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COURSE AGENDA
Sediment, Surface Water and Biota Sampling Methods to Support MCP Assessments

7:30 – 8:00 AM	Registration Check-In
8:00 – 9:15 AM	Welcome Lecture ▪ Introduction and Course Goals ▪ Sampling plans ▪ Sampling Gear ▪ Safety Notes ▪ Climate Vulnerability Maps
9:15-10:00 AM	Break and Travel to Study Sites by van

NOTE: the class will be divided into two groups. One group will focus on boat sampling, while the other focuses on wetland/shore sampling. The groups will switch after lunch.

10:00 AM – 12:30 PM	Field Sampling Units
12:30 PM – 1:30 PM	Picnic Lunch in Woods Hole
2:00 PM – 4:30 PM	Field Sampling Units
4:30 PM – 5:15 PM	Return to Office/Concluding Discussion/Wrap-Up

Locations:

Registration, Lecture, and Wrap-Up:
Woods Hole Group
107 Waterhouse Road
Bourne, MA 02532
508-540-8080

Boat Unit:
Zephyr Education Foundation, Inc.
97 Water Street
Woods Hole, MA 02543
508-566-7790

Wetland Unit & Lunch:
Woods Hole Park/Bell Tower Park,
Woods Hole, MA

Lecture

- Introduction and Course Goals
- Sampling plans
- Sampling Gear
- MCP Climate Vulnerability Requirements and Data Collection
- Safety Notes

Unit 1: Wetland Evaluation

General:

- MCP Perspective on Wetland Assessment
- Climate vulnerability and resiliency
- Field note-taking and record-keeping

Station 1:

- Seining
- D-Net
- Minnow trap
- Clam rake
- YSI Water quality measures (if available)

Station 2:

- Elevation Measurement – RTK vs Pole
- Show Tide Gauge – discuss placement, purpose etc.
- Discuss ADCPs – use and placement
- Hohonu | Smarter Flood Monitoring Discuss MCFRM data

Station 3:

- Invertebrate sieving
- Sediment collection (Ekman on stick vs ponar)
- Push Coring

Station 4:

- Quadrat sampling
- Wildlife and habitat observations
- General wetland characterization considerations

We will walk approximately 0.5 miles from the wetland area to the boat dock. During the walk we will visit locations on the Resilient Woods Hole Walking Trail.

Unit 2: Open Water/Bay Sampling by Boat

General:

- Field note-taking and record-keeping
- GPS
- MCP Perspective

Station 1:

- Subsurface Mooring/Hobo
- Transect sampling (objectives, use of GPS, offsets)

Station 2:

- Secchi disk
- Niskin water sampling

Station 3:

- Picture/Video based surveys – eelgrass etc. (Using our new mini-sub/camera)
- Side Scan Sonar (if possible)
- Bathymetry
-

Station 4:

- Petit ponar sediment grab (with discussion of Ekman)
- Otter trawl
- Scallop dredge
- Plankton tow
- Lobster trapping

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INSTRUCTOR BIOGRAPHIES
Sediment, Surface Water and Biota Sampling Methods to Support MCP Assessments

Theodore Wickwire, M.F.S. - *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, a Senior Environmental Scientist and Leader of the Applied Ecology Team, focuses on solving complex environmental problems using risk assessment, causal analysis, vulnerability assessment, field sampling/monitoring programs and weight-of-evidence approaches. He has applied his expertise to evaluating spills, legacy contamination, claims of loss or damage, climate vulnerabilities, non-chemical environmental stressors and developing new methods to advance the evaluations. Mr. Wickwire also assesses the impact of stressors on ecological systems and 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 contributes to climate vulnerability assessments. Working with probabilistic climate modelers, Mr. Wickwire helps clients develop the consequence piece of coastal vulnerability index development and is integrating climate vulnerability considerations into ecological risk assessments. This requires the selection and application of multiple criteria for scoring the comparative value of different assets including natural resources. He then combines the modeled probabilities with the consequence scores to arrive at CVIs. Ultimately, in collaboration with the Team, he assists clients with strategic resiliency and adaptation planning and project implementation including permitting support to minimize the impact of future climate change.

