



Teachers on the Estuary (TOTE) II Syllabus, 2012 Wells National Estuarine Research Reserve

Course description: This course is a research and field-based teacher training initiative of the National Estuarine Research Reserve System, part of the National Oceanic and Atmospheric Administration (NOAA). The goal of TOTE II is to improve teachers' and students' understanding of the environment using local examples and to provide resources and experience to support the incorporation of estuary and watershed topics into classroom teaching. The course is also designed to promote stewardship of watersheds and estuaries. This year there will be a particular emphasis on the creation and implementation of estuary-based research projects that can be duplicated with students back in the classroom.

The course will involve teachers in data analysis, systems thinking, research, stewardship, and service learning related to watersheds, estuaries, and coastal systems. The course incorporates investigations in the field and the use of on-line data. Course content and activities will be aligned with Maine Learning Results (2007).

Credit: The course is offered for 3 graduate credits or 30 Professional Development Points. Graduate credit is optional and is available from Cambridge College for \$50.00 per credit. PDPs are free and granted through Wells National Estuarine Research Reserve.

Grade levels: The course is designed for science teachers in grades 6 through 12.

Schedule:	Monday, July 16,	12:00pm -6:00 pm
	Tuesday, July 17	8:00 am – 5:15 pm
	Wednesday, July 18	8:00 am – 5:15 pm
	Thursday, July 19	8:00 am – 3:00 pm

Location: Wells National Estuarine Research Reserve, Wells, Maine

Cost: Thanks to support from a NOAA Bay Watershed Education and Training grant, the course is offered without charge.

Support: Each participant will receive a \$200 grant for education and stewardship projects related to course topics, as well as approximately \$150 in teaching materials.

Lodging and meals: Optional local lodging for 3 nights at a local hotel will be provided for participants during the course for those traveling from beyond daily commuting distance. Breakfast snacks and lunch will be provided.

Application: Space is limited and participation is by application. Completed application should be sent to Suzanne Kahn Eder, Wells Reserve, 342 Laudholm Farm Road, Wells, ME 04090 or emailed to: Suzanne@wellsnerr.org.

Application may be downloaded at http://www.wellsreserve.org/blog/5-teachers_on_the_estuary.

Instructor:

Suzanne Kahn Eder, Education Director, Wells National Estuarine Research Reserve
suzanne@wellsnerr.org (207) 646-1555 x 116

Course objectives: Participants will be able to

1. Describe systems thinking and be able to apply it to their classroom teaching.
2. Analyze weather and water quality data from the National Estuarine Research Reserve System (NERRS) System Wide Monitoring Program (SWMP).
3. Access and use the on-line middle school Estuaries 101 curriculum and other NERRS/NOAA educational products with students.
4. Describe impacts of human activities on coastal systems.
5. Develop a research project related to NERRS Estuarine Principles and Concepts, implement it, and be able to duplicate it with students back in the classroom.
6. Explain service learning and integrate it into teaching about estuaries, watersheds, and coastal systems.
7. Lead students in learning activities related to stewardship of the environment.

Estuarine Principles and 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 requirements: Participants will be expected to:

1. Review pre-course materials.
2. Attend all components of the four-day session.
3. Complete a pre-test and post-test.
4. Complete in-class assignments.
5. Participate in activities and discussions.
6. Undertake a stewardship project with students.
7. Participate in evaluation of the course.

Course Outline Teachers on the Estuary II July 16- July 19, 2012 Wells NERR

Monday July 16

12:00 pm – 6:00 pm

- Introductions of participants and presenters
- Introduction to Wells National Estuarine Research Reserve habitats
- Estuaries 101 middle school curriculum introduction and group work
- Field research project preparation
- Introduction to Wells NERR staff

Tuesday July 17

8:00 am – 5:15 pm

Morning

- Systems thinking speaker and group work
- Estuary and beach comparison study at Little River estuary with water quality testing, biodiversity studies, and human impact survey
- Analysis of weather and water quality data from NERRS System Wide Monitoring Program (SWMP) through focused group work with Wells Reserve Research Associate/SWMP Technician
- Field research project implementation at the estuary or beach
- Reflection and sharing time regarding applications to teaching

Wednesday, July 18:

8:00 am – 5:15 pm

- Bird banding demonstration
- Estuary and beach comparison study at Webhannet River estuary with water quality testing, biodiversity studies, and human impact survey
- Speaker focused on human impacts on estuaries and climate change
- Field research project implementation at the estuary or beach
- Service learning speaker and group work
- Reflection and sharing time regarding applications to teaching

Thursday July 19

8:00 am – 3:00 pm

- Field research project teacher presentations
- Stewardship project proposal work
- Stewardship project proposal teacher presentations
- Reflection and sharing time regarding applications to teaching
- Post test and course evaluation

Course texts and materials: Readings and reference materials will be drawn from the following sources, as well as from NOAA and many other web sites. In addition, many lesson plans and curriculum materials for teaching about estuaries will be provided.

