6.0 State of the Strait Poster Presentations with Abstracts

State of the Strait Conference- Poster Presentations
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Geographic Mapping and Hydrodynamic Modeling to Support Fish Spawning Habitat Rehabilitation in the Huron-Erie Corridor
David Bennion, U.S. Geological Survey
Bruce Manny, U.S. Geological Survey

Abstract: Quantity and quality of available habitats determines fish and wildlife population production capacity. The U.S. Environmental Protection Agency has designated the St. Clair River and Detroit River Areas of Concern (AOC) and as noted in 2004, project design for Michigan AOCs, including maps, was largely nonexistent. This poster summarizes a project that addresses AOC delisting goals for beneficial use impairments number 3 (degradation of fish and wildlife populations) and number 14 (loss of fish and wildlife habitat) by mapping major physical components of select fish spawning habitat. Information from recent spawning habitat construction projects and spawning and larval fish studies is combined with spatial overlays of depth and water velocity to identify and rank potential sites for future fish spawning habitat construction projects.

U.S. Army Corps of Engineers Surveying and Mapping along the Huron-Erie Corridor
Molly Reif, U.S. Army Corps of Engineers/Engineer Research and Development Center

Abstract: The U.S. Army Corps of Engineers (USACE) Joint Airborne Lidar Bathymetry Technical Center of eXpertise (JALBTCX) executes the National Coastal Mapping Program (NCMP) by providing surveying and mapping of the coastal U.S. on a recurring basis. Since the inception of the NCMP in 1994, high-resolution bathymetric and topographic lidar elevation data, as well as hyperspectral and RGB aerial imagery, have been collected along a 1-mile swath for over 15,000 kilometers of shoreline along the Gulf, Atlantic, Pacific, and Great Lakes coasts. These data are developed into a suite of Geographic Information Systems (GIS) products, including seamless bathymetric/topographic digital elevation models (DEMs), bare earth DEMs, building footprints, shoreline vectors, basic land cover classification, seafloor reflectance, and RGB and hyperspectral image mosaics. Consequently, the data are used to support a myriad of activities in the coastal zone, such as regional sediment management, construction, operations, and regulatory functions. More recently the data are used to support environmental and coastal engineering applications, ranging from habitat and invasive species mapping to shore protection and geomorphic feature extraction. Along select shorelines of lakes Erie and Huron, data were collected from 2006 to 2008, and again in summers 2011 and 2012. In addition to these data, analytical tools and methods are developed to support specific environmental and coastal engineering
studies in the Great Lakes, including: 1) development of a semi-automated procedure for bluff edge detection, 2) image and lidar data fusion for detection and monitoring of invasive species, such as *Phragmites australis*, 3) and time series capabilities to illustrate changes in the landscape and tracking progress of shore protection projects, such as on Presque Isle, PA. Furthermore, these data are available to support other research and project activities through free access to lidar point data, by accessing the JALBTCX website, www.jalbtcx.org, to explore NCMP coverage and via the National Oceanic and Atmospheric Administration's Digital Coast website, www.csc.noaa.gov/digitalcoast.

**LIDAR Feature Extraction: Skip the Overhead of Grids and Extract Information Directly from Your LAS File**

Trevor Floyd, St. Clair County GIS

Abstract: Staff at St. Clair County have pioneered a method of extracting feature information directly from the point file. Our two meter post spacing LAS with identified ground classifications has provided enough of a baseline to harvest features. A recursive process of selective data point elimination and re-grouping has provided some impressive results. After sorting the points into probable groups, data can be compared against other known information sources to help improve accuracy and precision. Why pay a consultant to replicate information you may already have available?

**Visualizing Our Coordinated Response. *Phragmites australis*: An Invasive Species in the St. Clair River delta**

Charles Miller, Clay Township Phragmites Advisory Board

Ernest Kafcas, Clay Township Phragmites Advisory Board

Trevor Floyd, St. Clair County GIS

Abstract: Determining locations and ownership can be a difficult task when working in an area such as the River Delta; this study includes large acreage assemblages of state property and small ownership lots as narrow as eight meters. The changing landscape of disappearing cuts and increasing marsh islands dot the watery landscape. Complicate the issue with three meter invasive grasses and the task becomes all the more difficult. Using the tools of GIS, residents, and community leaders are able to identify, explore, track, demonstrate, and manage progress. A range of mapping resources from Microsoft Bing to an enterprise ArcGIS Deployment have been leveraged in this program. Some benefits of this cooperative effort have been unified permitting and volume purchase of chemicals and equipment. GIS has been an invaluable tool; stop by and talk with local representatives regarding this program!

