Communications and Marine Advisory Services 2014-2017 Work Plan

The Advisory Services and Communications teams work together to share with Wisconsin's coastal residents, businesses, industries and resource managers the results and benefits of Sea Grant-supported research and the expertise of our outreach specialists. The focus areas for each project are abbreviated: HCE – Healthy Coastal Ecosystems, SFA – Sustainable Fisheries and Aquaculture, RCE – Resilient Communities and Economies and ELWD – Environmental Literacy and Workforce Development. Many of the projects proposed below overlap two or more Focus Areas, consequently the proposals are presented based on the individual specialist rather than the Focus Area though clearly some of the projects do relate well to one another. All of the projects address the National Sea Grant and Wisconsin Sea Grant goals, objectives and strategies listed in the respective Strategic Plans. The numbered strategies and impacts correspond to those listed in our 2014-17 Strategic Plan. The projects listed here are the major efforts proposed by our communications staff and outreach specialists. These involve multiple members of the outreach and communications staff and or external partners. The entire list of outreach and communications projects can be found in the Appendix. In addition to the projects listed below, all of the outreach staff and many of the communications staff are members or leaders of local, state, regional or national committees or organizations.

Communications

(Focus Areas: HCE, RCE, SFA, ELWD)

Background:
The Sea Grant communications staff acts as brand stewards, ensuring that science-based, non-advocating work on behalf of the Great Lakes is shared with appropriate target audiences. As the world comes to recognize the increased value of water and coastal resources our work will maintain our position at the forefront for policy makers and the public, and will increase. Our communications work on behalf of the Wisconsin Sea Grant program, its researchers and outreach staff creates, maintains and inspires credibility and confidence. We master and marshal traditional and non-traditional media tools and platforms. Such efforts require content management, create community and cultivate connections. Further, we develop messages. We combine targeted messages and employ effective vehicles to deliver those messages. Our delivery vehicles include: news releases; news conferences; listservs; partnership organizations; a quarterly program newsletter; face-to-face meetings/briefings; websites; social media platforms such as Facebook, iTunesU, Flickr, Twitter, Tumblr and Pinterest; publications, such as brochures, fact sheets, reports and watch cards; audio podcasts; video; op-eds; letters to the editor; and targeted pitches to media outlets.

Strategies:

- HCE-2. Engage researchers with the Sea Grant outreach and communications staff to effectively make available and deliver research-derived information and findings to resource managers, policy- and decision-makers and public stewards.
- HCE-3. Improve and enhance stakeholder access to and understanding of data, models, and policy information in Wisconsin and the Great Lakes that support ecosystem-based planning, decision-making and management approaches.
- HCE-4. Help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- HCE-5. Train and inform residents, resource managers and businesses so that they understand and can apply the policies that apply to coastal protected species and habitats.
- HCE-9. Interpret data, train and inform residents, resource managers and businesses to help them understand threats to Great Lakes ecosystems and importance of the benefits provided by preserving non-degraded ecosystems.
- SFA-2. Develop outreach products to make wild fish harvesters and aquaculture operations aware of advancements in product handling, packaging and marketing strategies.
- SFA-7. Develop outreach products for Wisconsin consumers about Wisconsin origin fish and fisheries products and other seafood choices, including nutrition benefits, risks, seafood safety and environmental impacts.
- RCE-2. Utilize Web-based technologies, publications, displays, and communication dissemination using traditional and new media to make available, and distribute information, about the value of waterfront, tourism-related economic activities and other socio-economic impacts.
- RCE-9. Communicate alternative actions to conserve water, protect water quality and protect water supply.
- RCE-12. Develop outreach and communication tools so that communities can understand the consequences of alternative development and storm-water mitigation scenarios.
- ELWD-2. Engage Sea Grant-supported graduate students, scientists and informal educators to help develop educational demonstrations for Great Lakes issues and topics to promote Great Lakes literacy.

Impacts:

- 2.1. Stakeholders have access to data, models, policy information and training that support ecosystem-based planning, decision-making and management approaches.
- 2.3 Residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- 2.4 Resource managers have an understanding of the policies that apply to coastal protected species.
- 3.1. Residents, resource managers and businesses understand the importance of the benefits provided by preserving non-degraded ecosystems.
- 3.2. Residents, resource managers and businesses understand the threats to ecosystems and the consequences of degraded ecosystems.

- 4.1. Fishery managers and fishermen understand the dynamics of wild fish populations.
- 4.2. The seafood industry is knowledgeable about innovative technologies, approaches and policies.
- 4.3. Commercial and recreational fishermen are knowledgeable about efficient and responsible fishing techniques.
- 4.4. The commercial fishing industry is aware of innovative marketing strategies to add value to its product.
- 4.5. The seafood processing industry learns and understands economically viable techniques and processes to ensure the production and delivery of safe and healthy seafood.
- 5.1. The seafood industry is aware of the standards for safe seafood.
- 5.2. The seafood industry is knowledgeable about consumer trends regarding seafood sustainability and safety and how to adjust operations to meet emerging demands.
- 5.3. U.S. seafood consumers have the knowledge to evaluate sustainable seafood choices.
- 5.4. U.S. seafood consumers have an increased knowledge of the nutritional benefits of seafood products and know how to judge seafood safety and quality.
- 7.1. Great Lakes communities understand the connection between planning and natural resource management issues and make management decisions that minimize conflicts, improve resource conservation efforts and identify potential opportunities.
- 8.1. Great Lakes communities are aware of the impact of human activities on water quality and supply.
- 8.2. Great Lakes communities understand the value of clean water, adequate supplies and healthy watersheds.
- 8.3. Great Lakes communities understand water laws and policies affecting the use and allocation of water resources.
- 9.1. Residents and decision-makers are aware of and understand the processes that produce hazards and climate change and the implications of those processes for them and their communities.
- 9.2. Decision-makers are aware of existing and available hazard- and climate-related data and resources and have access to information and skills to assess local risk vulnerability.
- 9.3. Communities have access to data and innovative and adaptive tools and techniques to minimize the potential negative impact from hazards.
- 9.4. Decision-makers understand the legal and regulatory regimes affecting adaptation to climate change, including coastal and riparian property rights, disaster relief and insurance issues.
- 10.1. Formal and informal educators are knowledgeable of the best available science on the effectiveness of environmental science education.
- 10.2. Formal and informal educators understand environmental literacy principles.
- 10.3. Lifelong learners are able to engage in informal science education opportunities focused on coastal topics.
- 11.1. Students and teachers are aware of opportunities to participate in science, technology, engineering, mathematics and active stewardship programs.

Performance Measures:

- HCE-wpm-7. The number of promotional events on how to prevent the introduction and spread of AIS and organisms in trade in the Great Lakes region. 8 events
- SFA-wpm-6. Collaborate with other state agencies and education partners to develop exhibits or lesson plans on the health benefits and risks of eating Great Lakes wild-caught fish and Wisconsin farm-raised fish. 2 exhibits or lesson plans.
- ELWD-wpm-7. The number of newspaper, radio, television, magazine and Web stories about Wisconsin Sea Grant and its work. 450 stories
- ELWD-wpm-8. The number of social media mentions of Wisconsin Sea Grant by other organizations. 10
- ELWD-wpm-9. The number of additional followers on the two leading social media platforms of Facebook and Twitter. 800
- ELWD-wpm-10. The number of materials distributed to target audiences using direct mail. 10,000
- ELWD-wpm-11. The number of webinars conducted to build communications capacity among outreach staff. 10
- ELWD-wpm-12. The number of new audio podcasts in the Wisconsin Sea Grant inventory. 10
- ELWD-wpm-13. The number of new videos in the Wisconsin Sea Grant inventory. 24
- ELWD-wpm-14. The number of program newsletters produced and disseminated. 16
- ELWD-wpm-15. The number of program-information publications produced and disseminated. 4
- ELWD-wpm-16. The number of websites redesigned and relaunched. 2

Jane Harrison – Environmental Sociology Specialist

Harrison 1 - Social Science Outreach to Wisconsin's Coastal Communities (Focus Areas: RCE, SFA)

Background:
Social science continues to be integrated across Sea Grant's programs and other NOAA offices and programs. Social science can provide the basis for understanding how Sea Grant products and services affect decisions and outcomes related to coastal resource management and coastal community development. Natural science can be better integrated into decision making if consideration is first given to the users of information, the translation and communication of that information, the processes by which information is used to make decisions, and the level at which decisions will be made (e.g. policy, emergency response or commercial businesses). Natural resource managers and coastal community decision-makers are faced with a wide range of issues and responsibilities they must address. They can apply social science tools such as public surveys, stakeholder meetings and focus groups, and economic models to answer questions like:

- What does the public know about this issue and what are their perceptions, attitudes and information needs?
- What economic impact would a certain alternative have on the community, and would the community support the alternative?
- What groups are interested in this issue and how might they participate in resolving it?

Planned or ongoing projects include:

- Weather Ready Nation Evaluation of the National Weather Service (NWS) Impact Based Warning (IBW) Tool. This project achieves two objectives: (1) Improve public response to extreme weather events, including thunderstorms and tornadoes and (2) Evaluate new NWS communication tool, IBW, in NWS Central Region. Interviews, focus groups and surveys with weather forecasters, emergency managers and broadcast meteorologist will be used to evaluate IBW. A report of IBW evaluation will be completed and presented to NWS Central Regional leadership. Findings will also be presented at several conferences and outreach briefs created to disseminate findings. The project will be completed by December 2014. Partners include National Weather Service, New York Sea Grant, Minnesota Sea Grant, Illinois-Indiana Sea Grant, NOAA Coastal Services Center, Great Lakes Social Science Network
- Safe and Sustainable Seafood Supply. This project seeks to increase knowledge of the health benefits and risks of seafood consumption and the impacts of seafood choices on fisheries sustainability, as well as promote the consumption of Wisconsin fish. A survey was used to evaluate the knowledge base and fish consumption decisions of grocery store customers in Madison and Milwaukee. A follow-up survey will be used to evaluate how that knowledge base and consumption decisions have changed after outreach materials are disseminated. Also, focus groups will be used to pilot the outreach materials. The project will be completed by December 2014. Partners include Milwaukee- and Madison-area grocery stores, grocery store customers and Wisconsin fish producers.
- Coastal Storms Needs Assessment. A needs assessment for products that reduce the negative impacts from coastal storms will be conducted among Great Lakes coastal communities. A survey and two focus groups of coastal planners will be used to gather data. The needs assessment data collection, analysis and reporting will be completed by December 2014. Partners include Great Lakes Sea Grant programs, NOAAs Coastal Storm Program, the American Planning Association and the Association of State Floodplain Managers.
- Assist the outreach and communications staff in development of evaluation plans or strategies for their projects and efforts to better assess the impacts and consequences of the Advisory Services program.
- Assist the research program director in development of a means to evaluate the impact and consequences of the Wisconsin Sea Grant research program.

Strategies:

- HCE-9. Interpret data, train and inform residents, resource managers and businesses to help them understand threats to Great Lakes ecosystems and importance of the benefits provided by preserving non-degraded ecosystems.
- HCE-11. Involve stakeholders in resource management decision-making processes and to help resource managers incorporate public input in resource management decisions.

Outcomes:

- 2.5. Methodologies are used to evaluate a range of practical ecosystem-based management approaches for planning and adapt to future management needs.

- Needs assessments are conducted to ensure Wisconsin Sea Grant activities are meeting the needs of stakeholders.
- Needs assessments are conducted in coordination with coastal community stakeholders who wish to determine priorities before initiating a project.
- Program evaluations are conducted to evaluate Wisconsin Sea Grant research and outreach programs.
- Program evaluations are conducted in coordination with coastal community stakeholders who wish to evaluate a project.
- Social science methods consultation are made available to coastal community stakeholders including, but not limited to:
    - Appropriate choice of social science methodology for issue/problem
    - Identification of target audience for social science product
    - Survey, interview and focus group methods, including instrument design, data collection, data analysis and reporting

Performance Measures:

- HCE-wpm-1. Investment in research, outreach and education projects that hold promise to develop measures and indicators of Great Lakes ecosystem health or that identify factors that threaten the sustainability of Great Lakes ecosystems.
- Number of social science products developed as project lead or co-lead. 3 annually
- Number of social science products provided for consulting or review. 5 annually

Harrison 2 - Economic Analysis for Wisconsin's Coastal Communities (Focus Areas: RCE, SFA, HCE)

Background:
Natural resources provide many goods and services, including ecosystem services, recreational opportunities, commercial uses and subsistence. Natural resource management can have an impact on local communities in terms of stimulating output and revenue as well as employment. It can also generate nonmarket, societal benefits such as recreational use, healthy ecosystem services, fish and wildlife habitat, and non-use values such as knowing the refuge exists (existence value) and the potential for visiting in the future (option value). Evaluating the potential socioeconomic impacts of changes in land and resource management practices is a necessary part of the planning process. A variety of economic tools are available to measure the market and nonmarket values of goods and services provided by natural resources. Outreach products that highlight the intersection between sustainable natural resource management and economic development are needed to inform coastal community decision-makers.

Proposed or current projects include:

- Sheboygan Area of Concern (AOC) Economic Study. This study will estimate the economic activity related to completed remediation and restoration in the Sheboygan AOC. It will help determine whether and how cleanup activities have incentivized entrepreneurs and established

firms to undertake additional economic activities. It will also estimate economic activity related to sport fishing, a key tourism draw for Sheboygan. The project includes three years of data gathering and analysis: 2013, 2015 and 2017. A findings brief will be disseminated to partners and regional decision-makers such as legislators and the Environmental Protection Agency.
    - Partners include the Wisconsin Department of Natural Resources, the city of Sheboygan, Sheboygan County and the University of Wisconsin-Extension.
- Milwaukee Urban Water Trail Video and Story Map. The video and story map will be used to promote the recreation potential of Milwaukee's waterways. They will connect Milwaukee residents to their waterways, and encourage a connection to the environment and a sense of stewardship of water resources. They will highlight the restoration and redevelopment work that have made it enjoyable to recreate on the river. This project is part of Wisconsin Sea Grant's larger effort of coastal heritage tourism. In particular, the story map can be considered one element of the Wisconsin Coastal Atlas. This project will be completed by December 2014.
    - Partners include Milwaukee Riverkeeper, Urban Ecology Center, city of Milwaukee, Milwaukee Riverwalk, Wisconsin River Alliance, Milwaukee Kayak Co., Lakefront Brewery and the Wisconsin Coastal Management Program.
- Aquaculture Economic Fact Sheets. Fact sheets will be geared toward commercial and small-scale/educational aquaculture enterprises. They will provide cost estimates for different levels of production. This project will be completed by December 2015. These fact sheets will be made available at the non-profit organization Growing Power's aquaculture workshops and from the Wisconsin Sea Grant publication store.

Strategies:

- HCE-11. Involve stakeholders in resource management decision-making processes and to help resource managers incorporate public input in resource management decisions.
- RCE-6. Support research that assesses the economic and social well-being of Wisconsin coastal communities to document improvements in quality of life related to coastal development plan implementation.

Outcomes:

- 4.14. There is an expansion of the sustainable domestic fishing and aquaculture industries.
- 6.2. Communities have access to information needed to understand the value of waterfront- and tourism-related economic activities.
- 6.7. Communities engage in economic development initiatives that capitalize on the value of their natural and cultural resources while balancing resource conservation and economic growth.
- 6.8. Communities have diverse, healthy economies and industries without displacing traditional working waterfronts.
- Wisconsin coastal communities will use economic impact analysis to determine how policy or regulatory changes affect regional income and other economic activities such as revenues, expenditures, employment, or inflation.

- Wisconsin coastal communities will use benefit cost analysis to value both the benefits and costs of a policy or regulation.
- In considering a policy position or change, Wisconsin coastal communities will use nonmarket valuation techniques to estimate the value of goods and services that are not directly bought or sold in markets, in particular, the nonmarket values of ecosystem services.
    - Nonmarket valuation techniques used will include hedonic analysis, travel cost models, contingent valuation and benefit transfer.

Performance Measures:

- SFA-wpm-3. Educate and inform Wisconsin residents about the health benefits and risks of eating Great Lakes wild-caught fish and Wisconsin farm-raised fish.
- RCE-npm-1. Number of communities that implemented sustainable economic and environmental development practices and policies (e.g., land-use planning, working waterfronts, energy efficiency, climate change planning, smart growth measures, green infrastructure) as a result of Sea Grant activities.
- Number of economic analyses and outreach products produced. 1 annually
- Number of economic analyses and outreach products provided consulting or review: 2 annually

David Hart – Geographic Information Systems Specialist

Hart 1 – Develop and Apply Geospatial Technologies to Promote Great Lakes Coastal Management (Focus Areas: HCE, RCE, SFA)

Background:

Since 1994, Wisconsin Sea Grant has collaborated with many partners to apply geospatial technologies to better understand coastal management issues facing the Great Lakes. This effort has evolved through several phases over the past 20 years: 1) providing GIS training for specific coastal issues; 2) discovering, acquiring and integrating local data to study regional issues; 3) implementing interoperable Web mapping services to build a dynamic and distributed coastal GIS; 4) utilizing visualization and animation to promote a more intuitive understanding of complex coastal issues; and 5) promoting a coastal spatial data infrastructure through development of the Wisconsin Coastal Atlas. The emphasis during the period of this work plan is the development and application of geospatial technologies to promote ecosystem-based management, sustainable coastal development and resilience to coastal hazards.

Strategies:

- HCE-3. Improve and enhance stakeholder access to and understanding of data, models, and policy information in Wisconsin and the Great Lakes that support ecosystem-based planning, decision-making and management approaches.
- HCE-11. Involve stakeholders in resource management decision-making processes and to help resource managers incorporate public input in resource management decisions.
- SFA-10. Make trap net GPS locations and maps available online and at boat ramps.

- RCE-5. Support research to develop or enhance community planning and visualization tools that demonstrate the benefits, risks and consequences of urbanization on the coastal environment.

Impacts:

- 2.1. Stakeholders have access to data, models, policy information and training that support ecosystem-based planning, decision-making and management approaches.
- 2.5. Methodologies are used to evaluate a range of practical ecosystem-based management approaches for planning and adapt to future management needs.
- Number of Sea Grant tools, technologies and information services that are used by our partners/customers to improve ecosystem-based management.
- 7.2. Communities make use of tools and information to explore the different patterns of coastal development, including community visioning exercises, resource inventories and coastal planning.
- 9.2. Decision-makers are aware of existing and available hazard- and climate-related data and resources and have access to information and skills to assess local risk vulnerability.
- 9.3. Communities have access to data and innovative and adaptive tools and techniques to minimize the potential negative impact from hazards.
- 9.5. Communities apply best available hazards and climate change information, tools and technologies in the planning process.
- 9.6. Decision-makers apply data, guidance, policies and regulations to hazard planning and recovery efforts.
- 9.7. Communities develop and adopt comprehensive hazard mitigation and adaptation strategies suited to local needs.

Performance Measures:

Wisconsin

- HCE-wpm-2. The number of geospatial technologies applied to better understand the relationship of Great Lakes ecosystem health with stakeholder in Wisconsin coastal communities. 3 communities
- HCE-wpm-3. The number of ecosystem-based management tools that are used to manage Great Lakes coastal resources. 5 tools
- SFA-wpm-4. Trap net location maps are used by anglers. 2,000 maps/10,000 downloads – adapt this measure for use of the trap net conflict mobile app
- RCE-wpm-3. The number of Wisconsin coastal communities that utilize planning support tools as a result of training and technical assistance by UW Sea Grant and its partners. 3 communities
- RCE-wpm-4. The number of Wisconsin Coastal Atlas-based water-resource-management tools used by Great Lakes coastal communities. 5 tools
- RCE-wpm-5. The number of training sessions for coastal hazards decision-support tools conducted by Sea Grant staff and partners; the number of decision-support tools that are used to promote resilience to Great Lakes coastal hazards. 3 sessions

- ELWD-wpm-2. Number of place-based learning activities addressing Great Lakes issues utilizing virtual globes or the Augmented Reality Interactive Storytelling (ARIS) platform developed by Wisconsin Sea Grant. 3 activities

National

- Number of Sea Grant tools, technologies and information services that are used by our partners/customers to improve Great Lakes ecosystem-based management.
- Number of communities that implemented sustainable economic and environmental development practices and policies (e.g., land-use planning, working waterfronts, energy efficiency, climate change planning, smart growth measures, green infrastructure) as a result of Sea Grant activities.
- Number of communities that implemented hazard resiliency practices to prepare for, respond to or minimize coastal hazardous events as a result of Sea Grant activities.

Hart 2 – Promote Coastal Heritage Tourism (Focus Area: RCE)

Background:
Wisconsin Sea Grant has collaborated on several projects that promote a better understanding of Wisconsin's Great Lakes coastal heritage. They include a website that features stories about Wisconsin shipwrecks, development of geocaching sites that provide education about Great Lakes maritime heritage and a Web mapping site that promotes exploration of the Great Lakes Circle Tour. This project will enhance those efforts and integrate them with activities of our external partners to create a more holistic approach to promote coastal heritage tourism both in Wisconsin and our neighboring states.

Strategy:

- RCE-2. Utilize Web-based technologies, publications, displays and communication dissemination using traditional and new media to make available, and distribute information, about the value of waterfront, tourism-related economic activities and other socio-economic impacts.

Impacts:

- 6.2. Communities have access to information needed to understand the value of waterfront- and tourism-related economic activities.
- 10.11. Members of the public incorporate broad understandings of their actions on the environment into personal decisions.

Performance Measures:

- RCE-wpm-1. Investment in research projects supported that seek to investigate or enhance Wisconsin's resilient coastal communities and economies.
- RCE-wpm-2. The number of Wisconsin coastal communities that utilize planning support tools as a result of training and technical assistance by Wisconsin Sea Grant and its partners. 10 communities.
- Community utilization of Wisconsin Sea Grant-developed resources to promote coastal heritage tourism. 10 coastal communities.

- Increased public desire to protect Great Lakes cultural resources.

Julia Noordyk – Coastal Storms and Water Quality Specialist

Noordyk 1 – Coastal Storms Program (Focus Area: RCE)

Background:
The NOAA Coastal Storms Program (CSP) is a nationwide effort to make coastal communities safer by reducing the loss of life and the negative impacts of coastal storms. The program has a history of providing an array of tools and services in the project areas, which have included improved observing systems, forecast models, decision-support tools, risk assessments, best-management practices, socioeconomic information, and outreach and extension activities to enhance community resilience. The CSP is currently focusing funds and resources in the Great Lakes region to help coastal communities reduce and mitigate the risk from storm and weather hazards and climate change, specifically with regards to: 1) improving beach hazard communication, forecasting and warnings; 2) addressing impacts of stormwater on natural resources; and 3) enhancing shoreline mapping and management. Funded through the NOAA CSP, Wisconsin Sea Grant has hired a coastal storms coordinator, Julia Noordyk, to co-lead the efforts of the CSP in the region.