Qualification Summary: • 28+ 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
Full CV: http://www.woodsholegroup.com/bios-long/JJC_Bio_Long_2016.pdf

David R. Walsh, M.S. - *Team Leader, Offshore Metocean Monitoring Systems Group*
Education:
M.S., Marine Studies – Oceanography 2004 Univ. of Delaware
B.S., Geoscience – 1999 Hobart College

Expertise: Design and implementation of real-time data monitoring systems in coastal, port, and deepwater environments. Oceanographic data collection systems. Mooring system instrumentation and deployment techniques. Field operations logistics, efficiency, Quality Health Safety and Environment (QHSE) documentation and implementation, and shipboard deck operations. Programming, deployment, and data analysis of oceanographic instruments including the ADCP, CTD, and environmental sensors. Mooring design, floatation/ hardware components, and acoustic releases. 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, sidescan 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.

Qualification Summary: • 24 years of experience • Experienced in the deployment/recovery of oceanographic mooring systems, instrumentation, and data processing • Specializes in oceanographic data collection program management and operational logistics for both surface and subsurface systems. • Use of ADCPs for temporal (moorings) and spatial (vessel surveys) oceanographic studies • Extensive field/shipboard operations and logistics management of geologic and oceanographic sampling • Sediment core collection and characterization • Geochronological analysis of sediment cores using radioisotope activities and contaminant histories • GIS geospatial analysis applications, cartographic transformations, and digital terrain modeling of topographic and bathymetric data • Geophysical survey data acquisition, processing, and interpretation (bathymetric, side-scan, sub-bottom).

Katie Lavallee M.S.- *Coastal Scientist and Team Lead Coastal Measurements & Sediments*

Education:

M.S. Geology 2017 Boston College

B.S. Environmental Geoscience 2014 Boston College

Expertise: Coastal processes and sediment transport, estuarine circulation; collection and analysis of timeseries data using oceanographic instruments including ADCPs, CTDs, water quality sondes; bathymetric surveying, saltmarsh restoration, groundwater monitoring, and sediment sample collection and characterization. Development and implementation of field monitoring programs and application of risk models to evaluate risk to ecological systems.

Qualification Summary: • Experience developing and implementing field monitoring programs and processing oceanographic timeseries data from ADCPs, CTDs, optical turbidity sensors, and

multiparameter water quality sondes • Experience collecting and characterizing sediment cores and samples for contaminant analysis • Experience conducting shoreline change analyses, including RTK GPS topographic and bathymetric surveys and geospatial analysis • Experience developing and implementing data quality management plans • Ecological risk assessment, method development, and risk management in freshwater, marine, estuarine and terrestrial environments • Strong written and verbal communication skills • MATLAB, ESRI ArcGIS, Hypack, Microsoft Office.

Brittany L. Hoffnagle, M.S. - *Climate Resiliency Specialist & GIS Analyst and Team Leader for Climate & Sustainability*
Education:
M.S., - Coastal Marine and Wetland Studies- 2015, Coastal Carolina University
B.S., - Marine and Environmental Biology- 2008, Millersville University

Expertise: Climate change and resiliency planning, geospatial data collection, advanced cartography and geospatial analysis, coastal environmental management, STEM education curriculum development, long-term water quality monitoring, in-situ field data collection, tidal creek morphology and migration.

Qualification Summary: • Conduct climate change vulnerability assessments and ecological risk assessments • Develop advanced educational and outreach materials including ArcGIS StoryMaps and climate change STEM curriculum frameworks • Manage large workflows for Geospatial data processing and develop QA/QC procedures • Experienced geospatial data collector and analyst using ESRI's ArcGIS and AGOL framework for coastal and marine projects • Experience in field data collection of water, elevation, vegetation, birds, marine mammals, and invertebrates • Provide technical support for visual and verbal scientific communication to diverse audiences • Software expertise: ESRI ArcGIS and AGOL; ETGeowizards; HYPACK; Fledermaus; MatLab; SigmaPlot; Onset HOBOware; Microsoft Office Suite; Adobe Photoshop and Illustrator; SLAMM: Sea Level Affecting Marshes Model.

