2011

COASTAL GEOTOOLS

CONFERENCE PROGRAM

http://geotools.csc.noaa.gov

Kingston Plantation
Myrtle Beach, South Carolina
March 21 to 24, 2011

Conference Goals

To help the constituents of the National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center address coastal resource management issues through the effective use of geospatial data and tools.

Conference Objectives

- Participants learn about emerging tools and techniques, and their benefits and applicability.
- Participants learn about the resources that are available to them, including training, data, and technology.
- Participants share best practices in the areas of geospatial data access, interoperability standards, and application development.
- The conference provides a forum to encourage the development of public and private partnerships that use geospatial technologies.

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A Message from the Director of the NOAA Coastal Services Center

Dear Colleagues:

Natural hazards and climate changes, marine spatial planning, shifting political and financial paradigms—coastal resource management is getting more and more complex. To ride the crest of these waves of change, coastal management professionals not only need the right tools and data, but also require the right partnerships, collaborations, and communication skills.

Attending Coastal GeoTools '11 is one of the best and easiest ways to explore existing and emerging technology—and to discover new partnerships, engage consensus-building tools, and enhance the sharing of geospatial data. For the first time, this year's conference will offer communication-related professional development opportunities.

Coastal GeoTools '11 will focus on the "Digital Coast," an exciting technological gateway that provides access to a plethora of geospatial data, tools, and technical training. This stimulating and inspiring conference also has many new features on tap.

The **Tools Showcase** is a special two-hour session where cutting-edge geospatial tools will be demonstrated in an interactive environment.

The **GeoTools Chat Room** features an enhanced setting to help facilitate face-to-face networking with other conference attendees.

Communications 101 offerings will help attendees learn how to develop outreach plans, improve speaking skills, communicate using social media, and more!

No other conference offers coastal managers the same opportunity to share their technical knowledge and experiences, engage new tools and techniques, develop contacts and partnerships, and learn about available training, data, and technology resources, all while enhancing their professional credibility.

There is nothing as exhilarating as riding the waves of change. The combined energy and ideas generated during Coastal GeoTools '11 will leave participants with the necessary resources, contacts, and communication skills to create the right solutions for their coastal communities.

Sincerely,

Margaret Davidson
Director
NOAA Coastal Services Center

Conference Exhibitors and External Committee

GeoTools '11 Conference Exhibitors

AECOM
Applied Imagery
BAE Systems
The Baldwin Group, Inc.
Dewberry
DigitalGlobe
Environmental Systems Research Institute, Inc.
Federal Geographic Data Committee
Fugro EarthData, Inc.
GeoVantage, Inc.
Google
I.M. Systems Group
IVS 3D, Inc.
Photo Science
The Sewall Company
Spatial Information Solutions
Surdex
Wilson & Company, Inc.
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NOAA Coastal Services Center

External Committee

Kurt Allen.....Photo Science
Chester Arnold.....University of Connecticut, Center for Land Use Education and Research
William Burgess.....National States Geographic Information Council
Zach Ferdaña .....The Nature Conservancy, Global Marine Initiative
Roger Gauthier .....Great Lakes Commission
Anne Hale Miglarese.....Booz Allen Hamilton
John Harding.....Northern Gulf Institute
Jeff Lovin .....Woolpert
Alan Lulloff .....Association of State Floodplain Managers
Dave Maune.....Dewberry
Arleen O'Donnell.....Eastern Research Group
Roger Parsons.....National Oceanic and Atmospheric Administration
Ed Saade .....Fugro EarthData
Daniel Sampson.....MassGIS
Jim Schwab.....American Planning Association
Sheila Siemans.....California Coastal Conservancy
Jonathan Westcott.....Federal Emergency Management Agency
Henry Wolter .....U.S. Geological Survey
Jennifer Wozencraft.....U.S. Army Corps of Engineers
Henry Norris.....Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute

Conference Overview

MONDAY, MARCH 21

Special Interest Meeting – 8:30 to 10:00 a.m.
(See descriptions on page 15)
S01. **SHARING GEOSPATIAL INFORMATION THROUGH WEB-BASED LEARNING**
» ***Somerset***

Special Interest Meetings – 8:30 to 11:30 a.m.
(See descriptions on page 15)
S02. **GETTING TO KNOW NOS' SOCIOECONOMIC INFORMATION PRODUCTS—AND GETTING YOUR FEEDBACK!**
» ***Windsor C***

S03. **MAKING DATA SERVICES FOR THE WEB WORK FOR YOU**
» ***Windsor A***

S04. **BUILDING COASTAL WEB ATLASES TO SUPPORT CMSP GOALS: BEST PRACTICES, LESSONS LEARNED, AND REQUIREMENTS**
» ***Windsor B***

Special Interest Meeting – 8:30 to 12:00
(See descriptions on page 16)
S05. **A COMPREHENSIVE AND INTERACTIVE APPROACH TO MAPPING SEA LEVEL RISE USING GIS**
» ***Hampton***

Special Interest Meetings – 1:00 to 3:00 p.m.
(See descriptions on page 17)
S06. **USABILITY: IMPROVING YOUR USER'S EXPERIENCE**
» ***Somerset***

S07. **USING TOOLKITS TO ADDRESS COASTAL AND MARINE RESOURCE ISSUES: LESSONS LEARNED IN CREATING TOOLKITS THROUGH COLLABORATIVE PROCESSES**
(canceled)

Special Interest Meetings – 1:00 to 4:00 p.m.
(See descriptions on page 18)
S08. **KEEPING IT SIMPLE: USING GOOGLE TOOLS TO DISPLAY YOUR GEOSPATIAL DATA AND ENHANCE STAKEHOLDER ENGAGEMENT**
» ***Windsor B***

S09. **ELEVATION BREAKLINES: DIFFERENT PERSPECTIVES**
» ***Hampton***

S10. **MAKING DATA SERVICES FOR THE WEB WORK FOR YOU**
(repeat of morning session)
» ***Windsor A***

Exhibitor Reception, Kensington D and E – 6:00 to 8:00 p.m.

TUESDAY, MARCH 22

Welcome and Keynote Address, Kensington Ballroom – 8:30 to 10:00 a.m.

NOAA Coastal Services Center Welcome

Nicholas Schmidt, Chief, Coastal Geospatial Services, NOAA Coastal Services Center
Margaret Davidson, Director, NOAA Coastal Services Center

Keynote Address

Dr. Jane Lubchenco, Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator (invited)

Break – 10:00 to 10:30 a.m.

Morning Sessions – 10:30 a.m. to 12:00 p.m.

See abstracts on page 20.

Coastal Hazards: Sea Level Rise Kensington A	**Coastal Land Use: Land Cover Analysis** Kensington B	**Coastal Mapping: Challenges and Solutions** Kensington C	**Coastal Hazards: Oil Spill Applications** Kensington F
A01. Evaluation of Analytical Techniques for Production of a Sea-Level Rise Advisory Mapping Layer for the National Flood Insurance Program	A04. High Resolution Land Cover Mapping in the Lower Columbia River Estuary	A07. Applications and Challenges of Coastal Zone Airborne Mapping	A10. ERMA and Geoplatform.Gov: Online Mapping Tools to Track Gulf Response
A02. Elevation and Tide Gauge Modeling to Assess Spatial and Temporal Vulnerability to Sea-Level Rise in Hawaii and American Samoa	A05. Mapping Developed Land Use Vs. Land Cover in Support of Large Aquatic Ecosystem Restoration Projects	A08. Planning for Perfect Weather: Coastal Imagery Capture in Humboldt Bay, California	A11. Airborne Hyperspectral Imaging of Oil Spills and Oil Impacted Areas
A03. Mapping and Visualizing Sea Level Rise and Coastal Flooding Impacts: Gulf Coast Examples	A06. High Resolution Is Not Enough: 30-Meter Land Cover Studies, Models and Tools of the University of Connecticut Center for Land Use Education and Research	A09. Challenges of Coordinating, Acquiring, and Processing Lidar Data for Complex and Difficult Coastal Locations	A12. Multiple Objective Approach to Restoration in the Gulf of Mexico: Utilizing Decision Support Technologies for Long Term Recovery

Exhibitor Lunch, Exhibitor Hall Open, Kensington D and E – 12:00 to 1:30 p.m.

Early Afternoon Sessions – 1:30 to 3:00 p.m.

See abstracts on page 28.

Coastal Hazards: Inundation Kensington A	**Coastal Land Use: Conservation and Planning** Kensington B	**Sediment Management** Kensington C	**The Digital Coast: Partnership Panel Discussion** Kensington F
B01. GIS Tools and Technologies for Coastal Flood Studies	B04. Louisiana's Coastal Forest Conservation Initiative: Spatial Decision Support System	B07. Bathymetric Lidar as a Tool for Mapping Bottom Materials in Coastal Environments	B10. The Digital Coast: What's in It for Me?
B02. Using GIS To Quantify the Risk in Coastal Areas from a 500-Year Flood Event	B05. An Overview of North Carolina's Strategic Habitat Area Designation Process	B08. Application of Satellite and Video Imagery to Advance Regional Sediment Management in Hawaii	
B03. Climate Change and Coastal Adaptation: Using GIS and Visualisation to Identify Issues Affecting Coastal Communities in Aberdeen, Scotland, UK	B06. Integrating Conservation and Land Use Planning at the Regional and County Level: A Case Study from the Georgia Coast	B09. GIS and Database Tools for Visualization of Sediment Sampling Data	

Break – 3:00 to 3:30 p.m.

Late Afternoon Sessions – 3:30 to 5:00 p.m.

See abstracts on page 34.

Coastal Hazards: Sea Level Rise Collaborations Kensington A	**Coastal Land Use: Digital Coast Applications** Kensington B	**Coastal Data: Efficiencies in Data Management** Kensington C	**Coastal and Marine Spatial Planning: State Examples** Kensington F
C01. Global Coastal Resilience Assessment Tool	C04. Creating an Online Community Resource Inventory for Georgetown County, South Carolina	C07. GDACT: Coordinating Geospatial Data Acquisition Activities in the Gulf of Mexico Using a Feature-Based Web Mapping Application	C10. The Oregon Marine Map Project: An Online Tool to Assist in Oregon's Ongoing Marine Spatial Planning Processes
C02. Regionally Consistent Methods for Sea Level Rise Inundation and Vulnerability Analysis in Southeast Florida	C05. Identifying Coastal Habitats for Conservation under Sea Level Rise Scenarios	C08. Python and Statistics and ArcMap—Oh My! Automating Statistical Analysis to Support Seagrass Monitoring	C11. Spatial and Economic Assessment of Current Use Activities in the Gulf of Maine and the Relevance to Marine Spatial Planning
C03. Pacific Islands Spatial Technology and Risk Management: Expanding Our Success through the Pacific Risk Management 'Ohana	C06. Coastal Land Cover Change 1996 to 2006 and into the Future	C09. Helping the Developing Caribbean Island of St. Lucia Build a National GIS	C12. Marine Spatial Planning and Offshore Renewable Energy: The Rhode Island Ocean SAMP

WEDNESDAY, MARCH 23

Early Morning Sessions – 8:30 to 10:00 a.m.

See abstracts on page 42.

Coastal Hazards: Habitat Impacts Kensington A	**Coastal Land Use: Modeling** Kensington B	**Social Science: Participatory GIS I** Kensington C	**Coastal Data: Discovery and Access I** Somerset
D01. Multi-Objective Priority Setting: Identifying Salt Marsh Areas Important for Biodiversity Conservation and Coastal Protection	D05. Modeling the Impact of Alternative Urban Infill and Redevelopment Scenarios on Water Quality in the Chesapeake Bay Watershed	D09. Mapping Marine Human Uses: Techniques and Lessons Learned from the Docks	D13. Washington Coastal Atlas: Informing Marine and Coastal Zone Resource Planning and Management
D02. Coastal Resilience: Decision Support and Local Solutions to Ecosystem-Based Coastal Adaptation	D06. 2d/3d Virtual Geospatial Modeling and Analysis: Applying Geodesign to Redevelopment in Highly Impacted Coastal Urban Areas	D10. Mapping Working Waters: A Participatory Human Use Mapping Initiative	D14. Data Basin: Expanding Access to Spatial Data, Tools, People, and Solutions
D03. Uncertainty in Elevation Data and Sensitivity to a Sea-Level Rise Estuary Habitat Model: Costs and Benefits of High Precision	D07. Mapping Policy Guidance for an Ecosystem Service Approach to Shoreline Protection Via a Geospatial Shoreline Management Model	D11. Mapping Human Uses of the Ocean: Informing Coastal and Marine Spatial Planning through Participatory GIS	D15. GIS Data Management Using eCoastal at the U.S. Army Corps of Engineers San Francisco District
D04. What to Believe: Factors for Consideration in Evaluating Marsh Impacts from Sea Level Rise	D08. Application of NASA's Coastal Online Assessment and Synthesis Tool (COAST) for Implementation of Best Management Practices	D12. Building Tools for Stakeholder Engagement: Examining the Design Decisions of MarineMap	D16. Data Sharing: What Works—What Doesn't

Break – 10:00 to 10:30 a.m.

Late Morning Sessions – 10:30 a.m. to 12:00 p.m.

See abstracts on page 52.

Coastal Hazards: Resilience Tools Kensington A	**Coastal Mapping: Shoreline Methods** Kensington B	**Social Science: Participatory GIS II** Kensington C	**Coastal Data: Discovery and Access II** Somerset
E01. Storm Surge Visualization Tools for Conveying Risk and Uncertainty	E05. Creating Tide Stage Lines from Lidar and VDatum	E09. Filling in the Gaps: Participatory Human-Use Mapping in Massachusetts' Ocean Waters Using a Web-Based Open-Source Technology Stack	E13. Virtual Data Collaboration and Visualization for Coastal Emergency Planning and Management in Oregon
E02. Community Resilience Index: A Remote Sensing Approach to Evaluate Post-Disaster Recovery of Ecosystem Services	E06. The Implementation of Marine Laser Survey Technology for Detailed Shoreline Mapping	E10. Shifting Perspectives: Applying Geospatial Tools to Spatial Planning in Coastal Watersheds	E14. A Framework for Geospatial Applications and Decision Support for the Northern Gulf Institute
E03. The Whole Is Greater Than the Sum of Its Parts: Multi-Component Collaborative Survey Generates Enhanced Data Products for Coastal Resiliency in Mobile Bay, Alabama	E07. Development in Tide-Coordinated Shoreline Mapping	E11. Human Use Mapping Methods in the Marine and Coastal Zone	E15. The IOOS Data Catalog: Harvesting and Displaying IOOS Web Services
E04. Enhancement of the Social Vulnerability Index (SoVI) for Use in Assessing Coastal Risk	E08. VDatum Model Validation with a GNSS Buoy	E12. Make Your Own Map: Collecting and Using Stakeholder Information through Participatory GIS (PGIS)	E16. The GIS Inventory: Up Close and Personal

Plenary Lunch, Kensington Ballroom – 12:00 to 2:00 p.m.

The GeoCloud—What Is It and Why Should I Care?

Anne Hale Miglarese, Booz Allen Hamilton

Zsolt Nagy, AECOM

There is lots of talk about cloud computing as the future of technology. What does this mean and what will it entail for those of us who work in geospatial technology? Come listen to an engaging discussion of geospatial technology in a cloud computing environment.

Afternoon Sessions – 2:00 to 3:30 p.m.

See abstracts on page 61.

Coastal Mapping: Approaches to Seafloor Mapping Kensington A	**Coastal and Marine Spatial Planning: Habitat Conservation** Kensington B	**Social Science: Data Applications** Kensington C	**Coastal Data: Processing and Techniques** Somerset
F01. Mapping of All California State Waters' Seafloor for a Statewide MPA Network and Comprehensive Coastal Zone Geospatial Information	F05. An Online Marine Mammal Habitat Modeling System for The U.S. East Coast and Gulf Of Mexico	F09. Losing Ground: Mediterranean Shoreline Change from an Environmental Justice Perspective	F13. Enhanced Processing of Bathymetric Lidar Data
F02. Imagery Interpretation for Coastal and Marine Spatial Planning	F06. SPARC: A Proof of Concept Tool to Spatially Assess Marine Resources off the California Coast	F10. The Use of Spatial Narratives to Promote Stewardship of the Great Lakes	F14. No Estuarine Intertidal Bathymetry? No Worries! Estimating Intertidal Depths from Readily Available GIS Data
F03. Seafloor Mapping Using Side Scan Sonar and Remotely Operated Vehicles at the Richard Stockton College of New Jersey	F07. Documenting Seagrass Recovery in a Coastal Bay System: Integrating Field and Aerial Observations	F11. Reverse 911 for Non-Immediate Hazard Warnings	F15. Advances in Coastal Digital Elevation Models
F04. Bathymetric Lidar over Lake Superior Supports Great Lakes Restorative Efforts	F08. Development of a Coastal Resources Atlas and Vulnerability Index	F12. Mapping the Coastlines: A Cadastral Perspective	F16. Mapping Inundation Uncertainty with a Standard Score (Z- Score) Technique

Break – 3:30 to 4:00 p.m.

Tools Showcase, Windsor Ballroom – 4:00 to 6:00 p.m.

See abstracts on page 70.

T01. National Aquaculture Sector Overview (NASO)
T02. Multipurpose Marine Cadastre
T03. NOAA's State of the Coast
T04. National Ocean Service Web Mapping Applications
T05. The Digital Coast Data Access Viewer (Beta)
T06. National Map Data and Services
T07. Southeast and Caribbean Data Explorer
T08. New York Ocean and Great Lakes Geodata Portal
T09. Tools to Integrate IOOS Data in ArcGIS 10
T10. Coastal County Snapshots
T11. Sea Level Rise Impacts Viewer
T12. New Directions in Ecosystem-Based Management Tools
T13. Marine Geospatial Ecology Tools (MGET)
T14. ChesapeakeSTAT
T15. The Estuary Data Mapper
T16. Land Cover Atlas
T17. SLAMM-View 2.0
T18. CanVis: A Tool for Visualization
T19. ERMA and Geoplatform.gov: Online Mapping Tools to Track Gulf Response
T20. The Bathymetric Information System

Reception, Kensington Ballroom – 7:00 to 10:00 p.m.

THURSDAY, MARCH 24

Early Morning Sessions – 9:00 to 10:30 a.m.

See abstracts on page 81.

Coastal Hazards: Risk Data Kensington A	**Coastal Data: Navigation Data Integration and Standards** Kensington B	**Coastal and Marine Spatial Planning: Inventories** Kensington C	**Tools for Fisheries Management** Kensington F
G01. Lasers in the Rainforest: Developing High Accuracy Elevation Data in American Samoa with a Mobile Lidar	G04. Integration of Multibeam Echosounder and Airborne Lidar Bathymetric and Topographic Data for Surveying Complex Coastal and Deep Bathymetry for Navigational Charting and Coastal Zone Management	G07. GAME: Evaluating Available Data for the Gulf of Mexico through Experts' Opinions	G10. AppGeo's Sector Management Application Enables New England Ground Fisheries to Manage Fishing Quotas
G02. Integrated Hazard, Risk and Loss Assessment in Data-Poor Regions	G05. Coastal Channel Data: Cooperative Production of a NOAA/USACE Data Framework	G08. Expanding the U.S. Marine Protected Area Inventory: What Coastal and Marine Resources Are Really Protected?	G11. Local Resource Management Goes Digital: Improving Municipal Shellfisheries Management with Interactive Mapping Technology
G03. Developing an Atlas of Community Anchor Institutions for Louisiana's Coastal Parishes	G06. *See Addendum*	G09. The Coastal and Marine Ecological Classification Standard (CMECS): A Framework for Effective Coastal and Marine Spatial Planning	G12. Application of Thermal Infrared Remote Sensing in Rivers and Streams: Understanding the Availability of Thermal Habitat for Cold Water Fish Species

Break – 10:30 to 11:00 a.m.

Late Morning Sessions – 11:00 a.m. to 12:30 p.m.
See abstracts on page 88.

Coastal Hazards: Shoreline Change Kensington A	Coastal Data: Fusion and Integration Kensington B	Coastal Mapping: Seafloor Characterization Kensington C	Coastal Data: Elevation Kensington F
H01. USACE Coastal Change Analysis in Response to the November 2009 Mid-Atlantic Nor'easter	H04. The Forefront of Data Production: Saving Time and Money through Automation	H07. Ground Truth Operation for Seafloor Characterization	H10. Using Bathymetric Lidar to Mitigate the Effect of Natural Disasters on Environment and Economy
H02. New Jersey GIS-Based State-Wide Beach-Dune System Susceptibility Assessment: Applications and Verification	H05. Hyperspectral and Lidar Fusion for Land Cover Classification and Change Assessment	H08. Fine-Scale Sediment Distribution at the Mouth of the Merrimack River	H11. The Northeast Multiphase Lidar Project
H03. New Jersey Beach Profile Network: Monitoring Shoreline Changes in New Jersey Reaches One through Fifteen Raritan Bay to Delaware Bay	H06. Geospatial Data Fusion for Coastal Environmental Applications	H09. Seafloor Characterization Using Airborne Hyperspectral Co-Registration Procedures Independent from Attitude and Positioning Sensors	H12. Building a Nationwide Elevation Inventory

Conference Abstracts and Detailed Agenda

MONDAY, MARCH 21

Special Interest Meetings

8:30 to 10:00 a.m.

S01. **SHARING GEOSPATIAL INFORMATION THROUGH WEB-BASED LEARNING**
» ***Somerset***

Web-based learning is becoming an increasingly popular mechanism to share information. This session will include interactive group discussions about virtual geospatial training, with the goal of better understanding people's likes and dislikes about virtual training, the materials and topic areas that best lend themselves to webinars, common delivery mechanisms, and potential pitfalls. Invited speakers from various agencies will also be asked to share some of their experiences, as well as tips and tricks, on delivering virtual training sessions. All attendees will be strongly encouraged to participate in the discussions.

8:30 to 11:30 a.m.

S02. **GETTING TO KNOW NOS' SOCIOECONOMIC INFORMATION PRODUCTS—AND GETTING YOUR FEEDBACK!**
» ***Windsor C***

The coastal management community is challenged to better understand and incorporate socioeconomic information into the management of coastal resources. This session will introduce GIS users, developers, managers, and other technical staff members to key National Ocean Service (NOS) products that either provide access to socioeconomic data and tools, or help build awareness of the value of incorporating socioeconomic information into coastal management decision-making. Participants will have time to interact with the products and those developing them, learn about the underlying data, provide feedback on these products, and participate in discussions for future socioeconomic needs related to coastal resource management.

S03. **MAKING DATA SERVICES FOR THE WEB WORK FOR YOU**
» ***Windsor A***

This session, building on the concepts of the "REST\SOAP Services Special Interest Meeting" conducted during GeoTools '09, will educate attendees on the range of considerations typically encountered while preparing data for Web services and while searching for and evaluating Web services to ingest and consume. A presentation will provide an overview of common standards surrounding data services, provide best practices for developing services, demonstrate how to use data catalogs to find services, and explain how to consume and utilize services. This special interest meeting will emphasize the large number of data resources available for data managers to mine and use within ESRI or open source applications, with little to no development needed. This session is intended for geospatial technicians and GIS managers.

8:30 a.m. to 12:00 p.m.

S04. **BUILDING COASTAL WEB ATLASES TO SUPPORT CMSP GOALS: BEST PRACTICES, LESSONS LEARNED, AND REQUIREMENTS**
» ***Windsor B***

The recently released National Ocean Policy, including the Framework for Effective Coastal and Marine Spatial Planning (CMSP), calls for the development of regional data portals and analytical tools to support comprehensive CMSP. Coastal Web atlases (CWAs) are online information resources that can help build collaborative relationships within and across state, regional, national, and international areas to foster more effective management of coastal and ocean resources and activities. The mission of the International Coastal Atlas Network (ICAN) is to share experiences and to find common solutions to CWA development, increasing awareness of the opportunities that exist for coastal and marine data sharing among policy makers and resource managers This special interest meeting will focus on the identification of best practices and lessons learned from the ICAN community, and will identify common elements that can be used from ICAN and other state and regional efforts to build a geospatial technology support network for regional CMSP. Attendees will be asked to share their knowledge of CMSP-related activities in their geographies, brainstorm on how they can work together within regions, and discuss potential opportunities for future collaborations.