Strategies:
- RCE-11. Support research that evaluates the impacts of increased climate variability and change, including intensity and frequency of rainfall and storm events on coastal community infrastructure.
- RCE-12. Develop outreach and communication tools so that communities can understand the consequences of alternative development and storm-water mitigation scenarios.
- RCE-13. Work with regulatory agencies, tribal entities and communities to help them understand the vulnerability of coastal properties to storm impacts.

Impacts:
- Great Lakes coastal communities will utilize effective comprehensive, mitigation, and climate adaptation plans and multi-objective management to promote resilience to coastal hazards and address problems from coastal storms before they become disasters.
- The most up-to-date and new beach hazard communication strategies will be implemented and reduce the loss of life due to dangerous currents in Wisconsin.

Performance Measures:
- RCE-npm-1. Number of communities that implemented sustainable economic and environmental development practices and policies (e.g., land-use planning, working waterfronts, energy efficiency, climate change planning, smart growth measures, green infrastructure) as a result of Sea Grant activities. 3 communities.
- RCE-npm-2. Number of communities that implemented hazard resiliency practices to prepare for, respond to or minimize coastal hazardous events as a result of Sea Grant activities. 5 communities.

- RCE-wpm-2. The number of Wisconsin coastal communities that utilize planning support tools as a result of training and technical assistance by UW Sea Grant and its partners. 3 communities.

Noordyk 2 – Lower Fox River and Green Bay Water Quality and Healthy Coastal Ecosystems (Focus Area: HCE)

Background:
Lower Green Bay and 14 tributaries in the Lower Fox River Basin do not meet Wisconsin water-quality standards due to low dissolved oxygen. Excessive suspended solids and phosphorous cause nuisance and harmful algal blooms (HABs) that have led to a dead zone in lower Green Bay. The Lower Fox River and Green Bay are listed on the state's 303(d) list of impaired waterbodies and have been designated a Great Lakes Area of Concern (AOC). In 2012, total maximum daily load (TMDL) standards for the area were approved by the Wisconsin Department of Natural Resources (DNR) and implementation began in 2013. Wisconsin Sea Grant is collaborating with multiple agencies and groups to support the delisting of Beneficial Use Impairments (BUI) in the AOC and the implementation of the TMDL.

The DNR is coordinating the implementation of the Remedial Action Plan (RAP) for addressing environmental problems in the AOC. UW Sea Grant holds membership on three AOC committees: 1) Biota and Habitat Advisory Committee and 2) Citizen Advisory Committee, and 3) Social Uses Workgroup. Noordyk chairs the AOC Citizen Advisory Committee Outreach sub-committee that will be working to identify, fund and implement outreach projects that will support the overall efforts of the RAP.

The TMDL identified sediment and phosphorous reductions needed from both nonpoint and point sources to achieve water quality standards. Excess nutrient and suspended solids runoff from land uses in the Fox River basin is extensive and pervasive and will require widespread management over many years. It will require the participation of farmers, urban and rural residents, municipal stormwater managers and wastewater dischargers throughout the watershed. To support TMDL implementation, the DNR has formed six stakeholder committees: 1) MS4 stormwater permit holders, 2) Agriculture, 3) Point source dischargers, 4) Outreach, 5) Monitoring, and 6) Technical. Noordyk is a working member of the TMDL Outreach Committee that will be developing and implementing a comprehensive public involvement and education strategy. Information about alternative actions is needed to improve decision-making and optimize resource allocations. Effective solutions to water quality degradation, especially from non-point sources of pollution, require meaningful participation and stewardship of knowledgeable stakeholders throughout the Lower Fox River basin.

Strategies:

- HCE-2. Engage researchers with the Sea Grant outreach and communications staff to effectively make available and deliver research-derived information and findings to resource managers, policy- and decision-makers and public stewards.

- HCE-3. Improve and enhance stakeholder access to and understanding of data, models, and policy information in Wisconsin and the Great Lakes that support ecosystem-based planning, decision-making and management approaches.
- HCE-4. Help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- HCE-5. Train and inform residents, resource managers and businesses so that they understand and can apply the policies that apply to coastal protected species and habitats.

Impacts:

- Coastal residents, resource managers, business and local officials will understand: 1) the causes consequences HABs in Green Bay, 2) the environmental, social, and economic impacts degraded water quality has on the region, and 3) what work is being done to improve water quality in the basin and 4) ways that they can contribute to the improvement of water quality in the basin.
- Municipal and regional governments, agricultural stakeholders, and MS4 permit holders will implement TMDL standards that will reduce total suspended solids and total phosphorus loading Green Bay by amounts necessary to reduce the severity of harmful algal blooms that are causing a dead zone in Green Bay
- Resource managers, industries and municipalities will have tools available to understand and predict the impacts of alternative loads of total phosphorus and total suspended solids runoff and climate on eutrophication in lower Green Bay.
- Baseline data, targets and indicators developed by Sea Grant and partners will be used to support ecosystem-based management in the AOC.
- Governments will use ecosystem approaches to implement adaptive management plans that reduce ecosystem stressors and restore beneficial uses.
- Progress toward achieving the targets will be continuously assessed, reported and used to adopt adaptive management plans.
- The effectiveness of coastal habitat rehabilitation, restoration and remediation projects will be enhanced by Sea Grant-supported research and outreach.

Performance Measures:

- HCE-npm-9. Number of Sea Grant tools, technologies and information services that are used by our partners/customers to improve Great Lakes ecosystem-based management. 2 services
- Number of public events held annually focusing on water quality and coastal community sustainability. 3
- Number of Lower Fox River and Green Bay watershed communities that take action to restore degraded water quality as a result of Sea Grant Activities. 3
- Number of outreach efforts that inform and support coastal community ecosystem-based management. 3

Noordyk 3 – Clean Marina Program (Focus Area: RCE)

Background:

The maintenance, operation and storage of recreational vessels have the potential to release pollutants to lakes and rivers. The Wisconsin Clean Marina Program promotes and celebrates voluntary adoption of measures to reduce pollution from marinas, boatyards and recreational boats. The program provides guidance education that enable marina and boatyard operators to become certified clean marinas that protect the resources that sustain their livelihood — clean water, clean air, and healthy fish and wildlife communities. The Clean Marina Program is administered by the Wisconsin Marina Association with guidance and technical assistance from Wisconsin Sea Grant.

Strategy:

- RCE-7. Work with Wisconsin's coastal communities, community leaders and businesses to help them develop and adopt plans for responsible development.
- RCE-9. Communicate alternative actions to conserve water, protect water quality and protect water supply.

Outcomes:

- An expert technical committee that is knowledgeable about Clean Marina best-management practices and capable of assisting Wisconsin Marina Association staff and marina and boatyard operators in the certification process.
- Marina and boatyard operators will be more knowledgeable and have an increased awareness of the Clean Marina Program, the best-management practices required for Clean Marina certification, and resources for certification.

Performance Measures:

- RCE-npm-1. Number of communities that implemented sustainable economic and environmental development practices and policies (e.g., land-use planning, working waterfronts, energy efficiency, climate change planning, smart growth measures, green infrastructure) as a result of Sea Grant activities. 6
- Number of new and renewing certified clean marinas in Wisconsin resulting from Sea Grant-led trainings. 8
- Number of trained clean marina certifiers. 5

Gene Clark – Coastal Engineering Specialist

Clark 1 – Coastal Engineering Project, Grant Proposal Review and Permit Assistance (Focus Areas: HCE, RCE)

Background:

Great Lakes shoreline and coastal regions continue to receive increasing levels of pressures from both the occasional weekend vacationer and especially new, year-round property owners and developments. Record levels of waterfront activities as well as the high demands for coastal property have created increased levels of human pressures on the fragile shoreline areas. Wisconsin's coastal areas are no exception. From the many new redevelopments along the Lake Michigan shoreline to the new

developments along many regions of the Lake Superior shorelines, there have been increasing numbers of individuals accessing the regions resources with little or no experience with the many natural coastal hazards that exist. As the demands continue to increase, so do the possibilities for increased loss of valuable coastal property, habitat and life.

Because of the ever-increasing demands to our Great Lakes coastal resources and the greater potential for loss of valuable property and lives, there continues to be a critical need to provide Great Lakes property owners, resource managers, lenders, insurers, engineers, realtors and local, regional and statewide agencies (Wisconsin Coastal management Program (WCMP), Wisconsin Department of Natural Resources (DNR) and Wisconsin Department of Transportation (DOT) with natural coastal hazard awareness, permit review assistance, grant proposal reviews, coastal engineering guidance, education opportunities and shoreline management tools. Sound coastal engineering information on coastal erosion, coastal structures, coastal processes, waves, rip currents, changing water levels, flooding potentials, bluff instability and shoreline best management practices are all needed. In addition to general Great Lakes coastal engineering guidance for property owners and coastal communities, special emphasis in this work plan period will be directed towards the DNR, WCMP and the DOT Harbor Assistance Program as it identifies easily approachable specific user groups for the information and would be able to incorporate the materials directly into their permit application reviews and guidance or grant proposal reviews.

Strategies:

- HCE-6. Develop and share materials, websites, training and workshops to help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- HCE-8. Collaborate with local, state, tribal and regional agencies and non-governmental organizations to implement strategies.
- RCE-4. Collaborate with local, state, tribal and regional agencies and non-governmental organizations to implement strategies.

Outcomes:

- DNR will have increased awareness of the potential effects shoreline structures can have on Great Lakes coastal shorelines, bluffs and habitats.
- DNR will incorporate information from Wisconsin Sea Grant into its coastal construction permit application reviews.
- WCMP and the DOT Harbor Assistance Program will incorporate information from Wisconsin Sea Grant into annual grant proposal reviews.
- Coastal engineering specialty activities will provide increased awareness and understanding by Great Lakes shoreline property owners, residents and visitors about coastal erosion, bluff failure, coastal structures, coastal processes and water safety issues (rip currents and hypothermia).

- Residents, coastal communities and visitors will have greater awareness and exercise caution utilizing information from Wisconsin Sea Grant about shoreline erosion, bluff instability, coastal structures and water safety issues.
- Wisconsin Sea Grant will conduct research and or outreach on methods to rehabilitate and prolong Great Lakes ports, harbors and marina infrastructure.

Performance Measures:

- RCE-wpm-7: The number of Great Lakes coastline erosion control, shoreline bluff stabilization or ports and harbor infrastructure projects that are completed utilizing significant Wisconsin Sea Grant Institute coastal engineering research results, outreach and/or design assistance. 10
- RCE-wpm-6: The number of Wisconsin Sea Grant partners that as a result of Wisconsin Sea Grant research and outreach, design, modify an initial design, permit and/or provide grant assistance to a project. 50 projects

Clark 2 – Wisconsin Department of Natural Resources Permit Review Policy for Timber Crib Piers (Focus Area: HCE)

Background:
The number of timber crib structures along the Madeline Island shoreline along Lake Superior now exceeds more than 100. Over the years, these perpendicular shoreline structures have been routinely permitted by the DNR without concern for their potential effects on adjacent Great Lakes shorelines. Recently, there have been a number of legal issues amongst adjacent shoreline property owners concerning the detrimental effects on Great Lakes shoreline properties due to these structures trapping littoral transport of sand that would normally move along the shoreline if these structures were not in place. Contractors have attempted to lessen the effects of this sediment movement by building the timber cribs with segments of "open" parts of the crib, with little success.

As additional Madeline Island shoreline property owners submit permit applications for the construction of timber crib piers along their shorelines, the DNR has realized that these permits require consideration of their potential effects to adjacent shorelines. However, the DNR does not have the training in coastal engineering to understand if the permit should be granted or not. The DNR has realized it needs to become proactive to create an official policy for water management specialists to follow when reviewing new timber crib permits. Therefore, the department has asked for and begun to utilize the Wisconsin Sea Grant coastal engineering specialist to assist in understanding the potential impacts of these coastal structures and adopt an official DNR policy to follow during timber crib pier application reviews and expected contested case hearings.

Strategies:

- HCE-6. Develop and share materials, websites, training and workshops to help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.

- HCE-7. Provide residents, resource managers and businesses with materials and training so that they understand and apply the policies that apply to coastal protected species and habitats.
- HCE-8. Collaborate with local, state, tribal and regional agencies and non-governmental organizations to implement strategies.

Outcomes:

- DNR will have increased awareness of the potential effects shoreline structures (particularly timber crib structures) can have on Great Lakes coastal habitats and nearshore processes.
- DNR will incorporate information from Wisconsin Sea Grant to improve construction permit reviews and work towards developing a region-wide policy on how timber crib structures are reviewed for permits.
- Coastal engineering specialty activities will provide increased awareness and understanding by Great Lakes shoreline property owners, residents and visitors about timber cribs and their potential effects on Great Lakes shorelines.
- Residents, coastal communities and visitors will have greater awareness and exercise caution utilizing when considering building timber crib structures along their Great Lakes shorelines by using information from Wisconsin Sea Grant about Great Lakes timber crib structures issues.
- The DNR works toward developing policy guidance for resource management specialists to follow when reviewing and permitting the use of solid timber crib piers along Wisconsin's Great Lakes shorelines.

Performance Measures:

- HCE: WDNR works towards developing policy guidance for resource management specialists to follow when reviewing and permitting the use of solid timber crib piers along Wisconsin's Great Lakes shorelines.

Clark 3 – Coastal Processes Manual Update (Focus Areas: HCE, RCE)

Background:

The Wisconsin Sea Grant Coastal Processes Manual was first written in 1987 by the coastal engineering specialist and was extremely successful. This manual quickly became a much-needed resource for Great Lakes coastal engineering information that was easily understandable to property owners, coastal communities, regulators and regional and statewide coastal resource agencies. The first edition's 600 printed copies were distributed Great Lakes-wide and sold old quickly. In 1998, a second edition was prepared and 200 copies printed. In 2006, the second edition was also offered as a free Wisconsin Sea Grant download. To date, all 200 hard copies of the second edition have been sold and more than 1,063 copies downloaded. The total manual distribution to date has been 2,463 copies.

The current second edition has seven chapters, 80 pages of text as well as an additional 48 pages of appendices containing sources of information and miscellaneous coastal engineering information. Since the second edition was prepared more than 15 years ago, there have been significant advances in several of the manual's topics and information sources as well as several completely new topics such as new Web-based coastal engineering tools and data sources, Federal Emergency Management Agency flood mapping results, coastal construction set-back guidance, coastal structure/processes interactions

understanding, climate change issues, etc. Therefore, the second edition is overdue for revision and updating with much new coastal engineering guidance for our Great Lakes property owners, coastal communities, regional and statewide agencies.

Strategies:

- HCe-6. Develop and share materials, websites, training and workshops to help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- RCE-2. Utilize Web-based technologies, publications, displays, and communication dissemination using traditional and new media to make available, and distribute information, about the value of waterfront, tourism-related economic activities and other socio-economic impacts.

Outcomes:

- Coastal engineering specialty activities will provide an increased awareness and updated understanding to Great Lakes shoreline property owners, residents and visitors about coastal erosion, coastal structures, coastal process, bluff instability and failure and water safety issues (rip currents and hypothermia).
- Wisconsin Great Lakes shoreline residents, coastal communities and visitors, regional and state agencies and other users will have greater awareness and exercise caution utilizing information from Wisconsin Sea Grant through the use of a newly revised Coastal Process Manual that will contain information concerning Great Lakes shoreline erosion, bluff instability and failure, coastal structures, coastal processes, coastal flooding and low-lake level issues, Web-based coastal engineering information tools and water safety issues (rip currents, hypothermia), etc.

Performance Measure:

- HCE. Complete revision of the existing Coastal Processes Manual.

Clark 4 – Harbor Dredging Beneficial Use of Dredged Material (Focus Area: HCE)

Background:
Maritime transportation in the Great Lakes, both commercial and recreational, relies on the maintenance of adequate water depth in harbors and connecting channels for navigation. Maintaining that depth where there is natural accumulation of sediments requires periodic dredging. Each year, navigation dredging in the Great Lakes produces 2 – 3 million cubic yards of sediment from the dredging of numerous federal Great Lakes commercial ports, recreational harbors and connecting channels maintained by the U.S. Army Corps of Engineers (Corps). Slightly more than half of the dredged sediment is typically disposed in specifically designed confined disposal facilities or CDFs. Clean sandy material is often used for beach nourishment, and much uncontaminated sediment dredged from Great Lakes harbors has historically been placed in the open lakes where states allow it, although that practice can face certain challenges at both the state and local levels.

Among federal agencies, Great Lakes states and individual communities, there is an increasing awareness that much of the material dredged in the Great Lakes for navigation is clean enough to be managed not as a burden—and in some states, a solid waste—but as a sustainable resource: a commodity with value. Recognizing that value, and identifying ways to maximize it, is the concept behind beneficial use as an environmentally sound, practical and sustainable approach to dredged material management in the Great Lakes.

In addition to the obvious wisdom of sustainably recycling a commodity with potential value, a more urgent motivation to promote beneficial use is the diminishing availability of other dredged material management alternatives. Consequently, dredged material only lightly contaminated is increasingly suitable for certain types of beneficial use.

CDFs, typically stone or earthen dikes designed to contain contaminated dredged sediment, have been used in the Great Lakes since the 1960s but they are quickly reaching their design capacity. Since the 1970s, the Corps has built and or operated 45 CDFs at a total cost of nearly $900 million. The 20 CDFs currently active in the Great Lakes are 80 percent full. Prohibitive construction costs, a cost-share requirement for non-federal partners of 35 percent and reduced site availability make construction of any new CDFs increasingly difficult. Therefore, the capacity of many Great Lakes CDFs is being expanded by heightening dikes or through removing material for beneficial use. Theoretically, CDF life could be lengthened indefinitely, assuming enough beneficial reuse projects of sufficient size are found to accommodate the sediment recycling concept.

Strategies:

- HCE-6. Develop and share materials, websites, training and workshops to help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- HCE-5. Improve and enhance stakeholder access to and understanding of data, models, policy information and training in Wisconsin and the Great Lakes that support ecosystem-based planning, decision-making and management approaches.

Outcomes:

- Ports, harbors and marinas will have an increased awareness and understanding about how to cope with varying Great Lakes water levels, especially due to the effects of climate change and the expected low water levels (increased dredging), and will use information from Wisconsin Sea Grant to plan for potential extreme water level changes and the associated increased dredged material disposal problems.
- State agencies, lawmakers and resources planners will have an increased awareness of the importance of the sustainable beneficial re-use of dredged material.
- Great Lakes states will promote and conduct several beneficial re-use of dredged material projects incorporating information from Wisconsin Sea Grant efforts into their plans.

- Great Lakes ports and harbors will look for sustainable methods to beneficially utilize their navigation channel and slip dredged material.
- Promote the regional sediment management of soil in the port and harbors watersheds so that this material remains on the land and is kept from entering the port and harbor tributaries (directly lessening the amount of material that would be needed to be dredged and disposed of).

Performance Measures:

- HCE-wpm-4: The number of Great Lakes ports and harbor projects that initiate the beneficial use of their harbor's navigation channel dredged material as the result of Wisconsin Sea Grant Institute research and outreach. 10
- HCE-wpm-5: The amount of Great Lakes dredged material put to beneficial use as the result of Wisconsin Sea Grant Institute research and outreach. 500,000 cubic yards of beneficially used dredged material

Fred Binkowski – Aquaculture Specialist

Binkowski 1 – Aquaculture/Aquaponics Education (Focus Areas: SFA, ELWD)

Background:
Declining wild fish populations and harvests combined with an increasing demand for world population food supply makes it imperative that work continue to establish aquaculture as a viable, sustainable industry in the Great Lakes region, the U.S. and the world. U.S. seafood consumption is 15 pounds per capita per year, far in excess of the capacity of the domestic fishery, making importation of seafood products necessary. More than 80 percent of seafood consumed in the U.S. is imported, resulting in a 2012 trade deficit for seafood and fish of $10.96 billion. (U.S. Department of Commerce, 2012)

There is currently a grassroots resurgence of interest in small-scale local food production that emphasizes home- or community-based farming. A popular model advocates a return to the practice of victory gardening, in which local community control is seen as providing an opportunity for more organic rather than mass industrial-scale farming practices. This general interest in home- or community-based farm production also extends into aquaculture and aquaponics. A popular strategy for developing aquaculture and aquaponics promotes the use of integrated recirculating systems combining fish and plant crop production.

Providing outreach to science and agricultural educators will be an important means of dispersing scientific and technical information to students, who will eventually become the owners and workforce for future aquaculture and aquaponics operations. We will continue curriculum development with our existing educational partners (Milwaukee's Fernwood Montessori Middle School, and Freedom High School in Freedom, along with Milwaukee's Vincent High School) and will expand our services by forging new relationships with high schools with agricultural programs in the state such as Shawano, Oshkosh,

Waterford, Winneconne and Morse-Marshall high schools. Relationships with First Nations schools will be initiated to promote and support education and employment opportunities in their communities.

The numerous requests that we have received specific to aquaponics in the Great Lakes Region through national networking have prompted us to provide specialized information in the form of a region-specific aquaponics manual. This manual will provide comprehensive "how-to" information for all aspects of aquaponics, from the initial system concept and design to the final stages of processing and marketing of fish and plant products. This project is aimed at providing aquaculture/aquaponics resource information to meet the increasing needs of the aquaponics industry.

Strategies:

- Develop aquaculture and aquaponics curriculum and training programs specifically directed to science and agricultural educators within the Wisconsin Department of Public Instruction (DPI) and First Nation school systems. This education program would expand our involvement with more than 30 high schools in the state of Wisconsin and will be coordinated with the Wisconsin Sea Grant educational specialist. This education initiative is endorsed by Dr. Tony Evers, superintendent of the DPI.
- Produce a comprehensive, region-specific aquaponics manual covering all aspects of fin fish and plant production from initial concept and system design to the final phase of marketing and processing of fin fish, plants and vegetables. Our past experience with conducting aquaponics workshops has shown us that there is still a need to answer general aquaponic inquiries. However, with the growing interest in producing high-value, high-quality, fin fish species, there is a need for up-to-date information pertaining to the biological, chemical and physical elements of these fin fish species. This represents a "new-age" aquaponics concept that would be used on a regional and national level.
- Collaborate with local, state, tribal and regional agencies and non-governmental organizations to implement strategies.
- Foster cooperative relationships with Wisconsin museums, nature centers and schools to help make students and teachers aware of science, technology, engineering and mathematics activities and coastal stewardship programs.
- ELWD-1. Work with education partners to develop K-12 curricula that address the Great Lakes Literacy Principles and adhere to science and environmental education standards approved by the DPI.

Outcomes:

- 10.1. Formal and informal educators are knowledgeable of the best available science on the effectiveness of environmental science education.
- 10.5. Engagement programs are developed and refined using the best available research on the effectiveness of environmental and science education.
- 10.6. Formal and informal education programs incorporate environmental literacy components.
- 10.7. Formal and informal education programs take advantage of the knowledge of Sea Grant-supported scientists and engagement professionals.