**Cooperative Approaches for Soil Erosion and Sediment Control in the Great Lakes Basin**

Laura Kaminski, Great Lakes Commission

Gary Overmier, Great Lakes Commission

Michael Schneider, Great Lakes Commission

Thomas Crane, Great Lakes Commission

Abstract: Science, public outreach, and technical support for conservation practices are combined in the Great Lakes Commission's (GLC) nonpoint source pollution (NPS) program. Two federal programs, facilitated in part by the GLC -- the Great Lakes Tributary Modeling (GLTM) Program and the Great Lakes Basin Program for Soil Erosion and Sediment Control (GLBP) -- promote partnerships and a coordinated approach to modeling sediment transport and implementing erosion and sediment control practices.

Soil erosion from urban, agricultural, and forested landscapes is a priority issue facing the Great Lakes region and a focus area of the Administration’s Great Lakes Restoration Initiative (GLRI). Soil erosion and sedimentation have adverse environmental and economic impacts. Sediment loadings to tributaries can be a major source of nutrients, which increases algal blooms and can accelerate eutrophication (or the development of dead zones) within the
Lakes. The introduction of sediment to water bodies reduces water depths in harbors and shipping channels and increases the need for dredging and the costs to navigation users. The loss of soil from the land can also reduce farmland productivity and contribute to stream channel and bank instability, decreased enjoyment of recreational uses, and diminished flood control.

The GLTM program (authorized through Section 516(e) of the Water Resources Development Act of 1996) addresses sediment production and delivery in critical watersheds around the Great Lakes basin through the development of customized watershed and sediment transport models. The program is a joint initiative between the U.S. Army Corps of Engineers, agency and university partners, and the Great Lakes states. Together, the Corps and its partners develop modeling tools that can be used by state and local agencies and other stakeholders to help plan and implement soil conservation and nonpoint source pollution implementation programs. This work is helping to reduce the need for and costs of navigation dredging, while promoting actions to delist Areas of Concern (AOCs) and enhance Great Lakes water quality. More than 25 models have already been completed for tributaries to the Great Lakes and are being used by local, state, and federal agencies for watershed and ecosystem planning, forestry management, navigation maintenance planning, and water quality compliance evaluations. Additional information on the GLTM program can be found on the project website at: http://glc.org/tributary.

The GLBP is coordinated by the GLC in partnership with the U.S. Department of Agriculture & Natural Resources Conservation Service (NRCS), the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers, and the Great Lakes states to promote the improvement of Great Lakes water quality through financial assistance, technical support, education, and outreach at the local level. Initiated in 1991 and authorized in the 2002 and 2007 Farm Bills, this partnership has supported more than 400 grants to implement soil erosion and sediment control projects throughout the Great Lakes region. In 2010, nine watershed scale sediment reduction projects were awarded funding in priority areas in the basin through the GLRI. A selection of completed projects can be viewed at: http://glc.org/basin.

Organic Matter Decay, Greenhouse Gas Evasion, and Microbial Activity in Invaded and Historic Wetlands in the Detroit River International Wildlife Refuge
Shawn Duke, Eastern Michigan University

Abstract: Invasive species can substantially alter vital ecosystem functions, such as carbon and nutrient cycling. One emergent macrophyte, the common reed (Phragmites australis subsp. australis), is currently overtaking many Great Lakes wetlands. Invasion has resulted in the displacement of historic plant species such as Typha x glauca. This transition may result in increased carbon accumulation in freshwater wetlands. Reeds form monocultures, exhibit high primary productivity, contain large proportions of recalcitrant biomass and produce compounds that are potentially allelopathic and antimicrobial. These traits enhance Phragmites ability to dominate large areas. This study compares organic matter decay, carbon dioxide and methane evasion, and the effects of plant derived leachates on microbial activity in invaded and historic wetlands. We hypothesized that Phragmites invasion decreases rates of organic matter turnover, decreases evasion of both carbon dioxide and methane and inhibits microbial activity. Litter decay, soil incubation and leachate addition experiments were conducted to determine the effects of Phragmites on carbon transformations in a Lake Erie marsh. The results of this study suggest that carbon is stored in Phragmites biomass for longer periods than Typha biomass and that less carbon dioxide and methane are emitted from Phragmites invaded wetlands regardless of saturation level. However, our data indicated that Phragmites leachates do not inhibit total microbial respiration. Despite minor fluctuations in carbon output, invasive Phragmites could be impacting wetland function by acting as a temporary sink.
A Profile Depiction of Transect Communities in the Detroit River International Wildlife Refuge
Greg Stevens, Eastern Michigan University

