Course Description and Syllabus

Sediment, Surface Water, and Biota Sampling Methods to Support MCP Assessments
June 13, 2018
Woods Hole and Falmouth, MA

Course Outline

7:30 – 8:00 AM  **Registration** – course will be limited to 30 participants, not including instructors and boat crew

8:00 – 8:30 AM  **Welcome, Course Goals, Introduction, Field, Boat/Water Safety Plan**

8:30 – 10:00 AM  **Lecture**
- Sampling Plans to Meet Data Quality Objectives
- Data Interpretation and Relationship to MCP
- Laboratory Coordination
- GPS (general introduction)
- Case Study Introductions

10:00 – 10:30 AM  **Break and Travel to Study Sites by Van**

**NOTE:** the class will be divided into two groups of 15 each. One group will focus on boat sampling, while the other focuses on wetland/shore sampling. The groups will switch after lunch. Each sampling unit will focus on a specific risk-related question/case study and the samples collected will tie into answering that question. We expect to use most sampling techniques listed but will select the final set of sampling techniques within 1-month before the start of the course.

10:30 AM – 1:00 PM  **Field Sampling Units**

1:00 PM – 2:00 PM  **Lunch**

2:00 PM – 4:30 PM  **Field Sampling Units**

4:30 PM – 5:00 PM  **Return to Office**

5:00 PM – 5:30 PM  **Concluding Discussion/Wrap-Up**
Locations are:

<table>
<thead>
<tr>
<th>Registration, Lecture, Wrap-Up:</th>
<th>Boat Unit and Lunch:</th>
<th>Wetland/Nearshore Unit:</th>
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<tbody>
<tr>
<td>Woods Hole Group</td>
<td>Zephyr Education Foundation, Inc.</td>
<td>Wood Neck Beach Sippewissett</td>
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<tr>
<td>81 Technology Park Drive</td>
<td>97 Water Street</td>
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<tr>
<td>E. Falmouth, MA 02536</td>
<td>Woods Hole, MA 02543</td>
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<tr>
<td>508-540-8080</td>
<td>508-566-7790</td>
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Unit 1: Saltmarsh and Intertidal Sampling, Wood Neck Beach
- Field note-taking and record-keeping
- Field documents and planning
- Wildlife and habitat observations
- Quadrat sampling
- YSI Meter (general introduction)
- Fish and invertebrate sampling by seining and trapping
- Invertebrate and insect sampling by D-net (kick net)
- Surficial sediment and benthic sampling by Eckman
- Deep sediment core with Russian peat corer
- Sediment sampling and sieving for invertebrates
- Pushcore
- Porewater sampling (e.g., peepers)
- In situ bioaccumulation array
- Surber sampling

Unit 2: Bay Sampling by Boat
- Note-taking/record-keeping
- Observations
- Identify photic zone with Secchi disk
- YSI Meter
- Fish and invertebrate sampling by otter trawl/scallop dredge
- Trapping (e.g. lobsters)
- Plankton sampling by plankton net
- Eelgrass and shellfish surveys – video based
- GPS tracking of sampling locations – transects
- Vertical water quality profiles
- Surface water sampling by Niskin bottle
- Sediment sampling by petit ponar
- Subsurface mooring w/acoustic release for sensors
Instructor Biographies

Theodore Wickwire, M.F.S., B.A. - Team Leader/Senior Environmental Scientist

Education
M.F.S., Forest Science – 1996, Yale University School of Forestry and Environmental Studies
B.A., Biology and Environmental Sciences – 1992, Bowdoin College (summa cum laude) Phi Beta Kappa; James Bowdoin Scholar

Expertise
Mr. Wickwire focuses on solving complex environmental problems using risk assessment, casual analysis, vulnerability assessment and weight-of-evidence approaches. He has applied his expertise to evaluating spills, legacy contamination, claims of loss or damage, environmental stressors and developing new methods to advance the evaluations. Mr. Wickwire has prepared numerous aquatic and terrestrial ecological and human health risk assessments in New England and around the United States. He has managed the development of models that incorporate wildlife behaviors and habitat suitability to increase the realism of exposure modeling. Using multiple types of evidence, he applies the causal analysis framework to provide a defensible path to identifying and managing a probable cause. Mr. Wickwire also uses relative risk model approaches to understand the potential vulnerabilities of different alternative approaches to environmental management such as introduction of species or climate change adaptation. He helps clients to evaluate the consequence of different probabilities of climate and storm driven inundation and other stressors on diverse assets.