- 11.1. Students and teachers in the Great Lakes region are aware of opportunities to participate in science, technology, engineering, mathematics and active stewardship programs.

Performance Measures:

- Number of K-12 curricula to address the Great Lakes Literacy Principles that adhere to science and environmental education standards approved by the Wisconsin Department of Instruction. adoption of aquaponics/aquaculture education programs by 30 high schools.
- ELWD-npm-2. Number of people engaged in Sea Grant supported informal education programs. 600 students.
- ELWD-wpm-1. Investment in education research projects that seek to improve environmental literacy or workforce development. 3,000 aquaponics manuals distributed.

Greg Fischer – Aquaculture Specialist

(Focus Areas: SFA, ELWD)

Background:

Over the duration of this work plan, Wisconsin Sea Grant will expand its aquaculture outreach efforts through a partnership with the University of Wisconsin-Stevens Point Northern Aquaculture Demonstration (UWSP-NADF) facility. This facility is well suited to providing hands-on training to Great Lakes aquaculture operators. The UWSP-NADF is working to expand the variety of species that might be suitable for the Wisconsin climate and in recirculating systems. We will support the UWSP-NADF to allow them to offer additional training sessions and communication about hybrid walleye culture as well as other potential species and aquaculture techniques. This, in turn, will allow Wisconsin Sea Grant to expand our aquaculture outreach capabilities.

Strategies:

- SFA-2. Develop outreach products to make wild fish harvesters and aquaculture operations aware of advancements in product handling, packaging and marketing strategies.
- Enhance Great Lakes regional aquaculture operations through hands-on training in recirculating aquaculture techniques and alternative species.
- Conduct recirculating aquaculture system workshops.
- Provide information on hybrid walleye (saugeye) aquaculture techniques.
- Assist Wisconsin and Great Lakes regional fish culture operations in the expansion and development of their fish farming enterprises.
- Support the NADF in the development of hybrid walleye culture and the enhancement of alternative species for fish culture in the Great Lakes region.

Outcomes:

- 4.8. The seafood industry adopts innovative technologies and approaches to supply safe and sustainable seafood.

- 4.10. The seafood industry adopts techniques and approaches to minimize the environmental impact of their sectors.
- 4.11. Resource managers establish policies and regulations that achieve a better balance between economic benefit and conservation goals.
- 4.13. The U.S. seafood supply is sustainable and safe.
- Wisconsin and Great Lakes aquaculture operations become more profitable and sustainable.
- New aquaculture products are available in the Great Lakes region.
- New and existing aquaculture operations in the Great Lakes region learn about the risks and values of recirculating aquaculture.

Performance Measures:

- SFA-npm-1. Number of fishermen, seafood processors and aquaculture industry personnel who modify their practices using knowledge gained in fisheries sustainability and seafood safety as a result of Sea Grant activities. 400 aquaculture personnel trained.
- SFA-wpm-2. Number of wild capture, aquaculture industry owner/operators and seafood processors using practices and knowledge as a result of Wisconsin Sea Grant activities. 40 processors or operators that gain knowledge.

Kathy Kline – Education Outreach Specialist

Kline 1 – Center for Great Lakes Literacy (Focus Area: ELWD)

Background:

The Center for Great Lakes Literacy (CGLL) is a collaborative effort led by Sea Grant educators throughout the Great Lakes watershed. The center fosters informed and responsible decisions that advance basin-wide stewardship by providing hands-on experiences, educational resources and networking opportunities that promote Great Lakes literacy among an engaged community of educators, scientists and citizens.

Signature CGLL offerings include annual Great Lakes Shipboard Science workshops that connect educators with scientists aboard the EPA's *R/V Lake Guardian;* webinars and social media postings featuring pressing Great Lakes issues; land-based watershed workshops that facilitate strong community-school partnerships resulting in action-oriented Great Lakes stewardship and restoration activities; Great Lakes Awareness Day events for the public at prominent educational institutions—aquariums, zoos, museums, etc.; Limno Loan Program for Hydrolab water-quality monitoring equipment; Educator Day at the International Association for Great Lakes Research Conference; and citizen science and other volunteer activities that create opportunities for adults to become involved in watershed restoration.

Strategies:

- ELWD-1. Work with education partners to develop K-12 curricula that address the Great Lakes Literacy Principles and adhere to science and environmental education standards approved by the Wisconsin Department of Public Instruction.

- ELWD-2. Engage Sea Grant-supported graduate students, scientists and informal educators to help develop educational demonstrations for Great Lakes issues and topics to promote Great Lakes literacy.

Outcome:

- 10.1 Formal and informal educators are knowledgeable of the best available science on the effectiveness of environmental science education.
- 10.2 Formal and informal educators understand environmental literacy principles.
- 10.3 Lifelong learners are able to engage in informal science education opportunities focused on coastal topics.

Performance Measures:

- ELWD-npm-1. Number of Sea Grant facilitated curricula adopted by formal and informal educators. Develop and distribute 1 Great Lakes teaching tool (lesson plan, exhibit, etc.)
- ELWD-npm-3. Number of people engaged in Sea Grant supported informal education programs. Engage 100 people each year in activities and events that support Great Lakes literacy

Kline 2 – Grandparents University (Focus Area: ELWD)

Background:
This Wisconsin Alumni Association "university curriculum" is conducted each summer for young people accompanied by their grandparent(s). Students select a course of study in a subject area and track through a two-day program of coursework. Wisconsin Sea Grant, in cooperation with the University of Wisconsin-Madison Center for Limnology, offers a popular course of study on limnology, including water sampling on a UW research vessel, hands-on operation of underwater robotic technology and activities on aquatic invasive species. The course of study concludes with the presentation of diplomas at a graduation ceremony.

Strategy

- ELWD-2. Engage Sea Grant-supported graduate students, scientists and informal educators to help develop educational demonstrations for Great Lakes issues and topics to promote Great Lakes literacy.

Outcomes:

- 10.3 Lifelong learners are able to engage in informal science education opportunities focused on coastal topics.
- 11.1 Students and teachers are aware of opportunities to participate in science, technology, engineering, mathematics and active stewardship programs.

Performance Measure:

- ELWD-npm-3. Number of people engaged in Sea Grant supported informal education programs. Engage 100 students and grandparents each year in activities that support Great Lakes literacy

Kline 3 – Consumer Education About Eating Wisconsin Fish (SFA)

Background:
Many people are interested in purchasing more of their food from local sources, but when it comes to local fish, consumers often have questions about nutrition benefits and risk, as well as environmental sustainability of Great Lakes fisheries and fish farms.

Initiated in the 2010-2014 work plan, Wisconsin Sea Grant will continue its Eat Wisconsin Fish campaign to educate consumers about the benefits and risks of eating wild Great Lakes fish and Wisconsin farm-raised fish, as well as the environmental impacts associated with them. Wisconsin Sea Grant will first partner with a few stores on a pilot-scale project. The campaign will continue to update a website and other outreach products that provide the information consumers need to make healthy choices for their families and support Wisconsin fishermen and fish farmers.

Strategies:

- SFA-7. Develop outreach products for Wisconsin consumers about Wisconsin origin fish and fisheries products and other seafood choices, including nutrition benefits, risks, seafood safety and environmental impacts.

Outcomes:

- 5.3 U.S. seafood consumers have the knowledge to evaluate sustainable seafood choices.
- 5.4 U.S. seafood consumers have an increased knowledge of the nutritional benefits of seafood products and know how to judge seafood safety and quality.

Performance Measure:

- SFA-wpm-3. Educate and inform Wisconsin residents about the health benefits and risks of eating Great Lakes wild-caught fish and Wisconsin farm-raised fish. Distribute outreach products to 10 Wisconsin grocery stores, seafood distributors or producers

Anne Moser – Aquatic Sciences Librarian

Moser 1 – Elementary Education (Focus Area: ELWD)

Background:
Wisconsin's Water Library has worked over the past four years developing relationships that provide opportunities for collaboration on educational outreach for children ages 3 through 10. The library intends to continue developing those relationships and expand on opportunities to specifically reach underserved populations. For the library, educational outreach is defined as a combination of literacy and marine-literacy activities and has been primarily a story time that includes reading on a water-related topic, science-based activities (experiments) and a craft related to the theme. The library has also had successful collaborations with the University of Wisconsin-Madison Science Alliance, an on-campus group doing science outreach all over Wisconsin as an embodiment of the Wisconsin Idea, providing science outreach to older children.

Strategies:

- ELWD-1. Work with education partners to develop K-12 curricula that address the Great Lakes Literacy Principles and adhere to science and environmental education standards approved by the Wisconsin Department of Public Instruction.
- ELWD-2. Engage Sea Grant-supported graduate students, scientists and informal educators to help develop educational demonstrations for Great Lakes issues and topics to promote Great Lakes literacy.

Outcomes:

- 10.1. Formal and informal educators are knowledgeable of the best available science on the effectiveness of environmental science education.
- 10.2. Formal and informal educators understand environmental literacy principles.
- 10.3. Lifelong learners are able to engage in informal science education opportunities focused on coastal topics.
- 10.6. Formal and informal education programs incorporate environmental literacy components.

Performance Measures:

- ELWD-npm-1. Number of Sea Grant facilitated curricula adopted by formal and informal educators. Develop 10 marine literacy story times to be used in informal settings
- ELWD-npm-2. Number of people engaged in Sea Grant supported informal education programs. Engage 500 children each year in activities and events that support Great Lakes literacy

Moser 2 – Digitization (Focus Area: ELWD)

Background:
One of the goals of the library is "the preservation of the library collection for future as well as historical value." Under this goal, the library will continue to work with appropriate partners on digitization projects that add value to Wisconsin Sea Grant. One project currently in the works is the creation of the digital archive of the Earthwatch Radio Program. The collection spans more than 30 years of two-minute radio spots providing an historical look at environmental science, water science in particular. It is currently in storage at University of Wisconsin Archives. The project was started during the last work plan period and continues. Additional digitization projects will be determined.

Strategy:

- ELWD-2. Engage Sea Grant-supported graduate students, scientists and informal educators to help develop educational demonstrations for Great Lakes issues and topics to promote Great Lakes literacy.

Outcomes:

- 10.1. Formal and informal educators are knowledgeable of the best available science on the effectiveness of environmental science education.

- 10.7. Formal and informal education programs take advantage of the knowledge of Sea Grant-supported scientists and engagement professionals.

Performance Measures:

- ELWD-npm-1. Number of Sea Grant facilitated curricula adopted by formal and informal educators. A digital archive of almost 40 years of Earthwatch Radio.

Titus Seilheimer – Fisheries Specialist

Seilheimer 1 – Commercial Net Safety (Focus Area: SFA)

Background:
Commercial fishing gear can be a hazard to anglers and recreational boaters. By providing maps of the net location in the Two Rivers-Manitowoc and Sheboygan areas of Lake Michigan, boaters are informed about the location of nets and conflicts are reduced. Net maps also allow for an educational outlet for what to do when gear becomes entangled in nets. Educational material on how to identify nets is also needed for Lake Superior waters to inform boats about how to identify risks from different types of nets and how to properly deal with entanglement.

Strategies:

- SFA-2. Develop outreach products to make wild fish harvesters and aquaculture operations aware of advancements in product handling, packaging and marketing strategies.
- Inform boaters and anglers about the presence of commercial fishing nets off Two Rivers, Sheboygan and Washburn.
- Make printed and electronic maps of net locations available to anglers and boaters.
- Minimize user conflict.
- Improve boater safety.

Outcomes:

- 4.3. Commercial and recreational fishermen are knowledgeable about efficient and responsible fishing techniques.
- 4.6. Fishermen employ efficient fishing techniques, including bycatch reduction.
- 4.10. The seafood industry adopts techniques and approaches to minimize the environmental impact of their sectors.
- 5.9. The U.S. seafood industry operates sustainably and is economically viable.
- Two Rivers-, Manitowoc- and Sheboygan-area anglers are able to avoid entanglement in commercial trap nets; user conflict is reduced.
- Anglers and boaters are informed of trap net locations.
- Anglers understand that the target species for commercial nets is lake whitefish and that non-target species are released.

- Lake Superior-area anglers and boaters are able to avoid entanglement in commercial nets; user conflict is reduced.

Performance Measures:

- SFA-wpm-1. Develop outreach products to make wild fish harvesters and aquaculture operations aware of advancements in product handling, packaging and marketing strategies.
- SFA-wpm-2. Number of wild capture, aquaculture industry owner/operators and seafood processors using practices and knowledge as a result of Wisconsin Sea Grant activities 2
- 1,500+ trap net web page visits during the netting season
- Posters and more than 800 maps distributed in the Two Rivers – Manitowoc and Sheboygan area
- 250 Web page visits during the netting season to Lake Superior net safety pages
- The number of people reporting lost gear will remain fewer than 10 per year
- 350 net-safety brochures distributed in the Lake Superior basin of Wisconsin

Seilheimer 2 – Whitefish Trawl Study (Focus Area: SFA)

Background:
The traditional method for capturing whitefish in Lake Michigan waters involves trap nets. Trap nets allow sorting and release of non-target species. Unfortunately, with the expansion of dreissenid mussels in Lake Michigan since the late 1980's, the water clarity has increased significantly such that the trap nets now get covered with algae. This alga causes the fish to avoid the nets and therefore requires the fishermen to clean off their nets about twice a week during the summer months. This is labor intensive and involves additional fuel costs.

There is interest among two commercial fishermen who trawl for smelt in using that approach to trawl for whitefish. This could allow capture of the whitefish without the associated algae problem and could allow capture in the wintertime when the dockside price is higher. There is concern, however, that use of a trawl could involve significant by-catch and mortality of non-target species.

Wisconsin Sea Grant will work with the Wisconsin Department of Natural Resources (DNR) and a Two Rivers commercial fisherman to evaluate the capture rate of non-target species from trawling for whitefish. This research will be used to determine if trawling could be conducted without impacting other fisheries (e.g. salmon and lake trout). Fishing will be conducted over all seasons and a range of depths in order to identify temporal and spatial patterns in whitefish distribution that minimize by-catch.

This project will be conducted over one year with a possible extension of the project to be determined upon completion of year one. Monthly trawling in Lake Michigan for whitefish will allow determination of the rate of by-catch. A final report will be prepared following the completion of the project. Wisconsin Sea Grant will provide onboard monitoring and tagging of by-catch during the study. Returns of tagged fish will be used to estimate survival.

Strategies:

- SFA-1. Support research to develop and improve aquaculture practices and techniques, including aquaponics, nutritional value of feeds and disease and pathogen prevention and diagnosis.
- Determine rate of by-catch for trawls and compare to other commercial gear types.
- Identify seasons and depths that minimize by-catch.
- Rule changes in the WDNR regulations governing commercial fishing will allow for trawling for whitefish based on information from this study.
- Commercial fishermen will be able to trawl for whitefish during the winter months when prices are high but trap nets cannot be set.

Outcomes:

- 4.2. The seafood industry is knowledgeable about innovative technologies, approaches and policies.
- 4.3. Commercial and recreational fishermen are knowledgeable about efficient and responsible fishing techniques.
- 4.6. Fishermen employ efficient fishing techniques, including bycatch reduction.
- 4.7. Fishermen apply techniques to reduce negative impacts on depleted, threatened or endangered species.
- If successful, commercial fishermen will have an alternative means of capturing whitefish.
- Commercial fishing operations will be more profitable.
- Salmonid by-catch is avoided or minimized.

Performance Measures:

- SFA-wpm-2. Number of wild capture, aquaculture industry owner/operators and seafood processors using practices and knowledge as a result of Wisconsin Sea Grant activities. 1
- CC-pm-2: Number of peer-reviewed publications produced as a result of Wisconsin Sea Grant support, and number of citations for all peer-reviewed publications from the last four years. 1
- Monthly reports will be produced on the catch of whitefish and non-target species.
- Bycatch will be comparable to other methods of fishing, e.g. gill and trap nets.
- Whitefish prices are higher in the winter months when supply is low, so commercial fishing operations that utilize winter harvest for whitefish will have access to higher income.

Seilheimer 3 – Watercraft Inspections to Prevent the Spread of AIS (Focus Area: HCE)

Background:

The Great Lakes have been a significant source of aquatic invasive species (AIS) to inland lakes in Wisconsin. This project, now in its ninth year, provides education to Great Lake boaters on the proper methods to reduce and prevent transport of AIS to other water bodies. Simple steps like draining water, removing vegetation and not moving live fish can significantly reduce the likelihood of transporting live organisms and pathogens to other waters.

Strategies:

- HCE-4: Help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- Hire and train up to nine undergraduate students to perform the watercraft inspections at Lake Michigan and Lake Superior boat ramps between Memorial Day and Labor Day.
- Disseminate informational brochures, pamphlets and other educational prompts to help make boaters aware of the cleaning steps and regulations surrounding AIS transport.
- Submit recorded data in a timely manner on the Wisconsin Department of Natural Resources website.

Outcomes:

- 2.3 Residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- 3.2 Residents, resource managers and businesses understand the threats to ecosystems and the consequences of degraded ecosystems.
- Boaters are better informed regarding AIS prevention steps.
- Aquatic invasive species are not moved between waters.
- Ecosystem health is maintained.

Performance Measures:

- HCE-wpm-1: Investment in research, outreach and education projects that hold promise to develop measures and indicators of Great Lakes ecosystem health or that identify factors that threaten the sustainability of Great Lakes ecosystems.
- Sea Grant watercraft inspectors will contact more than 8,000 boaters annually
- 85 percent of boaters at Great Lake boat ramps will know what steps to take to prevent spread of AIS via boats and trailers based on survey questions asked by Wisconsin Sea Grant inspectors.

Seilheimer 4 - Salmon Ambassadors Wisconsin (Focus Area SFA)

Background:
Pacific salmon were introduced into Lake Michigan in order to help control the non-native alewife, in addition to providing a valuable recreational fishery. These goals have been successful, with lower levels of alewife and a large sport fishery. The current fishery for Chinook salmon is mainly supported through stocking of hatchery-reared fish by the four states surrounding the lake. Natural reproduction of Chinook salmon in Michigan and Georgian Bay, Lake Huron, coupled with the decline in the lakewide abundance of preyfish, has led to recent reductions of stocking numbers. The distribution of stocked Chinook salmon between Wisconsin ports has been an issue of interest to anglers in recent years. Although Wisconsin has limited natural reproduction compared to Michigan, understanding the whole-lake dynamics of salmon movement is vital for sound management of the fishery.

This project will engage Wisconsin anglers in the management of Lake Michigan Chinook salmon. Anglers will be recruited from all the ports in Wisconsin to collect information about the fish they catch. Fish size and fin clip (an indicator of stocked or wild) data will be collected by anglers to increase the knowledge about of seasonal change in the abundance of wild salmon in Wisconsin waters. This program will also allow for increased and more targeted collection of Chinook salmon heads for retrieval of coded wire tags (CWT). All stocked Chinook salmon will be marked with CWT by 2014, so this project will include valuable information on the movement of stocked and wild salmon. DNR fishery biologists will provide guidance on the collection of Chinook salmon heads for CWT from certain ports of interest. The same methods will be used by Michigan Sea Grant to collect data on the Michigan side of Lake Michigan, which will provide temporal and spatial patterns in wild Chinook salmon, in addition to stocking location for CWT collected heads, for a large proportion of the lake. The information collected by this project will be used to communicate status and trends in the fishery as well as aspects of salmon biology to anglers and other groups.

Strategies:

- HCE-1: Support research that seeks to contribute to the understanding, management and improvement of Great Lakes ecosystem health.
- HCE-3: Improve and enhance stakeholder access to and understanding of data, models, and policy information in Wisconsin and the Great Lakes that support ecosystem-based planning, decision-making and management approaches.
- HCE-11: Involve stakeholders in resource management decision-making processes and to help resource managers incorporate public input in resource management decisions.
- Engage anglers through collection of data for use in management.
- Use program to asked specific research and management questions by targeting ports and rivermouths.
- Improved management of Lake Michigan sport fisheries.
- Provide outreach about the ecology of sport fish in Lake Michigan.
- Resource managers set realistic and prioritized goals to protect, enhance and restore habitats by incorporating scientific information and public input.

Outcomes:

- 1.2 Identify critical uncertainties that impede progress toward achieving sustainability of Great Lakes ecosystems and the goods and services they provide.
- 1.5 Greater public stewardship in the Great lakes region leads to participatory decision making and collaborative ecosystem-based management decisions.
- 4.1 Resource managers and fishermen in the Great Lakes understand the dynamics of wild fish populations.
- 4.11 Great Lakes resource managers establish policies and regulations that achieve a better balance between economic benefit and conservation goals.
- Reduce conflict between agencies and anglers through angler data collection.
- Improved efficiency in the management of Chinook salmon in Lake Michigan.

- Great Lakes stakeholders have access to data, models, policy information and training that support ecosystem-based planning, decision-making and management approaches.

Performance Measures

- NCE-npm-9: Number of Sea Grant tools, technologies and information services that are used by our partners/customers to improve Great Lakes ecosystem-based management. 1 tool
- Information from this program will be used by WI DNR to inform decisions on stocking questions.
- 15 anglers enroll in the Wisconsin salmon ambassadors program each year.

Seilheimer 5 - Understanding the Changing Lake Michigan Food Web (Focus Area: HCE, ELWD)

Background:
Develop an outreach and education program to describe the current state and causes of the change in Lake Michigan's food web. Explore the potential future changes to the food web related to human activity and climate change. Inform coastal residents and resource users on the state of the science on the Lake Michigan food web.

Strategies:

- HCE-2: Engage researchers with the Sea Grant outreach and communications staff to effectively make available and deliver research-derived information and findings to resource managers, policy- and decision-makers and public stewards.
- HCE-4: Help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- HCE-9: Interpret data, train and inform residents, resource managers and businesses to help them understand threats to Great Lakes ecosystems and importance of the benefits provided by preserving non-degraded ecosystems.
- ELWD-2: Engage Sea Grant-supported graduate students, scientists and informal educators to help develop educational demonstrations for Great Lakes issues and topics to promote Great Lakes literacy.
- Inform angler groups, conservation groups, and students about food web ecology, the structure of Lake Michigan's food web and how it has been changed by invasive species.
- Residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.

Impacts/Outcomes:

- 1.5 Greater public stewardship in the Great lakes region leads to participatory decision-making and collaborative ecosystem-based management decisions.
- 2.8 Residents, resource managers and businesses integrate social, natural and physical science when managing resources and work with all sectors in the decision-making process.
- 3.2 Residents, resource managers and businesses understand the threats to ecosystems and the consequences of degraded ecosystems.

- 10.3 Lifelong learners are able to engage in informal science education opportunities focused on coastal topics.
- 10.7 Formal and informal education programs take advantage of the knowledge of Sea Grant-supported scientists and engagement professionals.

