plan  
(subject to change) is to focus on plankton, horse shoe crabs, and osprey and other coastal birds.  
Teachers will explore Wampanoag cultural connections to the species as well as cover STE  
standards of food webs, life cycles, and adaptations for each species.
- 4:00-4:30pm      Break, get ready for boat trip (wear shoes that can get wet, bring dry shoes to change into, dress  
in layers as we will be staying out until the evening)
- 4:30-5:00pm      Load up boats, travel out to Washburn Island, learn about eutrophication in the bay from  
WBNERR Stewardship Coordinator Jim Rassman
- 5:00-5:30pm      Orientation to Island (include ecosystem services, adaptations of plants and animals, Wampanoag  
uses of plants and other connections to Wampanoag culture)
- 5:30-6:00pm      Explore beach and marsh habitat using hands on techniques
- 6:00-7:00pm      BBQ
- 7:00-7:30pm      Debrief about day, how will teachers apply what they learned in the classroom?
- 7:30-8:00pm      Travel back to boat house

HW: Look over websites we explored today, explore <https://coast.noaa.gov/estuaries/>, check out Sands of Time video on Youtube: <https://www.youtube.com/watch?v=9rAUyExwQqs>

**Wednesday, June 26**  
**Watershed Field Study**

Low tide- 1:00pm High tide: 8:14pm

- 8:30-9:00am Meet at WBNERR boathouse. We will be getting our feet wet so teachers should come dressed appropriately in layers. Bring hiking shoes or sneakers as well as another pair of footwear that can get wet.
- 9:00-noon Watershed walking field trip- make observation stops at kettle pond, and salt marsh. Wampanoag uses of plants will be covered along the trail.  
Journal- take air and water temperature, salinity, and pH  
Solos: journal, observations (5 senses), sketches, creative writing- prose, poems, questions –  
Gather, share in circle.  
Look for aquatic insects, Discuss kettle pond, glacial history  
Take measurements:  
Air, water temperature, salinity, pH  
Plants  
Animals: Scoop muck or sand  
How does temperature change over the seasons? How seasonal changes affect Wampanoag life.  
How can salinity affect life cycles?
- Noon-1:00pm Lunch - provided
- 1:00-5:00pm Oyster aquaculture and activities (visit site, take data, do activities from E101)  
Do water quality detectives activity  
Debrief activities through the lens of Science and Engineering Practice  
Which did we do so far this week?  
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 explanations and designing solutions  
7. Engaging in argument from evidence  
8. Obtaining, evaluating, and communicating information  
Make simple graphs with data from morning. Construct explanations and communicate information Learn how to use SWMP graphing tool/ Ap for air, water temperature, salinity, pH.  
Compare to morning's measurements.
- 5:00-5:30pm Journal, debrief

**Thursday, June 27**

low tide: 1:45pm high tide: 8:57pm

- 8:30-9:00am Meet at Mashpee Wampanoag Tribal Museum
- 9:00-noon Welcome and introduction to museum, tour of museum and weety8  
Herring, activities, go down to river, (include adaptations and life cycle)  
Peruse museum  
Three Sisters Garden, demo, story, cornhusk doll  
Clambake story  
Native Stories  
Knot nets, Clay pots (pinch pot and coil pot and beads)

Noon-1:00pm Wampanoag Lunch (at museum or Waquoit Bay Reserve- location TBD)

1:00-3:30pm Discuss class expectations, answer questions  
Brainstorm suggestions for Place-based experiences  
Divide into groups by school or grade level. Discuss how to apply in classroom  
Closing Circle, give out books and equipment  
Evaluation (on-line, laptop or another device to get on-line needed)

### **Saturday, November 2, 2019**

Mashpee Wampanoag Tribal Center

8:30-9:00am Coffee, settle in

9:00-noon Teachers share what they did with their students – share successes, problems, coach each other.

Noon-1:00pm Wampanoag lunch

1:00-3:00pm Tour of tribal center  
Presentation about Wampanoag culture from elder  
Post workshop survey  
Closing Circle/dance: Reflection Activity

Reference materials will be drawn from the following sources, as well as from NOAA and other web sites. Additional lesson plans and curriculum materials for teaching about estuaries, watersheds, and Wampanoag culture and history will be provided.

Watersheds at Bay: A Watershed Awareness Curriculum ([www.waquoitbayreserve.org](http://www.waquoitbayreserve.org) )

Estuaries 101 curriculum: <https://coast.noaa.gov/estuaries/>

*The Secret Bay* by Kimberly Ridley, illustrated by Rebekah Raye, Tilbury House

*Native American Gardening* : Stories, Projects, and Recipes for Families, by Michael Caduto and Joseph Bruchac, Fulcrum Publishing

*Awesome Ospreys: Fishing Birds of the World* by Donna Love, illustrated by Joyce Mihran Turley, Mountain Press Books

*Clambake: A Wampanoag Tradition* by Russell M. Peters, Lerner Publications (out of print)

**Course requirements:** Participants will:

1. Review pre-course materials.
2. Attend all sessions.
3. Complete in-class and homework assignments and participate in activities, discussions, and accessing and using NOAA websites.
4. Try a place-based experience to learn more about the native people living in their own area. For example:
  - a. Attend a PowWow
  - b. Visit Mashpee Wampanoag Indian Museum again (alone, with family, or students)
  - c. Visit Hobbomocks Homesite (Wampanoag home site) at Plimoth Plantation.
  - d. Visit a local museum or tribal center
  - e. Interview a member of the tribe in your area.
  - f. If there are no places to visit or events to attend in your area (but double check with instructors first), you can research the history of native peoples in your area from before European settlement to present day. Share what you learn with the class verbally and in a written reflection paper, or by sharing a teaching tool you've created to use with your class (poster, photo, video, powerpoint presentation, worksheet, scavenger hunt, ...)
  - f. Another project of your choosing (need to okay with Kitty or Joan first)
6. Incorporate information, curriculum, and resources about STEM topics provided in class into their own classroom teaching, and reflect upon the experience (outdoor student experiences preferred)
7. Participate in evaluation of the course including some on-line surveys.
8. Share information, photos, projects, or videos of student work.

**Grading criteria**

Participants earning graduate credit and those wishing to earn PDPs must complete exercises assigned as part of class work. Class participation and contributions to discussions will be worth 40 percent, the place-based experience will be worth 25 %, STEM class activity and write up will be worth 25 % and completion of evaluation aspects will be worth 10%. Participants taking the course for PDPs but not for graduate credit will not be graded but need to complete all assignments.

**Assignments:** Assignments should be sent to Joan Muller via e-mail at [joan.muller@state.ma.us](mailto:joan.muller@state.ma.us). Final reports will be due by the last day of class, November 2, 2019.