Qualification Summary
• 22+ years of Experience in environmental risk assessment, field sampling program design and implementation and project management
• Ecological risk assessment, method development, and risk management in freshwater, marine, estuarine and terrestrial environments
• Field/biomonitoring program design and management
• Causal/multiple stressor analysis application and method development
• Vulnerability assessment
• Relative risk modeling
• Risk communication
• Spatially explicit exposure assessment
• Guidance development
• Litigation support
• Forest ecology and watershed management.


Jerome J. Cura, Ph.D., M.S. - Senior Environmental Scientist

Education
Ph.D. Biological Oceanography, 1981 University of Maine
M.S. Biology, 1974 Northeastern University
B.A. Biology, 1971 College of the Holy Cross
**Expertise** Dr. Cura is an ecological risk assessor at Woods Hole Group. He is also an adjunct professor at Cape Cod Community College where he teaches a course in Oceanography. He is an expert in the area of ecological risk analysis. He has conducted ecological risk analyses in various freshwater systems, in marine and estuarine habitats, and in terrestrial environments. He has developed guidance for conducting risk assessments at dredging sites for the United States Army Corps of Engineers and he chaired the International Navigation Association’s (PIANC) workgroup that developed international guidance. Dr. Cura’s experience includes conducting assessments at CERCLA and RCRA sites (industrial and government facilities), providing technical advice on the design and execution of human health and ecological risk assessments, and providing expert testimony for law firms. Industry and Government organizations frequently invite him to lead or participate in environmental conferences or symposia. Dr. Cura works as a member of The Science Collaborative, a resource network of senior environmental scientists from the consulting industry and academia. He was a founding partner of Cura Environmental and Menzie-Cura & Associates, Inc. Dr. Cura has published over 30 peer-reviewed book chapters, technical papers, journal articles, and conference proceedings in the areas of risk assessment, environmental decision making, marine ecology, and dredged material disposal evaluation methods. He is a frequent contributor to Scientific Symposia.

**Qualification Summary** • Ecological risk assessment and analysis in freshwater systems, in marine and estuarine habitats, and in terrestrial environments • Expert testimony for law firms, industry, and government organizations • Designed and conducted studies to assess the effects of industrial and civil activities upon marine and aquatic ecosystems • Risk assessment and remediation at sediment and surface water contaminated sites • Environmental business development expertise for governments and companies • Founding partner of Cura Environmental and Menzie-Cura & Associates, Inc. • Taught various college and university course in the areas or environmental science, biology, and oceanography


**David R. Walsh, M.S. - Senior Project Manager/Coastal Scientist (Coastal Sciences, Engineering and Planning Division) Field Party Chief/Field Oceanographer (Oceanography and Measurement Systems Division).**

Expertise and research interests in coastal geomorphology and sedimentology. Application of field and laboratory research to resolve and evaluate geologic processes within coastal, estuarine, and oceanic environments. Utilization of GIS and other geospatial software packages to map and define geomorphological processes and sediment characteristics, including the presence of contaminants. Design, acquisition, and interpretation of bathymetric, side-scan sonar, and sub-bottom sonar surveys. Implementation of sediment sampling strategies to ground-truth geophysical survey data (physical properties, sediment stratigraphy, layer thickness) and estimate sedimentation rates. Oceanographic data collection systems. Coastal and deep-water mooring system instrumentation and deployment techniques. Field operations logistics, efficiency, safety, and shipboard deck operations. Programming, deployment, and data analysis of oceanographic instruments including the ADCP, ADV, and CTD. Mooring design, floatation/hardware components, and acoustic releases.
Elise Leduc, MEM, Coastal Scientist

Education
M.E.M., Coastal Environmental Management - 2011 Duke University
B.A., Biology – 2006 Williams College

Expertise Coastal environmental management, wetland delineation and restoration, shellfish and eelgrass surveys, coastal planning, geospatial analysis, shoreline change analysis, environmental impact analyses, ecological risk assessment, conservation prioritizations, field and water quality sampling, Massachusetts environmental regulations.