Performance Measures:

- HCE-wpm-1: Investment in research, outreach and education projects that hold promise to develop measures and indicators of Great Lakes ecosystem health or that identify factors that threaten the sustainability of Great Lakes ecosystems.
- Education program leads to measurement of indicators in local ecosystems (citizen science; e.g. Lake Michigan pH) 1 citizen group per year
- ELWD-npm-1: Number of Sea Grant facilitated curricula adopted by formal and informal educators.
- Number of education programs conducted by partners (WI Maritime Museum) 2
- ELWD-npm-2: Number of people engaged in Sea Grant supported informal education programs. 50 students and 5 angler groups annually.

Tim Campbell – Aquatic Invasive Species Outreach Specialist

Campbell 1 – Wakeboard Boat Ballast Study (Focus Area: HCE)

Background:

Some recreational boats have onboard ballast systems that are used to increase the enjoyment of water sports such as wake boarding and water skiing. These boats can carry more than 100 gallons of ballast and have the potential to move water and potentially invasive species overland. Working with a wakeboard boat dealer, initial observations determined that ballast water remains in the tanks even after the ballast system has been "fully drained" by the boat's pump system. Transporting water is in violation of Wisconsin law and while this rule is not currently being enforced on recreational boats with ballast systems, it would be wise to help these boaters find a way to reduce their risk of transporting aquatic invasive species (AIS). The goal of this project is to assess the potential of recreational boat ballast, to transport AIS, assess the risk of the boating behaviors of this boating group, and to ultimately develop a process to reduce the risk of recreational boat ballast transporting AIS.

Strategies:

- HCE-3: Improve and enhance stakeholder access to and understanding of data, models, and policy information in Wisconsin and the Great Lakes that support ecosystem-based planning, decision-making and management approaches.
- HCE-4: Help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- HCE-9: Interpret data, train and inform residents, resource managers and businesses to help them understand threats to Great Lakes ecosystems and importance of the benefits provided by preserving non-degraded ecosystems.

- Assess the potential of recreational boat ballast to transport AIS.
- Assess the risk of the boating behaviors of this boating group.
- Develop a process to reduce the risk of recreational boat ballast transporting AIS.

Outcomes:

- 3.2. Residents, resource managers and businesses understand the threats to ecosystems and the consequences of degraded ecosystems.
- 3.5. Resource managers, businesses and residents adopt innovative approaches and technologies to maintain or improve the function of ecosystems.
- An understanding of the potential of recreational boat ballast to transport AIS.
- Determine the boating behaviors of boaters with ballast and assess the risk of this boating group.
- Increased awareness of AIS prevention strategies by a previously untargeted group.
- Develop a convenient AIS prevention strategy for recreational boat ballast.

Performance Measures:

- CC-pm-2 - Number of peer-reviewed publications produced as a result of Wisconsin Sea Grant support, and number of citations for all peer-reviewed publications from the last four years. 1 publication
- HCE-wpm-1. Investment in research, outreach and education projects that hold promise to develop measures and indicators of Great Lakes ecosystem health or that identify factors that threaten the sustainability of Great Lakes ecosystems. 1 project
- Train 4 wakeboard retailers on AIS prevention.
- Host 2 wakeboard AIS prevention events for the general public
- Attend 6 wakeboard events to distribute AIS information and incorporate prevention activities
- Discuss AIS with 2 boat manufacturers the risk of ballast and possible solutions
- 1 presentation at a scientific conference

Campbell 2 – Organisms in Trade Symposium (Focus Area: HCE)

Background:

An introduction pathway for live organisms involves organisms in trade (OIT). These may be garden or nursery species but also include exotic pets and live food organisms. In Wisconsin, there are regulations on what species are allowed to be sold or possessed. Yet rather than rely solely on enforcement, we seek to develop a cooperative relationship between retailers, regulators, educators and consumers to help improve compliance and prevention. Regulations attempt to control what goes into trade, there are still potentially invasive organisms that are possessed by the public and these organisms can find their way into the environment through release or escape. Some planned activities include:

- Plan an OIT conference in Milwaukee in the spring of 2014 to help develop partnerships.
- Promote native or noninvasive alternatives for trade.
- Partner with aquarium clubs, animal rescues and humane societies to develop pet return mechanisms.

Strategies:

- HCE-3: Improve and enhance stakeholder access to and understanding of data, models, and policy information in Wisconsin and the Great Lakes that support ecosystem-based planning, decision-making and management approaches.
- HCE-4: Help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- HCE-9: Interpret data, train and inform residents, resource managers and businesses to help them understand threats to Great Lakes ecosystems and importance of the benefits provided by preserving non-degraded ecosystems.

Outcomes:

- 2.3. Residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- 2.8. Residents, resource managers and businesses integrate social, natural and physical science when managing resources and work with all sectors in the decision-making process.
- 3.5. Resource managers, businesses and residents adopt innovative approaches and technologies to maintain or improve the function of ecosystems.
- Stronger partnerships with stakeholders better address AIS issues.
- Better educated exotics retailers and consumers.
- Mechanisms to promote alternatives to pet release.
- Alternatives to using invasive species in the nursery and pet trades.
- Potentially fewer AIS in trade.
- Potentially fewer AIS being released into the environment.

Performance Measures:

- ELWD-npm-2. Number of people engaged in Sea Grant supported informal education programs. 1,000 people
- 2 pet amnesty events hosted
- 2 pet amnesty networks created
- 1 workshop/conference hosted on OIT and AIS issues
- 2 Habitattitude/OIT education events participated in

Phil Moy – Outreach Program Leader

Moy 1 – AIS Prevention at Fishing Tournaments (Focus Area: HCE)

Background:
Fishing tournaments have the potential to spread aquatic invasive species (AIS) through both the movement of participants' boats among water bodies as well as through the equipment used by tournament organizers. Judge and release boats and weigh-in equipment may be transported hundreds

of miles between events with little time to dry. By educating tournament organizers, and in turn tournament participants, about AIS prevention we can slow the spread of AIS between waters, maintain the fishing tournament industry and engage tournament anglers in youth education.

Strategies:

- Engage fishing tournament organizers as partners in AIS prevention efforts.
- Inform tournament anglers about the potential effects of AIS.
- Inform tournament anglers about how to prepare their boat for transport and not move AIS.
- Train tournament logistics support groups how to clean tournament boats.
- HCE-2. Engage researchers with the Sea Grant outreach and communications staff to effectively make available and deliver research-derived information and findings to resource managers, policy- and decision-makers and public stewards.
- HCE-4. Help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- HCE-9. Interpret data, train and inform residents, resource managers and businesses to help them understand threats to Great Lakes ecosystems and importance of the benefits provided by preserving non-degraded ecosystems.

Outcomes:

- Fishing tournaments are no longer a vector for AIS spread.
- Tournament anglers are better informed about AIS prevention steps.
- Tournament anglers become spokespersons to AIS prevention.
- Young anglers are informed about AIS prevention.
- 1.5 Greater public stewardship leads to participatory decision-making and collaborative ecosystem-based management decisions.
- 2.3 Residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- 3.1. Residents, resource managers and businesses understand the importance of the benefits provided by preserving non-degraded ecosystems.
- 3.5. Resource managers, businesses and residents adopt innovative approaches and technologies to maintain or improve the function of ecosystems.
- 3.6. Habitats are protected, enhanced or restored.

Performance Measures:

- HCE-npm-9. Number of Sea Grant tools, technologies and information services that are used by our partners/customers to improve Great Lakes ecosystem-based management. 1 best-management practice; 2 outreach tools or products

Appendix

Joint Advisory Services – Communications 2014-17 Project Proposal

This appendix contains the entire group of project proposals developed by the communications program and outreach program staff. In it, you can find further details on such topics as target audiences, time frame and external partners in addition to the basic information provided in the main body of the Omnibus proposal. The outreach staff involved include: Tim Campbell, Gene Clark, David Hart, Jane Harrison, Kathy Kline (50%), Anne Moser (60%), Julia Noordyk, Titus Seilheimer, Fred Binkowski (University of Wisconsin-Milwaukee) and Greg Fischer (University of Wisconsin-Stevens Point). Each of the outreach projects will involve communications staff and many will involve more than one member of the outreach staff.

In addition to the projects listed below, all of the outreach staff and many of the communications staff are members or leaders of local, state, regional or national committees or organizations.

Communications

FOCUS AREAS: HCE, RCE, SFA, ELWD

STRATEGIES:

- HCE-2. Engage researchers with the Sea Grant outreach and communications staff to effectively make available and deliver research-derived information and findings to resource managers, policy- and decision-makers and public stewards.
- HCE-3. Improve and enhance stakeholder access to and understanding of data, models, and policy information in Wisconsin and the Great Lakes that support ecosystem-based planning, decision-making and management approaches.
- HCE-4. Help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- HCE-5. Train and inform residents, resource managers and businesses so that they understand and can apply the policies that apply to coastal protected species and habitats.
- HCE-9. Interpret data, train and inform residents, resource managers and businesses to help them understand threats to Great Lakes ecosystems and importance of the benefits provided by preserving non-degraded ecosystems.
- SFA-2. Develop outreach products to make wild fish harvesters and aquaculture operations aware of advancements in product handling, packaging and marketing strategies.
- SFA-7. Develop outreach products for Wisconsin consumers about Wisconsin origin fish and fisheries products and other seafood choices, including nutrition benefits, risks, seafood safety and environmental impacts.
- RCE-2. Utilize Web-based technologies, publications, displays, and communication dissemination using traditional and new media to make available, and distribute information, about the value of waterfront, tourism-related economic activities and other socio-economic impacts.

- RCE-9. Communicate alternative actions to conserve water, protect water quality and protect water supply.
- RCE-12. Develop outreach and communication tools so that communities so that they can understand the consequences of alternative development and storm-water mitigation scenarios.
- ELWD-2. Engage Sea Grant-supported graduate students, scientists and informal educators to help develop educational demonstrations for Great Lakes issues and topics to promote Great Lakes literacy.

BACKGROUND:

The Sea Grant communications staff act as brand stewards, ensuring that science-based, non-advocating work on behalf of the Great Lakes is shared with appropriate target audiences. As the world comes to recognize the increased value of water and coastal resources our work will maintain our position at the forefront for policy makers and the public, and will increase. Our communications work on behalf of the Wisconsin Sea Grant program, its researchers and outreach staff creates, maintains and inspires credibility and confidence. We master and marshal traditional and non-traditional media tools and platforms. Such efforts require content management, create community and cultivate connections. Further, we develop messages. We combine targeted messages and employ effective vehicles to deliver those messages. Our delivery vehicles include: news releases; news conferences; listservs; partnership organizations; a quarterly program newsletter; face-to-face meetings/briefings; websites; social media platforms such as Facebook, iTunesU, Flickr, Twitter, Tumblr and Pinterest; publications, such as brochures, fact sheets, reports and watch cards; audio podcasts; video; op-eds; letters to the editor; and targeted pitches to media outlets.

The program's mission further guides Communications efforts: UW Sea Grant supports scientific research, education and outreach to foster the wise use, conservation and sustainable development of Great Lakes and coastal resources. We strive to provide unbiased science-based information to Great Lakes coastal residents, resource managers and other stakeholders. Our audiences include specific stakeholders and agencies, state and federal officials, the general public, the UW community and the National Sea Grant Program.

OBJECTIVES:

- Communicate Wisconsin Sea Grant support for original coastal research and/or replication studies. Disseminate research results to appropriate audiences.
- Communicate science-based policies and tools to resource managers that can benefit ecosystems, communities and economic endeavors.
- Communicate so as to encourage and foster careers in marine-science fields.
- Build marine-science literacy, which in turn, leads to understanding and stewardship of the Great Lakes.
- Respond to requests for Wisconsin Sea Grant information.

APPROACH/PLANNED ACTIVITIES:

- Google Plus, 1) fully understand and use the tools this platform allows, including the video archiving and real-time Web-based conferencing, 2) apply to the new Wisconsin Sea Grant

graduate student initiative and 3) conduct a pilot on stripping out the audio from Web-based conferencing and adding that to the current podcasting inventory.

- Build communications capacity with outreach staff, principal investigators and graduate students. Use webinars, Google Plus, and/or in-person sessions to cover topics such as photography, doing audio and/or video recording, effectively using social media, how best to use Google Plus, working with graphic designers, delivering an effective interview with the mainstream media, developing an elevator speech, and developing effective messages and activities for public events and booths.
- Produce at least one podcast series on coastal topics each year of the work plan. Will track downloads.
- Produce at least six videos on coastal topics each year of the work plan. These videos will be closed captioned. The videos will support our Focus Areas efforts in healthy Great Lakes ecosystems, sustainable fisheries and aquaculture in the Great Lakes region, resilient Great Lakes communities and economies, and environmental literacy and workforce development in the Great Lakes region research, education and outreach work as described in our strategic plan. The videos will be available for public viewing through a video player on our website (seagrantwisc.edu), through iTunesU and on our YouTube channel. Videos make up an important part of our communications strategy because they are an effective way to share stories in a concise and accessible manner with varied audiences. Additionally, some of our research grant recipients have expressed the intent to produce videos about their projects during this funding cycle.
- Produce a quarterly newsletter. Continue to survey readership on the newsletter's content, graphics and delivery systems.
- Populate social media channels that include You Tube, Flickr, Pinterest, Great Lakes Takes (a blog), Facebook and Twitter. Since social media creates an online community, on a daily basis it's possible to track engagement with audiences and note potential attitude and behavioral changes. On a quarterly basis, these efforts are surveyed and reported to staff. On an annual basis, efforts are shared with our Advisory Council. Adjustments informed by the analysis are made.
- Engage in media relations—reactive and proactive. On a quarterly basis, these efforts are surveyed and reported to staff. On an annual basis, they are shared with our Advisory Council. Adjustments informed by the analysis are made.
- Produce at least four program publications: 2014-16 and 2016-18 People and Project Directories, and 2012-14 and 2014-16 Wisconsin Sea Grant Biennial Reports.
- Website work. There is ongoing maintenance and content updating with all of Sea Grant's pages and sites. Other bigger website work will include a redesign and relaunch of the shipwrecks site, combining it with a maritime trails site now maintained by the Wisconsin Historical Society, plus adding features from the Wisconsin Coastal Guide; building a mobile site for seagrant.wisc.edu; and redesigning the Sea Grant online publications store. Assessments of Web trends are conducted on a quarterly basis, at a minimum. Adjustments informed by the analysis are made.
- Create print collateral and build Web assets as requested by the outreach staff.
- Maintain flexibility. This ensures readiness to respond to external factors relative to Great Lakes, coastal and other water-related topics, e.g. local debates on water diversion or Great Lakes remediation efforts. This also ensures readiness to adopt changing technology.
- Produce an internal Wisconsin Sea Grant newsletter on a monthly basis to facilitate staff interaction and share information.

IMPACTS:

- 2.1. Stakeholders have access to data, models, policy information and training that support ecosystem-based planning, decision-making and management approaches.
- 2.3 Residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- 2.4 Resource managers have an understanding of the policies that apply to coastal protected species.
- 3.1. Residents, resource managers and businesses understand the importance of the benefits provided by preserving non-degraded ecosystems.
- 3.2. Residents, resource managers and businesses understand the threats to ecosystems and the consequences of degraded ecosystems.
- 4.1. Fishery managers and fishermen understand the dynamics of wild fish populations.
- 4.2. The seafood industry is knowledgeable about innovative technologies, approaches and policies.
- 4.3. Commercial and recreational fishermen are knowledgeable about efficient and responsible fishing techniques.
- 4.4. The commercial fishing industry is aware of innovative marketing strategies to add value to its product.
- 4.5. The seafood processing industry learns and understands economically viable techniques and processes to ensure the production and delivery of safe and healthy seafood.
- 5.1. The seafood industry is aware of the standards for safe seafood.
- 5.2. The seafood industry is knowledgeable about consumer trends regarding seafood sustainability and safety and how to adjust operations to meet emerging demands.
- 5.3. U.S. seafood consumers have the knowledge to evaluate sustainable seafood choices.
- 5.4. U.S. seafood consumers have an increased knowledge of the nutritional benefits of seafood products and know how to judge seafood safety and quality.
- 7.1. Great Lakes communities understand the connection between planning and natural resource management issues and make management decisions that minimize conflicts, improve resource conservation efforts and identify potential opportunities.
- 8.1. Great Lakes communities are aware of the impact of human activities on water quality and supply.
- 8.2. Great Lakes communities understand the value of clean water, adequate supplies and healthy watersheds.
- 8.3. Great Lakes communities understand water laws and policies affecting the use and allocation of water resources.
- 9.1. Residents and decision-makers are aware of and understand the processes that produce hazards and climate change and the implications of those processes for them and their communities.
- 9.2. Decision-makers are aware of existing and available hazard- and climate-related data and resources and have access to information and skills to assess local risk vulnerability.
- 9.3. Communities have access to data and innovative and adaptive tools and techniques to minimize the potential negative impact from hazards.
- 9.4. Decision-makers understand the legal and regulatory regimes affecting adaptation to climate change, including coastal and riparian property rights, disaster relief and insurance issues.

- 10.1. Formal and informal educators are knowledgeable of the best available science on the effectiveness of environmental science education.
- 10.2. Formal and informal educators understand environmental literacy principles.
- 10.3. Lifelong learners are able to engage in informal science education opportunities focused on coastal topics.
- 11.1. Students and teachers are aware of opportunities to participate in science, technology, engineering, mathematics and active stewardship programs.

EXTERNAL PARTNERS:

Great Lakes Sea Grant Network communicators
National Sea Grant Network communicators
The National Sea Grant Office
Communications professionals in sister organizations, such as the Wisconsin Coastal Management Program and the National Weather Service
Communications professionals in academic settings where Sea Grant research is ongoing
Communications professionals in governmental agencies or in non-governmental organizations, such as the Milwaukee County Parks Department and the Wisconsin Academy of Sciences, Arts and Letters

INTENDED AUDIENCES:

- Researchers and education specialists on the state, regional and national level.
- Those who would apply the research and education, such as resource managers, educators, select members of the commercial sector, those in local and government or other Sea Grant-related stakeholders.
- Policy makers and opinion-leaders within the University of Wisconsin System and those holding elective positions.
- Students – K-12 and college or university, plus lifelong learners.
- The general public.

PROJECT DURATION: 2014-17

PERSONNEL:

Moira Harrington
Aaron Conklin
Yael Gen (60%)
John Karl
Rich Dellinger
Tom Dellinger
Elizabeth White (50%)
Marie Zhuikov

PERFORMANCE MEASURES:

- HCE-wpm-7. The number of promotional events on how to prevent the introduction and spread of AIS and organisms in trade in the Great Lakes region. 8 events
- SFA-wpm-6. Collaborate with other state agencies and education partners to develop exhibits or lesson plans on the health benefits and risks of eating Great Lakes wild-caught fish and Wisconsin farm-raised fish. 2 exhibits or lesson plans.

- ELWD-wpm-7. The number of newspaper, radio, television, magazine and Web stories about Wisconsin Sea Grant and its work. 450 stories
- ELWD-wpm-8. The number of social media mentions of Wisconsin Sea Grant by other organizations. 10
- ELWD-wpm-9. The number of additional followers on the two leading social media platforms of Facebook and Twitter. 800
- ELWD-wpm-10. The number of materials distributed to target audiences using direct mail. 10,000
- ELWD-wpm-11. The number of webinars conducted to build communications capacity among outreach staff. 10
- ELWD-wpm-12. The number of new audio podcasts in the Wisconsin Sea Grant inventory. 10
- ELWD-wpm-13. The number of new videos in the Wisconsin Sea Grant inventory. 24
- ELWD-wpm-14. The number of program newsletters produced and disseminated. 16
- ELWD-wpm-15. The number of program-information publications produced and disseminated. 4
- ELWD-wpm-16. The number of websites redesigned and relaunched.

Jane Harrison – Environmental Sociology Specialist

TITLE: Social Science Outreach to Wisconsin's Coastal Communities

FOCUS AREAS: HCE, RCE, SFA, ELWD

BACKGROUND:
Social science continues to be integrated across Sea Grant's programs and other NOAA offices and programs. Social science can provide the basis for understanding how Sea Grant products and services affect decisions and outcomes related to coastal resource management and coastal community development. Natural science can be better integrated into decision-making if consideration is first given to the users of information, the translation and communication of that information, the processes by which information is used to make decisions and the level at which decisions will be made (e.g. policy, emergency response or commercial businesses). Natural resource managers and coastal community decision-makers are faced with a wide range of issues and responsibilities they must address. They can apply social science tools such as public surveys, stakeholder meetings and focus groups, and economic models to answer questions like:

- What do members of the public know about this issue and what are their perceptions, attitudes and information needs?
- What economic impact would a certain alternative have on the community and would the community support the alternative?
- What groups are interested in this issue and how might they participate in resolving it?

OBJECTIVES:

- Needs assessments will be conducted to ensure Wisconsin Sea Grant activities are meeting the needs of stakeholders.
- Needs assessments will be conducted in coordination with coastal community stakeholders who wish to determine priorities before initiating a project.
- Program evaluations will be conducted to evaluation Wisconsin Sea Grant programs.
- Program evaluations will be conducted in coordination with coastal community stakeholders who wish to evaluate a project.
- Social science methods consultation will be made available to coastal community stakeholders including, but not limited to:
    - Appropriate choice of social science methodology for issue/problem
    - Identification of target audience for social science product
    - Survey, interview and focus group methods, including instrument design, data collection, data analysis and reporting

APPROACH/PLANNED ACTIVITIES:

- Weather Ready Nation Evaluation of the National Weather Service (NWS) Impact Based Warning (IBW) Tool. This project achieves two objectives: (1) Improve public response to extreme weather events, including thunderstorms and tornadoes and (2) Evaluate new NWS communication tool, IBW, in NWS Central Region. Interviews, focus groups and surveys with weather forecasters, emergency managers and broadcast meteorologist will be used to evaluate IBW. A report of IBW evaluation will be completed and presented to NWS Central Regional leadership. Findings will also be presented at several conferences and outreach briefs created to disseminate findings.
- Safe and Sustainable Seafood Supply. This project seeks to increase knowledge of the health benefits and risks of seafood consumption and the impacts of seafood choices on fisheries sustainability, as well as promote the consumption of Wisconsin fish. A survey was used to evaluate the knowledge base and fish consumption decisions of grocery store customers in Madison and Milwaukee. A follow-up survey will be used to evaluate how that knowledge base and consumption decisions have changed after outreach materials are disseminated. Also, focus groups will be used to pilot the outreach materials.
- Coastal Storms Needs Assessment. A needs assessment for products that reduce the negative impacts from coastal storms will be conducted among Great Lakes coastal communities. A survey and two focus groups of coastal planners will be used to gather data.
- Assist the outreach and communications staff in development of evaluation plans or strategies for their projects and efforts to better assess the impacts and consequences of the Advisory Services program.
- Assist the research program director in development of a means to evaluate the impact and consequences of the Wisconsin Sea Grant research program.