Abstract: The aim of this poster is to depict the landform and vegetation profiles for the research transects set up in the summer of 2011 for the Detroit River International Wildlife Refuge. Among the data collected for the 2010 season by Dr. Gene Jaworski, Lisa Denys, and Greg Stevens, was observations of the vegetation species. The vegetation profile will place these observations and seek to establish the plant associations to which these species belong. There will also be produced a profile that suggests what those associations would normally be composed of. These idealized landscapes will be in comparison to what was observed. This will serve as indicators on the state of the lands that are being managed. The depictions will be a profile “slice” through the landscape revealing aspects of elevation, observed water level and location of vegetation. The use of ArcMap GIS and AutoCAD 3-D will be used to construct these representations. The software representation files will be linked to the database for the DRIWR so that clarification of observations may take place, as well as allow the database to show temporal studies as to the degree of succession. Instances of past and perspective land management techniques will also be noted, to allow for visual comparison.

Effect of Non-Native *Phragmites australis* and its Control Measures on Microbial Community Composition and Abundance in a Freshwater Wetland
Jennifer Kirk, Eastern Michigan University

Abstract: *Phragmites australis* is an invasive plant that has strong negative impacts on wetland ecosystems. To control *Phragmites*, a combination of the broad-spectrum herbicides glyphosate and imazapyr are often applied. While the toxicity effect on macroorganisms and specific model microorganisms has been well researched, effects on microbial community structure have not. Because microbes are important regulators of nutrient cycling in wetlands, and changes in their composition can alter this function, the purpose of this study was to determine whether differences in microbial community structure and abundance occur after glyphosate treatment. A series of soil samples were collected from a local wetland prior to and following a large-scale glyphosate application by the Michigan Department of Natural Resources at a wetland within the Detroit River International Wildlife Refuge (DRIWR). Additionally, soil samples were taken from wetlands dominated with invasive *Phragmites australis* and native vegetation. Using terminal restriction fragment length polymorphism (T-RFLP), a DNA fingerprinting technique, and quantitative polymerase chain reaction (Q-PCR) analysis, a bacterial community profile was constructed through time and by vegetation type. I hypothesized that an overall shift in the microbial community composition and abundance would be seen, and that some microbial groups would be enriched based on their ability to use glyphosate as a nutrient source. Furthermore, I expected that microbial communities and abundance would differ between soils under different vegetation types. Analysis using principal component analysis (PCA) indicated distinct differences between vegetation type and exhibited changes in microbial structure after herbicide application through time. Given microbes’ central involvement in nutrient cycling, these changes are important to understanding how they relate to the function of freshwater wetland ecosystems.
Juvenile Lake Sturgeon Habitat Use in the Detroit River near Fighting Island
Margaret Hutton, University of New England
Justin Chiotti, US Fish and Wildlife Service
Ashlee Horne, US Fish and Wildlife Service
James Boase, US Fish and Wildlife Service
Charles Tilburg, University of New England

Abstract: The Detroit River contains one of the largest populations of lake sturgeon, *Acipenser fulvescens* in the Great Lakes. However, habitat degradation due to channel dredging, pollution, and overharvest has played a role in reducing the number of lake sturgeon in this system. In order to protect and restore this population, the critical habitat of all life stages needs to be identified. In the summer of 2010, three young-of-year lake sturgeon were collected during bottom trawl assessments along the east side of Fighting Island. To gain a better understanding of juvenile lake sturgeon habitat use in this section of the Detroit River, side-scan sonar, ponar grabs, and bottom trawl assessments were conducted during the summer of 2011. Over 1700 images were taken using an 1197 series Humminbird® Side Imaging System which were georeferenced in ArcGIS creating a mosaic of the sonar images. Forty-five petite ponar samples were taken throughout the sample area to verify specific substrate types (e.g. silt, clay, cobble, etc.) seen in the sonar images. Preliminary results from ponar grabs have shown the substrate as a mixture of silt, clay, sand, small gravel, and/or zebra mussels with one substrate dominating the mixture. Forty-five bottom trawls were conducted to assess juvenile lake sturgeon distribution. Together, this information will assist managers when protecting and restoring the lake sturgeon population in the Detroit River.