S05. **A COMPREHENSIVE AND INTERACTIVE APPROACH TO MAPPING SEA LEVEL RISE USING GIS**
» ***Hampton***

The purpose of this course is to provide the attendee with a wide range of current and relevant information on coastal inundation, with an emphasis on mapping sea level rise using GIS. The course is a combination of lectures and interactive demonstrations focused on topics relevant to coastal inundation, including resources available for products and data, enhanced spatial methods used to delineate flood areas in a coastal environment, visualization techniques, and more. Each lecture will be followed by a live demonstration of the covered material, allowing the attendee to see the methods for producing high-quality inundation products. The information and techniques in the short course are based on NOAA's two-day hands-on inundation mapping course and will follow a four-step process for mapping inundation as outlined in the NOAA Coastal Services Center's Coastal Inundation Toolkit. This workshop is designed for certified floodplain managers, National Weather Service personnel, and state, county, and municipal officials and planners.

1:00 to 3:00 p.m.

S06. **USABILITY: IMPROVING YOUR USER'S EXPERIENCE**
» ***Somerset***

Good usability of a site—be it a website or a geospatial application—can be the difference between users singing your praises or banging their heads against their keyboards. And it isn't just the responsibility of the developer designing the site to ensure that it is usable. The content can have just as big an impact on the usability, and the ultimate success or failure, of that website. By attending this session, participants will change the way they look at their content, their site, and their users.

S07. **USING TOOLKITS TO ADDRESS COASTAL AND MARINE RESOURCE ISSUES: LESSONS LEARNED IN CREATING TOOLKITS THROUGH COLLABORATIVE PROCESSES**
» ***Canceled***

1:00 to 4:00 p.m.

S08. **KEEPING IT SIMPLE: USING GOOGLE TOOLS TO DISPLAY YOUR GEOSPATIAL DATA AND ENHANCE STAKEHOLDER ENGAGEMENT**
» ***Windsor B***

This interactive session will demonstrate several simple, yet surprisingly effective, techniques available for free from Google for integrating interactive mapping and geographic data sharing into your websites. Techniques range from simply creating points, lines and/or polygons in a Google web interface, to leveraging Google basemaps with existing geospatial data. The session will provide an opportunity to use Google tools to effectively convey geographic data and information over the web, without requiring knowledge of or access to sophisticated online mapping programs.

S09. **ELEVATION BREAKLINES: DIFFERENT PERSPECTIVES**
» ***Hampton***

Take part in an interactive session discussing the different kinds of elevation breaklines and their uses in digital elevation model (DEM) generation and hydraulic and hydrologic analyses. Lidar data acquisition and processing technologies have matured to the point that some in the mapping community question the necessity of elevation breaklines for flood and inundation mapping. The "user community" is still trying to figure out when breaklines are necessary, what kind of breaklines they need, and what the breaklines will be used for. These are important questions as the generation of breaklines can significantly increase the cost of an elevation data set. In this special interest meeting, a panel consisting of both providers and users of elevation breaklines will attempt to answer these questions by providing real life examples of how they have used breaklines in their elevation projects. Participants will have the opportunity to ask questions and discuss their issues with the panelists during this special interest meeting.

S10. **MAKING DATA SERVICES FOR THE WEB WORK FOR YOU**
(repeat of morning session)
» ***Windsor A***

This session, building on the concepts of the "REST\SOAP Services Special Interest Meeting" conducted during GeoTools '09, will educate attendees on the range of considerations typically encountered while preparing data for Web services and while searching for and evaluating Web services to ingest and consume. A presentation will provide an overview of common standards surrounding data services, provide best practices for developing services, demonstrate how to use data catalogs to find services, and explain how to consume and utilize services. This special interest meeting will emphasize the large number of data resources available for data managers to mine and use within ESRI or open source applications, with little to no development needed. This session is intended for geospatial technicians and GIS managers.

Exhibitor Reception

Kensington D and E – 6:00 to 8:00 p.m.

Meet the exhibitors in Kensington D and E and the Cambridge Hall area at Kingston Plantation for an informal reception and viewing of the conference exhibits. Light hors d'oeuvres and a cash bar will be provided. Note that nonregistered guests will incur an added cost of $50 per person.

TUESDAY, MARCH 22

Welcome and Keynote Address

Kensington Ballroom – 8:30 to 10:00 a.m.

NOAA Coastal Services Center Welcome

Nicholas Schmidt, Chief, Coastal Geospatial Services, NOAA Coastal Services Center

Margaret Davidson, Director, NOAA Coastal Services Center

Keynote Address

Dr. Jane Lubchenco, Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator (invited)

Break

10:00 to 10:30 a.m.

Morning Sessions

10:30 a.m. to 12:00 p.m.

Coastal Hazards: Sea Level Rise

» *Kensington A*

A01. **EVALUATION OF ANALYTICAL TECHNIQUES FOR PRODUCTION OF A SEA- LEVEL RISE ADVISORY MAPPING LAYER FOR THE NATIONAL FLOOD INSURANCE PROGRAM**

Brian Batten, Dewberry

Taylor Asher, URS Corporation

The Federal Emergency Management Agency (FEMA) is conducting a proof-of-concept study to evaluate the feasibility of producing sea-level rise (SLR) advisory layers as a follow-on product to coastal Flood Insurance Studies (FIS). Conceptually, the SLR layer would be non-regulatory, helping communities identify and adapt to potential changes in flood hazards for SLR scenarios. The primary objective of the study is to evaluate the cost-effectiveness and accuracy of various methodologies in the context of available funding constraints and uncertainty in long-term sea level change projections. The study will provide FEMA with a recommended production method, advisory use guidance, and recommendations for follow-on pilot studies.

The analytical techniques being assessed by the study team make use of existing data and represent a range of rigor for calculating storm surge elevations and wave heights A baseline was established through a robust FIS- type approach using ADCIRC (surge) and WHAFIS (overland wave). This baseline provides a benchmark to evaluate the relative cost-effectiveness and accuracy of less rigorous approaches. Alternative approaches being evaluated include: changes in surge calculated by SLOSH or linear superposition; and changes in overland waves calculated by the HAZUS Flood Information Tool (less detailed version of WHAFIS) or geo-processing of the effective DFIRM is superimposed on the updated surge condition.

This talk will provide an overview of the study and focus on the relative accuracy of each method in predicting changes to coastal flood hazards for the various methodologies. Challenges, lessons learned, and plans for future activities will also be discussed.

A02. **ELEVATION AND TIDE GAUGE MODELING TO ASSESS SPATIAL AND TEMPORAL VULNERABILITY TO SEA-LEVEL RISE IN HAWAII AND AMERICAN SAMOA**

Matthew Barbee and Charles Fletcher, School of Ocean and Earth Science and Technology, University of Hawaii

Arielle Levine, NOAA Coral Reef Conservation Program

Jamieson Carter, NOAA Pacific Services Center

Matt Dyer, Hannah Cooper, Julius Paulo, and Tiffany Anderson, School of Ocean and Earth Science and Technology, University of Hawaii

Modeling sea-level rise impacts is important to planning adaptation. We assess spatial vulnerability using LiDAR-derived digital elevation models (RMSE(z) at 95% CL = 0.41 m; RMSE (x,y) at 95% CL = 2 m). We assess temporal vulnerability by removing the trend and tidal component of water level history from local tide gauge records (Honolulu, Kahului, Pago Pago). The residual represents historical local sea level variability. This is the basis for predicting future sea level variability on a smoothly accelerating trend to 2100 based on best (0.75 m) and worst (1.9 m) case scenarios (corrected for land movement) after Vermeer and Rahmstorf (2009). In the villages of Amouli and Vatia, American Samoa, spot elevations collected using kinematic GPS and Total Station surveys refine and correct existing coarse resolution elevation models and, with community scale GIS layers of infrastructure, are used to create terrain models. In Hawaii, airborne LiDAR terrain data is integrated along the coastal plains of Maui and Oahu to create elevation models. On Maui, for instance, we predict worst case exceedance of the +25 cm contour (MHHW): 1 week per year 2020-2030; 6 weeks per year 2040-2050, and 10 months per year 2060-2070. The resulting impact maps are provided to planners and communities through education-based programs to bring awareness of the potential effects of sea-level rise. As recommended by the NOAA and USGS

"community framework for responding to SLR and inundation", these results provide the geographic scope and temporal scales of concern for formulating SLR adaptation plans.

A03. MAPPING AND VISUALIZING SEA LEVEL RISE AND COASTAL FLOODING IMPACTS: GULF COAST EXAMPLES

Douglas Marcy, NOAA Coastal Services Center

It is one thing to have a discussion or write about a one- or two-foot rise in the ocean surface and the potential impacts to a local community, and it is another to show someone a map, highlighting the areas that will potentially be impacted. The ability to visualize the potential height and inland extent of water gives us a better understanding of the corresponding impacts and consequences. Mapping sea level changes in a GIS gives the user the ability to overlay the potentially impacted areas with other data such as critical infrastructure, roads, ecologically sensitive areas, demographics, and economics. Providing maps on the Web via Internet mapping technologies enables the user to have an interactive experience that truly brings out the "visual" part of the map definition. Over the past several years, the lessons learned from investigating pilot sea level change mapping applications have led to the development of a next generation sea level rise and coastal flooding viewer. In addition, new mapping techniques have been developed to use high-resolution data sources to show flooding impacts on local public infrastructure; mapping confidence; flooding frequency; marsh impacts; and social and economic impacts from potential inundation. This paper will provide a brief history of previous sea level change visualization pilots and a detailed discussion of new methods, the current status of new tool development and outputs, and future plans for expanding to the rest of the U.S.

Coastal Land Use: Land Cover Analysis

» ***Kensington B***

A04. HIGH RESOLUTION LAND COVER MAPPING IN THE LOWER COLUMBIA RIVER ESTUARY.

Keith Marcoe, Lower Columbia River Estuary Partnership

Tyler Bax, Sanborn Map Company

The lower Columbia River and estuary is a complex ecosystem that supports hundreds of species of animals and is home to hundreds of thousands of people. The Lower Columbia River Estuary Partnership (LCREP) works to protect this nationally significant estuary through ecosystem monitoring, habitat restoration, and educational programs. Up-to-date, detailed land cover data, that accurately identifies wetland vegetation and other estuarine features, is vital to support these activities. When the Estuary Partnership was interested in developing such land cover data, they began discussions with NOAA's Coastal Change Analysis Program (C-CAP) and, by partnering with NOAA, were able to capitalize on the mapping framework they developed with private industry partner The Sanborn Map Company. Through this partnership, and the innovative approaches used by Sanborn in this mapping project, the partners were able to develop necessary high resolution land cover within a limited budget. This presentation will discuss the roles each of these groups has played in this data development, as well as specifics related to the actual data developed. Discussion will include the use of image segmentation and object based classification techniques to improve high resolution classification, challenges associated with tide and river conditions and the selection of multiple resolution imagery, usefulness and impact of LiDAR data, the classification scheme used and challenges encountered, as well as the resulting classification and accuracy assessment.

A05. MAPPING DEVELOPED LAND USE VS. LAND COVER IN SUPPORT OF LARGE AQUATIC ECOSYSTEM RESTORATION PROJECTS

Peter Claggett, Frederick Irani, and Renee Thompson, U.S. Geological Survey

While only about 10% of the Chesapeake Bay watershed is developed, developed areas contribute 23% of non-point sources of the total delivered nitrogen load (including atmospheric deposition on urban lands) to the Bay. Digital maps representing impervious and pervious developed lands derived from Landsat satellite imagery are critical to measuring the urban footprint as an input to watershed models used to estimate nutrient and sediment loads to large aquatic ecosystems such as the Chesapeake Bay. While such datasets often represent the only affordable, available, and spatially-consistent representation of land cover, they can grossly underestimate the extent of developed land uses. This study quantifies and compares impervious and pervious surface estimates for developed lands based on land cover with those derived using a combination of land cover, road, and housing datasets. Rural and suburban areas exhibit the largest differences in the extent of developed land cover compared with land use. Differences between developed land cover and land use are less apparent in dense urban areas. As a result, watershed models calibrated with land cover data may underestimate the contribution of nutrient and sediment loads from developed lands and likely overestimate the contribution of non-point source loads from farmlands and forests.

A06. HIGH RESOLUTION IS NOT ENOUGH: 30-METER LAND COVER STUDIES, MODELS AND TOOLS OF THE UNIVERSITY OF CONNECTICUT CENTER FOR LAND USE EDUCATION AND RESEARCH

Emily Wilson and Chester Arnold, Center for Land Use Education and Research, University of Connecticut

With so much high resolution imagery out there, it's probably been awhile since you heard anyone clamoring for 30-meter resolution data. However, several longstanding projects at the University of Connecticut Center for Land Use Education and Research (CLEAR) demonstrate that 30-meter land cover data, and landscape analysis tools making use of that data, can still be enormously useful to land use decision makers at the state and local levels. CLEAR's Connecticut's Changing Landscape project charts changes in land cover, statewide, from 1985-2006 (soon to be expanded to 2010). The land cover change data, presented in a wide range of formats on the project website, is extensively used by researchers, nonprofit organizations, state agencies, land use commissioners, and citizens from around the state. Beyond the simple change data, studies and tools derived from the data include riparian corridor analysis, prime agricultural lands analysis, and forest fragmentation – the latter of which is included on the Digital Coast site and as a tool in CommunityViz software. As with the parent study, each of these analyses is accompanied by a website designed to facilitate access to the project information for users of varying degrees of geospatial sophistication. In addition, the information is folded into a number of CLEAR's outreach programs for local land use decision makers. This presentation will include brief descriptions of these studies, information and selected examples of regional, state and local uses of the data, and live demonstrations of selected sites.

Coastal Mapping: Challenges and Solutions

» *Kensington C*

A07. APPLICATIONS AND CHALLENGES OF COASTAL ZONE AIRBORNE MAPPING

Edward Saade, Dave White, and Richard McClellen, Fugro

As NOAA and similar agencies world wide focus their attention on coastal zone issues, airborne mapping activity has expanded into areas that present multiple challenges to field operations and geospatial data production. Recent projects have been designed to support research and policy decisions on a variety of needs, including CMSP, sea-level rise baseline, LULC analysis, coastal erosion and the Digital Coast. High resolution LIDAR data and digital imaging systems have been actively deployed via fixed-wing aircraft to collect precise information through thousands of miles of flight lines along the west coast of the United States. This paper presents an analysis of the challenges involved in airborne mapping of coastal environments for the production of accurate geospatial information, including the impacts of weather, low clouds and fog, military operations, tide windows and coordinating multi- agency participation.

A08. PLANNING FOR PERFECT WEATHER: COASTAL IMAGERY CAPTURE IN HUMBOLDT BAY, CALIFORNIA

Mark Meade and Rob Hudson, Photo Science

The National Oceanic and Atmospheric Administration Coastal Services Center (CSC) contracted with Photo Science to acquire aerial imagery to map submerged aquatic vegetation (SAV) for natural resource management initiatives underway in Humboldt Bay, CA. SAV mapping required imagery to be captured at a negative tide, with tight sun angle and optimal weather parameters. Calculating acceptable tidal control and sun angle scenarios resulted in only 40 possible acquisition days over a two year period. Out of those 40 potential days, humbling weather conditions prohibited acquisition to only two possible days within less than a two hour window. In response to this challenge, Photo Science created a Flight Planning Application for aerial flight operations to compare tide, sun angle, and weather by date. This unique ability to "calibrate" local tide gauges based on barometric pressure and wind speed and direction offered unparalleled capabilities for flight planning. Photo Science also collaborated with its stakeholders to create a formal protocol for daily flight operations. This protocol was used successfully to obtain the Humboldt Bay imagery and reflected the true collaborative nature off all project stakeholders. What once took days and hours of planning now can be done in less than half an hour. Incorporating this automated flight planning technique will save time and money for government agencies and contractors for future projects.

A09. CHALLENGES OF COORDINATING, ACQUIRING, AND PROCESSING LIDAR DATA FOR COMPLEX AND DIFFICULT COASTAL LOCATIONS

Tim Blak, Dewberry

The Channel Islands National Park is comprised of five islands that are geographically and biologically diverse due to their protected isolation off the coast of Santa Barbara CA. These fragile ecosystems are home to more than 2000 plants and animals in which 145 are found only on these islands. In keeping with Congress's plan to preserve and monitor these unique resources, Dewberry under a task order from the USGS provided highly accurate, extremely dense LiDAR data using the latest helicopter based LiDAR Technology. The challenges were many; to accurately map the diverse topography remotely with no ability to land on the islands for base station data collection or fuel, to collect during low tide and high spring windy conditions, to collect prior to nesting season for some rare birds, to coordinate with stakeholders to gain limited low impact

access to provide a minimal number of survey checkpoints, to process and classify LiDAR for the diverse topography consisting of mountains, deep canyons, and the craggy coastline cliffs which are home and vital to the endangered brown pelicans, sea lions and harbor seals. This presentation will focus on the challenges of coordinating, acquiring, and processing this difficult dataset.

Coastal Hazards: Oil Spill Applications

» *Kensington F*

A10. ERMA AND GEOPLATFORM.GOV: ONLINE MAPPING TOOLS TO TRACK GULF RESPONSE

George Graettinger, Michele Jacobi, Ben Shorr, Amy Merten, NOAA National Ocean Service, Office of Response and Restoration

Kari Sheets, NOAA National Weather Service, Office of Science and Technology

The Environmental Response Management Application (ERMA) and the new federal GeoPlatform website, www.GeoPlatform.gov/gulfresponse, the public face of ERMA, have been deployed to answer questions using detailed near-real-time information about the response and environmental impacts of the Deepwater Horizon/BP oil spill with clarity and transparency.

ERMA and GeoPlatform, developed though a joint partnership with the University of New Hampshire and other response partners incorporates response and environmental data from the various agencies that are working together to address the Deepwater Horizon Oil spill. ERMA is provides data visualization for the spill and the Natural Resource Damage Assessment. ERMA has also been named as the Deepwater Horizon Common Operational Picture (COP) by Admiral Allen the National Incident Commander.

ERMA was originally designed for responders who make operational decisions and recommendations for the oil spill response. ERMA integrates the latest data on the oil spill's location, fishery closures, wildlife impacts and other place-based Gulf Coast resources into one interactive map that is designed to be fast, user-friendly and constantly updated. ERMA facilitates communication and coordination among a variety of users—from federal, state and local responders to local community leaders and the public.

ERMA includes data from all federal partners and the Gulf States. Agencies contribute data through the response data sharing mechanism across the command posts. This includes posting geospatial data on a common server, providing access, and Web data services supporting use for multiple GIS platforms. The architecture is based on a familiar Google Maps-type interface and Web-mapping services built upon Open Source technology. ERMA is a proven tool in supporting response and damage assessment decision-making.

A11. AIRBORNE HYPERSPECTRAL IMAGING OF OIL SPILLS AD OIL IMPACTED AREAS

Michael Frank and Zhihong Pan, Galileo Group

In late June 2010, Galileo Group Inc. performed a study to collect high-resolution hyperspectral imagery over oil- impacted areas in the Gulf of Mexico, including wetlands, beaches and open water with various levels of oil impact, to determine whether the imagery was capable of providing timely assistance in containment and abatement. This presentation looks at Galileo's study and discusses its findings. It demonstrates how environmentally sensitive areas can be targeted for protection and cleanup and how long-term damage can be minimized through the use of hyperspectral time-sequenced images to guide efforts in real-time.

A12. MULTIPLE OBJECTIVE APPROACH TO RESTORATION IN THE GULF OF MEXICO: UTILIZING DECISION SUPPORT TECHNOLOGIES FOR LONG TERM RECOVERY

Zach Ferdaña, Michael Beck, and Laura Geselbracht, The Nature Conservancy

Unlike hurricane Katrina, which devastated the human built infrastructure of communities along the northern Gulf of Mexico coast, the physical damage caused by the Deepwater Horizon oil spill mostly affected natural infrastructure – salt marshes, oyster reefs and barrier island ecosystems. This natural infrastructure is at the very center of the region's economy. Now that the spill has stopped the even larger job of a massive recovery and ecosystem restoration effort is underway. One of the impediments to previous efforts towards large-scale conservation and restoration has been a lack of cohesive information about the region's natural systems. The Nature Conservancy (TNC) is providing decision support by developing an interactive web-based mapping application (http://globalcoastalresilience.org) to consolidate information and help prioritize and monitor restoration activities. While much information exists on northern Gulf of Mexico ecosystems and the spill, it is scattered, not easily accessible in a format that stakeholders can readily use. In partnership with NOAA, Esri, University of Southern Mississippi and a variety of state agencies, TNC is developing this decision support application intended to (1) illustrate data on natural and human infrastructure at multiple scales in a common data model, (2) initiate a geoaccounting approach and incorporate specific geodesign elements by developing analytical tools to facilitate restoration priorities and (3) incorporate

information on sea level rise, storm surge, and salt marsh migration. Our Gulf restoration decision support represents an ecosystem-based, coastal and marine spatial planning framework that incorporates ecological, socioeconomic and coastal hazard features together in a single application.

Exhibitor Lunch

Exhibitor Hall Open: Kensington D and E – 12:00 to 1:30 p.m.

Early Afternoon Sessions

1:30 to 3:00 p.m.

Coastal Hazards: Inundation

» ***Kensington A***

B01. **GIS TOOLS AND TECHNOLOGIES FOR COASTAL FLOOD STUDIES**

Chris Mack, AECOM

Coastal flood studies are developed with the significant integration of GIS. This presentation will provide an overview of how customized GIS tools and technologies are applied for each study phase, which includes: 1) Digital terrain development, 2) Coastal hazard analysis, and 3) Floodplain mapping. Development of the terrain surface requires the integration of multiple variant topographic and bathymetric data sources. Resolution of issues involving geospatial edge matching, datum conversions, and proper projections is accomplished with AECOM's WISE Terrain Analysis package. Coastal hazard analysis involves the modeling of overland wave propagation using FEMA's Wave Height Analysis for Flood Insurance Studies (WHAFIS). This analysis requires custom GIS tools used to extract ground elevations, land use, and obstruction features used to support the wave modeling process. Obstructions are measured in the field using custom GIS/GPS enabled field data collection systems. In addition, identification of the Primary Frontal Dune (PFD) and the accompanying erosion analysis is semi-automated using Coastal WISE erosion module. WHAFIS modeling input and visualization of computed results provides for rapid assessment and validation of modeled flood hazards of surge and waves in an interactive GIS-based modeling environment called Coastal WISE. Floodplain mapping is conducted within AECOM's Coastal WISE module, which streamlines the interpretation of WHAFIS modeling results along transects to connected flood zone boundaries. Features such as the Primary Frontal Dune (PFD), Limit of Moderate Wave Action (LiMWA), coastal A-zones, and V-zones are mapped as well.

B02. **USING GIS TO QUANTIFY THE RISK IN COASTAL AREAS FROM A 500-YEAR FLOOD EVENT**

Susan Phelps, AECOM

Mark Crowell, Federal Emergency Management Agency

FEMA has conducted several demographics studies to estimate U. S. population living in coastal areas. In a 2007 study, FEMA presented a method to determine coastal population based on whether a county bordered the coast (or associated sheltered water bodies) or contained velocity zones (V Zones) as defined by FEMA. However, V Zones only account for the subset of coastal flood hazard areas that are impacted by significant wave action or high-velocity waters. Coastal AE Zones, areas subject to coastal flooding but not impacted by the significant wave action/high velocity waters associated with V Zones, must also be considered. In 2010, FEMA completed an update to the original study, developing methods to approximate boundaries defining the landward extent of 100-yr coastal floods. It was concluded that slightly more than 3% of the total U.S. population live in 100-yr coastal flood hazard areas (includes the Great Lakes) as defined by FEMA. However, the 3% figure should not be considered an upper bounds on population exposed to coastal flood hazards, as there are numerous examples where coastal floods more rare than the 1% annual chance coastal flood have occurred and damaged homes. If less-frequent coastal flood events were considered, such as the 500-yr coastal flood, then larger swaths of land and associated population would be affected. Accordingly, this presentation provides an overview of geospatial tools and methods to determine the 500-yr coastal flood hazard boundary, and estimates of population subject to 500-year coastal flooding.