EXTERNAL PARTNERS:

Weather Ready Nation Evaluation of the National Weather Service (NWS) Impact Based Warning (IBW) Tool
National Weather Service
New York Sea Grant
Minnesota Sea Grant

Illinois-Indiana Sea Grant
NOAA Coastal Services Center
Great Lakes Sea Grant Social Science Network

Safe and Sustainable Seafood Supply
Milwaukee- and Madison-area grocery stores
Grocery store customers
Wisconsin fish producers

Coastal Storms Needs Assessment
Great Lakes Sea Grant programs
NOAA Coastal Storm Program
American Planning Association
Association of State Floodplain Managers

PROJECT DURATION:
Weather Ready Nation Evaluation of the National Weather Service (NWS) Impact Based Warning (IBW) Tool. The project will be completed by December 2014.

Safe and Sustainable Seafood Supply. The project will be completed by December 2014.

Coastal Storms Needs Assessment. The needs assessment data collection, analysis, and reporting will be completed by December 2014.

PERSONNEL:
Jane Harrison
Other Wisconsin Sea Grant staff when it involves their project or expertise (e.g., Kathy Kline – Safe and Sustainability Seafood Supply; Julia Noordyk – Coastal Storms Needs Assessment)

PERFORMANCE MEASURES:

- Number of social science products developed as project lead or co-lead: 3 annually
- Number of social science products provided consulting or review for: 5 annually

TITLE: Economic Analysis for Wisconsin's Coastal Communities

FOCUS AREAS: HCE, RCE, SFA, ELWD

BACKGROUND:
Natural resources provide many goods and services, including ecosystem services, recreational opportunities, commercial uses and subsistence. Natural resource management can have an impact on local communities in terms of stimulating output and revenue as well as employment. It can also generate nonmarket, societal benefits such as recreational use, healthy ecosystem services, fish and wildlife habitat, and non-use values such as knowing the refuge exists (existence value) and the potential for visiting in the future (option value). Evaluating the potential socioeconomic impacts of changes in land and resource management practices is a necessary part of the planning process. A variety of economic tools are available to measure the market and nonmarket values of goods and

services provided by natural resources. Outreach products that highlight the intersection between sustainable natural resource management and economic development are needed to inform coastal community decision-makers.

OBJECTIVES:

- Wisconsin coastal communities will use economic impact analysis to determine how policy or regulatory changes affect regional income and other economic activities such as revenues, expenditures, employment or inflation.
- Wisconsin coastal communities will use benefit cost analysis to value both the benefits and costs of a policy or regulation.
- In considering a policy position or change, Wisconsin coastal communities will use nonmarket valuation techniques to estimate the value of goods and services that are not directly bought or sold in markets, in particular, the nonmarket values of ecosystem services.
    - Nonmarket valuation techniques used will include hedonic analysis, travel cost models, contingent valuation and benefit transfer.

APPROACH/PLANNED ACTIVITIES:

- Sheboygan Area of Concern (AOC) Economic Study. This study will estimate the economic activity related to completed remediation and restoration in the Sheboygan AOC. It will help determine whether and how cleanup activities have incentivized entrepreneurs and established firms to undertake additional economic activities. It will also estimate economic activity related to sport fishing, a key tourism draw for Sheboygan. The project includes three years of data gathering and analysis: 2013, 2015 and 2017. A findings brief will be disseminated to partners and regional decision-makers such as legislators and the Environmental Protection Agency.
- Milwaukee Urban Water Trail Video and Story Map. The video and story map will be used to promote the recreation potential of Milwaukee's waterways. They will connect Milwaukee residents to their waterways, and encourage a connection to the environment and a sense of stewardship of water resources. They will highlight the restoration and redevelopment work that have made it enjoyable to recreate on the river. This project is part of Wisconsin Sea Grant's larger effort of coastal heritage tourism. In particular, the story map can be considered one element of the Wisconsin Coastal Atlas.
- Aquaculture Economic Fact Sheets. Fact sheets will be geared toward commercial and small-scale/educational aquaculture enterprises. They will provide cost estimates for different levels of production. These fact sheets will be made available at the nonprofit organization Growing Power's aquaculture workshops and from the Wisconsin Sea Grant publication store.

EXTERNAL PARTNERS:

Sheboygan Area of Concern (AOC) Economic Study
Wisconsin Department of Natural Resources
City of Sheboygan
Sheboygan County
University of Wisconsin-Extension

Milwaukee Urban Water Trail Video and Story Map
Milwaukee Riverkeeper

Urban Ecology Center
City of Milwaukee
Milwaukee Riverwalk
Wisconsin River Alliance
Milwaukee Kayak Co.
Lakefront Brewery
Wisconsin Coastal Management Program

Aquaculture Economic Fact Sheets
Growing Power

PROJECT DURATION:
Sheboygan Area of Concern (AOC) Economic Study. The project includes three years of data gathering and analysis: 2013, 2015 and 2017.

Milwaukee Urban Water Trail Video and Story Map. This project will be completed by December 2014.

Aquaculture Economic Fact Sheets. This project will be completed by December 2015.

PERSONNEL:
Jane Harrison
Other Wisconsin Sea Grant personnel when it involves their project or expertise

PERFORMANCE MEASURES:
- Number of economic analyses and outreach products produced: 1 annually
- Number of economic analyses and outreach products provided consulting or review for: 2 annually

David Hart – Geographic Information Systems Specialist

Geospatial Technologies for Great Lakes Coastal Management

TITLE: Develop and Apply Geospatial Technologies to Promote Great Lakes Coastal Management

FOCUS AREAS: HCE, RCE, SFA

STRATEGIES:
- HCE-3. Improve and enhance stakeholder access to and understanding of data, models, and policy information in Wisconsin and the Great Lakes that support ecosystem-based planning, decision-making and management approaches.
- HCE-11. Involve stakeholders in resource management decision-making processes and to help resource managers incorporate public input in resource management decisions.
- SFA-10. Make trap net GPS locations and maps available online and at boat ramps.
- RCE-5. Support research to develop or enhance community planning and visualization tools that demonstrate the benefits, risks and consequences of urbanization on the coastal environment.

BACKGROUND:

Since 1994, Wisconsin Sea Grant has collaborated with many partners to apply geospatial technologies to better understand coastal management issues facing the Great Lakes. This effort has evolved through several phases over the past 20 years: 1) providing GIS training for specific coastal issues; 2) discovering, acquiring and integrating local data to study regional issues; 3) implementing interoperable Web mapping services to build a dynamic and distributed coastal GIS; 4) utilizing visualization and animation to promote a more intuitive understanding of complex coastal issues; and 5) promoting a coastal spatial data infrastructure through development of the Wisconsin Coastal Atlas. The emphasis during the period of this work plan is the development and application of geospatial technologies to promote ecosystem-based management, sustainable coastal development and resilience to coastal hazards.

OBJECTIVES:

- Expand content and use of the Wisconsin Coastal Atlas.
- Promote the development of spatial decision support tools for adaptive management.
- Develop and apply decision support tools that promote ecosystem-based management.
- Develop and apply decision support tools that promote sustainable coastal development.
- Develop and apply decision support tools that promote resilience to coastal hazards.

APPROACH/PLANNED ACTIVITIES:

- Add new maps, data and tools in the Wisconsin Coastal Atlas. Provide training and outreach to coastal constituencies on effective use of the atlas.
- Works with additional coastal communities to apply "geotools" that demonstrate the value of a spatial narrative to promote stewardship of important coastal ecosystems.
- Add new case studies and tools on land use and zoning, habitat and environment, and coastal infrastructure into the Great Lakes Coastal Resilience Planning Guide.
- Develop and apply coastal land intensity data along estuaries and in watersheds. Land intensity data combines land use and land cover with other relevant geospatial data to better reflect the potential impacts of humans by quantifying the amount and degree of development in an area.
- Collaborate with Prof. John Janssen at the University of Wisconsin-Milwaukee School of Freshwater Sciences to develop and apply new methods to map Cladophora on the Lake Michigan coast.
- Collaborate with the NOAA Coastal Services Center to implement a lake level visualization tool for the Great Lakes.
- Apply planning support system software and geodesign principles to promote implementation of comprehensive plans in coastal communities.
- Integrate land use data in the Great Lakes region using Web feature services and demonstrate how distributed sources of land use data can be fed into simple models.
- Utilize digital elevation data and 3D visualization software to explore impacts of climate change scenarios.
- Collaborate with the Local Games Lab at the University of Wisconsin-Madison to show how place-based games can promote a better understanding and greater stewardship of the Great Lakes.

IMPACTS:

- 2.1. Stakeholders have access to data, models, policy information and training that support ecosystem-based planning, decision-making and management approaches.
- 2.5. Methodologies are used to evaluate a range of practical ecosystem-based management approaches for planning and adapt to future management needs.

- Number of Sea Grant tools, technologies and information services that are used by our partners/customers to improve ecosystem-based management.
- 7.2. Communities make use of tools and information to explore the different patterns of coastal development, including community visioning exercises, resource inventories and coastal planning.
- 9.2. Decision-makers are aware of existing and available hazard- and climate-related data and resources and have access to information and skills to assess local risk vulnerability.
- 9.3. Communities have access to data and innovative and adaptive tools and techniques to minimize the potential negative impact from hazards.
- 9.5. Communities apply best available hazards and climate change information, tools and technologies in the planning process.
- 9.6. Decision-makers apply data, guidance, policies and regulations to hazard planning and recovery efforts.
- 9.7. Communities develop and adopt comprehensive hazard mitigation and adaptation strategies suited to local needs.

EXTERNAL PARTNERS:
Coastal municipalities, counties and regional planning commissions
Wisconsin Coastal Management Program
Wisconsin Department of Natural Resources
Lake Superior National Estuarine Research Reserve
School of Freshwater Sciences, University of Wisconsin-Milwaukee
NOAA Coastal Services Center
Association of State Floodplain Managers
Ecosystem Based Management Tools Network, NatureServe

INTENDED AUDIENCES:
Coastal resource managers
Local government planners

PROJECT DURATION: 2014-17

PERFORMANCE MEASURES:
- HCE-npm-9. Number of Sea Grant tools, technologies and information services that are used by our partners/customers to improve Great Lakes ecosystem-based management.
- HCE-npm-10. Number of ecosystem-based approaches used to manage land, water and living resources in coastal areas as a result of Sea Grant activities.
- RCE-wpm-3. The number of Wisconsin coastal communities that utilize planning support tools as a result of training and technical assistance by UW Sea Grant and its partners.
- The number of decision support tools that integrate daily satellite imagery and model output for the Great Lakes that are accessible to coastal resource managers.
- The number of coastal communities that utilize Planning Support System software to evaluate proposed development plans and alternative development patterns and measure incremental progress of comprehensive plan implementation as a result of training and technical assistance by Wisconsin Sea Grant and its partners.
- The number of spatial data sets relevant to coastal hazards in Wisconsin that are integrated and accessible to property owners, governments and development interests through mapping interfaces and spatial data catalog in the Wisconsin Coastal Atlas.

- The number of coastal local governments that utilize decision support tools accessible through the Wisconsin Coastal Atlas to help riparian property owner's site coastal development.

Continuing Program Element: Coastal Heritage Tourism

TITLE: Promote Coastal Heritage Tourism

STRATEGY:

- RCE-2. Utilize Web-based technologies, publications, displays and communication dissemination using traditional and new media to make available, and distribute information, about the value of waterfront, tourism-related economic activities and other socio-economic impacts.

BACKGROUND:

Wisconsin Sea Grant has collaborated on several projects that promote a better understanding of Wisconsin's Great Lakes coastal heritage. They include a website that features stories about Wisconsin shipwrecks, development of geocaching sites that provide education about Great Lakes maritime heritage and a Web mapping site that promotes exploration of the Great Lakes Circle Tour. This project will enhance those efforts and integrate them with activities of our external partners to create a more holistic approach to promote coastal heritage tourism both in Wisconsin and our neighboring states.

OBJECTIVES:

- Promote discovery and stewardship of the Great Lakes.
- Promote interest in and appreciation of maritime heritage in Wisconsin and the Great Lakes region.
- Promote the appreciation and protection of Wisconsin's submerged archeological resources.
- Organize existing and new content about Wisconsin's maritime heritage through a Web-based mapping interface.
- Promote use of the Wisconsin Coastal Guide by a variety of different audiences, including tourists, government agencies and schools.
- Promote regional collaboration regarding coastal heritage tourism on Lake Michigan and Lake Superior.

APPROACH/PLANNED ACTIVITIES:

- Provide information about coastal heritage attractions on mobile devices.
- Share information about coastal heritage attractions at a regional scale to promote the Great Lakes Circle Tour.
- Integrate information about coastal heritage attractions with the Lake Michigan and Lake Superior water trails and the Wisconsin Maritime Trails
- Promote rustic roads and scenic byways in coastal counties.
- Include geocaching as a feature on the Wisconsin Coastal Guide.
- Develop a section of the new Wisconsin Coastal Atlas that promotes coastal heritage tourism and communicates what is special about the Great Lakes. Collect and geolocate multimedia stories about Great lakes cultural heritage (oral histories, historic images, essays, etc.).
- Continue partnerships to enhance coastal heritage tourism with state, local and regional partners.

- Promote virtual tourism of the Great Lakes through creation of immersive panorama photos and visualizations.
- Include a trip planning function in the Wisconsin Coastal Guide.
- Enhance content about the existing shipwrecks on the Wisconsin Shipwrecks website.

IMPACTS:
- Increased awareness of Wisconsin's maritime heritage.
- Increased visitation to coastal heritage attractions in Wisconsin.

EXTERNAL PARTNERS:
Wisconsin Coastal Management Program
Wisconsin Harbor Towns Association
Wisconsin Department of Natural Resources
Wisconsin Department of Transportation
Wisconsin Department of Tourism
Bay-Lake Regional Planning Commission
Northwest Wisconsin Regional Planning Commission
Southeastern Wisconsin Regional Planning Commission
Center of the Study of Upper Midwestern Cultures, UW-Madison
Illinois Coastal Management Program
Illinois-Indiana Sea Grant
Michigan Sea Grant
Minnesota Sea Grant
Great Lakes Commission

INTENDED AUDIENCES:
Tourists
Government agencies
Schools

PROJECT DURATION: 2014-17

PERFORMANCE MEASURES:
- Increased protection of Wisconsin's submerged archeological resources.
- Increased tourism to Great Lakes coastal heritage sites.
- Increased public desire to protect Great Lakes cultural resources.

Julia Noordyk – Coastal Storms Specialist

TITLE: Great Lakes Coastal Storms Program

FOCUS AREA: RCE

STRATEGIES:
- RCE-11. Support research that evaluates the impacts of increased climate variability and

- change, including intensity and frequency of rainfall and storm events on coastal community infrastructure.
- RCE-12. Develop outreach and communication tools so that communities so that they can understand the consequences of alternative development and stormwater mitigation scenarios.
- RCE-13. Work with regulatory agencies, tribal entities and communities to help them understand the vulnerability of coastal properties to storm impacts.

BACKGROUND:

The NOAA Coastal Storms Program (CSP) is a nationwide effort to make coastal communities safer by reducing the loss of life and the negative impacts of coastal storms. The program has a history of providing an array of tools and services in the project areas, which have included improved observing systems, forecast models, decision support tools, risk assessments, best-management practices, socioeconomic information, and outreach and extension activities to enhance community resilience. The CSP is currently focusing funds and resources in the Great Lakes region to help coastal communities reduce and mitigate the risk from storm and weather hazards and climate change, specifically with regards to: 1) improving beach hazard communication, forecasting and warnings; 2) addressing impacts of stormwater on natural resources; and 3) enhancing shoreline mapping and management. Funded through the NOAA CSP, Wisconsin Sea Grant has hired a Coastal Storm Coordinator, Julia Noordyk, to co-lead the efforts of CSP in the region.

OBJECTIVES:

- By 2015, Great Lakes coastal community needs assessment and report will be completed providing information about the data, tools, and training needs of Great Lakes planners and coastal managers.
- By 2015, Wisconsin Sea Grant will complete a review of local government plans addressing coastal flood hazard resilience in the Great Lakes.
- By 2016, Sea Grant will utilize decision support tools to advance adaptive management principles for managing the Great lakes coastal hazards
- By 2017, Sea Grant will produce a guidance document for plan implementation addressing coastal hazard resilience
- By 2017, Wisconsin Sea Grant will host and run a train-the-trainer workshop for Great Lakes Sea Grant outreach specialists focusing on helping communities reduce the negative impacts of coastal storms and to plan for resiliency.

APPROACH/PLANNED ACTIVITIES:

- Great Lakes Coastal Community Needs Assessment. Wisconsin Sea Grant will conduct a survey by 2015 to learn the planning and implementation needs of Great Lakes coastal planners to mitigate for and adapt to coastal storm hazards. The survey will be distributed to Great Lakes coastal community planners and resource managers. A report will be available and survey results will be used to develop products to help communities prepare for coastal storm hazards.
- General CSP Outreach. Noordyk will fulfill the general responsibilities of a CSP outreach coordinator, including engaging partners on the capabilities of CSP; identifying local needs and guiding product development by CSP team members; assisting with the integration of federal, state and local data, products, tools and programs; providing technical assistance and outreach on products; branding and promoting the program in the region; and tracking program/project performance and completing summative program evaluations.

- CSP Small Grants Request for Proposal (RFP) Coordination and Outreach. The CSP small grants program provides direct support to local communities to work on hazard resilience issues. Noordyk is contracted through Ohio State University to help coordinate and support the CSP Small Grants RFP administered by Ohio Sea Grant through 2014. In addition, Noordyk will provide assistance to potential grantees in the pre- and full-proposal phases through informational webinars, Q&A sessions, an FAQ document and as a point of contact on the RFP.

IMPACTS:
- Great Lakes coastal communities will utilize effective comprehensive, mitigation and climate adaptation plans and multi-objective management to promote resilience to coastal hazards and address problems from coastal storms before they become disasters.
- The most up-to-date and new beach hazard communication strategies will be implemented and reduce the loss of life due to dangerous currents in Wisconsin.

EXTERNAL PARTNERS:
Great Lakes Sea Grant Network
American Planning Association
Association of State Floodplain Mangers
State coastal hazard working groups
Federal Emergency Management Agency
National Weather Service
State Coastal Zone Management Programs

PERFORMANCE MEASURES:
- RCE-npm-1. Number of communities that implemented sustainable economic and environmental development practices and policies (e.g., land-use planning, working waterfronts, energy efficiency, climate change planning, smart growth measures, green infrastructure) as a result of Sea Grant activities.
- RCE-npm-2. Number of communities that implemented hazard resiliency practices to prepare for, respond to or minimize coastal hazardous events as a result of Sea Grant activities.
- RCE-wpm-2. The number of Wisconsin coastal communities that utilize planning support tools as a result of training and technical assistance by UW Sea Grant and its partners.
- Number of Wisconsin beaches that utilize updated and new beach hazard communication strategies related to dangerous currents.

TITLE: Lower Fox River and Green Bay Water Quality and Healthy Coastal Ecosystems

FOCUS AREA: HCE

STRATEGIES:
- HCE-2. Engage researchers with the Sea Grant outreach and communications staff to effectively make available and deliver research-derived information and findings to resource managers, policy- and decision-makers and public stewards.
- HCE-3. Improve and enhance stakeholder access to and understanding of data, models, and policy information in Wisconsin and the Great Lakes that support ecosystem-based planning, decision-making and management approaches.

- HCE-4. Help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- HCE-5. Train and inform residents, resource managers and businesses so that they understand and can apply the policies that apply to coastal protected species and habitats.

BACKGROUND:

Lower Green Bay and 14 tributaries in the Lower Fox River Basin do not meet Wisconsin water-quality standards due to low dissolved oxygen. Excessive suspended solids and phosphorous cause nuisance and harmful algal blooms that have led to a dead zone in lower Green Bay. The Lower Fox River and Green Bay are listed on the state's 303(d) list of impaired waterbodies and have been designated a Great Lakes Area of Concern (AOC). In 2012, Total Maximum Daily Load (TMDL) standards for the area were approved by the Wisconsin Department of Natural Resources (DNR) and implementation began in 2013. Wisconsin Sea Grant is collaborating with multiple agencies and groups to support the delisting of beneficial use impairments in the AOC and the implementation of the TMDL.

The DNR is coordinating the implementation of the Remedial Action Plan (RAP) for addressing environmental problems in the AOC. Wisconsin Sea Grant holds membership on three AOC committees: 1) Biota and Habitat Advisory Committee, 2) Citizen Advisory Committee and 3) Social Uses Workgroup. Noordyk chairs the AOC Citizen Advisory Committee Outreach Sub-committee that will be working to identify, fund and implement outreach projects that will support the overall efforts of the RAP.

The TMDL identified sediment and phosphorous reductions needed from both nonpoint and point sources to achieve water-quality standards. Excess nutrient and suspended solids runoff from land uses in the Fox River basin is extensive and pervasive and will require widespread management over many years and the participation of farmers, urban and rural residents, municipal stormwater managers and wastewater dischargers throughout the watershed. To support TMDL implementation, the DNR has formed six stakeholder committees: 1) MS4 Stormwater Permit Holders, 2) Agriculture, 3) Point Source Dischargers, 4) Outreach, 5) Monitoring and 6) Technical. Noordyk is a working member of the TMDL Outreach Committee, which will be developing and implementing a comprehensive public involvement and education strategy. Information about alternative actions is needed to improve decision-making and optimize resource allocations. Effective solutions to water-quality degradation, especially from diffuse sources of pollution, require meaningful participation and stewardship of knowledgeable stakeholders throughout the Lower Fox River basin.

OBJECTIVES:

- By 2015, two proposals will be submitted to the AOC Support Grant annually as a result of the work of the AOC-Citizen Advisory Committee Outreach and Education Sub-committee.
- By 2015, the AOC-Citizen Advisory Committee will have participated in two local public events with a focus on educating the public about the AOC.
- By 2016, Wisconsin Sea Grant will help develop an AOC habitat assessment, including status conditions, monitoring protocols and identification of priority projects.
- By 2016, Wisconsin Sea Grant will work with researchers to identify TMDL stakeholders and develop specific end-local that meet the needs of these stakeholder groups.

- By 2017, Wisconsin Sea Grant will work with researchers and TMDL stakeholders using the modeling end-product as a decision support tool in understanding how total suspended solids and total phosphorous loadings are impacted by management decisions and climate change trends.
- By 2017, the Edge of the Lake Lecture Series will be established and hold at least four events annually focusing on water quality and coastal community sustainability.