Current and Historical Mapping of Reed Cane (*Phragmites australis*, Genotype M), in Detroit River International Wildlife Refuge Units
Eugene Jaworski, Eastern Michigan University
Jacque Alessi, Eastern Michigan University

Abstract: Since the late 1970s the introduced genotype M variant of the tall, invasive grass, *Phragmites australis*, has been rapidly colonizing large areas of the coastal emergent marshes of Lake St. Clair, Detroit River, and western Lake Erie. Also known by its common name, Reed Cane, this cosmopolitan polyploid species is displacing the natural marsh vegetation on all 17 Detroit River International Wildlife Refuge (DRIWR) units. The displacement has occurred primarily in cattail (*Typha* sp.) communities, as well as in wet meadow areas (*Carex* spp., and amid *Calamagrostis canadensis*), and even among more aquatic plant species such as broad-leaf arrowhead (*Sagittaria latifolia*). Spreading initially by seed per coastal earth-moving work including berm building, local road construction, dredge and fill, along with lake level fluctuations, once established this invasive expands its patches several meters a year by way of rhizome extension. Genotype M of Reed Cane is now a dominant plant community type on all the Detroit River International Wildlife Refuge units. Tolerant of burning and mowing, the current preferred control method is herbicide treatment, followed by burning to remove the standing stock of dead culms. On some DRIWR sites, early results show that spraying and burning is facilitating the seed bank in the wetland soils in regenerating rather diverse marsh communities representative of the pre-1970s coastal wetland vegetation. The detailed mapping efforts of Institute for Geospatial Research and Education at EMU are assisting the DRIWR in targeting units for restoration.
Developing Biodiversity Conservation Strategies for Lake Erie: Preliminary Assessments of Viability and Threat, with Emphasis on the Huron-Erie Corridor

Douglas R. Pearsall, The Nature Conservancy
John Paskus, Michigan Natural Features Inventory
Patrick J. Doran, The Nature Conservancy
Dan Kraus, Nature Conservancy Canada
Anthony Sasson, The Nature Conservancy
Cindy Chu, Nature Conservancy Canada
Matt Herbert, The Nature Conservancy
Mary Khoury, The Nature Conservancy
Dave Ewert, The Nature Conservancy
Sagar Mysorekar, The Nature Conservancy
Tia Bowe, The Nature Conservancy
Rebecca Hagerman, The Nature Conservancy

Abstract: The Nature Conservancy, Michigan Natural Features Inventory, and Nature Conservancy Canada, are developing strategies for conservation of the biodiversity of Lake Erie. Our intent is that these strategies will complement and be incorporated into the Lake Erie Lakewide Management Plan (LaMP). Using the Conservation Action Planning (CAP) process, we are midway through this 2-year project and have identified the focal biodiversity conservation targets (the aquatic systems of the lake and connecting channels, associated coastal and wetland systems, islands, native migratory fish, and aerial migrants) and completed preliminary assessments of the viability (health) of biodiversity and threats to biodiversity. We are reporting these preliminary results for the lake, with a focus on the St. Clair River – Detroit River System (aka Huron – Erie Corridor). Our assessment incorporates indicators that align with those of the Lake Erie Millennium Network, as well as others, and we have taken an additional step of assigning ratings of Poor, Fair, Good, or Very Good to each indicator.

Forecasting Phragmites Invasion Patterns and Habitat Suitability in the Huron-Erie Corridor

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Martha L. Carlson Mazur, USGS Great Lakes Science Center
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Abstract: Wetland habitats and transportation corridors in the Great Lakes are being invaded by a tall exotic plant called common reed (Phragmites australis). This plant forms dense stands and impairs wetland functions, reduces biodiversity and property values, limits human uses of beaches and recreational areas, and is extremely difficult and costly to eradicate once established. In partnership with Michigan Tech Research Institute, radar data were used to create a distribution map of Phragmites extent within the Great Lakes basin and allow the assessment of habitat suitability using observed and modeled environmental conditions. The resulting habitat suitability index was used in conjunction with proximity to areas dominated by Phragmites in order to produce an online geospatially-based decision support tool. When complete, this tool will assist resource managers with efforts to prioritize invasive species control actions and strategically plan applied restoration projects that target this invasive species within the Great Lakes basin.