B03. **CLIMATE CHANGE AND COASTAL ADAPTATION: USING GIS AND VISUALISATION TO IDENTIFY ISSUES AFFECTING COASTAL COMMUNITIES IN ABERDEEN, SCOTLAND, UK**

David Green, Guillaume De La Fons, Thomas Bedford, and Thomas Danks, University of Aberdeen

IMCORE (Innovative Management for Europe's Changing Coastal Resource) is an EU funded Interreg IVB project focusing on how the coastal areas of North West Europe can best be adapted to climate change. As part of this project a number of practical GIS-based workshops were designed to explore the various different ways that GIS and geovisualisation tools can be used to engage local communities in climate change issues that will have a potential impact on their physical environment, livelihood, and the local infrastructure. The paper outlines the development and hosting of a number of these workshops designed to engage the local stakeholders in identifying the impacts of climate change. The examples focus on one climate change scenario, namely that of flooding. The study areas, Aberdeen City and Stonehaven in Scotland, are both coastal settlements on the east coast of the UK. The UKCIP report identifies increased rainfall as a significant

feature of Scotland's future climate. Already there is some evidence that rainfall has increased in frequency, intensity and duration. The end result has been increased flooding incidents where areas are flooded more frequently, whilst high run-off and high tides often leads to flooding of the areas surrounding rivers and small streams, as well as low-lying coastal areas. The use of GIS and geovisualisation tools offers a more interactive and experimental environment for people to engage with local issues by providing the means to examine different information in the form of spatial datasets.

Coastal Land Use: Conservation and Planning

» ***Kensington B***

B04. LOUISIANA'S COASTAL FOREST CONSERVATION INITIATIVE: SPATIAL DECISION SUPPORT SYSTEM

Steven Ward, GEC – Gulf Engineers and Consultants

Due to widespread ecosystem damage associated with the 2005 Hurricane season, the State of Louisiana has leveraged the Coastal Impact Assistance Program to develop a Coastal Forest Conservation Initiative (CFCI). Coastal forest habitats retain invaluable storm surge attenuation characteristics and serve as a critical line of defense to gulf coast communities. In order to objectively facilitate the acquisition of conservation easements across the coastal zone, GEC led the development of the CFCI program with a Spatial Decision Support System. This custom tool was developed in C## as an ArcGIS extension utilizing distance decay theory and Spatial Analyst functionality to create a prioritization surface for the conservation of forested lands across the coast. This spatial index will serve as the primary benchmark for state acquisition of forested lands in coastal Louisiana. The CFCI will be the first coastal forest conservation program utilizing GIS as its core decision making and management tool.

B05. AN OVERVIEW OF NORTH CAROLINA'S STRATEGIC HABITAT AREA DESIGNATION PROCESS

Jennifer Weaver, North Carolina State University

Scott Chappell, Anne Deaton, and Katy West, North Carolina Division of Marine Fisheries

North Carolina's Strategic Habitat Area (SHA) designation process was initiated in 2005 to identify a network of areas that are important habitat for state fishery production, either because they provide an exceptional function to fishery resources or because they are in need of protection from anthropogenic threats. SHA designation is a three-phase process completed on a regional basis. First, a comprehensive database of habitat types, fish abundance and anthropogenic stressors to the marine environment is compiled for each region. Second, the site selection program MARXAN is used to determine a configuration of SHAs that contains a representative amount of each habitat present in the region with the least amount of anthropogenic alteration. In the final phase, an advisory committee knowledgeable about the area modifies selections based on their own ecological knowledge to develop final nominations for the SHA network. The SHA process represents a successful application of the conservation planning software tool MARXAN to identify a network of habitat areas important to state fishery resources. In addition to the designation of these ecologically important and sensitive areas, the SHA database of habitats, anthropogenic activities and fish abundance in North Carolina's state waters could potentially be used as a starting point for more expansive marine spatial planning efforts within North Carolina's state waters.

B06. INTEGRATING CONSERVATION AND LAND USE PLANNING AT THE REGIONAL AND COUNTY LEVEL: A CASE STUDY FROM THE GEORGIA COAST

Regan Smyth, Ian Varley, and Patrick Crist, NatureServe

Jon Ambrose and Matt Elliot, Georgia Department of Natural Resources

The population of Georgia's coastal counties is expected to double in the next 20 years, impacting natural habitats including coastal beaches and dunes, rivers, salt marshes, freshwater wetlands and upland forests – and the ecosystem services they provide. NatureServe has partnered with the Georgia Department of Natural Resources, Georgia Conservancy, and Association County Commissioners of Georgia to identify critical coastal lands and promote sustainable development in the face of rapid growth. Using the NatureServe Vista conservation decision support system, coupled with supporting tools such as Marxan, Maxent, and Circuitscape, we are completing regional analyses to identify (a) areas of greatest conservation value and regionally-important landscape linkages, (b) areas where current land use conflicts with conservation goals, (c) areas of likely future conflict given development plans and trends, and (d) optimal solutions for meeting goals and mitigating conflicts. The regional work is being downscaled and incorporated into two county pilots using Vista to facilitate the input, management, and documentation of conservation targets and viability criteria, the mapping of current and alternative future land use scenarios, and the mapping and evaluation of landscape condition. When fully implemented, communities will be provided with these tools and the training to put them to use to better integrate conservation with local planning.

Sediment Management

» *Kensington C*

B07. BATHYMETRIC LIDAR AS A TOOL FOR MAPPING BOTTOM MATERIALS IN COASTAL ENVIRONMENTS

Charlene Sylvester and Chris Macon, U.S. Army Corps of Engineers, Joint Airborne Lidar Bathymetry Technical Center of Expertise

Transport and deposition of coarse-grained stamp sand material along the shoreline of Michigan's Keweenaw Peninsula are by-products of an early 20th century copper mining legacy near Gay, MI. Copper and associated metals from remnant stamp sand materials continue to be associated with environmental and economic degradation of this coastal region. Remote sensing techniques are uniquely suited for distinguishing aesthetically and texturally different stamp sand materials from those of native sand. Past investigations utilizing air photo interpretation have identified a decrease in the surface area of a remnant stamp sand deposit at Gay, MI, and in increase in the width of the deposit southwest of Gay between 1938 and 1997. Recent advancements in airborne topographic and bathymetric lidar technology facilitate mapping of stamp sand materials at increased spatial resolutions over large geographic extents. Seafloor reflectance values, which are obtained with sophisticated bathymetric lidar waveform processing algorithms, can be utilized together with lidar-based elevation measurements, limited grab samples, and supervised classification techniques to delineate both the sub-aerial and submerged extent of stamp sand deposits. This presentation will describe and evaluate the application of this innovative, lidar-based approach to obtaining bottom substrate information with a June 2008 U.S. Army Corps of Engineers CHARTS survey along Michigan's Keweenaw Peninsula. Derivatives of this application include laser reflectance and seabed classification images. These information products are important for furthering the understanding of stamp sand transport dynamics, and will inspire wise land-use and planning decisions along the Keweenaw Peninsula.

B08. APPLICATION OF SATELLITE AND VIDEO IMAGERY TO ADVANCE REGIONAL SEDIMENT MANAGEMENT IN HAWAII

Chip Fletcher, Laura Corley, Troy Heitmann, Matt Barbee, and Matt Dyer, School of Ocean and Earth Science and Technology, University of Hawaii

Thomas Smith, U.S. Army Corps of Engineers

The Honolulu District of the U.S. Army Corps of Engineers and its study sponsor, the Hawai'i Department of Natural Resources, are conducting Regional Sediment Management studies along the south coast of Oahu in order to identify ways to more effectively utilize sediment resources. To facilitate this goal, satellite imagery was analyzed to identify areas of potential offshore sand resources and images from a stationary video camera at Waikiki Beach were studied to quantify the area's complex coastal processes. Satellite imagery provides a valuable overview of sand bodies in clear and relatively shallow Hawaiian waters. The imagery was used to delineate likely areas of reef-top sand, assess their areal extent, and map their location for future geotechnical investigation. The analysis identified sand fields that are likely to be high-yield resources (non- ephemeral) for possible beach nourishment from those that are not likely to be high-yield (ephemeral). A high-resolution digital camera has been mounted on the roof of the Sheraton Waikiki hotel since October 2008. Hourly scenes from the camera were analyzed to provide a detailed record of shoreline change on one of the most heavily used beaches in Hawaii. The shoreline change data captured in the imagery was correlated to the incident wave energy during various time periods. Additionally, multispectral methods were used to quantify sediment mobilization thresholds and water circulation. This presentation will highlight the geospatial components of the studies with applicability to the topics of coastal spatial planning, visualization techniques, technology innovation and others.

B09. GIS AND DATABASE TOOLS FOR VISUALIZATION OF SEDIMENT SAMPLING DATA

Philip Wolf, U.S. Army Corps of Engineers

Rose Dopsovic, Bowhead Science and Technology

The Sediment Sampling Toolbar was originally developed under the Charleston District eCoastal implementation project as a means to organize and access all data related to a core boring or sediment testing activity. This ArcGIS Desktop (ArcMap) toolbar allows users to retrieve detailed Sediment Sample properties (e.g., XY locations, harbor bottom elevation, top of rock elevation, or material characteristics) in correlation with any relevant sediment testing (chemical, biological, or physical) results, and link related document such as Core Boring, Gradation Curves, or Sediment Testing reports. Through spatial or user-defined attribute queries sample sites can be located in the mapping display. Users can filter locations based on material characteristics found (e.g., shell hash, marl, or clay) at the boring penetration depth or top of rock depth. Detected chemical reports can also be generated from the site samples. User can locate any sample that contains a defined list of chemicals above or below detection limit values. All results are reported as separate data layer in ArcMap's Table of Contents. The toolbar requires two Spatial Data Standard (SDS) compliant feature classes, Access Database forms, and a number of related business tables to function properly. All required data structure is provided in the tool installation and detailed in the supplied documentation. This presentation will discuss the architecture and use of the Sediment Sampling GIS tool and database.

The Digital Coast: Partnership Panel Discussion

» *Kensington F*

B10. **THE DIGITAL COAST: WHAT'S IN IT FOR ME?**

Jim Schwab, American Planning Association
Jeff Stone, Association of State Floodplain Managers
Diana Bowen, Coastal States Organization
Carrie Clingan, National Association of Counties
Tim DeTroye, National States Geographic Information Council
Zach Ferdaña, The Nature Conservancy
John Palatiello, Management Association for Private Photogrammetric Surveyors

The Digital Coast is a constituent-driven, Web-based enabling platform that provides data, tools, training, and case studies to the coastal community. The website was designed and built with input from the Digital Coast Partnership Group. During this "ignite"-style session, you will hear members of this group briefly discuss the benefits that these organizations have realized through participation in building the Digital Coast. Five-minute presentations will be given by the Association of State Floodplain Managers, Coastal States Organization, The Nature Conservancy, National Association of Counties, American Planning Association, and National States Geographic Information Council, highlighting the impacts this resource has made to their memberships and communities. A seventh presentation will highlight the Digital Coast Act. This legislation will provide a program to acquire critical data to help meet the nation's important baseline geospatial data needs for responsibly managing our coastal resources. Following the panel presentations, discussion time will be provided for a question and answer session, as well as for further discussion of the Digital Coast effort.

Break

3:00 to 3:30 p.m.

Late Afternoon Sessions

3:30 to 5:00 p.m.

Coastal Hazards: Sea Level Rise Collaborations

» *Kensington A*

C01. **GLOBAL COASTAL RESILIENCE ASSESSMENT TOOL**

George Raber, University of Southern Mississippi
Zach Ferdaña, The Nature Conservancy

The Coastal Resilience project is collaboration between public, private, academic and not-for-profit institutions. The Nature Conservancy (TNC) is working locally and globally to develop ecosystem-based management tools for marine systems. The Global Coastal Resilience Tool is one product of these efforts. The tool is a web application that allows for data to be rapidly deployed and available for coastal environments worldwide at multiple scales and geographies. Available sea level rise data can be incorporated with other available data sources to provide users the ability to visualize understand the potential impacts of climate change and other natural disasters on the coastal environment. Detailed geospatial data for study sites are included as site modules. The National Oceanic and Atmospheric Administration's Coastal Services Center is providing data and technical assistance in decision support tool development at various stages in the project. TNC's Gulf of Mexico Coastal Restoration Tool was originally begun as a spin-off from this global tool.

C02. **REGIONALLY CONSISTENT METHODS FOR SEA LEVEL RISE INUNDATION AND VULNERABILITY ANALYSIS IN SOUTHEAST FLORIDA**

Diana Umpierre, South Florida Water Management District
Victoria Morrow and Erin Musgrave, Broward County
Douglas Marcy, NOAA Coastal Services Center
Brian Hadley, I.M. Systems Group at the NOAA Coastal Services Center

The potential effects of sea level rise (SLR) are of concern to Southeast Florida, due, among other things, to its low topographic relief and its peninsular nature. This region includes approximately 30% of Florida's population and is the home to key financial and cultural resources, as well as unique and sensitive natural resources, such as the Everglades and the Florida Keys. In 2009, four of Florida's southeastern counties (Broward, Miami-Dade, Palm Beach, and Monroe) signed a "Regional Climate Change Compact" that is paving the way to improved coordination as the region plans and adapts to the potential effects of climate change. In spring 2010, the NOAA Coastal Services Center and Center for Operational Oceanographic Products and Services (CO-OPS) facilitated a workshop to assist the compact and key partners in reaching consensus on methods and criteria for mapping SLR inundation, using a GIS framework and LiDAR data. The approach selected includes using NOAA's VDatum mean higher high water (MHHW) tidal surfaces and calculating Z scores to estimate the probability of inundation. The compact is also working on common approaches for analyzing and communicating SLR vulnerability to aid in the development of a regional climate change action plan. To that end, subsequent workshops have been focusing on other vulnerability analysis challenges, such as criteria for identifying resources at risk and methods for aggregating demographic and economic data. Although reaching technical consensus has been challenging, the spirit of regional collaboration and cooperation has been remarkable and has spurred innovation among the participants. This presentation will highlight the process, challenges, and progress made by this effort.

C03. **PACIFIC ISLANDS SPATIAL TECHNOLOGY AND RISK MANAGEMENT: EXPANDING OUR SUCCESS THROUGH THE PACIFIC RISK MANAGEMENT 'OHANA**

Jessie Huart, The Baldwin Group at the NOAA Pacific Services Center

The Pacific Risk Management *'Ohana* (PRiMO) supports Pacific Island communities in developing a comprehensive understanding of their natural and human-induced hazard risks, as well as encourages the use of shared resources to make the best social and economical decisions for risk mitigation and management. Through the Data Analysis and Decision Support Tool *hui* (working group), PRiMO has leveraged the resources and expertise from multiple agencies and organizations to support the development of a variety of GIS-based tools and applications. These tools provide managers and decision makers with the valuable information they need to make more informed decisions and to enhance their resilience to coastal hazards. This presentation will cover a suite of spatial technology tools being used for risk management in the Pacific Islands, highlight the benefits to collaboration, and present opportunities for other jurisdictions to engage and leverage the work of PRiMO.

Coastal Land Use: Digital Coast Applications

» ***Kensington B***

C04. **CREATING AN ONLINE COMMUNITY RESOURCE INVENTORY FOR GEORGETOWN COUNTY, SOUTH CAROLINA**

Jeffery Vernon and Dan Hitchcock, Baruch Institute of Coastal Ecology and Forest Science, Clemson University
David White, Department of Electrical and Computer Engineering, Clemson University
April Turner, South Carolina Sea Grant

In order to effectively plan for resilient coastal communities and to protect environmental quality, officials need detailed natural and cultural resource information. The online Community Resource Inventory (CRI-SC) tool presents online map data for users that lack sufficient mapping tools and information. A data inventory that includes cultural, natural, and human dimensions, such as land parcels, urban areas, streets and highways, has been developed. Specific data layers are grouped for the purposes of informing users with geospatial resources related to planning and zoning decisions, stormwater management, and recreational access. With local stakeholder involvement, the CRI has been piloted in Georgetown County, SC, with the objective to expand to all coastal SC counties. This presentation will focus on the development of this pilot CRI, using local data layers and the NOAA Coastal Services Center's C-CAP data, as well as the Habitat Priority Planner tool. The benefits and challenges of stakeholder engagement will also be discussed.

C05. **IDENTIFYING COASTAL HABITATS FOR CONSERVATION UNDER SEA LEVEL RISE SCENARIOS**

Neil Jordan, The Nature Conservancy
Tera Baird, U.S. Fish and Wildlife Service

The Winyah Bay Focus Area covers three estuarine watersheds in South Carolina currently showing evidence of sea level rise. Anticipating these impacts, members of the Winyah Bay Task Force are using geospatial techniques to examine impacts of sea level rise at a local level. The Winyah Bay Task Force is a partnership of non-profits, private landowners, state agencies, and federal agencies. This presentation will focus on how the Habitat Priority Planner was used to identify coastal habitat essential for key species, such as the Swallow Tail Kite, as a long-term adaptation strategy for rising sea levels in the Winyah Bay Focus Area. The Habitat Priority Planner is a GIS-based tool developed by the National Oceanic and Atmospheric Administration (NOAA) for guiding decisions related to conservation, restoration, and land use. Additionally, predicted sea level rise trends generated from a refined Sea Level Affecting Marshes Model are being considered in decision making. The Habitat Priority Planner is playing an important role in helping the local conservation community identify current habitat areas that are not protected, but which are most suitable – based on predicted changes – for meeting long-term conservation goals of the Winyah Bay Task Force.

C06. **COASTAL LAND COVER CHANGE 1996 TO 2006 AND INTO THE FUTURE**

Nate Herold, NOAA Coastal Services Center
John McCombs, The Baldwin Group at the NOAA Coastal Services Center
Brian Hadley, I.M. Systems Group at the NOAA Coastal Services Center

Land use and land cover play a significant role as drivers of environmental change, as well as in increasing the vulnerability of places to inundation, sea level rise, and other hazards. Information on what land covers are changing and where those changes are occurring is essential to improving our understanding of past management practices and in effectively responding to those environmental and human-induced changes now and in the future. NOAA's Coastal Change Analysis Program (C-CAP) produces nationally standardized land cover and land change information for the coastal regions of the U.S. These products provide inventories of coastal intertidal areas, wetlands, and adjacent uplands (using documented, repeatable procedures) with the goal of monitoring these habitats every five years. This program has been in existence since the mid 90s, and now has three dates of land cover information available (1996, 2001, and 2006) for the coastal areas of the lower 48 states. This presentation will summarize some of the major changes and trends observed between 1996 and 2006, both nationally and by region. We will also discuss the various ways that users can access C-CAP data and will highlight upcoming plans for a 2011 update to these data.

Coastal Data: Efficiencies in Data Management

» *Kensington C*

C07. GDACT: COORDINATING GEOSPATIAL DATA ACQUISITION ACTIVITIES IN THE GULF OF MEXICO USING A FEATURE-BASED WEB MAPPING APPLICATION

William Nichols and James Gibeaut, Harte Research Institute for Gulf of Mexico Studies, Texas A&M University–Corpus Christi

The Harte Research Institute for Gulf of Mexico Studies (HRI), in support of the Gulf of Mexico Alliance (GOMA), is developing Geospatial Data Acquisition Coordination Tool (GDACT), a web mapping application that provides Gulf of Mexico stakeholders the tools and information needed to coordinate geospatial data acquisitions. The Gulf of Mexico plays host to a vast number of agencies and organizations involved in research and monitoring activities, and collectively, these groups invest considerable resources into planning and acquiring new geospatial data. If agencies are aware of related data acquisition activities, they can pool resources and achieve benefits such as lowered costs or increased data quality. GDACT is a highly- focused web mapping application that allows users to create and search for information about data acquisition activities. GDACT attempts to encourage sharing of information by requiring little effort to create a record. GDACT records contain a small subset of FGDC metadata fields that can be imported from local or online sources. Metadata files or other planning information may be stored as an attachment. Records are stored in polygon features representing the actual boundaries of the data acquisitions. This allows for more accurate spatial search and better visualization of search results compared to using only bounding coordinates. Polygons can be created by sketch, manual coordinate entry, or by importing a shapefile or KML. By providing streamlined record creation and enhanced search and visualization capabilities, GDACT can improve Gulf of Mexico data acquisition coordination by increasing partner participation.

C08. PYTHON AND STATISTICS AND ARCMAP—OH MY! AUTOMATING STATISTICAL ANALYSIS TO SUPPORT SEAGRASS MONITORING

Allison Bailey, Sound GIS

Jeff Gaeckle, Peter Dowty, and Lisa Ferrier, Washington Department of Natural Resources

Our team has developed a set of tools for automating data conversion and statistical analyses for a multi-year seagrass monitoring project in Puget Sound, Washington. These tools are written in Python and are accessed via the ArcToolbox interface within ArcGIS software. These tools replace a hodge-podge of manual, semi-automated, and spreadsheet-based methods previously used to convert ASCII input data files to GIS format and calculate individual site statistics as well as region-wide statistical analyses and Monte Carlo simulations for uncertainty estimates. With these tools, we achieved numerous beneficial outcomes, including: (1) saving time by automating routine, annual data conversion and processing tasks, (2), increasing year-to-year consistency in calculations, (3) decreasing human errors in calculations, (4) standardizing data inputs and outputs for long-term data management, (5) consolidating workflow into a single environment. Additional unexpected positive benefits of the project include: (1) explicitly describing and documenting data analysis workflows into visual flow charts and (2) identifying additional improvements in workflow, data management, and quality control. With the addition of these tools to their analysis "toolbox," Puget Sound's seagrass scientists can spend more of their time exploring data for interesting patterns and testing hypotheses, rather than performing tedious data conversion and routine statistical analyses.

C09. HELPING THE DEVELOPING CARIBBEAN ISLAND OF ST LUCIA BUILD A NATIONAL GIS

Chad Lopez, Timothy Leary, and Debbie Simerlink, Fugro

Drastic changes in the island's economy and increased pressure to develop the coastline drove the Caribbean island nation of St Lucia to build a national GIS. St Lucia's economy was once driven by banana production, but the economy shifted to tourism in the 1990s due to changes in European Union importing and competition from the Latin American banana industry. Increased tourism has increased pressure to build along the coast where most of the population already lives. This could significantly impact coastal habitats, which are themselves tourist attractions. To ensure sustainable coastal development and protect natural resources, it was paramount to create a national GIS and populate it with up-to-date and accurate information because most of the existing data are old and inaccurate. First, the Banana Industry Trust contracted us to collect high resolution ADS40-SH52 orthoimagery along portions of the coast and map the coastal and benthic habitats using proven methods developed under previous NOAA- funded projects. Next, the St Lucia Ministry of Physical Development and Environment contracted us to collect additional imagery for the entire island, to create orthoimage base maps and extract planimetric features for the island. Taking advantage of the ADS40's HiRES collection mode, Fugro satisfied multiple imagery scales from a single collection profile. This presentation will describe data acquisition and processing methodologies, as well as how the two datasets will be integrated and used by the St. Lucia Government to help guide decisions on land development and natural resource management.

Coastal and Marine Spatial Planning: State Examples

» *Kensington F*

C10. THE OREGON MARINE MAP PROJECT: AN ONLINE TOOL TO ASSIST IN OREGON'S ONGOING MARINE SPATIAL PLANNING PROCESSES

Andrew Lanier, Oregon Coastal Management Program
Charles Steinback, Ecotrust
Chad Burt, Chris Macdonald, University of California–Santa Barbara
Scott Fletcher, Ecotrust
Tanya Haddad, Oregon Coastal Management Program
Tim Welch, Ecotrust
Will McClintock, University of California–Santa Barbara

The state of Oregon launched the Oregon MarineMap (*http://oregon.marinemap.org*) tool in January, 2011. The project adapts and builds on the MarineMap system currently being used in the California Marine Life Protection Act (MLPA) initiative to create a product customized for Oregon. Ultimately, the new tool is intended be used as the primary public visualization mechanism employed in Oregon's ongoing marine spatial planning process: the amendment of the Oregon Territorial Sea Plan for the inclusion of marine renewable energy. The OMM tool enables the online visualization and analysis of a wide range of coastal and marine data in ways that facilitate the ongoing renewable energy and nearshore resource planning processes in Oregon. The tool showcases a comprehensive database of ocean information collected during earlier phases of Oregon's marine reserves process, and also incorporates a suite of newly collected information on the human use footprint with Oregon's Territorial Sea. The OMM system is designed to incorporate and integrate multiple modules – each having a different focus of analysis. Initial modules include 1) a nearshore habitat module and 2) a renewable energy module. The intent is for Oregon MarineMap to provide visualization and analyses relevant to resource managers, scientists, stakeholders, and the public, and thereby provide a simple, flexible, and powerful means of involving Oregon stakeholders and the public in a process of collaborative decision making.