Dack Stuart, M.S. - *Coastal Scientist, WPIT*
Education:
M.S. Marine Studies – Oceanography 2010, University of Delaware
B.S Oceanography 2008, University of Michigan

Expertise: Mr. Stuart is a coastal scientist and Wetland Professional in Training (WPIT) with over 10 years of experience in discreet water sampling, sediment coring, resource area delineations, instrument deployment and maintenance, topographic surveys, and project management. He uses field and laboratory data to resolve and evaluate geologic processes within coastal and estuarine environments. He works with other coastal scientists and engineers to collect and

analyze the hydrological and geophysical data necessary for the development of hydrodynamic models and the satisfaction of permitting requirements in various coastal environments. In addition, Mr. Stuart has extensive field experience in the acquisition, processing, and interpretation of bathymetric and sub-bottom sonar surveys to investigate subaqueous sedimentary environments on a regional scale. He is on track to earn a Professional Wetland Scientist (PWS) accreditation.

Qualification Summary: • Proposal & budget creation and project management • Wetland and resource area delineation & habitat assessments • Interpretation of sedimentary environments based upon seafloor bedforms and sub-surface stratigraphy • Experience with hydrographic and RTK GPS topographic surveys and GIS geospatial analysis • Involved with coastal, estuarine, oceanographic, and meteorological observational programs, including preparation and mobilization of equipment, collection of field observations, and analysis of time-series oceanographic data • Calibration, deployment and maintenance of real-time buoys and water sample collection and data interpretation relating to water quality monitoring • Field and shipboard work performing environmental and geologic sampling as well as piloting, navigating, and docking vessels up to 55ft.

Joseph Famely, M.E.M.- *Environment & Climate Business Unit Manager*
Education:
M.E.M., 2009 Yale School of Forestry & Environmental Studies
B.A., 2000 Bowdoin College

Expertise: Focused on environmental and sustainability planning, Mr. Famely has expertise in assessing climate change vulnerability and risk for infrastructure and natural resources, and developing adaptation and resiliency plans for communities and organizations. As a trained provider in the Massachusetts Municipal Vulnerability Preparedness (MVP) Program, he has facilitated community engagement workshops following the Community Resilience Building Framework and successfully obtained funding through the MVP Action Grant program. In addition to numerous sea level rise and storm surge vulnerability assessments, he has developed customized greenhouse gas assessment tools to help organizations benchmark and track their carbon footprints and prepare sustainability reports, and led strategic land use planning projects. Mr. Famely's background in risk assessment, urban ecology, and environmental design brings a systems thinking approach to projects and facilitates collaboration with engineering and design professionals, as well as with clients and stakeholders.

Qualification Summary: • 20+ years experience in environmental science and climate planning • Certified MA Municipal Vulnerability Preparedness Program Provider • Certified Waterfront Edge Design Guidelines (WEDG) Professional • Climate change vulnerability assessment / adaptation planning • Land use sustainability planning and metrics • Greenhouse gas inventory

and sustainability reporting • Environmental impact statements • Project management and grant writing.

Gwen Fall, B.S. - *Coastal Engineer, EIT*
Education:
B.S Ocean Engineering, 2020, University of Rhode Island Expertise

Expertise: Wide range of experience with field data acquisition using RTK GPS, hydrographic survey instruments, and sediment vibracore; Drafting plans for coastal nourishment, wetland restoration, and shore protection projects; Assisting with design of coastal structure design and resiliency-building alternatives; Assessing environmental impacts from project alternatives; Assisting with permitting of coastal projects; Construction oversight; technical report writing and review and proposal preparation.

Qualification Summary: • RTK GPS and hydrographic survey instruments • Design and drafting plans within AutoCAD Civil 3D • Performing bathymetric, topographic, shellfish, and intertidal habitat surveys • Experience using vibracore set up for sediment sampling • Experience using wave modeling programs to analyze effects of storms to assess their impacts on a property • Technical Skills involving the following software tools: ArcGIS, AutoCAD Civil 3D, MATLAB, Xbeach, CHAMP, SWAN1D, & SBEACH