APPROACH/PLANNED ACTIVITIES:

- Edge of the Lake Lecture Series. – By 2014, Wisconsin Sea Grant will support the re-start of NEW Water's (formerly Green Bay Metropolitan Sewerage District) Edge of the Lake Lecture Series. The series will focus on watershed and coastal community sustainability related to the health of the Lower Fox River and Green Bay.
- TMDL Outreach. – Through the work of the TMDL Outreach committee, Noordyk will support implementation efforts of Lower Fox River TMDL. The efforts of the committee will target the three primary stakeholder groups impacted by the TMDL targets: 1) MS4 stormwater permit holders, 2) agriculture and 3) point source dischargers. The committee will work with NEW Water to foster collaboration throughout the watershed using an adaptive management strategy.
- AOC Outreach Sub-committee. Noordyk is the chair the AOC-Citizen Advisory Committee Outreach and Education Sub-committee that will help to identify and coordinate CAC outreach and education activities. In addition, Noordyk will help to submit identified proposals to the annual AOC Support Grant (February deadline). This work will be in close connection with that of the TMDL outreach and other water-quality efforts in the watershed.
- TMDL Decision Support Tool. Noordyk will advise and participate in the development of end-products under the University of Wisconsin-Milwaukee's J. Val Klump-led research project, Restoring the health of Green Bay ecosystem under a changing climate: Modeling Land Use, Management, and Future. The resulting decision support tool will be used within the Lower Fox River watershed to support ecosystem-based management using alternative sediment and phosphorous loading and climate trend scenarios.

IMPACTS:

- Coastal residents, resource managers, business and local officials will understand: 1) the causes and consequences of harmful algal blooms (HABs) in Green Bay, 2) the environmental, social and economic impacts degraded water quality has on the region, 3) what work is being done to improve water quality in the basin and 4) ways that stakeholders can contribute to the improvement of water quality in the basin.
- Municipal and regional governments, agricultural stakeholders and MS4 permit holders will implement TMDL standards that will reduce total suspended solids and total phosphorous loading Green Bay by amounts necessary to reduce the severity of HABs that are causing a dead zone in Green Bay.
- Resource managers, industries and municipalities will have tools available to understand and predict the impacts of alternative loads of total phosphorus, total suspended solids and climate on eutrophication in lower Green Bay.
- Baseline data, targets and indicators developed by Wisconsin Sea Grant and partners will be used to support ecosystem-based management in the AOC.
- Governments will use ecosystem approaches to implement adaptive management plans that reduce ecosystem stressors and restore beneficial uses.

- Progress toward achieving the targets will be continuously assessed, reported and used to adopt adaptive management plans.
- The effectiveness of coastal habitat rehabilitation, restoration and remediation projects will be enhanced by Wisconsin Sea Grant-supported research and outreach.

EXTERNAL PARTNERS:
Wisconsin Department of Natural Resources
University of Wisconsin-Extension
Lower Fox River Total Maximum Daily Load committees
Fox-River Valley County Land Conservation Departments
University of Wisconsin-Green Bay
St. Norbert College
University of Wisconsin-Milwaukee researchers
North East Wisconsin Water
Fox-Wolf Watershed Alliance
Wisconsin Natural Resources Conservation Services
Great Lakes Commission
Baylake Regional Planning Commission

PERFORMANCE MEASURES:
HCE-wpm-3. The number of ecosystem-based management tools that are used to manage Great Lakes coastal resources.

- Number of public events held annually focusing on water quality and coastal community sustainability.
- Number of Lower Fox River and Green Bay watershed communities that take action to restore degraded water quality as a result of Sea Grant Activities.
- Number of research projects that assess and monitor the ecological health of the bay.
- Number of outreach efforts that inform and support coastal community ecosystem-based management.

TITLE: Wisconsin Clean Marina Program

FOCUS AREA: RCE

STRATEGY:

- Communicate alternative actions to conserve water, protect water quality and protect water supply.

BACKGROUND:
The maintenance, operation and storage of recreational vessels have the potential to release pollutants to lakes and rivers. The Wisconsin Clean Marina Program promotes and celebrates voluntary adoption of measures to reduce pollution from marinas, boatyards and recreational boats. The program provides guidance education that enable marina and boatyard operators to become certified clean marinas that protect the resources that sustain their livelihood—clean water, clean air, and healthy fish and wildlife communities. The Clean Marina Program is administered by the Wisconsin Marina Association with guidance and technical assistance from Wisconsin Sea Grant.

OBJECTIVES:

- By 2015, at least two Clean Marina/BMP-focused trainings will have been held for marina and boatyard operators and will continue on annual basis as needed.
- By 2015, at least one training on marina BMPs and inspections will have been held for those who do on-site visits and continue on a biannual basis as needed.

APPROACH/PLANNED ACTIVITIES:

- Marina and Boatyard Operator Trainings – Wisconsin Sea Grant will provide one or two training classes annually for marina operators to teach and train them how to become a certified marina, coupled with the Great Lakes Online Classroom.
- Marina Inspector Training. Wisconsin Sea Grant will provide training for marina inspectors or those who do on-site marina visits.
- Clean Marina Website. Wisconsin Sea Grant will continue to support and host the Clean Marina website. The substance and content for the website, save training announcements, will come from the Wisconsin Marina Association.
- Technical Committee and Great Lakes Network. Wisconsin Sea Grant will continue to play a role on the Wisconsin Clean Marina Technical Committee and be a member of the Great Lakes Clean Marina Network.

IMPACTS:

- An expert technical committee that is knowledgeable about Clean Marina BMPs and capable of assisting WMA staff and marina and boatyard operators in the certification process.
- Marina and boatyard operators will be more knowledgeable and have an increased awareness of the Clean Marina Program, the BMPs required for Clean Marina certification, and resources for certification.

PERFORMANCE MEASURES:

- Number of new and renewing certified clean marinas in Wisconsin resulting from Sea Grant-sled trainings.
- Number of trained clean marina certifiers.

Gene Clark – Coastal Engineering Specialist

TITLE: Coastal Engineering Project, Grant Proposal Review and Permit Assistance

FOCUS AREAS: HCE, RCE

STRATEGIES:

- HCE-6: Develop and share materials, websites, training and workshops to help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- HCE-8: Collaborate with local, state, tribal and regional agencies and non-governmental organizations to implement strategies.
- RCE-4: Collaborate with local, state, tribal and regional agencies and non-governmental organizations to implement strategies.

BACKGROUND:

Great Lakes shoreline and coastal regions continue to receive increasing levels of pressures from both the occasional weekend vacationer and especially new, year-round property owners and developments. Record levels of waterfront activities as well as the high demands for coastal property have created increased levels of human pressures on the fragile shoreline areas. Wisconsin's coastal areas are no exception. From the many new redevelopments along the Lake Michigan shoreline to the new developments along many regions of the Lake Superior shorelines, there have been increasing numbers of individuals accessing the regions resources with little or no experience with the many natural coastal hazards that exist. As the demands continue to increase, so do the possibilities for increased loss of valuable coastal property, habitat and life.

Because of the ever-increasing demands to our Great Lakes coastal resources and the greater potential for loss of valuable property and lives, there continues to be a critical need to provide Great Lakes property owners, resource managers, lenders, insurers, engineers, realtors and local, regional and statewide agencies (WCMP, DNR and DOT) with natural coastal hazard awareness, permit review assistance, grant proposal reviews, coastal engineering guidance, education opportunities and shoreline management tools. Sound coastal engineering information on coastal erosion, coastal structures, coastal processes, waves, rip currents, changing water levels, flooding potentials, bluff instability and shoreline best-management practices are all needed. In additional to general Great Lakes coastal engineering guidance for property owners and coastal communities, special emphasis this work plan period will be directed towards the DNR, WCMP and the DOT Harbor Assistance Program as they are easily approachable specific user groups for the information and would be able to incorporate the materials directly into their permit application reviews and guidance or grant proposal reviews.

OBJECTIVES:

- DNR will have increased awareness of the potential effects shoreline structures can have on Great Lakes coastal shorelines, bluffs and habitats.
- DNR will incorporate info from Wisconsin Sea Grant into their coastal construction permit application reviews.
- WCMP and the DOT—Harbor Assistance Program will incorporate info from Wisconsin Sea Grant into annual grant proposal reviews.
- Coastal Engineering specialty activities will provide increased awareness and understanding by Great Lakes shoreline property owners, residents and visitors about coastal erosion, bluff failure, coastal structures, coastal processes and water-safety issues (rip currents and hypothermia).

- Residents, coastal communities and visitors will have greater awareness and exercise caution utilizing info from Wisconsin Sea Grant about shoreline erosion, bluff instability, coastal structures and water-safety issues.
- Wisconsin Sea Grant will conduct research and or outreach on methods to rehabilitate and prolong Great Lakes ports, harbors and marina infrastructure.

APPROACH/PLANNED ACTIVITIES:

- Wisconsin Sea Grant will conduct research, public awareness education and outreach to increase understanding for coastal hazards including shoreline erosion, bluff instability and failure, coastal structures and water safety (rip currents and hypothermia).
- Wisconsin Sea Grant will provide significant coordination to coastal communities about shoreline and bluff erosion and failure research, coastal structures and their effects on coastal processes and best-management practices for shoreline property owners.
- Wisconsin Sea Grant will provide significant assistance to Wisconsin Great Lakes permitting agency reviews (DNR).
- Wisconsin Sea Grant will provide significant assistance to Wisconsin Great Lakes agency grant proposal reviews (WCMP and DOT).

EXTERNAL PARTNERS:
Wisconsin Coastal Management Program
Wisconsin Department of Natural Resources
Wisconsin Department of Transportation—Harbor Assistance Program
National Park Service (Apostle Islands National Lakeshore)
Great Lakes Commission
Great Lakes Dredging Team
U.S. Army Corps of Engineers

INTENDED AUDIENCES:
Wisconsin Coastal Management Program
Wisconsin Department of Natural Resources
Wisconsin Department of Transportation—Harbor Assistance Program
National Park Service (Apostle Islands National Lakeshore)
U.S. Army Corps of Engineers
Great Lakes ports, harbors and marinas
Wisconsin coastal communities
Coastal engineering consultant firms

PROJECT DURATION: 2014-17

PERFORMANCE MEASURES:

- RCE-wpm-7: The number of Great Lakes coastline erosion control, shoreline bluff stabilization or ports and harbor infrastructure projects that are completed utilizing significant Wisconsin Sea Grant Institute coastal engineering research results, outreach and/or design assistance. 10
- RCE-wpm-6: The number of Wisconsin Sea Grant partners that as a result of Wisconsin Sea Grant research and outreach, design, modify an initial design, permit and/or provide grant assistance to a project. 50 projects.

TITLE: Wisconsin Department of Natural Resources Permit Review Policy for Timber Crib Piers

FOCUS AREA: HCE

STRATEGIES:

- HCE-6: Develop and share materials, websites, training and workshops to help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- HCE-7: Provide residents, resource managers and businesses with materials and training so that they understand and apply the policies that apply to coastal protected species and habitats.
- HCE-8: Collaborate with local, state, tribal and regional agencies and non-governmental organizations to implement strategies.

BACKGROUND:

The number of timber crib structures along the Madeline Island shoreline now exceeds more than 100. Over the years, these perpendicular shoreline structures have been routinely permitted by the DNR without concern for their potential effects on adjacent Great Lakes shorelines. Recently, there have been a number of legal issues amongst adjacent shoreline property owners concerning the detrimental effects on Great Lakes shoreline properties due to these structures trapping littoral transport of sand, which would normally move along the shoreline if these structures were not in place. Contractors have attempted to lessen the effects of this sediment movement by building the timber cribs with segments of "open" parts of the crib with little success.

As additional Madeline Island shoreline property owners submit permit applications for the construction of timber crib piers along their shorelines, the DNR has realized that these permits require consideration of their potential effects to adjacent shorelines. However, the DNR does not have the training in coastal engineering to understand if the permit should be granted or not. The DNR has realized they need to become proactive to create an official policy for their water management specialists to follow when reviewing new timber crib permits. Therefore, they have asked for and begun to utilize the Wisconsin Sea Grant coastal engineering specialist to assist them in their understanding of the potential impacts of these coastal structures and adopt an official DNR policy to follow during their timber crib pier application reviews and expected contested case hearings.

OBJECTIVES:

- DNR will have increased awareness of the potential effects shoreline structures (particularly timber crib structures) can have on Great Lakes coastal habitats and nearshore processes.
- DNR will incorporate information from Wisconsin Sea Grant to improve construction permit reviews and work towards developing a region-wide policy on how timber crib structures are reviewed for permits.
- Coastal Engineering specialty activities will provide increased awareness and understanding by Great Lakes shoreline property owners, residents and visitors about timber cribs and their potential effects on Great Lakes shorelines..
- Residents, coastal communities and visitors will have greater awareness and exercise caution utilizing when considering building timber crib structures along their Great Lakes shorelines by using information from Wisconsin Sea Grant about Great Lakes timber crib structures issues.

APPROACH/PLANNED ACTIVITIES:

- Wisconsin Sea Grant will conduct research, public awareness education and outreach to increase understanding for the effects by timber crib structures can have on Great Lakes coastal processes.
- Wisconsin Sea Grant will work specifically with the WI DNR to increase their understanding of how timber crib structures can impact coastal processes.
- Wisconsin Sea Grant will provide significant assistance to Great Lakes permitting agency (DNR) reviews.

EXTERNAL PARTNERS:

Wisconsin Coastal Management Program
Wisconsin Department of Natural Resources
University of Wisconsin-Madison Civil and Environmental Engineering Department
U.S. Army Corps of Engineers

INTENDED AUDIENCES:

Wisconsin Coastal Management Program
Wisconsin Department of Natural Resources
National Park Service (Apostle Islands National Lakeshore)
Wisconsin coastal communities and property owners
Great Lakes construction companies

PROJECT DURATION: 2013-17

PERFORMANCE MEASURE:

- HCE: WI DNR works towards developing policy guidance for their Resource Management Specialists to follow when reviewing and permitting the use of solid timber crib piers along Wisconsin's Great Lakes shorelines.

TITLE: Coastal Processes Manual, Edition #3

FOCUS AREAS: HCE, RCE

STRATEGIES:

- HCE-6: Develop and share materials, websites, training and workshops to help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- RCE-2: Utilize Web-based technologies, publications, displays, and communication dissemination using traditional and new media to make available, and distribute information, about the value of waterfront, tourism-related economic activities and other socio-economic impacts.

BACKGROUND:

The Wisconsin Sea Grant Coastal Processes Manual was first written in 1987 by the coastal engineering specialist and was extremely successful. This manual quickly became a much-needed resource for Great Lakes coastal engineering information that was easily understandable to property owners, coastal communities, regulators and regional and statewide coastal resource agencies. The first edition's 600 printed copies were distributed Great Lakes-wide and sold old quickly. In 1998, a second edition was prepared and 200 copies were printed. In 2006, the second edition was also offered as a free Wisconsin Sea Grant download. To date, all 200 hard copies of the second edition have been sold and more than 1,063 copies downloaded. The total manual distribution to date has been 2,463 copies.

The current second edition has seven chapters, 80 pages of text as well as an additional 48 pages of appendices containing sources of information and miscellaneous coastal engineering information. Since the second edition was prepared more than 15 years ago, there have been significant advances in several of the manual's topics and information sources as well as several completely new topics such as new Web-based coastal engineering tools and data sources, Federal Emergency Management Agency flood mapping results, coastal construction set-back guidance, coastal structure and processes interactions understanding, climate change issues, etc. Therefore, the second edition is overdue for revision and updating with much new coastal engineering guidance for our Great Lakes property owners, coastal communities, regional and statewide agencies.

OBJECTIVES:

- Coastal engineering specialty activities will provide an increased awareness and updated understanding to Great Lakes shoreline property owners, residents and visitors about coastal erosion, coastal structures, coastal process, bluff instability and failure and water safety issues (rip currents and hypothermia).
- Wisconsin Great Lakes shoreline residents, coastal communities and visitors, regional and state agencies and other users will have greater awareness and exercise caution utilizing information from Wisconsin Sea Grant through the use of a newly revised Coastal Process Manual that will contain information concerning Great Lakes shoreline erosion, bluff instability and failure, coastal structures, coastal processes, coastal flooding and low-lake level issues, Web-based coastal engineering information tools and water safety issues (rip currents, hypothermia), etc.

APPROACH/PLANNED ACTIVITIES:

- Wisconsin Sea Grant will work with the WCMP hazards team to review the content of the existing Coastal Processes Manual Edition #2 to determine which chapters and appendices require updating, which chapters and appendices are no longer applicable and specifically which new chapters should be included.
- Wisconsin Sea Grant will seek grant opportunities to fund the preparation of the Coastal Processes manual Edition #3.
- Wisconsin Sea Grant will coordinate the preparation and completion of the Coastal Processes Manual #3.

EXTERNAL PARTNERS:

Wisconsin Coastal Management Program

Wisconsin Department of Natural Resources

National Park Service (Apostle Islands National Lakeshore)

American Association of Flood Plain Managers
Coastal engineering consultant firms

INTENDED AUDIENCES:
Wisconsin Coastal Management Program
Wisconsin Department of Natural Resources
National Park Service (Apostle Islands National Lakeshore)
American Association of Flood Plain Managers
U.S. Army Corps of Engineers
Wisconsin coastal communities
Coastal engineering consultant firms
Wisconsin coastal communities and property owners
Great Lakes Sea Grant Network specialists

PROJECT DURATION: 2014-17

PERFORMANCE MEASURES:

- HCE: Complete revision of the existing Coastal Processes Manual

TITLE: Harbor Dredging Beneficial Use of Dredged Material Outreach and Project Assistance

FOCUS AREA: HCE

STRATEGIES:

- HCE-6: Develop and share materials, websites, training and workshops to help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- HCE-5: Improve and enhance stakeholder access to and understanding of data, models, policy information and training in Wisconsin and the Great Lakes that support ecosystem-based planning, decision-making and management approaches.

BACKGROUND:
Maritime transportation in the Great Lakes, both commercial and recreational, relies on the maintenance of adequate water depth in harbors and connecting channels for navigation. Maintaining that depth where there is natural accumulation of sediments requires periodic dredging. Each year, navigation dredging in the Great Lakes produces 2-3 million cubic yards of sediment from the dredging of numerous federal Great Lakes commercial ports, recreational harbors and connecting channels maintained by the U.S. Army Corps of Engineers (Corps). Slightly more than half of the dredged sediment is typically disposed in specifically designed confined disposal facilities or CDFs. Clean sandy material is often used for beach nourishment, and much uncontaminated sediment dredged from Great Lakes harbors has historically been placed in the open lakes where states allow it, although that practice can face certain challenges at both the state and local levels.

Among federal agencies, Great Lakes states and individual communities, there is an increasing awareness that much of the material dredged in the Great Lakes for navigation is clean enough to be managed not as a burden—and in some states, a solid waste—but as a sustainable resource: a commodity with value. Recognizing that value, and identifying ways to maximize it, is the concept behind "beneficial use" as an environmentally sound, practical and sustainable approach to dredged material management in the Great Lakes.

In addition to the obvious wisdom of sustainably recycling a commodity with potential value, a more urgent motivation to promote beneficial use is the diminishing availability of other dredged material management alternatives. Consequently, dredged material only lightly contaminated is increasingly suitable for certain types of beneficial use.

CDFs, typically stone or earthen dikes designed to contain contaminated dredged sediment, have been used in the Great Lakes since the 1960s, but they are quickly reaching their design capacity. Since the 1970s, the Corps has built and or operated 45 CDFs at a total cost of nearly $900 million. The 20 CDFs currently active in the Great Lakes are 80 percent full. Prohibitive construction costs, a cost-share requirement for non-federal partners of 35 percent and reduced site availability make construction of any new CDFs increasingly difficult. Therefore, the capacity of many Great Lakes CDFs is being expanded by heightening dikes or through removing material for beneficial use. Theoretically, CDF life could be lengthened indefinitely, assuming enough beneficial reuse projects of sufficient size are found to accommodate the sediment recycling concept.

OBJECTIVES:

- Ports, harbors and marinas will have an increased awareness and understanding about how to cope with varying Great Lakes water levels, especially due to the effects of climate change and the expected low water levels (increased dredging), and will use information from Wisconsin Sea Grant to plan for potential extreme water level changes and the associated increased dredged material disposal problems.
- State agencies, lawmakers and resources planners will have an increased awareness of the importance of the sustainable beneficial re-use of dredged material.
- Great Lakes states will promote and conduct several beneficial re-use of dredged material projects incorporating information from Wisconsin Sea Grant efforts into their plans.
- Great Lakes ports and harbors will look for sustainable methods to beneficially utilize their navigation channel and slip dredged material.
- Promote the regional sediment management of soil in the port and harbors watersheds so that this material remains on the land and is kept from entering the port and harbor tributaries (directly lessening the amount of material that would be needed to be dredged and disposed of).

APPROACH/PLANNED ACTIVITIES:

- Wisconsin Sea Grant will continue education and outreach campaigns to increase understanding and promote the regional sediment management of watershed soils and the beneficial re-use of dredged material.

- Wisconsin Sea Grant will continue to serve as a Wisconsin representative on the Great Lakes Dredging Team.
- Wisconsin Sea Grant will chair the Duluth/Superior harbor dredging sub-committee that is working on beneficial use of the harbor's dredged material.
- W Sea Grant will chair the Great Lakes Dredging Team's Technical Committee which has the beneficial use of dredged material as one of its major Great Lakes-wide priorities.
- Wisconsin Sea Grant will provide significant coordination of efforts to promote the beneficial uses of dredged material to Great Lakes ports and harbors.
- Wisconsin Sea Grant will work with the U.S. Army Corps of Engineers and local watershed agencies to lessen the sediment loads into the Nemadji River (major tributary to the Duluth/Superior Harbor).
- Wisconsin Sea Grant will prepare one Web page and or one technical presentation or paper on Great Lakes dredging and the beneficial re-use of dredged material.

EXTERNAL PARTNERS:
Wisconsin Department of Natural Resources
Wisconsin Department of Transportation – Harbor Assistance Program
Wisconsin Commercial Ports Association
University of Wisconsin-Madison Center for Freight and Infrastructure Research and Education Program
Great Lakes Commission
Great Lakes Dredging Team
U.S. Army Corps of Engineers
Great Lakes ports, harbors and marinas
Lake Superior National Estuarine Research Reserve

INTENDED AUDIENCES:
Wisconsin Department of Natural Resources
Wisconsin Department of Transportation-Harbor Assistance Program
Wisconsin Commercial Ports Association
Great Lakes Commission
Great Lakes Dredging Team
U.S. Army Corps of Engineers
Great Lakes ports, harbors and marinas
Nemadji River watershed agencies (Lake Superior National Estuarine Research Reserve, Douglas County, Wis. and Carlton County, Minn.)

PROJECT DURATION: 2013-17

PERFORMANCE MEASURES:
- HCE-wpm-4: The number of Great Lakes ports and harbor projects that initiate the beneficial use of their harbor's navigation channel dredged material as the result of Wisconsin Sea Grant Institute research and outreach. 10

- HCE-wpm-5: The amount of Great Lakes dredged material put to beneficial use as the result of Wisconsin Sea Grant Institute research and outreach. 500,000 cubic yards of beneficially used dredged material.