C11. SPATIAL AND ECONOMIC ASSESSMENT OF CURRENT USE ACTIVITIES IN THE GULF OF MAINE AND THE RELEVANCE TO MARINE SPATIAL PLANNING

Kerry Lagueux, New England Aquarium

Offshore areas are often viewed as pristine and exploitable for new uses and are of interest for offshore wind farms, aquaculture facilities, and energy installations. Marine spatial planning provides the framework to evaluate human and ecological impact of the placement for new and competing uses in the offshore. We used existing databases of fishing, shipping, and marine animals (mammals and sea turtles) to evaluate the current use of the U.S. federal waters in the Gulf of Maine. In conjunction with use, we integrated economic models to evaluate the impacts on shipping companies and fishing communities if displacement did occur and to help evaluate trade-offs. Most of the Gulf of Maine has at least one use activity with high use areas focused around bathymetric features that attract fisherman and marine animals. Shipping patterns followed great circle routes and mandated shipping lanes and not bathymetric features. Assessing for current use in the marine spatial planning process can enhance engagement of stakeholders and potentially eliminate conflict. However, it is a myth that the offshore environment in the Gulf of Maine is pristine and virtually open for other uses. Additionally, economic valuation of current use show different patterns of importance compared to use assessment alone.

C12. MARINE SPATIAL PLANNING AND OFFSHORE RENEWABLE ENERGY: THE RHODE ISLAND OCEAN SAMP

Malcolm Spaulding and Annette Grilli, Ocean Engineering, University of Rhode Island
Christopher Damon, Environmental Data Center, University of Rhode Island
Grover Fugate, Rhode Island Coastal Resources Management Council

The Rhode Island Ocean Special Area Management Plan (Ocean SAMP) is a two-year study to characterize and zone Rhode Island's offshore marine environment for renewable energy development. The aim of this work was to adopt an ecosystem-based management approach by integrating the best available science with active stakeholder participation to create a policy that balances development potential with existing uses and habitat protection. The University of Rhode Island's Environmental Data Center (EDC) is part of a consortium of researchers and planners assisting with this effort, and has been tasked with developing the data storage/retrieval system, assisting with spatial modeling and providing mapping/visualization/data dissemination support for the research teams and stakeholders. This talk will provide an overview of the SAMP approach to Marine Spatial Planning (MSP), and will step through the first-order site evaluation process used to identify potential development locations. A key component will be the introduction of a new evaluation model known as the Technology Development Index (TDI). The TDI incorporates engineering and economic Parameters into the decision- making process and was used to refine the potential development locations and focus limited research dollars. The RI Ocean SAMP project highlights the importance of integrating geospatial tools with the planning process and will provide a real-world example of putting the theory of MSP into practice.

WEDNESDAY, MARCH 23

Early Morning Sessions

8:30 to 10:00 a.m.

Coastal Hazards: Habitat Impacts

» ***Kensington A***

D01. **MULTI-OBJECTIVE PRIORITY SETTING: IDENTIFYING SALT MARSH AREAS IMPORTANT FOR BIODIVERSITY CONSERVATION AND COASTAL PROTECTION**

Christine Shepard, University of California–Santa Cruz

Ben Gilmer, Zach Ferdaña, and Mike Beck, The Nature Conservancy

Salt marsh restoration and conservation actions are imperative for maintaining and protecting biodiversity, however there are additional benefits associated with preserving salt marsh areas. Marsh vegetation has been shown to have a significant positive effect on processes related to wave attenuation and shoreline stabilization. These ecosystem services help to protect adjacent human populations from coastal hazards such as storm waves and flooding. Under certain circumstances, salt marshes may even be able to maintain the coastline relative to sea level rise by accreting sediment providing a further reduction in vulnerability of human and natural systems to hazards and climate change. Here we report a case study on Long Island, New York in which we used the site selection software Marxan to identify marsh areas that are suitable for conservation action and have the greatest capacity for population protection. Population protection capacity was quantified using geospatial information related to marsh size, proximity to vulnerable human communities, adjacent population densities, and topography. This case study also includes techniques for identifying marsh areas with high quality upland areas, or migration zones, available for marsh migration as sea level rises. The migration zone assessment is based on broad indicators related to migration impediments along the marsh perimeter, sea level rise inundation likelihood, land cover, and the availability of vacant parcels. Although explicit modeling of marsh migration requires site specific information such as local accretion rates, our case study shows that coastal planners can and should begin to account for marsh protective services and sea level rise to ensure viability of marshes in the future and their ability to maintain critical ecosystem services.

D02. **COASTAL RESILIENCE: DECISION SUPPORT AND LOCAL SOLUTIONS TO ECOSYSTEM-BASED COASTAL ADAPTATION**

Ben Gilmer, Adam Whelchel, Randy Parsons, and Zach Ferdaña, The Nature Conservancy

Coastal Resilience (*www.coastalresilience.org*) is an ecosystem-based planning framework and web mapping application that visually displays ecological, socioeconomic, and coastal hazards information and intersections coupled with adaptation solutions in Long Island Sound (New York and Connecticut), USA. Much of Long Island Sound's private property is only inches above sea level, placing billions of dollars in public and private funds at risk to rising sea levels and other coastal hazards. These impacts also threaten wetlands and other coastal ecosystems that provide habitat, storm buffering and flood storage, and other ecosystem services. Despite a growing awareness of global climate change, local decision makers often lack the tools to examine different management objectives as sea levels and coastal hazards increase. The Coastal Resilience project provides tools and information to better inform decision-making with a primary goal of identifying vulnerable human and natural communities and enabling adaptation solutions, while demonstrating the important role of ecosystems. This study showcases The Nature Conservancy's use of innovative spatial analysis techniques with a focus on the role of local community engagement and multidisciplinary partnerships in planning for community resilience. The project team includes partners such as the NASA Goddard Institute for Space Studies, NOAA's Coastal Services Center, Association of State Floodplain Managers, and local governments. With this approach we can better identify and plan for the protection of vulnerable coastal communities and ecosystems, allow for natural resource migration, and reduce socioeconomic risk.

D03. **UNCERTAINTY IN ELEVATION DATA AND SENSITIVITY TO A SEA-LEVEL RISE ESTUARY HABITAT MODEL: COSTS AND BENEFITS OF HIGH PRECISION**

Justin Saarinen, U.S. Geological Survey

Understanding the threats of sea-level rise (SLR) to ecosystem services in key estuarine habitats is a high priority for Pacific Northwest coastal biologists, fish and wildlife managers, and shellfish growers. The utility of decision support systems for understanding potential effects of these changes is dependent on many factors including the quality of inputs. Our objective is to measure uncertainty of modeled input elevation data for the Sea Level Affecting Marsh Model (SLAMM). Many formulations in SLAMM are based on values referenced from a defined digital elevation model (DEM). The accuracy and precision of the source data used to develop the DEM are important factors to consider when evaluating SLAMM outputs for management decisions. Multiple DEMs developed from LiDAR, airborne Interferometric Synthetic Aperture Radar (IFSAR), National Elevation Data (NED), and National Wetlands Inventory (NWI) were developed for a tributary in

Yaquina Bay along the central Oregon coast. The DEMs were incorporated with current habitat maps and local parameters into SLAMM simulations to project the future distribution of habitat. DEM values were compared with precise GPS measurements to gauge uncertainty. Comparing simulation results with DEM specification and procurement expense shows there is less elevation uncertainty in intertidal areas with more expensive data. Elevation datasets that specified areas within intertidal regions, resulted in more accurate modeled elevations and increased confidence in projected habitat distribution. Accounting for uncertainty in DEMs for estuarine habitat modeling can aid managers and scientists in their decisions about modeling approaches, limitations and the resources required for desired results.

D04. WHAT TO BELIEVE: FACTORS FOR CONSIDERATION IN EVALUATING MARSH IMPACTS FROM SEA LEVEL RISE

Nate Herold, NOAA Coastal Services Center
Keil Schmid, I.M. Systems Group at the NOAA Coastal Services Center

While the scientific community is generally in agreement that global sea level is rising and coastal marshes are changing as a result, it is proving to be a challenge to predict the results, since natural systems are inherently unpredictable. Users of these modeled predictions are often unclear that there are various levels of confidence or uncertainty associated with maps depicting future marsh conditions. The apparent certainty can disguise the fact that model results should generally be used only as a guide to help understand when and where such impacts have the potential to occur, and as a gauge to how severe they may be. This presentation will outline several aspects that were considered in the development of the NOAA Coastal Services Center's Sea Level Rise Viewer and how the marsh impacts and migration modeling has been handled within that tool. The model is being viewed as a "generic" example of the genre of regional sea level and marsh change models. Several variables of the sea level rise scenarios, site variability, and base data will be examined in the "generic" model to highlight the important assumptions and questions the user should ask before running or using the results from any sea level rise model. Understanding what to look for and what to ask about the models and their parameters will ultimately lead to a more educated and effective use of the information for coastal management.

Coastal Land Use: Modeling

» *Kensington B*

D05. MODELING THE IMPACT OF ALTERNATIVE URBAN INFILL AND REDEVELOPMENT SCENARIOS ON WATER QUALITY IN THE CHESAPEAKE BAY WATERSHED

Renee Thompson and Peter Claggett, U.S. Geological Survey

The Chesapeake Bay Land Change Model forecasts and hindcasts developed land uses and populations on sewer and septic systems throughout the Chesapeake Bay watershed. Scenarios, including trends and business as usual, lead to various plausible alternative futures, each of which entails its own uncertainty. Significant uncertainty is associated with estimates of future urban infill and redevelopment. Infill and redevelopment has been touted as a potential solution to reducing urban sprawl while increasing urban density. For the purposes of this study, infill and redevelopment are defined as development that occurs in undeveloped or underutilized areas within currently developed areas, i.e., the current urban footprint. This type of development can be located in urban and suburban areas and may also include redevelopment projects to increase the number of occupied housing units in renovated vacant housing or less dense areas. This research will model a range of infill and redevelopment scenarios and explore their regional impact on the conversion of forests and farmlands and potential effects on water quality in the Chesapeake Bay watershed. Potential scenarios include variations in the urban area footprint and infill and redevelopment capacity. The results will be ran through the Chesapeake Bay Land Change Model and Watershed Model to determine the impact of alternative infill scenarios on the water quality of the Chesapeake Bay.

D06. 2D/3D VIRTUAL GEOSPATIAL MODELING AND ANALYSIS: APPLYING GEODESIGN TO REDEVELOPMENT IN HIGHLY IMPACTED COASTAL URBAN AREAS

Samuel Martin, ECOS 360
Tammie Organski, Versar

Sustainable real estate redevelopment in highly impacted coastal areas is complex and lacks supportive analytical tools. Challenges include natural hazards, aging infrastructure, green initiatives, master plans, zoning policies, environmental site design, potential long-term climate changes, and both governmental and citizen approvals. Professionals must rapidly identify and create redevelopment alternatives and assess economic, environmental, transportation, and social impacts. Elected officials, staff, and citizens all participate in visualizing, understanding, and mitigating possible impacts to the community. Buckroe Beach

community (Hampton, VA) – a former 1890's era summer resort, located along the lower Chesapeake Bay and subject to major coastal storms, is a good example of a highly impacted coastal area subject to redevelopment pressures. As a solution, ECOS 360, LLC applied geodesign principles to create and apply a 2-Dimension/3-Dimension (2D/3D) geospatial model of the community's existing physical, infrastructure, land use, socio-economic, demographic (including surrounding areas), environmental, transportation, and related conditions. The model was applied to assemble alternative scenarios for residential, retail, and mixed use (residential and retail) combinations, assess alternatives against design (density, types, massing, heights, green initiatives, and natural hazards) and governmental (zoning and master plan) requirements, and use 3D geospatial model in public and governmental work sessions/presentations to evaluate and refine the selected scenario and achieve government approvals. The result was an integral 2D/3D geospatial analysis and visualization tool optimizing planning, workflow, and project business decisions.

D07. MAPPING POLICY GUIDANCE FOR AN ECOSYSTEM SERVICE APPROACH TO SHORELINE PROTECTION VIA A GEOSPATIAL SHORELINE MANAGEMENT MODEL

Marcia Berman, Tamia Rudnicky, Carl Hershner, Molly Roggero, Karen Duhring, Julie Bradshaw, and Pamela Mason, Virginia Institute of Marine Science

In an effort to affect a change in policy guidance with respect to tidal shoreline management, the geospatial shoreline management model was developed to deliver site specific recommendations to local and state regulators, private property owners and marine contractors. The model integrates the science of wetland ecosystem function with coastal engineering practices to identify solutions that minimize impacts to the natural landscape yet recommends a strategy to provide adequate erosion control. The model output adheres to management approaches that maximize ecosystem services through the use of living shorelines or soft stabilization techniques.

The GIS-based framework used to build the model was based upon a large decision tree-type matrix that defines physical and biological conditions onsite and the resulting treatment options suitable for shoreline protection. Parameters used to assess conditions on site are restricted to attributes which have been mapped using GIS. Some examples include the presence of wetlands, exposure to high energy waves, nearshore bathymetry, and the presence of tree canopy.

The model output maps strategies that include riparian buffer vegetation management to reduce canopy, increase light and enhance marsh growth. Along the bank, grading combined with re-vegetation may be a preferred alternative to stabilize the slope. Along the shoreline, treatments options range from biologs, marsh sills, and offshore breakwaters depending on prevailing conditions.

Model results are currently planned for delivery in map format as guidance documents or simple integration into local government comprehensive plans. Phase two plans to migrate toward an online user-based query interface.

D08. APPLICATION OF NASA'S COASTAL ONLINE ASSESSMENT AND SYNTHESIS TOOL (COAST) FOR IMPLEMENTATION OF BEST MANAGMENT PRACTICES

Katherine Milla, Florida A&M University

This project was developed in response to an initiative by the Gulf of Mexico Alliance to address nutrient impacts to the waters of the Gulf of Mexico. This project adds functionality to NASA's Coastal On-line Assessment and Synthesis Tool (COAST). The added functionality will assist the Florida Department of Agriculture in encouraging agricultural producers to voluntarily adopt agricultural Best Management Practices (BMPs). The study site for this pilot project is the Lower Suwannee River Basin in Central Florida, a watershed that has experienced large inputs of agricultural nutrients that are ultimately delivered to the Gulf of Mexico. When completed, the BMP selection tool will enable the end user to view imagery of a landscape at any scale, digitize outlines of selected areas, view and modify current land uses, select BMP options, and submit these parameters as input for hydrologic modeling. Model inputs will be processed by the Watershed Assessment Model (WAM), a GIS-based program that assesses water quality and quantity responses to land use management practices within watersheds. Processed outputs will be returned to the COAST interface. End users can display and interpret model results to help producers visualize and understand how their selected practices can reduce nutrient inputs to coastal waters. We anticipate that the utility of the BMP selection tool can be adapted for different geographic and jurisdictional regions, and will be useful to a variety of end users, including county extension agents, watershed planners, water management districts and environmental regulatory agencies.

Social Science: Participatory GIS I

» *Kensington C*

D09. MAPPING MARINE HUMAN USES: TECHNIQUES AND LESSONS LEARNED FROM THE DOCKS

Timothy Welch, Ecotrust

Over the last decade, Ecotrust has worked with coastal communities and organizations across a range of geographies and interests to collect local expert

knowledge in support of marine spatial planning. This presentation will draw on those experiences and share best practices and lessons learned. We will focus on the technical aspects of our work – following the evolution of our survey software, Open OceanMap, and its development for both supervised field-based surveys and unsupervised web-based surveys. More specifically, we will discuss the pros and cons of different survey methods (digital vs. paper, field vs. web) and which methods best support minimization of technology fear and technological bias. In addition, we will highlight the attributes of different drawing methods (point vs. polygon vs. grid) including ways to improve drawing accuracy and reduce participant error. Finally, we will present guidelines for developing usable, and even fun, user interfaces.

D10. MAPPING WORKING WATERS: A PARTICIPATORY HUMAN USE MAPPING INITIATIVE

Shey Conover, Heather Deese, and Robert Snyder, Island Institute

Mapping Working Waters is a participatory project to map the human uses within the marine environment in the Gulf of Maine. Maine's island and remote coastal communities are intricately dependent on their surrounding waters and the wildlife, fisheries, and tourism that those waters support. Today multiple converging drivers are poised to radically change the way we as a society allocate use of space in the ocean, and how communities can access and use their ocean territory. Ocean energy developments, marine conservation efforts, and increased short-distance shipping all have the potential to impact current and traditional ocean uses. Marine Spatial Planning has the potential to structure these changes and minimize conflicts, but requires accurate spatial information on current and projected future uses. The Island Institute's Mapping Working Waters project engages ocean stakeholders within the Gulf of Maine, particularly fishermen, to map their use of the ocean, filling a critical data gap. Using participatory GIS methods, we are working closely with fishermen to map the location, intensity, and seasonality of fishing within the nearshore and offshore environment. Essential to the project's success has been the development of data sharing, access, aggregation and visualization strategies that protect stakeholder privacy concerns while providing comprehensive, accurate, publicly available data. We will discuss how these processes have empowered communities of fishermen, on land and on the sea, to value sharing this sensitive data to be included in discussions around future marine uses, including examples of current applications in ocean energy siting discussions.

D11. MAPPING HUMAN USES OF THE OCEAN: INFORMING COASTAL AND MARINE SPATIAL PLANNING THROUGH PARTICIPATORY GIS

Mimi D'Iorio, Nicholas Hayden, and Charles Wahle, NOAA National Marine Protected Areas Center

Understanding human uses of the ocean is an essential component to successful marine resource planning and management. Unfortunately, spatial data on ocean uses are limited, as use patterns are often qualitative, subjective and difficult to capture consistently over large areas. Emerging technologies in the arena of participatory GIS are providing new ways to tap this critical knowledge and document human uses patterns in a spatial context. The participatory GIS approach helps to bring often inaccessible expertise and knowledge into the spatial arena and yields critical information to support resource planning and decision-making by engaging experts in the delineation of use patterns and providing a forum to gather and refine spatial data. NOAA's Marine Protected Areas Center has been engaged in various participatory mapping efforts to document human uses of the ocean throughout the U.S. in recent years. Through a refined participatory process, we have mapped nearly 30 distinct uses of the ocean at multiple scales, across different domains and for a variety of marine management applications. These projects have targeted a wide variety of uses, but broadly include consumptive, non-consumptive, industrial and military activities. The process has been successfully completed for California's state and federal waters, the coastal and marine environments of New Hampshire and Southern Maine and the state waters off the Northwest coast of Hawaii. This presentation will provide a summary of our mapping approach and key lessons learned throughout our process with tips for designing and implementing a successful participatory GIS project for related applications.

D12. BUILDING TOOLS FOR STAKEHOLDER ENGAGEMENT: EXAMINING THE DESIGN DECISIONS OF MARINEMAP

Chad Burt, University of California—Santa Barbara

MarineMap was developed to support the Marine Life Protection Act Initiative in developing a network of marine protected areas in the state waters of California. One unique aspect of this process is that stakeholder groups of fishermen, conservationists, divers, artists, and primarily non-technical users were tasked with developing these marine protected area networks. This presentation will examine some of the design decisions made when developing MarineMap for a group of users unfamiliar with traditional geospatial software. We will examine what lessons can be learned from consumer mapping software like Google Earth, how decision support tools can serve as an educational tool, and why seemingly trivial concerns like responsiveness and aesthetics can make or break an application. MarineMap will serve as a case study, but we'll focus on lessons learned relevant to all decision support tools aimed at a wide audience.

Coastal Data: Discovery and Access I

» *Somerset*

D13. WASHINGTON COASTAL ATLAS: INFORMING MARINE AND COASTAL ZONE RESOURCE PLANNING AND MANAGEMENT

Darby Veeck, Liz O'Dea, Tammy Pelletier, Deborah Purce, and Kathy Taylor, Washington State Department of Ecology

The Washington Coastal Atlas (*http://www.ecy.wa.gov/programs/sea/sma/atlas_home.html*) provides geographic information to support informed management of Puget Sound and the outer coast of Washington. This web-based atlas is used by local and Tribal governments, state and federal planners and resource managers, researchers, consultants, and interested citizens. Recently redeveloped to meet additional user needs, it features an improved user interface designed to be easily accessible to a diverse audience. Improvements include the addition of important new data sets such as (1) public beach access locations in Washington State, where much of this land is privately owned, (2) new digital FEMA flood maps, and (3) beach closure and water quality information. The mapping technology has been upgraded to use both ESRI ArcGIS Server Silverlight (main map) and JavaScript (supplemental maps) APIs. These new improvements add to the information that has been historically available on the atlas such as: habitat features, physical features, regulated features, shoreline modifications and jurisdictional delineations. The atlas also includes decades of oblique aerial photos which can be used to view current and historic shoreline features, such as level of development and presence of any shoreline modifications. In addition, the atlas provides information on land cover changes over time using NOAA C-CAP data. The atlas is coordinating with other coastal atlas-type applications on the west coast (http://ican.science.oregonstate.edu/westcoast/), as well as participating in the International Coastal Atlas Network (ICAN) to collaborate on data interoperability, tools and resources for improved coastal zone management.

D14. DATA BASIN: EXPANDING ACCESS TO SPATIAL DATA, TOOLS, PEOPLE, AND SOLUTIONS

James Strittholt, Conservation Biology Institute

Mapping and spatial analysis are often a fundamental part of conservation problem solving, yet spatial data are widely scattered, difficult to locate, and often unavailable. Valuable time and resources are wasted locating and gaining access to important datasets, information, and experts. As conservation problems become more serious and the demand to solve them grows more urgent, a new way to connect science and practice is needed. Data Basin is an innovative web tool that connects users with conservation datasets, tools, and expertise. Built in partnership with ESRI, this new system developed by the Conservation Biology Institute provides easy-to-use functionality for users to explore and download a vast library of conservation datasets, upload their own datasets, connect to other external data sources, and produce customized maps that can be easily shared. Users can also gain quick access to experts, run supported analytical tools, create and manage their own public or private working groups, and publish their findings through galleries. Data Basin encourages sharing but also provides the necessary privacy when needed. Data Basin houses several centers including an Aquatic Conservation Center in order to draw particular attention to and develop specific functionality for topics or geographic areas of great conservation interest and importance.

D15. GIS DATA MANAGEMENT USING ECOASTAL AT THE U.S. ARMY CORPS OF ENGINEERS SAN FRANCISCO DISTRICT

Nancy Ferris, U.S. Army Corps of Engineers, San Francisco District

The San Francisco District of the US Army Corps of Engineers has implemented eCoastal enterprise geographic information system (GIS) tools to organize, use, and share geospatial data. The eCoastal program includes an SDSFIE compliant geodatabase template, a series of comprehensive ArcGIS applications, database connectivity between each participating Corps of Engineers District, and a web interface. The eCoastal GIS database is a repository for many types of coastal related information, including but not limited to bathymetric surveys, channel framework, sediment placement sites, dredge histories, NOAA electronic navigation chart data, and other basemap features on land and water. The San Francisco District has made progress on the initial data collection effort for navigation and coastal information to support the District's dredging program thanks to support from the national Navigation and Coastal Data Bank. The eCoastal enterprise GIS also serves projects and studies that focus on flood damage reduction, ecosystem restoration, watershed planning and regional sediment management.

D16. DATA SHARING: WHAT WORKS—WHAT DOESN'T

Lynda Wayne, GeoMaxim at the Federal Geographic Data Committee

There are lots of reasons why data sharing doesn't happen: limited resources, liability concerns, technical challenges. In most case, however, the reasons are more political than operational. Given the pressures on the coastal environment the need for shared data resources is greater than ever and increasing demand for data combined with economic cut-backs has boosted the business case for data sharing. This session will highlight data sharing best (and worst) practices.