- Estuaries 101 <http://estuaries.noaa.gov/Teachers/Home.aspx>

- Taylor, P, et al. *What is Ecology? An Introduction to Ecology through Estuaries*. Wells National Estuarine Research Reserve. <http://www.wellsreserve.org/sup/downloads/what-is-ecology.pdf>
- Tutorial on water quality monitoring: <http://estuaries.noaa.gov/ScienceData/Default.aspx?ID=156>
- Other resources and studies

Grading criteria

Participants earning graduate credit and those earning PDPs must complete exercises assigned as part of class work. Participation and contributions to workshop activities and discussions will be worth 75 percent and the stewardship project proposal will be worth 25 percent.

Participants taking the course for PDPs but not for graduate credit will not be graded, but should complete all assignments.

Stewardship project: Stewardship projects can be thought of as service projects that will benefit a local watershed or water body. Examples of stewardship projects completed by past TOTE teachers include starting a school composting program, planting a school garden, eradicating invasive plant species on school grounds, planting native vegetation along riparian zones, and monitoring the water quality of a local harbor.

Teachers may work alone or with one or two other participants to develop and carry out the stewardship project. The plan for the project is due on the final day of the summer workshop (July 19), but participants have until the end of the 2012-2013 school year to complete projects.

The **stewardship project proposal** should include the following sections:

- Goals, objectives, and/or expected outcomes
 - Estuary Principles and Concepts addressed by the project
 - Description of the project
 - How the project idea was developed
 - Number of students involved and description of the students (grade level, class, club, etc.)
 - Time line
 - How stewardship project money will be spent
 - How the stewardship project will address the 6 stewardship project criteria (listed below)
- 1) Address a resource management need in the students' own watershed.
 - 2) Be student driven.
 - 3) Include outreach to a broader community (beyond the students' own class).
 - 4) Utilize knowledge or practice skills learned through the TOTE training.
 - 5) Involve collaboration with a community organization or volunteer expert in the community.
 - 6) Be an integral part of the instructional program.

Stewardship Project Notes and Context

An effective way to guide students to conduct a stewardship project is to use the format for a **Meaningful Watershed Educational Experience (MWEE)** as described in NOAA's Bay Watershed Education and Training grant guidelines. These experiences include three phases:

1. A preparation phase, which involves students in discussions about a question, problem or issue.
2. An action phase, which includes an outdoor experience where students make observations and collect data. This phase could include helping with projects that result in positive impacts to the environment.
3. A reflection phase, which includes evaluating the activity, analyzing conclusions and sharing the results.

The stewardship project could be incorporated into the action phase or could be designed by the students during the reflection stage as a culminating follow up activity.

The stewardship project is an important activity that provides an opportunity for teachers to integrate and apply with their students the skills learned through the Teachers on the Estuary II course.

The following TOTE goals and outcomes can be addressed and achieved through stewardship projects:

TOTE II Program Goal: Teachers and students have knowledge and appreciation of estuary and watershed environments and the necessary skills to act as stewards of estuary and watershed resources.

Mid-Term Outcomes (application of new knowledge):

- Teachers incorporate experiential learning in their classes and are effective in teaching their students about estuaries and watersheds.
- Students are able to explain how their actions in watersheds affect estuaries.
- Students gain a better understanding of their own watersheds and/or estuaries.

Long-Term Outcomes (effect or change in secondary target audience)

- Teachers act as stewards of estuaries.
- Students act as stewards of estuaries.

\$200 Stewardship Mini Grant: This grant money may be spent on materials, buses, stipends for speakers or anything needed for the students to accomplish their stewardship projects. Teachers submit their stewardship proposal, which includes how they plan to spend their \$200 stewardship mini grant.