Qualification Summary • Adept at spatial data acquisition and geospatial analysis using ESRI’s ArcGIS to analyze and display data for coastal and marine projects. • Experience conducting shoreline change analyses. • Experience with wetland delineation, shellfish and eelgrass surveys, and field data collection of sediments, water, and invertebrates for environmental studies. • Experience with local, state, and federal permitting of coastal and environmental projects. • Experience developing beach management plans, and coastal management and conservation documents. • Strong written and verbal communication skills, and the ability to engage diverse groups of stakeholders. • ESRI ArcGIS; ETGeowizards; MATLAB; Microsoft Office; Adobe Photoshop and Illustrator

Zachary D. Stromer, M.S. - Coastal Scientist

Education
M.S., Geology – 2016, Univ. of Massachusetts - Amherst
B.S., Environmental Geology/Chemistry – 2014, Northeastern University

Expertise in coastal, estuarine, and fluvial geomorphology and sedimentology. Application of field and laboratory research in order to resolve and evaluate geologic processes. Acquisition of geophysical and geologic data from a variety of environments. Physical (grain size, mineralogy, porosity, etc) and geochemical (XRF, isotope analysis, total organic carbon content, gamma spectroscopy, etc) analysis and interpretation of sediment samples. Utilization of GIS and MATLAB for analysis and visualization of data.

Qualification Summary • Sediment core/sample collection • Geochemical and physical sediment characterization • Geochronological analysis of sediment cores • GIS geospatial analysis applications • Geophysical survey data acquisition (Bathymetric and GPR) • Extensive field operations and logistics management of geologic and water sampling • Programming experience with MATLAB

Brittany L. Hoffnagle, M.S., B.S. - Environmental Scientist

Education
M.S., - Coastal Marine and Wetland Studies- 2015, Coastal Carolina University
B.S., - Marine and Environmental Biology - 2008, Millersville University

Expertise Geospatial data collection and analysis, coastal environmental management, ecological risk assessment, climate change vulnerability assessment, long-term water quality monitoring, in situ field data collection, tidal creek morphology and migration.

Qualification Summary • Geospatial data collection, reduction and analysis using RTK-GPS and ESRI ArcGIS • Coastal processes and their effects on shoreline morphology and tidal creek migration • Experience in field data collection of water, elevation, vegetation, birds, marine mammals and invertebrates • Conducting ecological risk assessments and climate change vulnerability assessments
Joseph Famely, M.E.M., B.A. - Project Manager/Environmental Scientist
Education M.E.M., - 2009 Yale School of Forestry & Environmental Studies B.A., - 2000 Bowdoin College
Expertise Environmental management, environmental impact analyses, ecological risk assessment, geospatial analysis, land use planning, sustainable design, greenhouse gas accounting, sustainability reporting, systems modeling, shoreline change analysis, climate change vulnerability assessment and adaptation planning.
Qualification Summary ∙ 15 years of experience in the environmental sciences ∙ Climate change vulnerability analysis and adaptation planning ∙ Land use sustainability planning and metrics ∙ Carbon footprinting and greenhouse gas accounting ∙ Environmental impact statements ∙ Ecological risk assessment – fieldwork, database design and management, exposure and risk analysis ∙ Geospatial analysis ∙ Shoreline change analysis ∙ Proficient in data visualization and technical writing for diverse audiences ∙ ESRI ArcGIS; ETGeowizards; MatLab; SimaPro Life Cycle Assessment; StatSoft Statistica; SigmaPlot; Vensim; Microsoft Office; Adobe Photoshop and Illustrator.

Adam J. Finkle B.S., M.S. - Coastal Scientist
Education M.S., Sustainability Science – 2012 University of Massachusetts Amherst B.S., Biology – 2009 Siena College
Expertise Habitat restoration, coastal bank stabilization, beach renourishment, wetland delineation, coastal resource area delineation, native plant identification, coastal plant community dynamics, invasive plant management, implementation of green infrastructure, implementation of coastal bioengineering, construction management, ecological restoration project management.

Rob Reynolds, Director/Owner, Zephyr Education Foundation
Rob Reynolds started Zephyr Education Foundation in 2009. Over 10,000 students have participated in Zephyr cruises since 2010. Rob’s summer job during high school and college was working as the mate on the Marine Biological Lab’s 40 foot collecting boat “Ciona”. After graduating from Princeton, he worked as a field engineer, party chief, program manager and field operations manager for EG&G Oceanographic Consultants. In 1982 Rob joined ORE International (Ocean Research Equipment) and in 1991 became co-owner of the company. In 1999 he left to become co-owner of TG&B Marine Services, a company that provides marine environmental sampling services throughout New England.