Break

10:00 to 10:30 a.m.

Late Morning Sessions

10:30 a.m. to 12:00 p.m.

Coastal Hazards: Resilience Tools

» ***Kensington A***

E01. **STORM SURGE VISUALIZATION TOOLS FOR CONVEYING RISK AND UNCERTAINTY**

Thomas Allen and Stephen Sanchagrin, East Carolina University

Emergency managers have expressed interest in visualization techniques for assisting decision support and communicating risks of storm surges. Two storm surge models, SLOSH (Sea, Lake and Overland Surge from Hurricanes) and ADICRC (ADvanced CIRCulation), are evaluated for potential to visualize storm surges for risk communication. Both models present visualization challenges, such as grid and temporal resolution, generalization, and storage volumes. Future enhancements of storm surge visualization will be examined with experimental prototypes of 3D-storm surge maps, animations, and online applications developed for the Outer Banks, North Carolina. Limitations and insights from uncertainty modeling using Monte Carlo techniques are also described.

E02. **COMMUNITY RESILIENCE INDEX: A REMOTE SENSING APPROACH TO EVALUATE POST-DISASTER RECOVERY OF ECOSYSTEM SERVICES**

Chris Renschler, National Center for Geographic Information and Analysis, Multidisciplinary Center for Earthquake Engineering Research, University at Buffalo

Amy Frazier, National Center for Geographic Information and Analysis, University at Buffalo

Scott Miles, Western Washington University

The development of an integrated Community Resilience Index (CRI) required quantifying the status, exposure and recovery of physical, economic, socio-cultural, and ecological capital for a specific target community. To evaluate this new approach we developed and applied the CRI modeling prototype ResilUS in a pilot study for coastal communities in four parishes in Southwestern Louisiana that are recovering from the impact of Hurricane Rita (landfall September 24, 2005). The primary goal of this particular study was to monitor the recovery of the ecological capital by using Remote Sensing-derived Gross Primary Production (GPP) for biomass as an "ecosystem-wellness" indicator and assess the effect of ecological capital on the recovery of an integrated CRI. The results illustrate that the variable nature of the recovery of the ecological capital after extreme events can potentially impact the recovery of certain businesses that rely heavily on ecosystem services such as agriculture, forestry, fishery as well as tourism.

E03. **THE WHOLE IS GREATER THAN THE SUM OF ITS PARTS: MULTI-COMPONENT COLLABORATIVE SURVEY GENERATES ENHANCED DATA PRODUCTS FOR COASTAL RESILIENCY IN MOBILE BAY, ALABAMA**

Galen Scott, NOAA National Geodetic Survey

Allison Allen, NOAA Center for Operational Oceanographic Products and Services

Rich Patchen, NOAA Office of Coast Survey

Coastal communities around the globe are facing the increasing challenges of human pressures, natural resource sustainability, and environmental/climate change. Successfully addressing these coastal challenges requires a comprehensive, high quality integrated suite of geophysical and oceanographic data products and services that are by their nature multidisciplinary. As an example of the types of multidisciplinary collaborations needed, NOAA's National Ocean Service (NOS) is focusing its capabilities in a collaborative survey of Mobile Bay and its environs. The NOS collaborative survey comprises a comprehensive suite of accurate measurements of the physical setting, including bathymetry, instantaneous water levels, updated tidal datums, wetland elevations, three dimensional currents, salinity, and water temperatures. A centerpiece of the survey is a series of nested (large to fine scale) nowcast/forecast circulation models, providing water levels, three-dimensional currents, salinity and water temperatures. Fundamental long term geophysical observing systems, including tide stations and Continuously Operating Reference Stations (CORS) will provide accurate estimates of local sea level change and land motion. All of these data and tools will enhance coastal communities' ability to meet present and future challenges. The NOS collaborative survey framework has placed a strong emphasis on outreach to ensure that the final data products and services will meet coastal stakeholder needs. By working closely with these local partners and developing outreach opportunities, the NOS Mobile Bay Collaborative Survey is providing a concrete example of how to maximize the impact of scientific resources in support of coastal communities.

E04. **ENHANCEMENT OF THE SOCIAL VULNERABILITY INDEX (SOVI) FOR USE IN ASSESSING COASTAL RISK**

Christopher Emrich, University of South Carolina

The Social Vulnerability Index (SoVI), originally formulated by Cutter et al. (2003), is a multi-dimensional, scalable, spatially reliant algorithm for capturing a snapshot of the social vulnerability of a place to environmental hazards. It provides a comparative assessment of pre-existing vulnerability as a means for understanding the potential impact of a hazard event on different places and the residents who live there. In this way, the index provides guidance on the differential capacity within places to prepare for, respond to, and recover from disaster events. The SoVI is a both a product and a methodology. It has been used

and referenced in NOAA's Coastal Services Center's hazards work for many years, as well as in other state and county hazards and vulnerability assessments (see http://www. sovius.org). This research systematically applies SoVI to every US coastal county to create a comprehensive visualization and statistical understanding of baseline hazard vulnerability levels across space. Utilizing the most current geospatial technologies enables seamless incorporation of outputs from this study into the NOAA Digital Coast product. Creating web service supporting spatial analytics provides researchers, planners, emergency managers, and the general public with the tools needed to quickly identify those baseline conditions known to decrease the ability to prepare for, respond to and rebound from current and future disaster events. Understanding the place-based character of social vulnerability in a rapid and standardized fashion will create new opportunities to mitigate/prepare for the impact of future threats to lives and livelihoods.

Coastal Mapping: Shoreline Methods

» *Kensington B*

E05. CREATING TIDE STAGE LINES FROM LIDAR AND VDATUM

Randy Dana, Oregon Coastal Management Program

Lidar data collected for the Oregon coast provides accurate bare-earth digital elevation models of the land/sea interface. NOAA's VDatum tool provides good approximations for the elevation of various tide stages along the outer coast and lower estuaries. A scripted process brings these two data sets together to produce vector representations of specific tide stages, where the source data permit. Discussion will include methods to compare lidar flight times to recorded tide heights to estimate for which tide stages useful vector results may be produced.

E06. THE IMPLEMENTATION OF MARINE LASER SURVEY TECHNOLOGY FOR DETAILED SHORELINE MAPPING

Nicholas Lesnikowski and Gregory Baird, David Evans and Associates

Over the past year, David Evans and Associates, Inc. has been utilizing a marine based laser scanning system from several specialized hydrographic survey vessels to obtain highly accurate topographic data in areas not easily accessible by conventional survey methods. DEA has employed this technology on a variety of projects throughout the Northwest for clients ranging from the US Army Corps of Engineers to Ports and State Government agencies. This paper gives an overview of the technology, including critical elements such as vessel positioning and motion compensation which are critical to producing accurate results. Several projects which successfully utilized marine laser scanning will be discussed including one for a state agency which required DEA to map the Ordinary High Water (ODW) line along a 13 mile section of the Willamette River. Operating from the water the surveyors were able to obtain data in areas that would have been difficult to access or require entry permits to cross private property. The efficiency, accuracy and thoroughness of the data coverage will be discussed, as well as, "lesson- learned" which can be applied on to future survey operations.

E07. DEVELOPMENT IN TIDE-COORDINATED SHORELINE MAPPING

Anuchit Sukcharoenpong and Rongxing (Ron) Li, Ohio State University
Christopher Parrish, American Society for Photogrammetry and Remote Sensing

Since the establishment of the Survey of the Coast in 1807, mapping of tidally-referenced shorelines has been a challenging undertaking. Although shoreline mapping from ground surveys utilizing plane tables and staff leveling techniques provided high-quality shoreline, the task was labor intensive and time consuming. Aerial photography and photogrammetric mapping techniques were introduced to improve efficiency in coastal mapping. Recent advances in mapping of tidally-referenced shoreline involve advanced tools and technologies, including light detection and ranging (LIDAR), and auto-feature extraction from imagery. LIDAR data is now beginning to be utilized in NOAA's national shoreline production for MHW shoreline, along with photogrammetric compilation from tide-coordinated aerial imagery for MLLW shoreline. This paper discusses approaches to tide-coordinated shoreline from the past, present and future. A review of the latest technologies and techniques is also presented in the paper.

E08. VDATUM MODEL VALIDATION WITH A GNSS BUOY

Ben Hocker, David Evans and Associates
Nathan Wardwell, JOA Surveys

Under a charting contract with the National Oceanic and Atmospheric Administration (NOAA), David Evans and Associates, Inc. (DEA) was tasked to evaluate the VDatum model in Chesapeake Bay while mapping large portions of the area. The VDatum software was developed by NOAA to vertically transform geospatial data among a variety of tidal, orthometric and ellipsoidal vertical datums. The goal of the evaluation was the Mean Lower Low Water (MLLW) datum model as applied to convert ellipsoid heights to chart datum. With this VDatum model conversion validated, it follows that conversions of chart data to orthometric heights can also be verified. This is of particular importance when assembling multiple data sources on a common datum as uncertainties in the transformations can be established. Using a buoy outfitted with a GPS receiver and tilt sensor, tidal datums were computed at three locations bounding the project area in 2009 and an additional three deployments continue in 2010. Several post-processing methodologies including single and multi-base Post-Processed Kinematic (PPK) as well as Precise Point Positioning (PPP) were compared to derive antenna height. Different methods of reducing antenna height to the water

surface using the tilt measurements were also evaluated. Corrected ellipsoid water levels were filtered and the datums were computed using the Tide-by-Tide method of simultaneous comparisons using a control station. Final results were compared with existing shore-based tide stations, water levels computed on two survey vessels using inertially-aided GPS data, radar gauges established in the project area and the VDatum model.

Social Science: Participatory GIS II

» ***Kensington C***

E09. FILLING IN THE GAPS: PARTICIPATORY HUMAN-USE MAPPING IN MASSACHUSETTS' OCEAN WATERS USING A WEB-BASED OPEN-SOURCE TECHNOLOGY STACK

Nicholas Napoli and Kimberly Starbuck, Massachusetts Ocean Partnership
Chris Watson, University of Massachusetts–Boston

To set the foundation for sound decision-making, it is critical that we expand our knowledge of how, where and when humans use the ocean. As we learned during the development of the MA Ocean Management Plan, existing human use data are often insufficient to support marine planning. Starting with a survey to better understand the spatial patterns and economic values associated with recreational boating, the Massachusetts Ocean Partnership (MOP) and our partners are developing and utilizing geospatial technology along with stakeholder outreach to collect new human use data. MOP developed the MA Recreational Boater Survey (RBS) web-mapping tool to gather spatial and economic information from Massachusetts recreational boaters on their boating activity during the 2010 season. This tool is based on Open OceanMap (OOM), which was developed by Ecotrust for the collection of marine spatial planning data. The OOM application was originally built as a desktop application using Python and QGIS, and has evolved into a web-based GIS application. The open-source technology stack for the RBS implementation of OOM includes GeoDjango, GDAL, PostGIS and GeoServer. It was developed to be interoperable with the ocean data management infrastructure in MA, but also to be adopted or modified by other entities interested in collecting human use data. This presentation will include an overview of the recreational boating study and the web-mapping tool, samples of spatial data collected, and plans to modify the tool for additional human uses in MA and the northeast.

E10. SHIFTING PERSPECTIVES: APPLYING GEOSPATIAL TOOLS TO SPATIAL PLANNING IN COASTAL WATERSHEDS

Erika Washburn, NOAA

Population pressure in coastal New Hampshire challenges land use decision-making and threatens the ecological health and functioning of Great Bay, an estuary designated as the site of both a NOAA National Estuarine Research Reserve and an EPA National Estuary Program. Regional population has exploded in the last four decades, resulting in sprawl, increased impervious surface cover and ecological degradation of the estuary. All of Great Bay's contributing watersheds face land use challenges, resulting in calls for strategies addressing growth, development and land use planning. Is there a potential for shifting to watershed-based spatial planning in this coastal area? To determine the answer to this question, a case study was carried out in the Lamprey River watershed to analyze the social landscape of land use decision-making using a mixed qualitative social science approach within a grounded theory analytical strategy. Geospatial tools were developed to be used in both participatory mapping exercises and as visual probes in the context of semi-structured interviews. This presentation will describe the design process and methodological use of these geospatial tools, discuss the impact recorded in the data, and reflect on the value of these tools on promoting an action research environment for scientists, coastal managers and the public.

E11. HUMAN USE MAPPING METHODS IN THE MARINE AND COASTAL ZONE

Christopher Hawkins, Eastern Research Group and University of Hawaii Sea Grant
Martina McPherson, Eastern Research Group
Nicholas Napoli, Massachusetts Ocean Partnership

The newly established National Ocean Policy has given federal and state agencies an opportunity to comprehensively plan and adaptively manage the future of the nation's marine and coastal zones through coastal and marine spatial planning (CMSP). However, spatial information on human uses in the coastal and marine zone is lacking in comparison to other environmental data. In support of NOAA CSC, ERG undertook a review of consumptive, non-consumptive, and military and industrial use mapping methods to determine common approaches, limitations, and data gaps. A literature review, supplemented with informal interviews with government representatives, non-governmental organizations, and state coastal zone managers revealed a growing capacity and interest in the consumptive category of human uses (commercial fishing, recreational boating and fishing), while non-consumptive uses, such as surfing and other similar recreational activities, continue to be mapped less formally.

E12. MAKE YOUR OWN MAP: COLLECTING AND USING STAKEHOLDER INFORMATION THROUGH PARTICIPATORY GIS (PGIS)

Jeffery Herter and Sue Senecah, New York Coastal Management Program
Danielle Bamford and Chrissa Waite, The Baldwin Group at the NOAA Coastal Services Center

New York State Department of State (DOS) collected information on where, how, and when the waters offshore New York are being used. Using participatory GIS (PGIS) techniques, DOS mapped ocean uses by acquiring valuable information from offshore users. This offshore use information will be used in a larger initiative to develop an ocean amendment to New York's Coastal Management Program, aimed at appropriately siting offshore wind energy facilities and providing greater protection to ocean habitats. PGIS is a way to collect local knowledge not currently captured in GIS format. Flexibility in PGIS collection techniques lends itself to working with stakeholders with a wide range of technical skills, from participants drawing on a map to entering data straight into GIS. DOS used three distinct steps in carrying out PGIS: Step 1 – Offshore use constituent "champions" were invited to a series of workshops, at which they learned about a) the ocean amendment process, b) the role of human use information in that process, and c) how to collect offshore use information from the user group they represent; Step 2 – Champions met with their membership to identify, locate, and characterize offshore use areas, and information collected on printed maps was sent to DOS where it was collated, digitized, and aggregated; and Step 3 – Offshore use constituent champions were reconvened to review and verify compiled offshore use information.

Coastal Data: Discovery and Access II

» *Somerset*

E13. VIRTUAL DATA COLLABORATION AND VISUALIZATION FOR COASTAL EMERGENCY PLANNING AND MANAGEMENT IN OREGON

Ed Arabas, State of Oregon

Annually, Oregon's coastal counties are subject to severe weather events. Due to prevailing climatic conditions, warm and wet weather systems from the sub-tropics often converge with arctic air masses coming from the Gulf of Alaska. These converging systems generate weather extremes that combine to cause high river flows, high tidal situations, and high winds that are reminiscent of coastal disasters in other parts of the USA. To address this relatively common occurrence, Oregon has teamed with four other states under the umbrella of the US Dept of Homeland Security to develop a virtual common operating environment. This platform and capability will allow regional emergency responders and managers to confidently deliver planning and response services across Oregon's coastal communities, even in the event that a given emergency operations center becomes inoperable due to power failure or inundation. This presentation describes the operational system that was developed and deployed in Multnomah County, Oregon, and its virtual extension to other counties along Oregon's northwest coast (Tillamook and Lincoln Counties). The potential for shared visualization and interoperable data capture and asset tracking will be demonstrated.

E14. A FRAMEWORK FOR GEOSPATIAL APPLICATIONS AND DECISION SUPPORT FOR THE NORTHERN GULF INSTITUTE

John Cartwright, Mississippi State University
Julie Baca, U.S. Army Corps of Engineers, Engineer Research and Development Center
William McAnally, Mississippi State University

The Northern Gulf Institute (NGI), a National Oceanic and Atmospheric Administration (NOAA) Cooperative Institute operates an integrated research and transition program focused on filling priority gaps and reducing limitations in current Northern Gulf of Mexico awareness, understanding and decision support. One objective of the Mississippi State University NGI research projects is the development of a framework for a decision support system. This framework will provide a system with an interface for ready access to environmental and natural resources information, allowing for a better understanding in the evaluation of the probable consequences of management decisions and natural change. Additionally the system will provide a scalable approach for base of users with diverse skills and needs. The transfer of technologies, and associated data products, is a critical component in the success of this objective. This transfer must provide interested, and vested, stakeholders useable information from scientific research activities. The technologies that provide the mechanism for transfer of information are often as dynamic as the associated data and models themselves. Geospatial technologies are providing a wide array of web-based mapping activities and applications with scalable and efficient solutions for this transfer of information. Current efforts and activities are focused on geospatial process and toolkit development. Efforts are being initialized for mobile applications, allowing for the expansion of spatial tool development with an approach based on user driven content. These types of two-way communications would steer user influence beyond data collection or interaction and towards application development and refinement.

E15. THE IOOS DATA CATALOG: HARVESTING AND DISPLAYING IOOS WEB SERVICES

Eric Bridger, Gulf of Maine Research Institute

As the US IOOS moves towards a web service based architecture the existence of a dynamic and fully automated observing assets catalog and registry has become possible. Version 1.0 of the Catalog went live in June 2010 at http://ioos.gov/catalog. This presentation will describe both the back end polling and

harvesting of both federal and regional SOS and THREDDS services to extract metadata and recent observations to create a geo-spatial database and the front end display of the results in map viewer. The map viewer allows rapid access to all recent observations and allows filtering by time range, geospatial boundaries, organization, service types, data types, etc. This allows coastal managers to see what services are available where and how timely and relevant they are. Valuable lessons have been learned about the type of metadata which is needed for fully describing these systems and tools developed to assist data providers in improving their metadata for discovery and accessibility.

E16. **THE GIS INVENTORY: UP CLOSE AND PERSONAL**

William Burgess, National States Geographic Information Council

National States Geographic Information Council (NSGIC) created the GIS Inventory in 2005 while working under contract to NOAA to inventory GIS users and their organizations, policies, systems and data holdings. In October 2010, NSGIC released a completely new version (4.0) of the system while under contract to the Department of Homeland Security. Major changes were made to the System to make it more robust so that it will support new national initiatives such as the Geospatial Platform. These changes will be described and information will be provided about how the GIS Inventory can help meet your business requirements. The goal of this presentation is to effectively demonstrate why your organization should become one of the fast growing number of organizations that have adopted and use the GIS Inventory.

Plenary Lunch

Kensington Ballroom – 12:00 to 2:00 p.m.

The GeoCloud—What Is It and Why Should I Care?

Anne Hale Miglarese, Booz Allen Hamilton

Zsolt Nagy, AECOM

There is lots of talk about cloud computing as the future of technology. What does this mean and what will it entail for those of us who work in geospatial technology? Come listen to an engaging discussion of geospatial technology in a cloud computing environment.

Afternoon Sessions

2:00 to 3:30 p.m.

Coastal Mapping: Approaches to Seafloor Mapping

» *Kensington A*

F01. **MAPPING OF ALL CALIFORNIA STATE WATERS' SEAFLOOR FOR A STATEWIDE MPA NETWORK AND COMPREHENSIVE COASTAL ZONE GEOSPATIAL INFORMATION**

Jerry Wilson, Fugro Pelagos

The California Seafloor Mapping Program (CSMP) is supporting selection of an integrated statewide network of Marine Protected Areas (MPAs). Beyond this impressive objective, the CSMP was planned and executed to address to the fullest possible extent the NOAA ideal of "map once, use many ways". Formal planning was initiated in late 2005 with support from the California Coastal Conservancy for a workshop organized by the Seafloor Mapping Laboratory of California State University Monterey Bay. Seafloor and coastline data gaps were addressed and mapping priorities were decided among 70 participating stakeholders. They recommended a program to generate benthic fisheries habitat information for immediate use in defining MPAs, plus yield seafloor geospatial and groundtruth data supporting many uses including geological, biological, environmental, and navigation safety applications. The CSMP has been an exemplary cooperative program between several State and Federal Agencies, Academia and Industry. Funded through the California Ocean Protection Council, results already have been used to define candidate MPA sites along the 1800-kilometer mainland coast out to the three-nautical-mile maritime boundary. The CSMP was conducted with three interleaving mapping operations: 24-hour deepwater surveying, small-boat surveying to the inshore limit of safe navigation, and airborne LiDAR bathymetry with coastal topography. The primary initial product was benthic habitat maps, which depended significantly on acoustic backscatter imagery from multibeam echosounding. Examples of the various survey operations will be presented with emphasis on the technologies used. The various data products and their integrated results are shown with highlights of interesting seafloor features.

F02. **IMAGERY INTERPRETATION FOR COASTAL AND MARINE SPATIAL PLANNING**

Keith VanGraafeiland, CSA International

George McLeod, Old Dominion University

This paper describes the use of remote sensing data, GIS habitat mapping, and environmental sensitivity analysis methods to map selected coastal and seafloor features. These technologies are employed to develop an efficient

means of determining and mapping nearshore and seafloor features warranting environmental protection. The application of remote sensing techniques to high-resolution aerial or satellite imagery may be utilized to identify and delineate near-shore and coastal features and perform habitat classifications. These data can be used to produce Environmental Sensitivity Index (ESI) maps, thematic maps, and statistical summaries (areal and linear dimensions) of habitat type which may support Environmental Impact Assessments (EIAs), Environmental Impact Studies (EISs), Baseline Environmental Baseline Surveys (EBSs), monitoring plans, and spill contingency planning. This rapid assessment and mapping approach gives a time-efficient and cost-effective means to identify and map environmentally sensitive features within a large and environmentally complex geographical area. This paper additionally presents the development and application of an environmental impact mitigation plan based on a combination of the ESI analysis and habitat mapping data. This combined technical approach is a practical means to minimize environmental impact while meeting the scientific, engineering and logistic constraints of coastal and marine development activities.

F03. **SEAFLOOR MAPPING USING SIDE SCAN SONAR AND REMOTELY OPERATED VEHICLES AT THE RICHARD STOCKTON COLLEGE OF NEW JERSEY**

Robert Koch, Richard Stockton College of New Jersey

The Richard Stockton College of New Jersey's Marine Science department and Coastal Research Center have integrated the use of side scan sonar and a remotely operated vehicle (ROV) to supplement marine and coastal research at the college. Hydrographic surveys that combine both side scan sonar and ROV technology provide a unique perspective of underwater environments. Side scan sonar uses sound pulses from a tow fish to locate and measure targets within its range and identify bathymetric features. Resulting sonar imagery is analyzed to determine the location, size, and composition of features/debris. Sonar Images from multiple perspectives are mosaiced and georeferenced to support subsequent site investigations with the ROV. The ROV is capable of underwater sonar imaging, video recording, water quality data recording and small-scale sampling. The operator uses a handheld controller and computer displays of sonar and video to guide navigation of the vehicle.

The integration of these two technologies produces powerful datasets that have created new and exciting research opportunities for the college. Thus far, several pilot studies have focused on the investigation and characterization of marine debris. These debris studies included investigating marine structures, construction sites and commercial fishing activities. In addition, the college was appropriated funding through Sea Grant to evaluate artificial reef productivity at the NJDEP Little Egg artificial reef. This entails surveying and mapping of temperate artificial and natural reef habitats for modeling productivity and trophic linkage to marine fisheries.