TITLE: Freshwater Harbor Corrosion Study Results Fact Sheet

FOCUS AREAS: HCE), RCE

STRATEGY:

- HCE-6: Develop and share materials, websites, training and workshops to help residents, resource managers, businesses and industries understand the effects of human activities, environmental changes on coastal resources and techniques to protect those resources.

BACKGROUND:

Since 2004 when the accelerated freshwater corrosion problem was first discovered in the Duluth/Superior harbor, UW Sea Grant has provided education, research and outreach concerning the accelerated freshwater corrosion seen in Lake Superior port, harbor, marina structures. Prior to 2004, nothing was known about the rapid deterioration of steel structures in Lake Superior and why this was happening. To understand what the mechanisms were that were creating this problem and also how to repair and rehabilitate or when to replace steel structures damaged by this accelerated corrosion, Wisconsin Sea Grant helped form and guide a systematic approach to the research, inspections and field testing of many corrective options possible to assist ports, harbors and marinas cope with this previously unknown problem.

From the beginning, Wisconsin Sea Grant has hosted the steering committee's web site and yearly updated a fact sheet detailing the results of the previous year's research, studies and field investigations. As the outreach news reached other harbors in on Lake Superior and they also found freshwater corrosion to exist in their structures, the requests for repair and rehabilitation information has continued to increase. The need for a condensed version of the Duluth/Superior research and field test results of possible mitigation measures grew. Therefore, a companion to the initial fact sheet which characterizes the problem and discusses much of the field tests conducted in the Duluth/Superior harbor is needed to focus on the appropriate mitigation strategies.

OBJECTIVES:

- Understanding by Great Lakes coastal communities (ports, harbors and marinas) of the importance of coastal infrastructure and the risks of deterioration over their useful life cycles will be increased by the information of corrosion protection technologies.
- Great Lakes ports, harbors and marinas will incorporate corrosion protection information from Wisconsin Sea Grant into their plans to repair and prolong the useful lives of their infrastructure.
- Grant funding programs will incorporate Wisconsin Sea Grant corrosion protection guidance into funded projects (WCMP and DOT—Harbor Assistance Program).
- Ports, harbors and marinas will have an increased awareness and understanding about how to cope with the accelerated freshwater corrosion in Lake Superior, especially the damaging

structural effects due to this rare phenomenon, and will use information from UW Sea Grant to plan for appropriate mitigated strategies.

APPROACH/PLANNED ACTIVITIES:

- Wisconsin Sea Grant will continue to conduct port, harbor and marina outreach to increase understanding of appropriate and new technology with respect to port, harbor and marina infrastructure repair.
- Wisconsin Sea Grant will provide significant coordination of ports, harbors and marinas structure repair and protection research.
- Two professional presentations and or journal papers concerning ports, harbors and marinas coastal infrastructure repair option recommendations will be published.
- Wisconsin Sea Grant will conduct education and outreach campaigns to increase understanding and promote the use of corrosion-resistant materials to increase the useful life of steel structures in Lake Superior.
- Wisconsin Sea Grant will prepare 1 Web page update on ports, harbors and marinas coastal infrastructure repair option recommendations using corrosion resistant materials.
- Wisconsin Sea Grant will prepare 1 fact sheet for ports, harbors and marinas specifically focusing on corrosion repair options.

EXTERNAL PARTNERS:

Wisconsin Department of Transportation—Harbor Assistance Program
Wisconsin Commercial Ports Association
U.S. Army Corps of Engineers

INTENDED AUDIENCES:

Wisconsin Department of Transportation—Harbor Assistance Program
Wisconsin Commercial Ports Association
U.S. Army Corps of Engineers
Great Lakes ports, harbors and marinas
Wisconsin coastal communities
Coastal engineering consultant firms

PROJECT DURATION: 2014

PERFORMANCE MEASURES:

- RCE-wpm-5: The number of training sessions for coastal hazards decision-support tools conducted by Sea Grant staff and partners; the number of decision-support tools that are used to promote resilience to Great Lakes coastal hazards. One Fact Sheet.
- RCE-wpm-7: The number of Great Lakes coastline erosion control, shoreline bluff stabilization or ports and harbor infrastructure projects that are completed utilizing significant Wisconsin Sea Grant Institute coastal engineering research results, outreach and/or design assistance. 10 Projects.

Fred Binkowski – Aquaculture Specialist

FOCUS AREA: SFA, ELWD

BACKGROUND:
Declining wild fish populations and harvests combined with an increasing demand for world population food supply makes it imperative that work continue to establish aquaculture as a viable, sustainable industry in the Great Lakes region, the U.S. and the world. U.S. seafood consumption is 15 pounds per capita per year, far in excess of the capacity of the domestic fishery, making importation of seafood products necessary. More than 80 percent of seafood consumed in the U.S. is imported resulting in a 2012 trade deficit for seafood and fish of $10.96 billion. (U.S. Department of Commerce, 2012)

There is currently a grassroots resurgence of interest in small-scale local food production that emphasizes home- or community-based farming. A popular model advocates a return to the practice of "victory gardening," in which local community control is seen as providing an opportunity for more "organic" rather than mass industrial-scale farming practices. This general interest in home- or community-based farm production also extends into aquaculture and aquaponics. A popular strategy for developing aquaculture and aquaponics promotes the use of integrated recirculating systems combining fish and plant crop production.

Providing outreach to science and agricultural educators will be an important means of dispersing scientific and technical information to students, who will eventually become the owners and workforce for future aquaculture and aquaponics operations. We will continue curriculum development with our existing educational partners (Milwaukee's Fernwood Montessori Middle School, and Freedom High School in Freedom as well as Milwaukee's Vincent High School) and will expand our services by forging new relationships with high schools with agricultural programs in the state such as Shawano, Oshkosh, Waterford, Winneconne and Morse-Marshall High Schools. Relationships with First Nations schools will be initiated to promote and support education and employment opportunities in their communities.

The numerous requests that we have received specific to aquaponics in the Great Lakes Region through national networking have prompted us to provide specialized information in the form of a region specific aquaponics manual. This manual will provide comprehensive how-to information for all aspects of aquaponics, from the initial system concept and design to the final stages of processing and marketing of fish and plant products. This project is aimed at providing aquaculture and aquaponics resource information to meet the increasing needs of the aquaponics industry.

OBJECTIVES:

- Develop aquaculture and aquaponics curriculum and training programs specifically directed to science and agricultural educators within the Wisconsin Department of Public Instruction and First Nation school systems. This education program would expand our involvement with more than 30 high schools in the state of Wisconsin and will be coordinated with the Wisconsin Sea Grant educational specialist. This education initiative is endorsed by Dr. Tony Evers, Superintendent of Wisconsin Department of Public Instruction.

- Produce a comprehensive, region specific aquaponics manual covering all aspects of fin fish and plant production from initial concept and system design to the final phase of marketing and processing of fin fish, plants, and vegetables. Our past experience with conducting aquaponics workshops has shown us that there is still a need to answer general aquaponic inquiries. However, with the growing interest in producing high-value, high-quality, fin fish species, there is a need for up-to-date information pertaining to the biological, chemical, and physical elements of these fin fish species. This represents a "new-age" aquaponics concept that would be used on a regional and national level.

APPROACH/PLANNED ACTIVITIES:

- We intend to continue and expand our aquaculture education program. Aquaculture educators need outreach services to update their aquaculture curricula with current information. Approximately 300 high schools, mostly in rural Wisconsin, have vocational agriculture training programs. Novice teachers can be confronted with the demand to include or continue existing aquaculture programs without ever having been exposed to practical aquaculture activities during their undergraduate training. Established vocational agriculture teachers could use up-to-date information to develop or improve the aquaculture education programs they are offering. Involving First Nation's schools will be a priority with the goal of developing programs that will train the agricultural educators about aquaculture and aquaponics operations and develop curricula.

  These classroom school programs will provide a positive image and visibility of aquaculture and aquaponics and can be used as a conduit to attract students to become interested in core science, technology, engineering and math classes. The aquaculture and aquaponics system model is ideal for classroom instruction because it can be integrated into numerous cross curriculum disciplines including technology education, English, math, science and social studies.

- A manual designed to educate people, whether novices or experts, operating small or large facilities about the critical aspects of natural aquaponic systems and hybrid aquaponic systems will be produced. Topics covered will include fin fish husbandry and biology, water-quality, system design and construction, fish health, aquatic microbiology, processing and marketing. Additionally, shellfish husbandry and health will be included, with specific reference to Red Claw Crayfish production that shows promising growth and revenue potential in aquaponics.

  Although many commercial "how-to" aquaponics manual are currently available, the target species most often referred to is tilapia for use in integrated recirculating systems. We will focus on coolwater fin fish not commonly used at this time in aquaponic systems such as yellow perch, bluegill and hybrid bluegill. Catfish will also be included to satisfy people with an interest in warmwater fish. Additionally, we intend to examine the potential of using plants and vegetables that have an increased potential to remove nutrients more efficiently. As a result of the introduction of these new fin fish and plant groups, significant changes will need to be addressed regarding system design and function, water chemistry, aquatic microbiology, fin fish and shellfish husbandry and health practices.

  Manual Topics:

  - Natural Aquaponic System Design, Material Selection, and Construction
  - Production Systems Technology

- Production Systems Water Chemistry
- Aquatic Microbiology
- Plant Selection and Husbandry
- Fin Fish Biology
- Fish Health
- Processing and Marketing
- Red Claw Crayfish in Aquaponics

EXTERNAL PARTNERS:
Wisconsin Department of Public Instruction
Milwaukee Public School System
National Education Association Foundation
Association of Public and Land Grant Universities
Herrick Foundation, Michigan
MillerCoors Foundation
International Aquaponics Association
U.S. Bureau of Indian Affairs

PERFORMANCE MEASURES:
- Number of new and continuing aquaculture and aquaponics education programs developed with Wisconsin Department of Public Instruction and First Nation Schools as a result of Wisconsin Sea Grant aquaculture outreach activities.
- Student Enrollment: number of students instructed on how to apply the methods and techniques of aquaculture and aquaponics production.
- Completion of a comprehensive region-specific aquaponics manual.

Greg Fischer – Aquaculture Specialist

FOCUS AREAS: SFA, ELWD

BACKGROUND:
Over the duration of this work plan, Wisconsin Sea Grant will expand its aquaculture outreach efforts through a partnership with the University of Wisconsin-Stevens Point Northern Aquaculture Demonstration (UWSP-NADF) facility. This facility is well suited to providing hands-on training to Great Lakes aquaculture operators. The UWSP-NADF is working to expand the variety of species that might be suitable for the Wisconsin climate and in recirculating systems. We will support the UWSP-NADF to allow them to offer additional training sessions and communication about hybrid walleye culture as well as other potential species and aquaculture techniques. This, in turn, will allow Wisconsin Sea Grant to expand our aquaculture outreach capabilities.

STRATEGIES:
- SFA-2. Develop outreach products to make wild fish harvesters and aquaculture operations aware of advancements in product handling, packaging and marketing strategies.

- Enhance Great Lakes regional aquaculture operations through hands-on training in recirculating aquaculture techniques and alternative species.
- Conduct recirculating aquaculture system workshops.
- Provide information on hybrid walleye (saugeye) aquaculture techniques.
- Assist Wisconsin and Great Lakes regional fish culture operations in the expansion and development of their fish farming enterprises.
- Support the UWSP-NADF in the development of hybrid walleye culture and the enhancement of alternative species for fish culture in the Great Lakes region.

IMPACTS:

- 4.8. The seafood industry adopts innovative technologies and approaches to supply safe and sustainable seafood.
- 4.10. The seafood industry adopts techniques and approaches to minimize the environmental impact of their sectors.
- 4.11. Resource managers establish policies and regulations that achieve a better balance between economic benefit and conservation goals.
- 4.13. The U.S. seafood supply is sustainable and safe.
- Wisconsin and Great Lakes aquaculture operations become more profitable and sustainable.
- New aquaculture products are available in the Great Lakes region.
- New and existing aquaculture operations in the Great Lakes region learn about the risks and values of recirculating aquaculture.

PERFORMANCE MEASURES:

- SFA-npm-1. Number of fishermen, seafood processors and aquaculture industry personnel who modify their practices using knowledge gained in fisheries sustainability and seafood safety as a result of Sea Grant activities. 400 aquaculture personnel trained.
- SFA-wpm-2. Number of wild capture, aquaculture industry owner/operators and seafood processors using practices and knowledge as a result of Wisconsin Sea Grant activities. 40 processors or operators that gain knowledge.

Kathy Kline – Education Outreach Specialist

TITLE: Center for Great Lakes Literacy

FOCUS AREA: ELWD

BACKGROUND:

The Center for Great Lakes Literacy (CGLL) is a collaborative effort led by Sea Grant educators throughout the Great Lakes watershed. The center fosters informed and responsible decisions that advance basin-wide stewardship by providing hands-on experiences, educational resources and networking opportunities that promote Great Lakes literacy among an engaged community of educators, scientists and citizens.

Signature CGLL offerings include annual Great Lakes Shipboard Science workshops that connect

educators with scientists aboard the EPA's *R/V Lake Guardian;* webinars and social media postings featuring pressing Great Lakes issues; land-based watershed workshops that facilitate strong community-school partnerships resulting in action-oriented Great Lakes stewardship and restoration activities; Great Lakes Awareness Day events for the public at prominent educational institutions—aquariums, zoos, museums, etc.; Limno Loan Program for Hydrolab water-quality monitoring equipment; Educator Day at the International Association for Great Lakes Research Conference; and citizen science and other volunteer activities that create opportunities for adults to become involved in watershed restoration.

STRATEGIES:

- ELWD-1. Work with education partners to develop K-12 curricula that address the Great Lakes Literacy Principles and adhere to science and environmental education standards approved by the Wisconsin Department of Public Instruction.
- ELWD-2. Engage Sea Grant-supported graduate students, scientists and informal educators to help develop educational demonstrations for Great Lakes issues and topics to promote Great Lakes literacy.

IMPACTS:

- 10.1 Formal and informal educators are knowledgeable of the best available science on the effectiveness of environmental science education.
- 10.2 Formal and informal educators understand environmental literacy principles.
- 10.3 Lifelong learners are able to engage in informal science education opportunities focused on coastal topics.

PERFORMANCE MEASURES:

- ELWD-npm-1. Number of Sea Grant facilitated curricula adopted by formal and informal educators. Develop and distribute 1 Great Lakes teaching tool (lesson plan, exhibit, etc.)
- ELWD-npm-3. Number of people engaged in Sea Grant supported informal education programs. Engage 100 people each year in activities and events that support Great Lakes literacy.

TITLE: Grandparents University

FOCUS AREA: ELWD

BACKGROUND:

This Wisconsin Alumni Association university curriculum is conducted each summer for young people accompanied by their grandparent(s). Students select a course of study in a subject area and track through a two-day program of coursework. Wisconsin Sea Grant, in cooperation with the University of Wisconsin-Madison Center for Limnology, offers a popular course of study on limnology, including water sampling on a UW research vessel, hands-on operation of underwater robotic technology and activities on aquatic invasive species. The course of study concludes with the presentation of diplomas at a graduation ceremony.

STRATEGY:

- ELWD-2. Engage Sea Grant-supported graduate students, scientists and informal educators to help develop educational demonstrations for Great Lakes issues and topics to promote Great Lakes literacy.

IMPACTS:

- 10.3 Lifelong learners are able to engage in informal science education opportunities focused on coastal topics.
- 11.1 Students and teachers are aware of opportunities to participate in science, technology, engineering, mathematics and active stewardship programs.

PERFORMANCE MEASURE:

- ELWD-npm-3. Number of people engaged in Sea Grant supported informal education programs. Engage 100 students and grandparents each year in activities that support Great Lakes literacy.

TITLE: Consumer Education About Eating Wisconsin Fish

FOCUS AREA: SFA

BACKGROUND:

Many people are interested in purchasing more of their food from local sources, but when it comes to local fish, consumers often have questions about nutrition benefits and risk, as well as environmental sustainability of Great Lakes fisheries and fish farms.

Initiated in the 2010-2014 work plan, Wisconsin Sea Grant will continue its Eat Wisconsin Fish Campaign to educate consumers about the benefits and risks of eating wild Great Lakes fish and Wisconsin farm-raised fish, as well as the environmental impacts associated with them. Wisconsin Sea Grant will first partner with a few stores on a pilot-scale project. The campaign will continue to update a website and other outreach products that provide the information consumers need to make healthy choices for their families and support Wisconsin fishermen and fish farmers.

STRATEGY:

- SFA-7. Develop outreach products for Wisconsin consumers about Wisconsin origin fish and fisheries products and other seafood choices, including nutrition benefits, risks, seafood safety and environmental impacts.

IMPACTS:

- 5.3 U.S. seafood consumers have the knowledge to evaluate sustainable seafood choices.
- 5.4 U.S. seafood consumers have an increased knowledge of the nutritional benefits of seafood products and know how to judge seafood safety and quality.

PERFORMANCE MEASURE:

- SFA-wpm-3. Educate and inform Wisconsin residents about the health benefits and risks of eating Great Lakes wild-caught fish and Wisconsin farm-raised fish. Distribute outreach products to 10 Wisconsin grocery stores, seafood distributors or producers.

Anne Moser – Aquatic Sciences Librarian

TITLE: Elementary Education

FOCUS AREA: ELWD

BACKGROUND:
Wisconsin's Water Library has worked over the past four years developing relationships that provide opportunities for collaboration on educational outreach for children ages 3 through 10. The library intends to continue developing those relationships and expand on opportunities to specifically reach underserved populations. For the library, educational outreach is defined as a combination of literacy and marine-literacy activities and has been primarily a story time that includes reading on a water-related topic, science-based activities (experiments) and a craft related to the theme. The library has also had successful collaborations with the University of Wisconsin-Madison Science Alliance, an on-campus group doing science outreach all over Wisconsin as an embodiment of the Wisconsin Idea, providing science outreach to older children.

STRATEGIES:
- ELWD-1. Work with education partners to develop K-12 curricula that address the Great Lakes Literacy Principles and adhere to science and environmental education standards approved by the Wisconsin Department of Public Instruction.
- ELWD-2. Engage Sea Grant-supported graduate students, scientists and informal educators to help develop educational demonstrations for Great Lakes issues and topics to promote Great Lakes literacy.

IMPACTS:
- 10.1. Formal and informal educators are knowledgeable of the best available science on the effectiveness of environmental science education.
- 10.2. Formal and informal educators understand environmental literacy principles.
- 10.3. Lifelong learners are able to engage in informal science education opportunities focused on coastal topics.
- 10.6. Formal and informal education programs incorporate environmental literacy components.

PERFORMANCE MEASURES:
- ELWD-npm-1. Number of Sea Grant facilitated curricula adopted by formal and informal educators. Develop 10 marine literacy story times to be used in informal settings.
- ELWD-npm-2. Number of people engaged in Sea Grant supported informal education programs. Engage 500 children each year in activities and events that support Great Lakes literacy.

TITLE: Digitization

FOCUS AREA: ELWD

BACKGROUND:
One of the goals of the library is "the preservation of the library collection for future as well as historical value." Under this goal, the library will continue to work with appropriate partners on digitization projects that add value to Wisconsin Sea Grant. One project currently in the works is the creation of the digital archive of the Earthwatch Radio Program. The collection spans more than 30 years of two-minute radio spots cover an historical look at environmental science, water science in particular. It is currently in storage at University of Wisconsin Archives. The project was started during the last work plan period and continues. Additional digitization projects will be determined.

STRATEGY:
- ELWD-2. Engage Sea Grant-supported graduate students, scientists and informal educators to help develop educational demonstrations for Great Lakes issues and topics to promote Great Lakes literacy.

IMPACTS:
- 10.1. Formal and informal educators are knowledgeable of the best available science on the effectiveness of environmental science education.
- 10.7. Formal and informal education programs take advantage of the knowledge of Sea Grant-supported scientists and engagement professionals.

PERFORMANCE MEASURES:
- ELWD-npm-1. Number of Sea Grant facilitated curricula adopted by formal and informal educators. The digital archive of almost 40 years of Earthwatch Radio.

Titus Seilheimer – Fisheries Specialist

TITLE: Commercial Net Safety

FOCUS AREA: SFA

BACKGROUND:
Commercial fishing gear can be a hazard to anglers and recreational boaters. By providing maps of the net location in the Two Rivers-Manitowoc and Sheboygan areas of Lake Michigan, boaters are informed about the location of nets and conflicts are reduced. Net maps also allow for an educational outlet for what to do when gear becomes entangled in nets. Educational material on how to identify nets is also needed for Lake Superior waters to inform boats about how to identify risks from different types of nets and how to properly deal with entanglement.

STRATEGIES:

- SFA-2. Develop outreach products to make wild fish harvesters and aquaculture operations aware of advancements in product handling, packaging and marketing strategies.
- Inform boaters and anglers about the presence of commercial fishing nets off Two Rivers, Sheboygan and Washburn.
- Make printed and electronic maps of net locations available to anglers and boaters.
- Minimize user conflict.
- Improve boater safety.

IMPACTS:

- 4.3. Commercial and recreational fishermen are knowledgeable about efficient and responsible fishing techniques.
- 4.6. Fishermen employ efficient fishing techniques, including bycatch reduction.
- 4.10. The seafood industry adopts techniques and approaches to minimize the environmental impact of their sectors.
- 5.9. The U.S. seafood industry operates sustainably and is economically viable.
- Two Rivers-, Manitowoc- and Sheboygan-area anglers are able to avoid entanglement in commercial trap nets; user conflict is reduced.
- Anglers and boaters are informed of trap net locations.
- Anglers understand that the target species for commercial nets is lake whitefish and that non-target species are released.
- Lake Superior-area anglers and boaters are able to avoid entanglement in commercial nets; user conflict is reduced.

EXTERNAL PARTNERS:
Commercial fishermen
Bait shops
Marinas
Lake Link website
Local fishing clubs

INTENDED AUDIENCES:
Anglers in the Two Rivers-Manitowoc area
Anglers in the Sheboygan and Ashland areas

PERFORMANCE MEASURES:

- SFA-wpm-1. Develop outreach products to make wild fish harvesters and aquaculture operations aware of advancements in product handling, packaging and marketing strategies.
- SFA-wpm-2. Number of wild capture, aquaculture industry owner/operators and seafood processors using practices and knowledge as a result of Wisconsin Sea Grant activities. 2
- 1,500+ trap net Web page visits during the netting season.
- Posters and more than 800 maps distributed in the Two Rivers-Manitowoc and Sheboygan area.
- 250 Web page visits during the netting season to Lake Superior net safety pages.
- The number of people reporting lost gear will remain fewer than 10 per year.
- 350 net safety brochures distributed in the Lake Superior basin of Wisconsin.