F04. **BATHYMETRIC LIDAR OVER LAKE SUPERIOR SUPPORTS GREAT LAKES RESTORATIVE EFFORTS**

Mick Hawkins and Richard McClellan, Fugro

The Great Lakes Restoration Initiative (GLRI), an interagency initiative led by the Environmental Protection Agency (EPA), partnered with the NOAA Coastal Services Center (CSC), to target the most significant problems in the region, including invasive aquatic species, non-point source pollution, and contaminated sediment. As part of the GLRI, the CSC contracted Fugro to acquire airborne bathymetric LiDAR data along GLRI identified priority areas of the Lake Superior shoreline. Fugro acquired and processed bathymetric LiDAR data at a 5 meter nominal post spacing from 30 meters onshore out to 1 kilometer from the land/water interface or to where laser extinction precluded reaching this extent from shore. Data was collected with the LADS Mk II Bathymetric LiDAR system mounted on a Fokker F27 aircraft. This data will provide critical elevation data along the designated Lake Superior shoreline to meet the objectives of the GLRI.

Coastal and Marine Spatial Planning: Habitat Conservation

» ***Kensington B***

F05. **AN ONLINE MARINE MAMMAL HABITAT MODELING SYSTEM FOR THE U.S. EAST COAST AND GULF OF MEXICO**

Benjamin Best, Patrick Halpin, and Ei Fujioka, Duke University
Caroline Good, Lenfest Ocean Program and Marine Science Initiative
Erin LaBrecque, Robert Schick, Jason Roberts, and Andrew Read, Duke University

We describe a comprehensive set of marine mammal habitat models for the U.S. east coast and Gulf of Mexico and delivery through an online mapping portal. Drawing from datasets in the online OBIS-SEAMAP geo-database, we integrated surveys conducted by ship (n=36) and aircraft (n=16), using residence times to weight sampling grid cells to harmonize the search effort between the two survey platforms. We used Generalized Additive Models (GAMs) to predict the likelihood of encounter against a suite of environmental predictors, including variables that are static (depth, distance to shore, distance to shelf, slope) and dynamic (sea-surface temperature, chlorophyll) in time. For the dynamic environmental variables, we fitted models with remotely sensed data synchronous with the survey observations and predicted the model across the seascape using the median month of the season. We then used Receiver Operator Characteristic (ROC) curves to generate binary habitat maps based on a threshold that minimizes false positive and false negative error rates. We integrated all model outputs and ancillary

information into an online spatial decision support system (SDSS), allowing for easy navigation of models by taxon, region, season, and data provider. Users can define regions of interest and extract statistical summaries of the model for that region. This versatile, easy-to-use online system enables the application of these habitat models to real-world conservation and management issues. Finally, we discuss the ecological relevance of these model outputs and identify key data gaps across species, regions and seasons.

F06. SPARC: A PROOF OF CONCEPT TOOL TO SPATIALLY ASSESS MARINE RESOURCES OFF THE CALIFORNIA COAST

Ken Buja and Charles Menza, NOAA National Ocean Service, National Centers for Coastal Ocean Science, Center for Coastal Monitoring and Assessment

The SPARC (Spatial Assessment and Resource Characterization) tool is an ArcGIS 10 extension designed to assess the resources of the nation's Marine Protected Areas. This project is a collaboration between NOAA's National Marine Protected Area Center (MPA Center) and the Center for Coastal Monitoring and Assessment (CCMA) to develop a gap analysis process for MPAs within the framework of the Coastal and Marine Spatial Planning initiative. A proof of concept will be conducted for the waters off California. It will focus on gathering existing ecological spatial information, building out the MPA Center Inventory to include ecological and management resources, and the building of an analytical tool that will bring this information together with the resources in the Inventory. The tool is designed to allow MPA managers to characterize resources and MPAs to provide a comprehensive analysis of resources protected inside and outside MPA boundaries. This will help managers identify the types of resources inside current MPAs, the resources and features are missed in MPAs, the resources that could be incorporated into a modified MPA system, and the MPAs that have resources of interest.

F07. DOCUMENTING SEAGRASS RECOVERY IN A COASTAL BAY SYSTEM: INTEGRATING FIELD AND AERIAL OBSERVATIONS

David Wilcox, Robert Orth, Scott Marion, Kenneth Moore, David Parrish, and Anna Kenne, Virginia Institute of Marine Science

The abundant eelgrass beds in the Virginia Delmarva seaside coastal bays that once supported a bay scallop fishery, completely disappeared in the 1930s. While there has been some recovery in Chincoteague Bay, the southern bays remained unvegetated though the 1990s. Successful experiments with whole plants and seeds in the late 1990s led to the initiation of a large-scale seed based eelgrass restoration effort in 2001. In nine years, directed seeding of 32 million eelgrass seeds into 262 acres has succeeded in reestablishing eelgrass to over 4000 acres in the Virginia coastal bays. The recovery has been recorded by detailed documentation of transplant and seed distribution plots, field observations, low-level and higher-level aerial photography, and both water quality observations from both a fixed station and a surface mapping system. Through integrating these data sources, a more complete picture is possible of the seagrass dispersal characteristics and water quality conditions that are supporting the recovery.

F08. DEVELOPMENT OF A COASTAL RESOURCES ATLAS AND VULNERABILITY INDEX

Kelly Knee and Eoin Howlett, Applied Science Associates

In recent years, the need for balancing the various demands on marine areas and resources has become critical. This balance can be achieved through marine spatial planning, an integrated, multi-sector and multi-disciplinary process which considers ecological, economic, and social objectives. The Environment Agency of Abu Dhabi (EAD) recently completed a Coastal Resources Atlas and Environmental Vulnerability Index to support coastal management and planning. This innovative project combines an ArcGIS Server web portal, an ArcGIS Desktop based expert software system, ecosystem classification, and quantification of habitat vulnerability to a variety of stressors (e.g. climate change and marine pollution) into a system that both educates the public and facilitates decisions for policy-makers and regulators. The public web portal, developed with FLEX, allows for detailed data discovery by exposing all data layers and attributes as well as linking them to relevant thematic data such as EAD reports, papers, photographs, and videos. It provides several custom tools allowing users to animate time varying data, create time series graphs, and generate custom queries on habitat data. The ArcGIS-based expert client was developed as a desktop extension which allows approved users to add and edit data, run custom site screening and siting analyses, perform time-series analysis, quantify the impacts of environmental incidents, and perform custom fisheries assessments.

Social Science: Data Applications

» *Kensington C*

F09. LOSING GROUND: MEDITERRANEAN SHORELINE CHANGE FROM AN ENVIRONMENTAL JUSTICE PERSPECTIVE

Michelle Portman, Hebrew University of Jerusalem

Loss of land due to coastal erosion is a world-wide problem. In many areas, the crisis is exacerbated by human intervention in natural processes and by the effects of climate change including greater storm activity and sea- level rise. In the Mediterranean region, coastal erosion has had deleterious effects; future impacts to life and property will be significant. In Israel, a country with little land resources, burgeoning population with large and growing minority populations

and widening disparity among classes, shoreline change has important socio-economic implications. After a review of environmental justice issues among different sectors of activity and geographical contexts related to coastal erosion, this article describes a case study in Israel. The shores of Netanya along Israel's Mediterranean coast have been hard-hit by erosion. This research analyzes the socio-demographic characteristics of the nearby population and the availability of alternative open space using statistical analysis of GIS data. Results provide a basis for which to explore the environmental justice implications of coastal erosion. In Netanya, populations living close to eroding beaches are generally stronger and better-off than those living elsewhere in the city. These findings suggest that coastal erosion is a special type of environmental hazard. From a justice perspective its repercussions are complex and will vary greatly from case to case on a local and regional scale. This work highlights the consideration of coupled natural and human systems in the policy analysis and design of responses to coastal shoreline change and defense.

F10. THE USE OF SPATIAL NARRATIVES TO PROMOTE STEWARDSHIP OF THE GREAT LAKES

David Hart, University of Wisconsin Sea Grant Institute
Janet Silbernagel, University of Wisconsin–Madison

A spatial narrative is a conceptual framework that brings the qualitative experience of place together with the geoscience analysis of space. A meshing of qualitative knowledge with geographic and ecological sciences to synthesize spatial narratives can help us understand human- ecological relationships and enrich coastal planning and management. This presentation will examine how spatial narratives are being used to promote stewardship of the Great Lakes through two projects. The first is a joint Wisconsin/ Minnesota Sea Grant project that utilizes "vignettes" of local resource management issues (water quality in trout streams, beach health, restoration of wild rice beds, stormwater management, supplemental fishing and environmental justice, and restoration of a Lake Sturgeon fishery) and place-based games to enhance public awareness and understanding of the new St. Louis River Estuary National Estuarine Research Reserve dedicated in October 2010. The second involves including place- based "Great Lakes stories" on the Wisconsin Coastal Guide (*http://www.wisconsincoastalguide.org/*)—an interactive web mapping site that promotes coastal heritage tourism. The presentation will focus on the methods used to create the vignettes and integrate multimedia stories into a web- mapping interface.

F11. REVERSE 911 FOR NON-IMMEDIATE HAZARD WARNINGS

Antonia Rosati, University of Colorado–Denver

Reverse 911 is a telephonic community notification system that may be used to deliver outbound messages in the event of an emergency. The system uses database and mapping technologies to allow phone calls to be sent to a specific geographic area for delivery of appropriate messages to residents in the affected area. Through the use of GIS, specific communities can be targeted to receive phone warning messages based on a particular hazardous threat. This study focuses on inundation hazards, such as river floods, dam breaks and tsunamis. The National Weather Service in Humboldt, Del Norte and Mendocino county are working together to use Reverse 911 as a method of emergency communication. More than one way is needed to communicate disasters, hazards, and evacuations. Technology has vastly changed and people get news from more sources than the old public alert system can currently supply.

F12. MAPPING THE COASTLINES: A CADASTRAL PERSPECTIVE

Mark Kemper, The Sidwell Company

The mapping of a coast line, be it ocean, lake, or river, presents a unique set of challenges from a cadastral perspective. This discussion will examine these challenges, and the means by which they can be resolved. – Riparian Rights – Shifting Boundaries – Ownership Conflicts – Monument Placement and Recovery – Sea Level changes – Researching Ownership – Does the parcel boundary extend to the observable water's edge? To a meander line? To a mean line between high and low tide? Have monuments been placed? Are they tied to Surveys? Are the Surveys available? What happens to ownership when an established water boundary changes position, whether by natural or human action What are the implications of rising sea levels on surveying and cadastral mapping practices? Each of these questions and more will be addressed in this presentation.

Coastal Data: Processing and Techniques

» ***Somerset***

F13. ENHANCED PROCESSING OF BATHYMETRIC LIDAR DATA

John Gerhard, Woolpert
Carol Lockhart, Geomatics Data Solutions

In the summer of 2010, Woolpert acquired bathymetric LiDAR, topographic LiDAR, RGB imagery, and hyperspectral imagery from Rhode Island to southern Maine in support of the National Coastal Mapping Program. This presentation will review the project and provide an analysis of the data and the software integration that enhanced the use of that data to support regional sediment management, construction, operations, and regulatory functions along the coast. During

processing, Woolpert used Fledermaus 3D Editor to view point data and GreenC Solutions and AHAB's Coastal Survey Suite to view waveform and image data, allowing the technician to formulate decisions faster and more accurately. The bathymetric LiDAR was then imported from the Fledermaus software directly into an ESRI geodatabase to store and manage the ArcGIS data. The use of Fledermaus allowed users to perform sounding selection and surface modeling on a wide variety of hydrographic formats within ArcGIS.

F14. NO ESTUARINE INTERTIDAL BATHYMETRY? NO WORRIES! ESTIMATING INTERTIDAL DEPTHS FROM READILY AVAILABLE GIS DATA

Patrick Clinton, U.S. Environmental Protection Agency
Justin Saarinen, U.S. Geological Survey
Henry Lee, II, U.S. Environmental Protection Agency
Deborah Reusser, U.S. Geological Survey

The importance of littoral elevation to the distribution of intertidal species has long been a cornerstone of estuarine ecology and its historical importance to navigation cannot be understated. However, historically, intertidal elevation measurements have been sparse likely due to the difficulty of collecting data in shallow often broad areas subject to tidal drainage with little vertical control. Modern concerns including the threats of tsunami inundation, the effects of climate change on sea level rise and efforts to integrate terrestrial and bathymetric elevation mapping have spurred new intertidal elevation data collection and compilation. Yet, there remains a lack of bathymetric data in many estuarine systems except for, perhaps, a distinction between subtidal and intertidal areas. Here we present techniques and data sources for estimating intertidal bathymetric depth distributions from readily available data that may be useful in modeling estuarine ecological change under varying sea level rise scenarios. The resulting bathymetric models will vary along a scale of reliability according to the quality of input data.

F15. ADVANCES IN COASTAL DIGITAL ELEVATION MODELS

Barry Eakins, University of Colorado at Boulder
Lisa Taylor, NOAA National Geophysical Data Center
Kelly Carignan, University of Colorado at Boulder
Maureen Kenny, NOAA Coast Survey Development Laboratory

Coastal DEMs provide the framework for modeling of many natural processes, including: tsunami propagation and coastal inundation, hurricane storm-surge, sea-level rise, ocean circulation, sediment transport, and contaminant dispersal. As such efforts pursue ever greater levels of detail, the effects of inaccuracies in the DEMs can be magnified, especially in the coastal zone, where the vertical datums meet.

We present advances in coastal DEM development aimed at minimizing DEM errors that can adversely impact modeling results. The key piece is accurately establishing a common vertical datum, so that shoreline crossing phenomena are accurately replicated during modeling.

Land DEMs may be built from a single survey, eliminating the need to resolve inconsistencies between datasets. Coastal DEMS (those that integrate ocean bathymetry and land topography) do not have this luxury, since the data are collected by a variety of different methods and instruments in different terrestrial environments. They have the added challenge of source elevation data being referenced to different vertical datums. Measurements of bathymetry are typically referenced to tidal datums, most commonly mean lower low water (MLLW). Topographic measurements, however, are usually referenced to an ellipsoidal or orthometric datum, such as North American Datum of 1988 (NAVD 88).

It is often the failure to properly integrate bathymetric and topographic data at the coast that causes modeling results to run astray.

F16. MAPPING INUNDATION UNCERTAINTY WITH A STANDARD SCORE (Z-SCORE) TECHNIQUE

Brian Hadley, I.M. Systems Group at the NOAA Coastal Services Center

Vertical error in the topographic data is the most important factor affecting the accuracy of single-value surface model inundation maps (National Research Council, 2009). A single-value surface model, often referred to as a "bathtub" model, requires two primary topographic input variables: (1) the water surface (i.e., tidal datum + inundation level) and (2) the ground elevation. Unfortunately, both variables include spatially varying vertical error that introduces uncertainty into the resultant map for a given inundation scenario. More sophisticated hydraulic and geomorphic models have their own error budgets, which can be quite complex depending on model assumptions. Standard scores, or z-scores, measure the number of standard deviations an observation falls above or below the mean. This investigation employs z-scores to map the uncertainty introduced by the propagated error associated with the topographic variables. The technique permits greater flexibility than existing uncertainty methods that map the horizontal extension of the elevation data at the 95% confidence level.

Break

3:30 to 4:00 p.m.

Tools Showcase

4:00 to 6:00 p.m.

» ***Windsor Ballroom***

T01. NATIONAL AQUACULTURE SECTOR OVERVIEW (NASO)

Jose Aguilar-Manjarrez, Food and Agriculture Organization of the United Nations
James Kapetsky, Consultants in Fisheries and Aquaculture Sciences and Technologies

A new Web site, the National Aquaculture Sector Overview (NASO) map collection, shows the locations of aquaculture sites and their characteristics. Presently NASO includes an aquaculture inventory for the United States of America and eleven other countries. Visualization is accomplished using "Google Maps and Google Earth" to assist UN/FAO member countries to inventory and monitor aquaculture (http://www.fao.org/fishery/naso-maps/naso-home/en).The collection addresses marine spatial planning via monitoring the status and trends of aquaculture development and addressing site selection and zoning issues. In addition to the aquaculture inventory, data accessed via browsers such as Google Earth are a source of many important layers in an aquaculture management information system such as water bodies, roads, and population centers, when imported into a GIS. Moreover, the locations of aquaculture producers, processors, transporters and marketers are fundamental for defining aquaculture's potential impacts on ecosystems and social and economic consequences within administrative boundaries. The Web site, launched on 16 September 2010, is part of a number of follow-on activities based on the work we presented at CGT09 on "H08. Spatial data needs for the development and management of offshore aquaculture in the U.S. Exclusive Economic Zones". The Web site is global in scope but we feature the NASO map for the United States of America and report on the progress made so far on estimates of US offshore mariculture potential that use Google- based technology to present the results.

T02. MULTIPURPOSE MARINE CADASTRE

Brian M. Smith, I.M. Systems Group at the NOAA Coastal Services Center
David Stein, NOAA Coastal Services Center

The Multipurpose Marine Cadastre data viewer is an integrated marine information system that provides legal, physical, ecological, and cultural information in a common geographic information system (GIS) framework. The project is the result of a collaborative effort among a number of federal agencies, regional planning bodies, state entities, and nongovernmental organizations. The Bureau of Ocean Energy Management, Regulation, and Enforcement and the National Oceanic and Atmospheric Administration co-lead this collaborative effort. The Multipurpose Marine Cadastre is beneficial to those involved in coastal and marine spatial planning efforts that involve finding the best location for renewable energy projects. Users select the ocean geography of their choosing and quickly see the applicable jurisdictional boundaries, restricted areas, laws, critical habitat locations, and other important features. With the Multipurpose Marine Cadastre, potential conflicts can be identified and avoided early in the planning process. The Multipurpose Marine Cadastre is also a helpful tool in the permit review process. All organizations considering an offshore activity can benefit from this comprehensive, visual approach to data analysis.

T03. NOAA'S STATE OF THE COAST

Kristen Crossett and Erick DiFiore, NOAA National Ocean Service

NOAA has developed the State of the Coast (SOTC) Web site to foster an increased awareness of the crucial importance of healthy coastal ecosystems to a robust U.S. economy, a safe population, and a sustainable quality of life for coastal residents (stateofthecoast.noaa.gov). The desired outcome for visitors to this site is to gain an appreciation for the need to better understand, manage, and protect our Nation's coastal resources. To this end, the SOTC Web site first offers quick facts and more detailed statistics through interactive indicator visualizations that provide highlights of what we know about coastal communities, coastal ecosystems, and the coastal economy and about how climate change might impact the coast. This presentation will focus on the development of visualizations and interactive maps for the socioeconomic topics presented on the SOTC Web site.

T04. NATIONAL OCEAN SERVICE WEB MAPPING APPLICATIONS

Erick DiFiore, NOAA National Ocean Service

With most complex datasets you get a list, but want so much more. You want to visualize and interact with the data using a list, a map and graphs. You want the interaction to be intuitive and fun. You want to come away informed but not feel like you were. You want it to be cool. So how do you take a boring spreadsheet, database or map and make it look and do everything you want – without making it cumbersome. You need the correct tools to build an amazing visualization. In our case we picked Flash/Flex to provide us with the speed, power and the artistic palette to get the job done. But now you need to design the application so the user experience is intuitive, fun and informative. This is no small task and this will be discussed along with four web mapping applications that we in the NOAA/NOS Special Projects Office have built over the last year.

T05. THE DIGITAL COAST DATA ACCESS VIEWER (BETA)

Jennifer Dare, The Baldwin Group at the NOAA Coastal Services Center

The Data Access Viewer is the NOAA Coastal Services Center's primary data distribution system, providing users with easy access to lidar, land cover, imagery, and other types of data useful for coastal management. The interface makes it easy to search for data and, in many cases, create a custom output with options such as clipping data to a specific area of interest and creating a digital elevation model from lidar data. This most recent version of the tool (under development) has been designed using feedback from users. Come to this session to learn more about the latest Data Access Viewer features and let us know what you think.

T06. NATIONAL MAP DATA AND SERVICES

Rob Dollison, U.S. Geological Survey

This presentation will provide an overview of how new The National Map web services and data download capabilities (http://viewer.nationalmap.gov/viewer/) can be easily accessed and used either on the web, or directly in ArcGIS. In addition, the presentation will demonstrate combing these services with other authoritative federal government map services, and local user defined datasets being generated to support scientific research work and other government business programs. As the use of map service technology becomes more standardized and accepted across governments and industry, The National Map viewer can be used as a "portal" of authoritative map services which can be integrated – or mashed-up – in viewers such as ArcGIS Explorer with other map services or other local datasets. The future direction of The National Map data services will be discussed as well as how these mash-ups, or new user "instances", provide enhanced user flexibility and productivity by aggregating data and customizing views – in the user's viewer of choice – which support specific business needs.

T07. SOUTHEAST AND CARIBBEAN DATA EXPLORER

Gabe Sataloff, I.M. Systems Group at the NOAA Coastal Services Center

NOAA provides public access to vast amounts of geospatial data, tools, and applications through various websites and GIS Web services. The NOAA Southeast and Caribbean Regional Team (SECART) provides coordination and support for cross-NOAA initiatives to enhance delivering NOAA data and services to people and organizations operating within North Carolina, South Carolina, Georgia, Florida, Puerto Rico, and the U.S. Virgin Islands. The Southeast and Caribbean Data Explorer was created as a focal point for coordinating data and metadata to provide greater access to NOAA products within the southeastern United States. This presentation will provide a detailed examination of the data explorer with an emphasis on integrating search and discovery tools for the Web, ArcGIS desktop products, and Flex-based mapping tools. The Southeast and Caribbean Data Explorer provides access through the Open Geospatial Consortium (OGC) standards, specifically the Catalog Services for the Web (CS-W). This is accomplished with the support of the Geoportal extension for ArcGIS Server provided by ESRI. The data explorer utilizes these standard Web-based interfaces to support the NOAA product itself, as well as broaden the accessibility of the NOAA catalog of data and services. This presentation will provide insights into the project background, design and planning, development, and lessons learned by the team during the construction of the data explorer. A demonstration of the Southeast and Caribbean Data Explorer and how it can be utilized within various scenarios will follow the presentation.

T08. NEW YORK OCEAN AND GREAT LAKES GEODATA PORTAL

David Healy, Nick Floersch, and Katie Budreski, Stone Environmental

Jeff Herter, New York Department of State, Ocean and Great Lakes Program

The New York Ocean and Great Lakes GeoData Portal v.2 provides easy access to an extensive catalogue of data, ranging from social to economic to environmental information. This second version of the GeoData Portal has been created for the New York Ocean and Great Lakes Ecosystem Conservation Council (Council) to assist with carrying out its mission. The presentation will focus on the following elements: new features; challenges-technical and social; metadata issues; harvesting techniques; and developing data partnerships. Some of the new features include a Geoportal search widget that enables users to search the GeoPortal directly from within a Flex mapping application or on an independent Web page; federated searching that allows users to search multiple catalogs registered with the NY OGL geoportal all at once; registered users can now provide feedback on the quality and usefulness of a resource by adding ratings and comments; users can view resources that are related to one another as defined in the resources' metadata; enhanced data publishing by simplifying the registration of new data resources; a new harvesting tool and service; and when a resource is registered with the GeoPortal, the GeoPortal will regularly and automatically check the resource for changes and update the Geoportal catalog; and now has CS-w support for the Open Geospatial Consortium (OGC) ISO Application profile and INSPIRE Discovery service. Following the discussion of the above elements, a live demonstration of the GeoPortal will be made.

T09. TOOLS TO INTEGRATE IOOS DATA IN ARCGIS 10

Eoin Howlett, Kelly Knee, and Zongbo Shang, Applied Science Associates

Roy Mendelssohn and Cara Wilson, NOAA National Marine Fisheries Service

ArcGIS 10 has made new tools available to manage time- varying geospatial datasets. One of the challenges that still remain is ingesting ocean and earth science data that is typically stored in formats such as Grib, HDF and NetCDF, and

delivered with web services such as the Sensor Observation Service (SOS). To address this issue, NOAA Fisheries (SWFSC/ERD) and ASA have built an extension for ArcGIS that allows users to browse Thematic Real-time Environmental Distributed Data System (THREDDS) catalogs and SOS services to access large amounts of scientific data and ingest the data into ArcGIS. The data is then converted to raster or feature classes in ArcGIS and is available for standard GIS analysis and display and uses the new ESRI Timeslider for temporal display and analysis. This presentation will discuss the implementation of the tool, demonstrate access to a variety of NOAA data servers and discuss the challenges faced when dealing with disparate data sets, data with non-uniform time-steps, and merging datasets that range from high frequency data such as in-situ current and wind measurements, to climate data that may be measured in terms of decades.

T10. COASTAL COUNTY SNAPSHOTS

Danielle Bamford, The Baldwin Group at the NOAA Coastal Services Center
Lori Cary-Kothera, Jeffrey Adkins, and Douglas Marcy, NOAA Coastal Services Center
William Brooks, I.M. Systems Group at the NOAA Coastal Services Center

The Coastal County Snapshots tool provides brief, county-level overviews of key resource management issues, such as coastal flooding or ocean-related employment, illustrated with summaries of relevant data, such as land cover and wages, that help local officials understand the role of these data in decision-making. A Web interface allows users to pick the county of interest from maps or drop-down menus and generate reports that can be saved or printed. The easy-to-use format makes Coastal County Snapshots a great learning and communications tool for local officials and their constituents. Snapshots are currently available for most coastal counties in the contiguous United States and Hawaii. A wide variety of data is used, from sources that include the Federal Emergency Management Agency, the U.S. Census, the Coastal Change Analysis Program (C-CAP), and Economics: National Ocean Watch (ENOW). This session will introduce the Coastal County Snapshots product line, the data and information contained in these products, and related NOAA Coastal Services Center products.

T11. SEA LEVEL RISE IMPACTS VIEWER

Douglas Marcy, NOAA Coastal Services Center

Over the past several years, the lessons learned from investigating pilot sea level change mapping applications have led to the development of a next-generation sea level rise and coastal flooding viewer. In addition, new mapping techniques have been developed to use high-resolution data sources to show flooding impacts on local public infrastructure, mapping confidence, flooding frequency, marsh impacts, and social and economic impacts from potential inundation. This demonstration will provide a description of the tool's new functionality and a discussion of new methods, current status of new tool development and outputs, and plans for expanding to the rest of the U.S.

T12. NEW DIRECTIONS IN ECOSYSTEM-BASED MANAGEMENT TOOLS

Sarah Carr, Ecosystem-Based Management Tools Network, NatureServe

Coastal-marine spatial planning (CMSP) and ecosystem-based management (EBM) are holistic approaches to management that consider ecosystems, including humans and the environment, rather than managing one issue or resource in isolation. Implementing these approaches is a challenge for resource managers. Many software tools have been developed to assist with these processes, but using these tools can be difficult due to lack of resources, time, and training. At the Tool Showcase, the EBM Tools Network's Training Program (www.ebmtools.org) will present on approaches for connecting practitioners with relevant tools. These approaches include: 1) highlighting "easier-to-use" tools that managers can use for meeting some CMSP and EBM needs such as data visualization and stakeholder communication and 2) coordinating training on toolkits that address some of the multidisciplinary issues that CMSP and EBM practitioners face such as integrated land-sea planning.

T13. MARINE GEOSPATIAL ECOLOGY TOOLS (MGET)

Jason Roberts, Ben Best, and Daniel Dunn, Marine Geospatial Ecology Lab, Duke University
Eric Treml, School of Biological Sciences, University of Queensland
Patrick Halpiln, Marine Geospatial Ecology Lab, Duke University

Marine Geospatial Ecology Tools (MGET) contains over 200 geoprocessing tools designed for coastal and marine research and management. The tools are highly modular and may be linked together in ArcGIS workflows to perform many different spatially-explicit analyses, such as modeling species' habitats, summarizing fishing effort and catch, identifying oceanographic features such as fronts and eddies, and simulating larval dispersal by ocean currents. Since July 2009, MGET has been installed over 1000 times at universities, government agencies, NGOs, and for-profit companies in 56 countries. An important step in marine spatial planning is the acquisition and analysis of biological and oceanographic data. Here, we demonstrate two approaches to this using MGET with publically-available data. In the first scenario, we show how to download point observations of marine animals for a region of interest from the Ocean Biogeographic Information System (OBIS) into ArcGIS and summarize biodiversity by creating fishnet grids and calculating species diversity indices for each cell. In the second scenario, we demonstrate tools that efficiently download popular oceanographic products, including remote sensing datasets from NOAA and NASA and the HYCOM and ROMS-CoSiNE ocean models, and build collections of ArcGIS rasters. We then show how to create climatological summaries (e.g.

mean temperature, by month), identify oceanographic features, and illustrate the flow of ocean currents. By complementing these biological and oceanographic summaries with other pertinent data, such as marine boundaries and benthic cover data from NOAA Digital Coast, marine spatial planners can quickly assemble a comprehensive spatial database for their region of interest.

T14. CHESAPEAKESTAT

John Wolf, U.S. Geological Survey
Andy Fitch, National Park Service
Jerry Johnston, U.S. Environmental Protection Agency

ChesapeakeStat is a web-accessible interactive program management and accountability tool aimed at furthering the goals of the Chesapeake Bay restoration effort. The tool provides the Chesapeake Bay Program Partnership access to information about implementation strategies, priorities, and activities; resource allocations; and progress toward reaching goals and milestones. Information in ChesapeakeStat is derived from (1) the Chesapeake Bay Program Strategic Framework, (2) data assembled via the Chesapeake Registry (the Chesapeake Bay Program Partnership's resource accounting system), (3) a suite of environmental indicators originating in the Bay Barometer report card, (4) 2 Year Milestones for improving water quality agreed upon by the State and Federal partners, (5) tracking of progress towards the Chesapeake Bay Total Maximum Daily Load (TMDL), and (6) progress on implementation of the Chesapeake Action Plan called for in President Obama's Executive Order Strategy for Protecting and Restoring the Chesapeake Bay Watershed. ChesapeakeStat serves the important role of providing an up-to-date, transparent, web accessible manifestation of Chesapeake Bay Program restoration and conservation objectives and progress towards goals in a geographic context. The geospatial components of ChesapeakeStat have been built using ESRI's ArcGIS Server and the associated Flex API. Other technologies employed include Drupal for content management and FusionCharts for interactive, Adobe Flash-based charting. ChesapeakeStat is loosely coupled with other adaptive management and decision support tools being used in Chesapeake Bay restoration efforts, including the Chesapeake Online Adaptive Support Toolkit (COAST) developed by USGS and NOAA's Digital Coast.

T15. THE ESTUARY DATA MAPPER

Naomi Detenbeck and Marilyn ten Brink, U.S. Environmental Protection Agency
Todd Plessel, Lockheed Martin
Marguerite Pelletier, Mohamed Abdelrhman, and Steve Rego, U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency (US EPA) is developing e-Estuary, a decision-support system for coastal management. E-Estuary has three elements: an estuarine geo- referenced relational database, watershed GIS coverages, and tools to support decision-making. To facilitate data access for estuaries and associated coastal watersheds around the U.S., we are developing the Estuary Data Mapper (EDM), a stand-alone program requiring only internet access to allow users to identify, visualize, and download multi- media environmental data and geospatial coverages. The downloaded data can be imported into an ArcMap data model for estuaries and watersheds using tools developed for the ArcMap Toolbox, then used to run applications. Examples will be given for downloading inputs to 1) a diagnostic tool for estuary eutrophication, 2) a simple spreadsheet tidal prism model, and 3) a predictive model for seagrass habitat.

T16. LAND COVER ATLAS

Nate Herold, NOAA Coastal Services Center
Brian Hadley, I.M. Systems Group at the NOAA Coastal Services Center

Having an accurate picture of an area's landscape and understanding how that landscape is changing is important information for any planning effort. Comparing maps and data from one year to the next helps communities understand how their land management efforts are working and provides trend information for future planning initiatives. The Land Cover Atlas is an online data viewer that provides user-friendly access to regional land cover and land cover change information developed through NOAA's Coastal Change Analysis Program (C-CAP) for the coastal areas of the U.S. The atlas eliminates the need for desktop geographic information system software, or advanced technical expertise, by processing data for the user and providing access to distilled and custom change information. Come get a peek at this newly updated tool, and learn what it can provide to you.

T17. SLAMM-VIEW 2.0

Jeff Ehman, Image Matters
Bill Wilen, U.S. Fish and Wildlife Service

SLAMM-View is a Web-based visualization and analysis tool that facilitates the comparison of SLAMM results from different dates and sea level rise scenarios. SLAMM – the Sea Level Affecting Marshes Model – simulates transitions among water, wetland, and land cover types to predict future states of coastal wetlands based on different rates of sea level rise and freshwater flows to estuaries. Since the demonstration of SLAMM-View v1.0 at the 2009 Coastal GeoTools conference, the USFWS funded major enhancements of the application, resulting in the release of v2.0 this past fall. Three enhancements are most noteworthy: (1) the interface was re-engineered so the user makes step-wise selections of the Project, Region, Scenario, and Years for their preferred comparison; (2) a view with seven geographically-linked maps provides visualization of changes over longer temporal sequences; (3) analysis tools allow users to specify their area-of-interest (AOI) for which a report with both graphics (map series) and quantitative summary

(table series) is automatically generated. Moreover, since 2009, three additional Project results were added to SLAMM-View, which now hosts: (1) the South Carolina and Georgia coast (EPA funding), (2) the Chesapeake Bay Region, and (3) Puget Sound and Coastal Washington/Oregon Region (National Wildlife Federation and the U.S. Fish and Wildlife Service funding), and (4) a site-specific simulation for the area around Chincoteague National Wildlife Refuge (U.S. Fish and Wildlife Service funding). This fall, The Nature Conservancy in Texas is adding their SLAMM results from simulations of 6 different areas along the Gulf Coast.

T18. CANVIS: A TOOL FOR VISUALIZATION

Chris Haynes, The Baldwin Group at the NOAA Coastal Services Center

Coastal professionals often face a common problem when speaking to stakeholders, other professionals, and the public: how can their organizations communicate the true importance and impact of resource change when armed with maps, graphs, and statistics? How can speakers make data coalesce into a visual image that will show their listeners—not simply tell them—about potential changes? Simulated visual images are often much more effective in conveying the real impact of coastal change and development, and can spur stakeholders to develop strategies that mitigate potential negative impacts. However, until recently, effective visualizations such as these have been hard to come by for most professionals, who lacked the specialized skills, resources, or time to create them. In response to the requests of coastal professionals for easy-to-use, inexpensive visualization tools, the NOAA Coastal Services Center contacted the U.S. Department of Agriculture about CanVis, an entry-level program that allows users to quickly and easily create photo-realistic simulations with minimal computer skills. This session was developed to provide participants with photo-realistic visualization basics and hands-on experience. Examples of projects where CanVis has been used to enhance geospatial data in the past are provided to give participants ideas about potential applications.

T19. ERMA AND GEOPLATFORM.GOV: ONLINE MAPPING TOOLS TO TRACK GULF RESPONSE

George Graettinger, Michele Jacobi, Ben Shorr, and Amy Merten, NOAA National Ocean Service, Office of Response and Restoration

Kari Sheets, NOAA National Weather Service, Office of Science and Technology

The Environmental Response Management Application (ERMA) and the new federal GeoPlatform website, www.GeoPlatform.gov/gulfresponse, the public face of ERMA, have been deployed to answer questions using detailed near-real-time information about the response and environmental impacts of the Deepwater Horizon/BP oil spill with clarity and transparency.

ERMA and GeoPlatform, developed though a joint partnership with the University of New Hampshire and other response partners incorporates response and environmental data from the various agencies that are working together to address the Deepwater Horizon Oil spill. ERMA is provides data visualization for the spill and the Natural Resource Damage Assessment. ERMA has also been named as the Deepwater Horizon Common Operational Picture (COP) by Admiral Allen the National Incident Commander.

ERMA was originally designed for responders who make operational decisions and recommendations for the oil spill response. ERMA integrates the latest data on the oil spill's location, fishery closures, wildlife impacts and other place-based Gulf Coast resources into one interactive map that is designed to be fast, user-friendly and constantly updated. ERMA facilitates communication and coordination among a variety of users—from federal, state and local responders to local community leaders and the public.

ERMA includes data from all federal partners and the Gulf States. Agencies contribute data through the response data sharing mechanism across the command posts. This includes posting geospatial data on a common server, providing access, and Web data services supporting use for multiple GIS platforms.

The architecture is based on a familiar Google Maps-type interface and Web-mapping services built upon Open Source technology. ERMA is a proven tool in supporting response and damage assessment decision-making.

T20. THE BATHYMETRIC INFORMATION SYSTEM

Bertrand Baud and Jaime Crandall, Esri Maritime Team

As seafloor mapping technologies are constantly evolving, bathymetric sensors are able to collect ever growing amounts of denser, higher quality data. This surge in data volumes calls for a new approach to bathymetric data management, and in this session, we will demonstrate how modern GIS technology addresses the needs of bathymetric data producers and consumers. The tools presented allow organizations to manage all their bathymetric survey data, metadata, associated information and documents in a central database repository. We will demonstrate how large volumes of Bathymetric Attributed Grids (BAGs) files can be stored, visualized, manipulated, analyzed and ultimately disseminated inside and outside the organization. Specific capabilities include:

- Storage and visualization of an arbitrary number of BAG files on a scalable and flexible GIS based server architecture
- Creation of a seamless surface from BAGs of various resolutions and coming from multiple surveys

- On-the-fly rendering of depth and uncertainty data using different representations
- Interactive display of seabed historical shape and evolution over time
- Publishing and remote access to data over secure and customizable web services

The combined technologies are part of a solution developed jointly by IVS 3D and Esri, aiming to revolutionize how bathymetric information is managed, deployed, and used for better decision making.

Reception

Kensington Ballroom – 7:00 to 10:00 p.m.

Come to the Kensington Ballroom for the Wednesday night 80s bash. Be prepared for high energy fun and an experience that you will never forget. The reception will include heavy hors d'oeuvres and a cash bar.

Feel free to bring your spouse or friend, but please note that additional guests will incur an added cost of $75 a person. Attire is casual.

THURSDAY, MARCH 24

Early Morning Sessions

9:00 to 10:30 a.m.

Coastal Hazards: Risk Data

» *Kensington A*

G01. **LASERS IN THE RAINFOREST: DEVELOPING HIGH ACCURACY ELEVATION DATA IN AMERICAN SAMOA WITH A MOBILE LIDAR**

Jamieson Carter, NOAA Pacific Services Center

NOAA's Pacific Services Center (PSC) worked with the American Samoa Department of Commerce, the American Samoa National Park Service, and The Sanborn Map Company to acquire high-accuracy, high-resolution topographic elevation data for seven coastal villages in American Samoa. This project was conducted using a vehicle-mounted Optech Lynx Mobile Mapper lidar system and conventional survey techniques to develop bare-earth data products from the shoreline to the 15-meter contour in each village. The remote location, the tropical vegetation, the weather, and the culture of the island posed significant challenges that the team addressed using a collaborative, multidisciplinary, and bilingual approach. PSC and NOAA's Pacific Marine Environmental Lab are using these data to model tsunami inundation in the territory. The American Samoa Coastal Management Program and other local agencies will apply the results of this modeling effort to inform tsunami mitigation activities, such as land use and evacuation planning.

G02. **INTEGRATED HAZARD, RISK AND LOSS ASSESSMENT IN DATA-POOR REGIONS**

Steven Stichter, Kinetic Analysis Corporation

The Caribbean Catastrophe Risk Insurance Facility [CCRIF], the world's first regional risk insurance facility, was established to provide member governments throughout the Caribbean with an economic buffer against impacts from the many natural hazards which frequent the region. CCRIF's parametric insurance mechanism provides cover for catastrophic hurricane and earthquake events. Kinetic Analysis Corporation was contracted by CCRIF to perform the natural hazard and loss modeling for 19 countries and territories in the Caribbean for its regional risk insurance pool. The absence of available digital information on assets at risk in this region presents a major challenge for such work in the Caribbean, and in many other areas of the world that are still in the process of developing robust, integrated digital datasets. To address this issue, Kinetic Analysis uses

remotely sensed land cover, distributed population information and economic statistics to generate a distributed database of exposures for use in damage and loss assessment, in conjunction with our MPRES modeling platform. This talk focus on the application (and results) of this approach to the Caribbean member countries of the CCRIF.

G03. DEVELOPING AN ATLAS OF COMMUNITY ANCHOR INSTITUTIONS FOR LOUISIANA'S COASTAL PARISHES

Craig Johnson, Louisiana Geographic Information Center
Chris Cretini, U.S. Geological Survey

LAGIC is working under a Partnership Agreement with USGS to develop a comprehensive infrastructure data set, using the USGS structures data model and covering Community Anchor Institutions (hospitals, schools, police stations) in the Louisiana Coastal Zone. In addition to the data collection, quality assurance and public distribution aspects of the work, LAGIC has developed an online interface that can be accessed through a web browser to modify and update the data as needed. Phase 1 of the project, four coastal parishes, is complete and Phase 2 has begun. This presentation will emphasize lessons learned and the unanticipated benefits we discovered.

Coastal Data: Navigation Data Integration and Standards

» *Kensington B*

G04. INTEGRATION OF MULTIBEAM ECHOSOUNDER AND AIRBORNE LIDAR BATHYMETRIC AND TOPOGRAPHIC DATA FOR SURVEYING COMPLEX COASTAL AND DEEP BATHYMETRY FOR NAVIGATIONAL CHARTING AND COASTAL ZONE MANAGEMENT

Don Ventura, Fugro Pelagos

The recent successful MBES/LiDAR ENC Charting surveys to the North of Jeddah, Kingdom of Saudi Arabia, were conducted in a co-operative programme by Fugro for the General Commission for Surveys (GCS) to International Hydrographic Organization (IHO) standards (S44 Order 1a, 1b, and 2). The survey project, completed in late 2010, will result in new nautical charts, including S57-compliant ENCs, showing previously uncharted coastal infrastructure and providing an excellent contribution toward a Digital Coast for siting and planning future coastal developments. The program at North Jeddah has been completed as a government-sponsored pilot survey for the newly formed GCS, now charged with administering Maritime Charting and Terrestrial Mapping in the Kingdom. The survey consisted of nearly 4000km^2 of combined LiDAR and MBES data collection ranging seamlessly across complex shallow water (coralline) barrier reef coastal margins and the typical deep water of the Red Sea rift area, which also included a narrow band of coastal topography. Without aerial bathymetric data acquisition and well-managed data fusion capability, this very poorly charted region could never be surveyed in such a holistic manner as befits a rational national charting program. This paper highlights the challenges of data integration of this dual survey-platform methodology for the successful delivery of a comprehensive program of works to achieve superior results in a geomorphologically complex marine, coral reef and terrestrial coastal environment.

G05. COASTAL CHANNEL DATA: COOPERATIVE PRODUCTION OF A NOAA/USACE DATA FRAMEWORK

Elizabeth Shope, U.S. Army Corps of Engineers

The United States Army Corps of Engineers (USACE) and the National Oceanic and Atmospheric Administration (NOAA) are responsible for providing navigation information to the maritime community. The national channel framework (NCF) is the basis for portraying information about congressional authorized navigation channels. The most fundamental components of the NCF consist of the outside channel limits (TOELINES) construction centerlines, top of slope lines (TOSLINES) and quartered sections of the channel as well as reach locations within the channels. Up until recently, both agencies have been using CAD to build and maintain all channel framework data, creating design standards for the existing CAD products and transferring that data to the Mobile District eCoastal Enterprise GIS geodatabase. Through Internet Map Service (IMS) and Web Map services (WMS), USACE is able to consolidate the channel framework data, and has been successful in sharing data with NOAA. With additional ARRA funding for this project, channel framework has grown to include the creation of 3D models for the 61 high tonnage channels maintained by USACE and has considerably helped push the task at hand to completion.

G06. SEE ADDENDUM

Coastal and Marine Spatial Planning: Inventories

» *Kensington C*

G07. GAME: EVALUATING AVAILABLE DATA FOR THE GULF OF MEXICO THROUGH EXPERTS' OPINIONS

Cristina Carollo, Harte Research Institute, Texas A&M University–Corpus Christi
Erin Leone, Florida Fish and Wildlife Conservation Commission

Over the past 5 years, the Geospatial Assessment of Marine Ecosystems (GAME) project has built a catalog of existing coastal and marine information for the Gulf of Mexico. This data discovery process, together with the development of online tools to share and visualize data, allows resource managers to access

critical information on ecosystem structure and functioning to support their decisions. Thus, GAME provides an approach for determining data availability and indentifying information gaps, a key step towards the implementation of Coastal and Marine Spatial Planning; significant gaps may lead to poor decisions. The GAME "qualitative" gap analysis provides a visual representation of gaps in GIS by showing presence/absence of information. Building off of this effort a more detailed "quantitative" gap analysis is being performed for the West coast of Florida. As a first step, a survey was sent to 1900 stakeholders throughout the Gulf region; experts were asked to rank data categories according to level of importance and score several qualifiers (spatial and temporal scale, age, and level of details) for each data category. The categories resulted from multiple workshops and Gulf of Mexico Alliance meetings in which data priorities were discussed. Preliminary results obtained from the analysis of 346 responses will be discussed focusing on expert ranking of data categories and scoring of qualifiers. The information stored in the GAME database has been weighted; weights have been developed from data category ranks and qualifier scores such that higher ranked categories with high-scoring qualifiers were given the greatest weight.

G08. EXPANDING THE U.S. MARINE PROTECTED AREA INVENTORY: WHAT COASTAL AND MARINE RESOURCES ARE REALLY PROTECTED?

Jordan Gass, Mimi D'Iorio, Hugo Selbie, and Rondi Robison, NOAA National Marine Protected Areas Center

The national picture of marine protection is constantly evolving. Marine management techniques have expanded to include various types of marine protected areas (MPAs) and other sorts of place-based management. The MPA Inventory is the product of efforts undertaken by NOAA's MPA Center and federal, state and territorial MPA programs and partners to characterize MPAs in U.S. oceans and the Great Lakes. The Inventory is maintained to reflect the best available information on MPA boundaries, resources and management. Past data collection has focused on classifying MPAs using standardized criteria to better understand the variety and purpose for which MPAs are established. This approach allows for a cohesive, geographically-based analysis on the protection status in U.S. marine waters. Recent developments such as the Administration's Coastal and Marine Spatial Planning initiative and the Gulf oil spill, highlight the need for more detailed information on marine resources to better inform management decisions. To address this need, the MPA Inventory is being expanded to incorporate resource and management information at the site level. The MPA Center is working to incorporate data on the presence of living marine resources, habitats, cultural resources, monitoring activities and specific restrictions to the MPAs in the inventory. These data will enable users to conduct spatial resource assessments on the protection of specific marine resources, and identify gaps in resource management. This presentation will describe the inventory expansion, discuss some challenges encountered in the data collection and provide examples of analyses now possible with the updated information.

G09. THE COASTAL AND MARINE ECOLOGICAL CLASSIFICATION STANDARD (CMECS): A FRAMEWORK FOR EFFECTIVE COASTAL AND MARINE SPATIAL PLANNING

Mark Finkbeiner, NOAA Coastal Services Center
Becky Allee, NOAA Gulf Coast Services Center
Garry Mayer, NOAA National Marine Fisheries Service, Office of Habitat Conservation
Chris Madden, South Florida Water Management District

Coastal and marine planners and managers face an increasing need for a standard national classification for coastal and marine systems. The National Oceanic and Atmospheric Administration, NatureServe, and a broad partnership of federal and state agencies, academic institutions, and nonprofit organizations have developed the Coastal and Marine Ecological Classification Standard (CMECS) to meet this need. The objective of CMECS is to provide a means to classify ecological habitat units in a standard format using a common terminology. The CMECS standard is based on the five components of the estuarine and marine environment—water column, benthic biota, surficial geology, the sub-benthos, and geomorphologic setting. CMECS is designed to incorporate information from a variety of sensors and observations. This makes CMECS especially valuable for synthesis of data obtained using different methods, scales, and levels of detail, an important part of coastal and marine spatial planning. CMECS is in the later stages of consideration by the Federal Geographic Data Committee as a national standard. As such, federally funded projects will be required to use CMECS or at least need to cross-walk their data into the CMECS structure. Informing various user communities and demonstrating the value of the system are essential to broad application of the standard. Coastal managers, scientists, industry representatives, and spatial analysts who typically attend the GeoTools conference are a key audience of the CMECS standard. The authors will present the CMECS standard, illustrate how various data collection technologies contribute to the CMECS framework, and educate potential users about implementation strategies.