TITLE: Whitefish Trawl Study

FOCUS AREA: SFA

BACKGROUND:
The traditional method for capturing whitefish in Lake Michigan waters involves trap nets. Trap nets allow sorting and release of non-target species. Unfortunately, with the expansion of dreissenid mussels in Lake Michigan since the late 1980's, the water clarity has increased significantly such that the trap nets now get covered with algae. This algae causes the fish to avoid the nets and therefore requires the fishermen to clean off their nets about twice a week during the summer months. This is labor intensive and involves additional fuel costs.

There is interest among two commercial fishermen who trawl for smelt in using that approach to trawl for whitefish. This could allow capture of the whitefish without the associated algae problem and could allow capture in the wintertime when the dockside price is higher. There is concern however, that use of a trawl could involve significant by-catch and mortality of non-target species.

Wisconsin Sea Grant will work with the Wisconsin Department of Natural Resources and a Two Rivers commercial fisherman to evaluate the capture rate of non-target species from trawling for whitefish. This research will be used to determine if trawling could be conducted without impacting other fisheries (e.g. salmon and lake trout). Fishing will be conducted over all seasons and a range of depths in order to identify temporal and spatial patterns in whitefish distribution that minimize by-catch.

This project will be conducted over one year with a possible extension of the project to be determined upon completion of year one. Monthly trawling in Lake Michigan for whitefish will allow determination of the rate of by-catch. A final report will be prepared following the completion of the project. Wisconsin Sea Grant will provide onboard monitoring and tagging of by-catch during the study. Returns of tagged fish will be used to estimate survival.

STRATEGIES:
- SFA-1. Support research to develop and improve aquaculture practices and techniques, including aquaponics, nutritional value of feeds and disease and pathogen prevention and diagnosis.
- Determine rate of by-catch for trawls and compare to other commercial gear types.
- Identify seasons and depths that minimize by-catch.
- Rule changes in the DNR regulations governing commercial fishing will allow for trawling for whitefish based on information from this study.
- Commercial fishermen will be able to trawl for whitefish during the winter months when prices are high but trap nets cannot be set.

IMPACTS:
- 4.2. The seafood industry is knowledgeable about innovative technologies, approaches and policies.

- 4.3. Commercial and recreational fishermen are knowledgeable about efficient and responsible fishing techniques.
- 4.6. Fishermen employ efficient fishing techniques, including bycatch reduction.
- 4.7. Fishermen apply techniques to reduce negative impacts on depleted, threatened or endangered species.
- If successful, commercial fishermen will have an alternative means of capturing whitefish.
- Commercial fishing operations will be more profitable.
- Salmonid by-catch is avoided or minimized.

EXTERNAL PARTNERS:

Susie Q Fish Co.

Wisconsin Department of Natural Resources

INTENDED AUDIENCES:

Susie Q Fish Co.

Wisconsin Department of Natural Resources

Manitowoc-area anglers

PERFORMANCE MEASURES:

- SFA-wpm-2. Number of wild capture, aquaculture industry owner/operators and seafood processors using practices and knowledge as a result of Wisconsin Sea Grant activities. 1
- CC-pm-2. Number of peer-reviewed publications produced as a result of Wisconsin Sea Grant support, and number of citations for all peer-reviewed publications from the last four years. 1
- Monthly reports will be produced on the catch of whitefish and non-target species.
- Bycatch will be comparable to other methods of fishing, e.g. gill and trap nets.
- Whitefish prices are higher in the winter months when supply is low, so commercial fishing operations that utilize winter harvest for whitefish will have access to higher income.

TITLE: Watercraft Inspections to Prevent the Spread of AIS

FOCUS AREA: HCE

BACKGROUND:

The Great Lakes have been a significant source of aquatic invasive species (AIS) to inland lakes in Wisconsin. This project, now in its ninth year, provides education to Great Lake boaters on the proper methods to reduce and prevent transport of AIS to other water bodies. Simple steps like draining water, removing vegetation and not moving live fish can significantly reduce the likelihood of transporting live organisms and pathogens to other waters.

STRATEGIES:

- HCE-4. Help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- Hire and train up to nine undergraduate students to perform the watercraft inspections at Lake Michigan and Lake Superior boat ramps between Memorial Day and Labor Day.

- Disseminate informational brochures, pamphlets and other educational prompts to help make boaters aware of the cleaning steps and regulations surrounding AIS transport.
- Submit recorded data in a timely manner on the Wisconsin Department of Natural Resources website.

IMPACTS:
- 2.3 Residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- 3.2 Residents, resource managers and businesses understand the threats to ecosystems and the consequences of degraded ecosystems.
- Boaters are better informed regarding AIS prevention steps.
- Aquatic invasive species are not moved between waters.
- Ecosystem health is maintained.

EXTERNAL PARTNERS:
Wisconsin Department of Natural Resources
University of Wisconsin-Extension

INTENDED AUDIENCES:
Great Lakes boaters on both Lake Superior and Lake Michigan

PERFORMANCE MEASURES:
- HCE-wpm-1. Investment in research, outreach and education projects that hold promise to develop measures and indicators of Great Lakes ecosystem health or that identify factors that threaten the sustainability of Great Lakes ecosystems.
- Sea Grant watercraft inspectors will contact more than 8000 boaters annually
- 85% of boaters at Great Lake boat ramps will know what steps to take to prevent spread of AIS via boats and trailers based on survey questions asked by WISG inspectors.

TITLE: Salmon Ambassadors Wisconsin

FOCUS AREA: SFA

BACKGROUND:
Pacific salmon were introduced into Lake Michigan in order to help control the non-native alewife, in addition to providing a valuable recreational fishery. These goals have been successful, with lower levels of alewife and a large sport fishery. The current fishery for Chinook salmon is mainly supported through stocking of hatchery-reared fish by the four states surrounding the lake. Natural reproduction of Chinook salmon in Michigan and Georgian Bay, Lake Huron, coupled with the decline in the lakewide abundance of preyfish has led to recent reductions of stocking numbers. The distribution of stocked Chinook salmon between Wisconsin ports has been an issue of interest to anglers in recent years. Although Wisconsin has limited natural reproduction compared to Michigan, understanding the whole-lake dynamics of salmon movement is vital for sound management of the fishery.

This project will engage Wisconsin anglers in the management of Lake Michigan Chinook salmon. Anglers will be recruited from all the ports in Wisconsin to collect information about the fish they catch. Fish size and fin clip (an indicator of stocked or wild) data will be collected by anglers to increase the knowledge about of seasonal change in the abundance of wild salmon in Wisconsin waters. This program will also allow for increased and more targeted collection of Chinook salmon heads for retrieval of coded wire tags (CWT). All stocked Chinook salmon will be marked with CWT by 2014, so this project will include valuable information on the movement of stocked and wild salmon. DNR fishery biologists will provide guidance on the collection of Chinook salmon heads for CWT from certain ports of interest. The same methods will be used by Michigan Sea Grant to collect data on the Michigan side of Lake Michigan, which will provide temporal and spatial patterns in wild Chinook salmon, in addition to stocking location for CWT collected heads, for a large proportion of the lake. The information collected by this project will be used to communicate status and trends in the fishery as well as aspects of salmon biology to anglers and other groups.

STRATEGIES:

- HCE-1. Support research that seeks to contribute to the understanding, management and improvement of Great Lakes ecosystem health.
- HCE-3. Improve and enhance stakeholder access to and understanding of data, models, and policy information in Wisconsin and the Great Lakes that support ecosystem-based planning, decision-making and management approaches.
- HCE-11. Involve stakeholders in resource management decision-making processes and to help resource managers incorporate public input in resource management decisions.
- Engage anglers through collection of data for use in management.
- Use program to ask specific research and management questions by targeting ports and rivermouths.
- Improved management of Lake Michigan sport fisheries.
- Provide outreach about the ecology of sport fish in Lake Michigan.
- Resource managers set realistic and prioritized goals to protect, enhance and restore habitats by incorporating scientific information and public input.

IMPACTS:

- 1.2 Identify critical uncertainties that impede progress toward achieving sustainability of Great Lakes ecosystems and the goods and services they provide.
- 1.5 Greater public stewardship in the Great lakes region leads to participatory decision making and collaborative ecosystem-based management decisions.
- 4.1 Resource managers and fishermen in the Great Lakes understand the dynamics of wild fish populations.
- 4.11 Great Lakes resource managers establish policies and regulations that achieve a better balance between economic benefit and conservation goals.
- Reduce conflict between agencies and anglers through angler data collection.
- Improved efficiency in the management of Chinook salmon in Lake Michigan.
- Great Lakes stakeholders have access to data, models, policy information and training that support ecosystem-based planning, decision-making and management approaches.

EXTERNAL PARTNERS:
Michigan Sea Grant
Wisconsin Department of Natural Resources
Michigan Department of Natural
Resources
U.S. Fish and Wildlife Service

INTENDED AUDIENCES:
Recreational and charter anglers

PERFORMANCE MEASURES:
- NCE-npm-9. Number of Sea Grant tools, technologies and information services that are used by our partners/customers to improve Great Lakes ecosystem-based management. Target: 1 tool
- Information from this program will be used by WI DNR to inform decisions on stocking questions.
- 15 anglers enroll in the Wisconsin salmon ambassadors program each year.

TITLE: Understanding the Changing Lake Michigan Food Web

FOCUS AREA: HCE, ELWD

BACKGROUND:
Develop an outreach and education program to describe the current state and causes of the change in Lake Michigan's food web. Explore the potential future changes to the food web related to human activity and climate change. Inform coastal residents and resource users on the state of the science on the Lake Michigan food web.

STRATEGIES:
- HCE-2. Engage researchers with the Sea Grant outreach and communications staff to effectively make available and deliver research-derived information and findings to resource managers, policy- and decision-makers and public stewards.
- HCE-4. Help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- HCE-9. Interpret data, train and inform residents, resource managers and businesses to help them understand threats to Great Lakes ecosystems and importance of the benefits provided by preserving non-degraded ecosystems.
- ELWD-2. Engage Sea Grant-supported graduate students, scientists and informal educators to help develop educational demonstrations for Great Lakes issues and topics to promote Great Lakes literacy.
- Inform angler groups, conservation groups, and students about food web ecology, the structure of Lake Michigan's food web and how it has been changed by invasive species.
- Residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.

IMPACTS:

- 1.5 Greater public stewardship in the Great lakes region leads to participatory decision-making and collaborative ecosystem-based management decisions.
- 2.8 Residents, resource managers and businesses integrate social, natural and physical science when managing resources and work with all sectors in the decision-making process.
- 3.2 Residents, resource managers and businesses understand the threats to ecosystems and the consequences of degraded ecosystems.
- 10.3 Lifelong learners are able to engage in informal science education opportunities focused on coastal topics.
- 10.7 Formal and informal education programs take advantage of the knowledge of Sea Grant-supported scientists and engagement professionals.

PERFORMANCE MEASURES:

- HCE-wpm-1: Investment in research, outreach and education projects that hold promise to develop measures and indicators of Great Lakes ecosystem health or that identify factors that threaten the sustainability of Great Lakes ecosystems.
- Education program leads to measurement of indicators in local ecosystems (citizen science; e.g. Lake Michigan pH). 1 citizen group per year
- ELWD-npm-1: Number of Sea Grant facilitated curricula adopted by formal and informal educators.
- Number of education programs conducted by partners (Wisconsin Maritime Museum). 2
- ELWD-npm-2: Number of people engaged in Sea Grant supported informal education programs. 50 students and 5 angler groups annually

EXTERNAL PARTNERS:
Wisconsin Maritime Museum

INTENDED AUDIENCES:
Angler groups
Conservation groups
Students

Tim Campbell – Aquatic Invasive Species Outreach Specialist

TITLE: Wakeboard Boat Ballast Study

FOCUS AREA: HCE

BACKGROUND:
Some recreational boats have onboard ballast systems that are used to increase the enjoyment of water sports such as wake boarding and water skiing. These boats can carry more than 100 gallons of ballast and have the potential to move water and potentially invasive species overland. Working with a wakeboard boat dealer, initial observations determined that ballast water remains in the tanks even after the ballast system has been “fully drained” by the boat’s pump system. Transporting water is in violation of Wisconsin law and while this rule is not currently being enforced on recreational boats with

ballast systems, it would be wise to help these boaters find a way to reduce their risk of transporting aquatic invasive species (AIS). The goal of this project is to assess the potential of recreational boat ballast, to transport AIS, assess the risk of the boating behaviors of this boating group, and to ultimately develop a process to reduce the risk of recreational boat ballast transporting AIS.

STRATEGIES:

- HCE-3. Improve and enhance stakeholder access to and understanding of data, models, and policy information in Wisconsin and the Great Lakes that support ecosystem-based planning, decision-making and management approaches.
- HCE-4. Help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- HCE-9. Interpret data, train and inform residents, resource managers and businesses to help them understand threats to Great Lakes ecosystems and importance of the benefits provided by preserving non-degraded ecosystems.
- Assess the potential of recreational boat ballast to transport AIS.
- Assess the risk of the boating behaviors of this boating group.
- Develop a process to reduce the risk of recreational boat ballast transporting AIS.

IMPACTS:

- 3.2. Residents, resource managers and businesses understand the threats to ecosystems and the consequences of degraded ecosystems.
- 3.5. Resource managers, businesses and residents adopt innovative approaches and technologies to maintain or improve the function of ecosystems.
- An understanding of the potential of recreational boat ballast to transport AIS.
- Determine the boating behaviors of boaters with ballast and assess the risk of this boating group.
- Increased awareness of AIS prevention strategies by a previously untargeted group.
- Develop a convenient AIS prevention strategy for recreational boat ballast.

EXTERNAL PARTNERS:

Fort Fremont Marine
East Central Wisconsin Regional Planning Commission

INTENDED AUDIENCES:

Wakeboarders
Inland surfers
Boat retailers
Watersport organizations
Boat manufacturers

PERFORMANCE MEASURES:

- CC-pm-2 - Number of peer-reviewed publications produced as a result of Wisconsin Sea Grant support, and number of citations for all peer-reviewed publications from the last four years. 1 publication

- HCE-wpm-1. Investment in research, outreach and education projects that hold promise to develop measures and indicators of Great Lakes ecosystem health or that identify factors that threaten the sustainability of Great Lakes ecosystems. 1 project
- Train 4 wakeboard retailers on AIS prevention.
- Host 2 wakeboard AIS prevention events for the general public.
- Attend 6 wakeboard events to distribute AIS information and incorporate prevention activities.
- Discuss AIS with 2 boat manufacturers the risk of ballast and possible solutions.
- 1 presentation at a scientific conference.

TITLE: Organisms in Trade Symposium

FOCUS AREA: HCE

BACKGROUND:
An introduction pathway for live organisms involves organisms in trade (OIT). These may be garden or nursery species but also include exotic pets and live food organisms. In Wisconsin, there are regulations on what species are allowed to be sold or possessed. Yet rather than rely solely on enforcement, we seek to develop a cooperative relationship between retailers, regulators, educators and consumers to help improve compliance and prevention. Regulations attempt to control what goes into trade, there are still potentially invasive organisms that are possessed by the public and these organisms can find their way into the environment through release or escape. Some planned activities include:

- Plan an OIT conference in Milwaukee in the spring of 2014 to help develop partnerships.
- Promote native or noninvasive alternatives for trade.
- Partner with aquarium clubs, animal rescues, and humane societies to develop pet return mechanisms.

STRATEGIES:
- HCE-3. Improve and enhance stakeholder access to and understanding of data, models, and policy information in Wisconsin and the Great Lakes that support ecosystem-based planning, decision-making and management approaches.
- HCE-4. Help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- HCE-9. Interpret data, train and inform residents, resource managers and businesses to help them understand threats to Great Lakes ecosystems and importance of the benefits provided by preserving non-degraded ecosystems.

IMPACTS:
- 2.3. Residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- 2.8. Residents, resource managers and businesses integrate social, natural and physical science when managing resources and work with all sectors in the decision-making process.
- 3.5. Resource managers, businesses and residents adopt innovative approaches and technologies to maintain or improve the function of ecosystems.
- Stronger partnerships with stakeholders better address AIS issues.
- Better educated exotics retailers and consumers.

- Mechanisms to promote alternatives to pet release.
- Alternatives to using invasive species in the nursery and pet trades.
- Potentially fewer AIS in trade.
- Potentially fewer AIS being released into the environment.

EXTERNAL PARTNERS:
Wisconsin Department of Natural Resources
Kingdom Animalia Exotic Animal Rescue
Wisconsin Green Industry Association
Pet Industry Joint Advisory Council

INTENDED AUDIENCES:
Nurseries
Aquarium stores
Industry
Aquarium clubs
Master gardeners
Animal rescues
Humane societies
Zoos
Nature centers

PERFORMANCE MEASURES:
- ELWD-npm-2. Number of people engaged in Sea Grant supported informal education programs. 1,000 people
- 2 pet amnesty events hosted
- 2 pet amnesty networks created
- 1 workshop/conference hosted on OIT and AIS issues
- 2 Habitattitude/OIT education events

TITLE: Watercraft Decontamination for Wisconsin Communities and Organizations

FOCUS AREA: HCE

STRATEGIES:
HCE-6. Develop and share materials, websites, training and workshops to help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
HCE-8. Collaborate with local, state, tribal and regional agencies and non-governmental organizations to implement strategies.
HCE-12.

BACKGROUND:
Interest in watercraft decontamination has grown as other states and areas adopt decontamination strategies for AIS prevention. The goal of this project is to help develop standard decontamination

recommendations for Wisconsin, provide guidance to stakeholders interested in decontamination, and provide decontamination educational materials.

IMPACTS:

- Greater knowledge of watercraft decontamination techniques.
- Greater application of watercraft decontamination techniques in Wisconsin.
- Increased number of decontamination stations available across the state and especially along the Great Lakes Coast.

APPROACH/PLANNED ACTIVITIES:

- Introduce decontamination techniques through presentations to stakeholders.
- Meet with coastal communities, communities on DNR "super spreader" waterbodies and interested lake associations to determine decontamination needs.
- Where decontamination stations are appropriate, help find funding to purchase and operate the station.
- Train interested organizations and event promoters in AIS prevention and decontamination techniques.
- Distribute decontamination outreach materials to those using decontamination techniques.
- Continue to participate in the decontamination policy team to develop decontamination guidance for Wisconsin.
- Develop a survey to set a baseline of decontamination knowledge and then use subsequent surveys to track attitude and knowledge change.
- Build awareness of decontamination techniques and priorities in 2014-15.
- As awareness grows, train interested groups or help interested stakeholders obtain decontamination materials.

EXTERNAL PARTNERS:
Wisconsin Department of Natural Resources
University of Wisconsin-Extension

INTENDED AUDIENCES:
Boaters
Organizations that engage in boating activities
Communities that provide boating access
Lake associations

PERFORMANCE MEASURES:

- 500 decontamination brochures ordered and distributed.
- 4 decontamination signs posted at stations.
- 10 meetings with stakeholders about decontamination.
- 8 decontamination trainings for interested organizations.

TITLE: Great Lakes Charter Captains Aquatic Invasive Species Network

FOCUS AREA: HCE

STRATEGIES:
HCE-6. Develop and share materials, websites, training and workshops to help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
HCE-12.

BACKGROUND:
Charter captains are opinion leaders in the field of fishing and may speak with clients daily about AIS issues. Captains may not know all the facts about AIS and may not have time perform research to get the facts. The purpose of this project is to provide captains with AIS facts and information so they are properly informed. This information can also be passed along to interested clients. There also is no a standard reporting mechanism for reporting a possible new invasive species. This project will provide charter captains with a standard reporting process to increase the likelihood a new invasive will be reported and will hopefully increase dialogue between charter captains and AIS professionals.

IMPACTS:
- Better educated charter captain force that can inform clients of AIS issues.
- More streamlined reporting protocol for new possible AIS for charter captains.

APPROACH/PLANNED ACTIVITIES:
- A survey of charter captains will assess the AIS information needs of charter captains, and the willingness of charter captains to participate in an AIS information program.
- A toolkit developed using the results of the survey will be piloted in Port Washington and Milwaukee.
- A toolkit incorporating changes from the pilot study will be distributed to charter captains throughout the remainder of Wisconsin.
- Surveys at the end of each season will be used reevaluate the toolkit, assess knowledge of AIS issues, and make changes for the next fishing season.

EXTERNAL PARTNERS:
Charter captains
Great Lakes sport fishing clubs

INTENDED AUDIENCES:
Charter captains
Fishing guides

PERFORMANCE MEASURES:
- 20 charter captains with toolkits.
- 4 contacts by charter captains through the reporting mechanisms.
- 5 captains with toolkits with increased knowledge of AIS issues.

Phil Moy – Outreach Program Leader

TITLE: AIS Prevention at Fishing Tournaments

FOCUS AREA: HCE

BACKGROUND:
Fishing tournaments have the potential to spread aquatic invasive species (AIS) through both the movement of participants' boats among water bodies as well as through the equipment used by tournament organizers. Judge and release boats and weigh-in equipment may be transported hundreds of miles between events with little time to dry. By educating tournament organizers, and in turn tournament participants, about AIS prevention we can slow the spread of AIS between waters, maintain the fishing tournament industry and engage tournament anglers in youth education.

STRATEGIES:
- Engage fishing tournament organizers as partners in AIS prevention efforts.
- Inform tournament anglers about the potential effects of AIS.
- Inform tournament anglers about how to prepare their boat for transport and not move AIS.
- Train tournament logistics support groups how to clean tournament boats.
- HCE-2. Engage researchers with the Sea Grant outreach and communications staff to effectively make available and deliver research-derived information and findings to resource managers, policy- and decision-makers and public stewards.
- HCE-4. Help residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- HCE-9. Interpret data, train and inform residents, resource managers and businesses to help them understand threats to Great Lakes ecosystems and importance of the benefits provided by preserving non-degraded ecosystems.

OUTCOMES:
- Fishing tournaments are no longer a vector for AIS spread.
- Tournament anglers are better informed about AIS prevention steps.
- Tournament anglers become spokespersons to AIS prevention.
- Young anglers are informed about AIS prevention.
- 1.5 Greater public stewardship leads to participatory decision-making and collaborative ecosystem-based management decisions.
- 2.3 Residents, resource managers, businesses and industries understand the effects of human activities and environmental changes on coastal resources.
- 3.1. Residents, resource managers and businesses understand the importance of the benefits provided by preserving non-degraded ecosystems.
- 3.5. Resource managers, businesses and residents adopt innovative approaches and technologies to maintain or improve the function of ecosystems.
- 3.6. Habitats are protected, enhanced or restored.

PERFORMANCE MEASURES:

- HCE-npm-9. Number of Sea Grant tools, technologies and information services that are used by our partners/customers to improve Great Lakes ecosystem-based management. 1 best-management practice; 2 outreach tools or products