Tools for Fisheries Management

» *Kensington F*

G10. APPGEO'S SECTOR MANAGEMENT APPLICATION ENABLES NEW ENGLAND GROUND FISHERIES TO MANAGE FISHING QUOTAS

Andrew Buck, Applied Geographics

AppGeo developed the Sector Manager application for the Cape Cod Commercial Hook Fisherman's Association. The Sector Manager application is designed to support the change in management of New England fisheries away from a "days at sea" model to one based on vessel and species quotas. The Sector Manager allows sector managers to allocate species quotas, set by NOAA's National Marine Fisheries Service (NMFS), across vessels within the sector. The system allows for the comparative analysis of Vessel Trip Reports (catch data), dockside monitoring data, and remaining quota limitations. Catch share allocations can be traded among vessels and between sectors. An extensive set of reporting and analysis features provide the tools that are required by sector managers and fishermen to administer the quota management system and satisfy the NMFS reporting and compliance requirements. Effort points (haul locations as latitude /longitude) can be displayed in the integrated geospatial viewer to provide a grid based visual representation of catch data for comparison to overfished and other sensitive areas. The sector manager is a single user desktop application written in C# using .NET, ArcGIS Engine mapping components, and a fully relational database.

G11. LOCAL RESOURCE MANAGEMENT GOES DIGITAL: IMPROVING MUNICIPAL SHELLFISHERIES MANAGEMENT WITH INTERACTIVE MAPPING TECHNOLOGY

Cary Chadwick, Center for Land Use Education and Research, University of Connecticut

Connecticut's municipal shellfish commissions are responsible for managing shellfisheries within their town waters. Each commission is required to develop a comprehensive management plan that identifies appropriate sites for both recreational and commercial shellfishing activity to avoid potential social (use) conflicts and adverse environmental effects. The use of geospatial information is critical to this decision making process. Previously, data layers including distribution and abundance of marine resources, mooring positions, shellfish classification areas, water quality data and existing harvest areas have been distributed in formats ranging from hand drawn or paper maps to sophisticated GIS datasets. The variety of information and range of technical skill required to utilize these data has been an impediment for municipal managers across the state, most of which are volunteer-based, on a limited budget, and less likely to have training in geospatial technology. With help from the Connecticut Sea Grant Program and the Connecticut Department of Agriculture, Bureau of Aquaculture, the University of Connecticut Center for Land Use Education and Research (CLEAR) has developed an interactive online map viewer to provide the commissions with the tools and information necessary to make informed decision regarding the siting of shellfisheries in their town. The online viewer is built using ESRI's ArcGIS API for Flex which allows for the creation of rich Internet applications on top of ArcGIS Server. This presentation will include a brief description of the project needs and impacts as well as an in-depth look at how the ArcGIS Flex API web map was developed.

G12. APPLICATION OF THERMAL INFRARED REMOTE SENSING IN RIVERS AND STREAMS: UNDERSTANDING THE AVAILABILITY OF THERMAL HABITAT FOR COLD WATER FISH SPECIES

Russell Faux, Watershed Sciences

Thermal infrared (TIR) remote sensing has proven an effective method for mapping spatially-explicit surface temperature patterns in rivers and streams. The imagery is typically collected at resolutions of < 1-meter and georectified for display and analysis in a GIS environment. TIR imagery and derived datasets can illustrate the influence of surface and sub-surface inflows on main stream temperatures across multiple spatial scales. This technology has been applied extensively in the Pacific Northwest for determining the availability of thermal refugia for salmonids and other cold water fishes during the summer months. More recently, these techniques have also been applied to small coastal streams in Alaska to provide baseline data for Pacific Salmon habitat, and on tributaries of the Miramishi River, New Brunswick, Canada to study the availability of thermal habitat for Atlantic Salmon and Sea-Run Brook Trout. We will discuss the accuracy and uncertainty of TIR remote sensing for mapping stream temperatures, drawing from examples from these three systems. We will also present findings that are common across stream systems, and discuss the utility of these data towards understanding how climate change can influence the availability of thermal habitat in coastal streams across broad spatial scales.

Break

10:30 to 11:00 a.m.

Late Morning Sessions

11:00 a.m. to 12:30 p.m.

Coastal Hazards: Shoreline Change

» *Kensington A*

H01. **USACE COASTAL CHANGE ANALYSIS IN RESPONSE TO THE NOVEMBER 2009 MID-ATLANTIC NOR'EASTER**

Charlene Sylvester, U.S. Army Corps of Engineers, Joint Airborne Lidar Bathymetry Technical Center of Expertise

Remnants of Tropical Storm Ida combined with a coastal nor'easter off the mid-Atlantic coast in early November 2009. Heavy precipitation, flooding, and rough surf battered coastal areas in the mid-Atlantic and Southeast, and precipitated a major disaster declaration in Virginia. Baseline data layers, critical for storm damage assessments, include high-resolution lidar elevation data and concurrent RGB imagery. The U.S. Army Corps of Engineers (USACE), under the National Coastal Mapping Program (NCMP), acquired this critical pre-storm data in September 2005 and only three months prior to the nor'easter in August 2009 for coastal areas from North Carolina through Delaware. As conditions improved following the storm, the U.S. Geological Survey St. Petersburg Coastal and Marine Science Center collected post- storm data along the same reach of coastline. This presentation describes a USACE analysis effort, supported by the North Atlantic Division (NAD), to determine the spatial distribution and magnitude of storm impacts between Ocracoke, NC and Cape Henlopen, DE. NCMP-standard information products including topo/bathymetry digital elevation models (DEMs), bare earth DEMs, and NAVD88 0-m elevation contours are analyzed for change and presented as a suite of advanced information products for the NCMP. These include cross-shore elevation profiles, pre-/post- storm elevation difference and beach volume change images, and transect vectors that are attributed with the magnitude and direction of positional change in the NAVD88 0-m contour. Results of this analysis will lend insight into storm-driven coastal geomorphology change, and provide decision-support tools for storm mitigation at USACE.

H02. **NEW JERSEY GIS-BASED STATE-WIDE BEACH-DUNE SYSTEM SUSCEPTIBILITY ASSESSMENT: APPLICATIONS AND VERIFICATION**

Daniel Barone and Robert Koch, Coastal Research Center, Richard Stockton College of New Jersey

The State of New Jersey contains areas of eroding bluff coastlines to the north and sand barrier-spit/island complexes to the south. Many of the sand beaches and shorelines along the New Jersey coast are sand starved and have been experiencing erosion for many decades. Much of this beach erosion is due to the effects of coastal storms such as hurricanes, and more commonly, northeast storms. These storms can cause catastrophic damage to the coastal infrastructure and adversely impact the livelihood of residents and tourists in these communities. Because it has a large coastal economy, New Jersey has been the most proactive state in the USA in undertaking shore protection projects to guard against beach erosion and maintain this valuable coastal resource. The Richard Stockton College Coastal Research Center (CRC) has developed a state-wide GIS-based beach-dune system susceptibility assessment. The assessment incorporates multiple geospatial and remote sensing techniques into a knowledge-driven spatial data model. The goal of the assessment is to evaluate the performance of oceanfront beach-dune systems in response to various storm events (i.e. FEMA classified 2-, 5-, 10-, 20-, 50-year storm events). In addition, the beach-dune susceptibility assessment provides federal, state, and local entities a useful tool to better manage a state's valuable coastal economy. Field verifications of the susceptibility model were recently carried out in Long Beach Island, NJ following a northeast storm in November 2009, which resulted in a Presidential Disaster Declaration. The field observations coincide with the susceptibility model output.

H03. **NEW JERSEY BEACH PROFILE NETWORK: MONITORING SHORELINE CHANGES IN NEW JERSEY REACHES ONE THROUGH FIFTEEN RARITAN BAY TO DELAWARE BAY**

Stewart Farrell, Brent Howard, Steven Hafner, Daniel Barone, Kim McKenna, Robert Koch, Brad Smith, and Michael Flynn, Richard Stockton College of New Jersey

The New Jersey Beach Profile Network (NJBPN) provides local and regional information on coastal zone changes and is designed to document storm-related damage assessments to the New Jersey shoreline. NJBPN is focused on long-term trends at sites to develop statistically meaningful information for State and local coastal zone managers. The database covers 23 years at 100 locations between Raritan Bay, the Atlantic Ocean coastline, and Delaware Bay. Each site has been visited annually in the fall since 1986. Semiannual visits, each spring and fall, began in 1994 following the passage of Public Law 155. The program was expanded to take surveys every spring following the winter northeasters and in the fall following the summer beach accretion. The field data is used to generate graphical cross section plots, which compare profiles across the width of the active coastal zone. The cross section is also used to calculate sand volume and shoreline position changes. This data aids NJDEP regulatory and planning personnel in the following ways: Determining areas of potential erosion problems. Implementing policies to protect beaches, dunes, overwash fans and erosion hazard areas (EHA), as well as reducing risks to development in these high hazard areas. Facilitating assessment of disaster impacts following future storm events. Providing useful background information, when evaluating NJDEP permit applications. Providing evidence on dune development at any site. Assisting local municipal governments in developing policies or plans for dealing with coastal erosion or improving storm

preparedness. In addition to NJBPN, we will be present findings from a study of Shoreline and Landmass Migration of Little Beach, NJ. Shoreline migration and landmass movement was analyzed over the past 90 years using historical aerials, LIDAR, and 2010 survey data.

Coastal Data: Fusion and Integration

» *Kensington B*

H04. THE FOREFRONT OF DATA PRODUCTION: SAVING TIME AND MONEY THROUGH AUTOMATION

Aaron Lawrence, Woolpert

For years Woolpert has been collecting, testing and experimenting with imagery and LiDAR data, but recent technology advances have allowed for the fusion of multi- spectral/hyper-spectral data to become a cost effective and accurate means of deriving geospatial information. With automated feature extraction, impervious surface delineation, land use classification, change detection datasets are at the fore front of this advance in technology. This presentation will demonstrate how data such as impervious surfaces, buildings, landuse/landcover classifications, etc. can now be produced through automation using multi-spectral imagery and LiDAR data. In the past, feature extraction was labor intensive, time consuming, and costly. This presentation will show how data can now be extracted, classified, and incorporated into a GIS. The presentation will also cover additional benefits of automation such as timeliness and cost-effectiveness.

H05. HYPERSPECTRAL AND LIDAR FUSION FOR LAND COVER CLASSIFICATION AND CHANGE ASSESSMENT

Christopher Macon, U.S. Army Corps of Engineers, Joint Airborne Lidar Bathymetry Technical Center of Expertise

Recently, multiple sensor data collection efforts have become more attainable but the tools to use the data together are still in their infancies. There are promising data fusion approaches that will automate processes which are currently manually time intensive and subjective. With various approaches it is easy to forget about keeping the products related to a set of standards that are currently used by the public. The U.S. Army Corps of Engineers (USACE) operates the Compact Hydrographic Airborne Rapid Total Survey (CHARTS) system with the U.S. Naval Oceanographic Office (NAVOCEANO) through the Joint Airborne Lidar Bathymetry Technical Center of eXpertise (JALBTCX). The CHARTS system is a multi- sensor platform that collects high-resolution lidar, aerial, and hyperspectral imagery for the USACE National Coastal Mapping Program (NCMP). The imagery datasets from the NCMP provides the USACE with regional scale data that are useful for engineering and environmental monitoring activities. Utilizing these regional datasets, the JALBTCX generated a basic land cover classification strategy that works nationally by combining the lidar elevation data and the hyperspectral imagery. This classification strategy started by using an arbitrary classification hierarchy and has become a highly requested product. This presentation will outline the current classification strategy, examples of uses for hurricane assessment, and the planned path to make this data fusion product compliant with the National Land Cover Database (NLCD).

H06. GEOSPATIAL DATA FUSION FOR COASTAL ENVIRONMENTAL APPLICATIONS

Molly Reif, U.S. Army Corps of Engineers, Engineer Research and Development Center

The Environmental Laboratory (EL) of the U.S. Army Engineer Research and Development Center (ERDC) is working with the Joint Airborne Lidar Bathymetry Technical Center of eXpertise (JALBTCX) to assist in the expansion of coastal environmental data products and applications. High resolution airborne lidar and hyperspectral imagery are collected along U.S. coastlines on a reoccurring basis by an integrated sensor suite, jointly operated and maintained by the U.S. Army Corps of Engineers (USACE) and the U.S. Naval Oceanographic Office. Geographic Information Systems (GIS) products created from these elevation data and imagery, such as 1-meter Digital Elevation Models (DEMs), 1- meter bare earth DEMs, true color orthorectified aerial image mosaics, pre-processed hyperspectral image mosaics, basic land cover classifications, and zero-contour shoreline vectors, are used to support planning, engineering, construction, operation, and maintenance activities in coastal areas. Recently, the EL teamed up with the JALBTCX to expand the use of and maximize the benefits of these data to support environmental activities. The focus of this presentation is to illustrate data fusion techniques, combining hyperspectral and lidar, as well as coastal environmental applications, such as critical coastal habitat mapping, species composition, invasive species identification, wetlands and beach characterization, and ecological modeling. Current collaborations within the USACE will also be highlighted, such as a new project using hyperspectral imagery and bathymetric lidar fusion for the discrimination and mapping of submerged aquatic vegetation.

Coastal Mapping: Seafloor Characterization

» *Kensington C*

H07. GROUND TRUTH OPERATION FOR SEAFLOOR CHARACTERIZATION

Shachak Pe'eri, Center for Coastal and Ocean Mapping, University of New Hampshire
Seth Ackerman, U.S. Geological Survey, Woods Hole Coastal and Marine Science Center
James Gardner and Abigail Morris, Center for Coastal and Ocean Mapping, University of New Hampshire

A compilation of airborne lidar bathymetry (ALB), multibeam echosounder (MBES), and swath interferometry datasets from the offshore of the Merrimack River, Massachusetts was used to develop ground-truth procedures that include

underwater video and grab sampling from more than 150 stations. The sampling scheme was developed based largely on backscatter and bathymetry maps produced from the acoustic surveys conducted in 2004 and 2005. The sample collection was conducted during the summer of 2009 and 2010. The compilation provides a comprehensive seafloor datasets that includes grain-size analyses, seafloor morphology and vegetation coverage. The results of the sediment analyses will be combined with images from the seafloor video and the existing bathymetry and backscatter data into an ESRI ArcMap project that allows simple archiving and presentation of the project. Data for each ground-truth station includes: the location of the grab sample, underwater video imagery, frame images of from the underwater video, the percent clay-silt-sand-gravel, rock-vegetation distributions, in addition to a description determined from the MBES backscatter. Here, we present the results using the ground-truth collection, the collection standards and procedure, data products, and archive structure of the compiled datasets.

H08. FINE-SCALE SEDIMENT DISTRIBUTION AT THE MOUTH OF THE MERRIMACK RIVER

Seth Ackerman, U.S. Geological Survey, Woods Hole Coastal and Marine Science Center
Shachak Pe'eri, Center for Coastal and Ocean Mapping, University of New Hampshire
Walter Barnhardt and Brian Andrews, U.S. Geological Survey, Woods Hole Coastal and Marine Science Center
James Gardner, Center for Coastal and Ocean Mapping, University of New Hampshire

The seafloor at the mouth of the Merrimack River, Massachusetts, is a complex mosaic of fluvial and coastal sediments that are reworked by currents and the seasonally variable wave conditions in the western Gulf of Maine. This study integrates a series of new closely-spaced sediment samples and acoustic data with existing geophysical data (airborne lidar bathymetry, multibeam echosounder (MBES), swath interferometry, and sidescan- sonar backscatter) to characterize the local seafloor geology, sediment distribution and surficial processes at the mouth of the Merrimack River. Sediment-sample and seafloor-video data were collected in 2009-2010 at more than 150 sites and an additional MBES survey was completed in August 2010. Here we present the preliminary results from the analyses of these datasets with a focus on the spatial distribution of the sediments discharged from the Merrimack River and their assimilation into the coastal environment of the Gulf of Maine. This study builds on existing research from a US Geological Survey regional mapping program (OFR2007-1373 - http://pubs.usgs.gov/of/2007/1373/). Using GIS and remote-sensing software, we relate the grain- size results from the new seafloor samples along with the MBES data to the existing backscatter imagery and bathymetry data. The integration of these datasets in the GIS allows us to identify fine-scale patterns of sediment distribution and surficial seafloor features that illustrate the effects that regional tides, currents and strong winter storms have on these fluvial and coastal sediments.

H09. SEAFLOOR CHARACTERIZATION USING AIRBORNE HYPERSPECTRAL CO-REGISTRATION PROCEDURES INDEPENDENT FROM ATTITUDE AND POSITIONING SENSORS

Yuri Rzhanov and Shachak Pe'eri, Center for Coastal and Ocean Mapping University of New Hampshire
James Guilford, Fugro
James Gardner, Center for Coastal and Ocean Mapping, University of New Hampshire

The advance of remote-sensing technology and data-storage capabilities has progressed in the last decade to commercial multi-sensor data collection. There is a constant need to characterize, quantify and monitor the coastal areas for habitat research and coastal management. In this paper, we present work on seafloor characterization that uses hyperspectral imagery (HSI). The HSI data allows the operator to extend seafloor characterization from multibeam backscatter towards land and thus creates a seamless ocean-to-land characterization of the littoral zone.

Coastal Data: Elevation

» *Kensington F*

H10. USING BATHYMETRIC LIDAR TO MITIGATE THE EFFECT OF NATURAL DISASTERS ON ENVIRONMENT AND ECONOMY

David Lye, Peledryn

Peledryn recently completed an exploratory LiDAR bathymetry survey in the Republic of Maldives, a country consisting of nearly 2,000 low-lying coral reef islands arranged in a number of atolls. The islands are vulnerable to a number of natural disasters, including severe metrological conditions (windstorm and storm surge), tsunamis caused by earthquakes, and flooding due to a global rise in the sea level. The coastal and marine environment of Maldives is also a highly valuable ecosystem of considerable marine biological diversity that supports over 80 percent of the population's livelihoods. This presentation will use the results of Peledryn's recent survey to discuss the ways airborne LiDAR bathymetry and topography systems can efficiently and effectively gather the baseline geospatial data needed to inform disaster mitigation and coastal infrastructure planning in areas where the environment and economy are at risk from natural hazards and global climate change.

H11. THE NORTHEAST MULTIPHASE LIDAR PROJECT

Michael Smith, Maine Office of GIS
Dan Walters, U.S. Geological Survey
Mark Meade, Photo Science
Charles LaBash, Environmental Data Center, University of Rhode Island

The Northeast LiDAR Consortium received award funds totaling $1.4M from USGS and contributing funds from other agencies and organizations totaling $1.1M towards Phase I of its initiative to achieve regional LiDAR coverage for the Northeast. Phase I is underway to provide complete coastal LiDAR coverage for the region. Consortium participants will discuss the initiative, cost sharing, proposal and award, along with plans for data access and distribution. With input from the prime contractor, Photo Science, we will also discuss data specifications, products, and status of the LiDAR data collection. We will also present plans and funding ideas for future phases of the project.

H12. BUILDING A NATIONWIDE ELEVATION INVENTORY

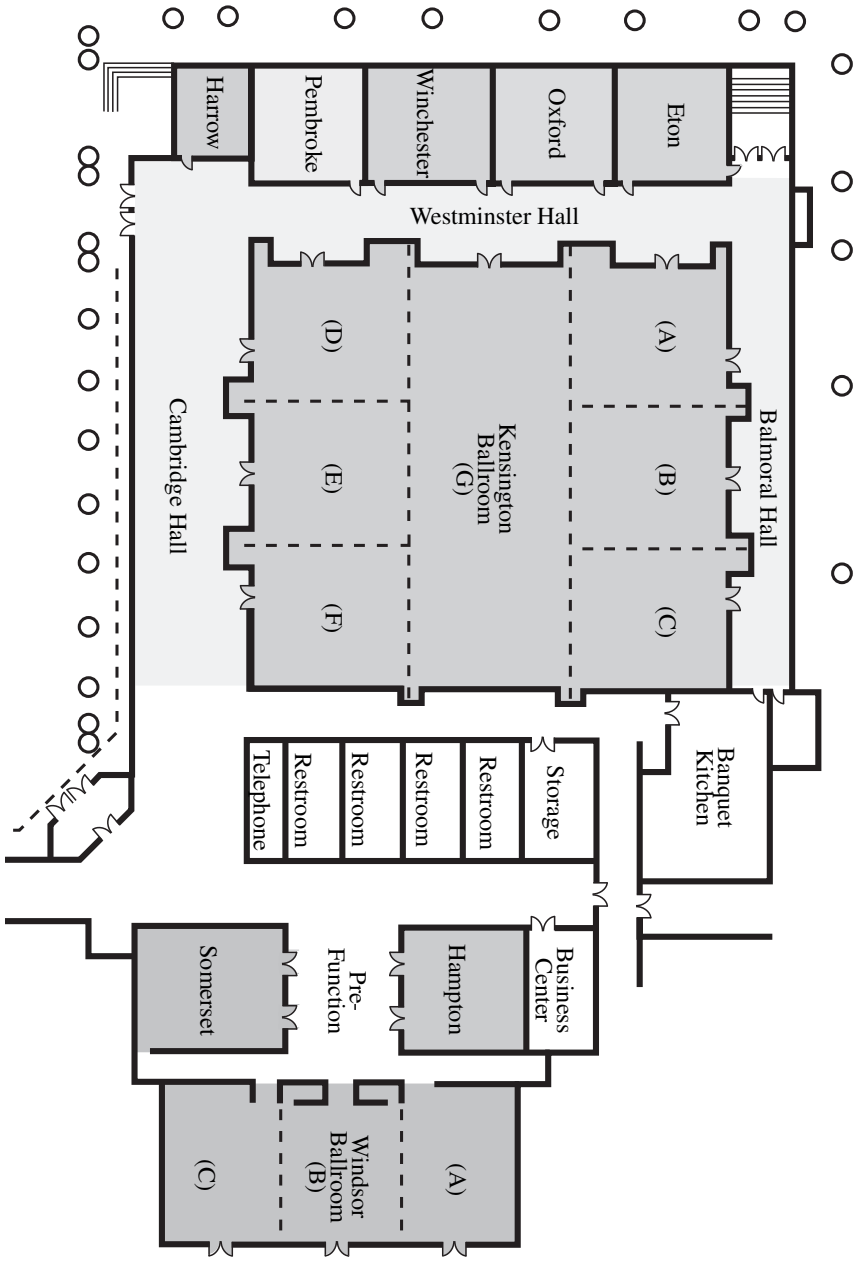
Lindy Betzhold, The Baldwin Group at the NOAA Coastal Services Center

Until now, NOAA's Topographic and Bathymetric Data Inventory has been a coastal-focused online tool that links users with the best available elevation data for their area. To make one comprehensive elevation inventory for the entire nation, including all noncoastal regions, the NOAA Coastal Services Center has teamed up with the Federal Emergency Management Agency (FEMA) and the U.S. Geological Survey (USGS). First, the Center has worked to build a detailed inventory of coastal elevation data sets that gives the user an idea of data quality and links the user directly to the data, where possible. Second, FEMA recently completed a broad-brushstroke inventory of topographic data sets for each FEMA region. The Center has worked to incorporate FEMA's national inventory into the NOAA interactive viewer in order to represent elevation data holdings across the nation. Finally, USGS has coordinated further refinements and validation of the inventory through its Geospatial Liaison Network.

For each data set, up to 22 attributes are provided, including data quality information, a point of contact, and if available, a direct link to the data. In addition to providing new and updated elevation information, the viewer has also been upgraded with new functionality, and work is ongoing for updates to the Gulf of Mexico, West Coast, and Pacific Islands.

Author Index

Embassy Suites Conference Center Floor Plan



COASTAL GEOTOOLS

About the NOAA Coastal Services Center

The National Oceanic and Atmospheric Administration (NOAA) is a world leader in coastal science and management. NOAA's Coastal Services Center provides the up-to-date technology, information, and management strategies needed to address complex coastal issues.

The Center is housed within NOAA's National Ocean Service and has offices and staff members throughout the coastal zone. Constituents include local and state governments, coastal regulatory programs, land trusts, Sea Grant, floodplain managers, research reserves, and emergency managers.

To access the Center's products and services, visit the website or e-mail the organization at *csc@csc.noaa.gov* to learn more.

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