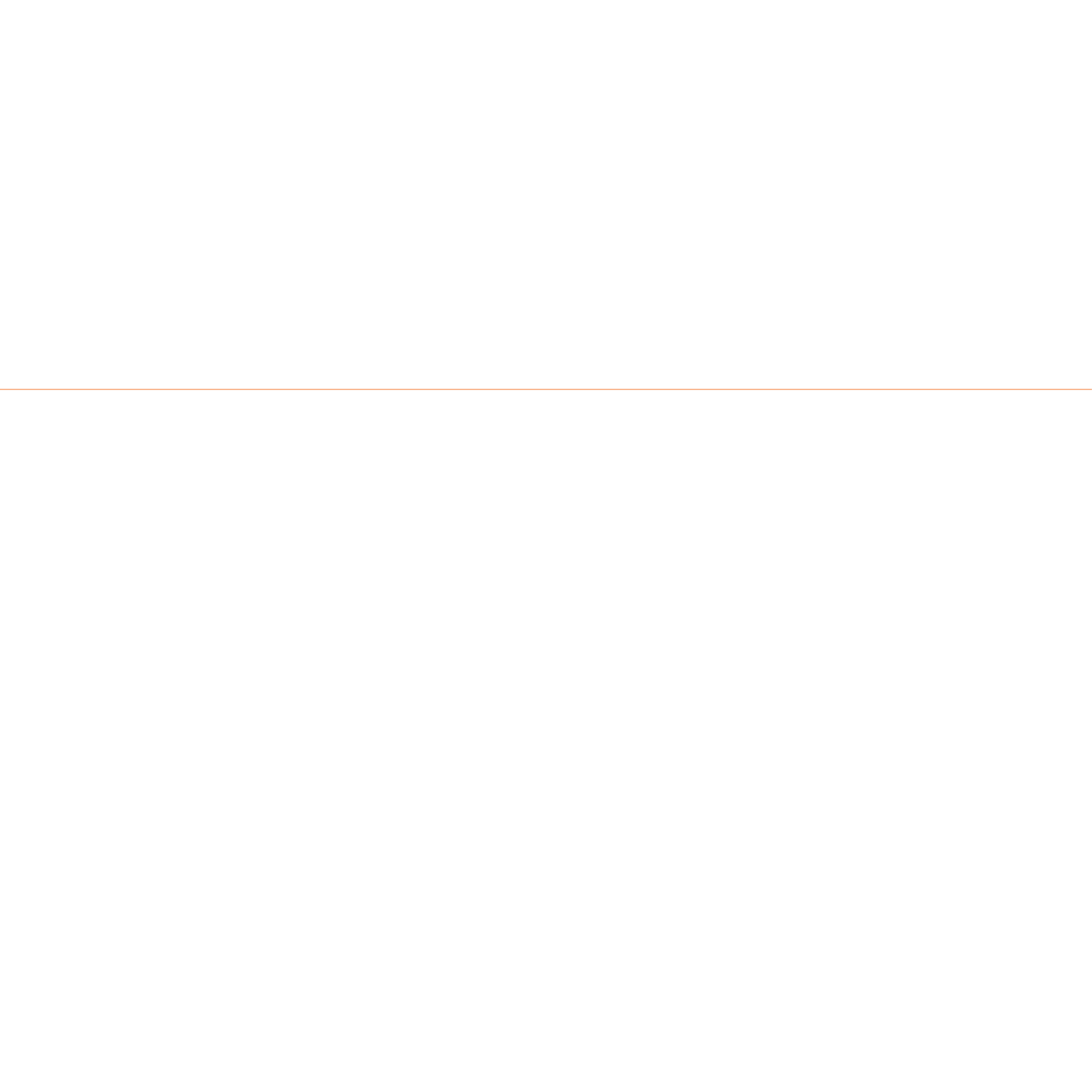


SG

**2006-08 DIRECTORY OF
PROJECTS AND PEOPLE**
University of Wisconsin Sea Grant Institute





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PROJECTS AND PEOPLE**
University of Wisconsin Sea Grant Institute

Sea Grant is a unique partnership with public and private sectors combining research, education, outreach and technology transfer for public service. Sea Grant is a national network of 30 university-based programs of research, outreach, and education enhancing the practical use and conservation of coastal, ocean and Great Lakes resources to create a sustainable economy and environment.



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From the Director

This directory presents the 2006–08 University of Wisconsin Sea Grant College Program, a statewide program of research, outreach and education dedicated to the beneficial use of Great Lakes, ocean and coastal resources. Launched in 1968, Wisconsin Sea Grant is part of a national network of 30 university-based programs funded through the National Sea Grant College Program, National Oceanic & Atmospheric Administration (NOAA), U.S. Department of Commerce, with matching contributions from participating states and private sources.

Sea Grant is a highly competitive grants program that provides awards totaling about \$3 million annually to Wisconsin public and private universities and colleges. After conducting rigorous national peer reviews and expert panel reviews of all project proposals, our guiding principle for funding projects is to select those that can help meet national Sea Grant goals by using the strengths that our program and Wisconsin's academic community can bring to bear on them, while also taking into account the strategic research, outreach and educational priorities of our parent institution, the State of Wisconsin, and the Great Lakes region. The UW Sea Grant College Program for 2006–08 is thus organized in an issue-oriented, thematic approach in accordance with National Sea Grant College Program themes and goals.

This directory presents a brief description of each of the 33 new and continuing research, outreach and education projects receiving UW Sea Grant support during 2006–08. In sum, these projects involve more than 100 faculty, staff and students in 32 departments or units at eight UW System campuses, UW-Extension, Lawrence University and Marquette University, plus the Wisconsin Historical Society, four units of three state agencies, 14 out-of-state universities, and seven units of three federal agencies. In “the Wisconsin Idea” tradition, UW Sea Grant Advisory Services and Communications staff will be partnering more than 200 public agencies, businesses, nongovernmental organizations and individuals on a variety of outreach and education projects during 2006–08 that involve a dozen units of UW–Madison and a dozen more at four other UW System campuses, 16 units of seven state agencies, two Wisconsin tribal governments, three regional organizations, five units of NOAA and five other federal agencies, and universities and state agencies in a half-dozen other states.

To learn more about our program and its activities, we invite you to visit our Web site at www.seagrants.wisc.edu.


Anders W. Andren, Director

Participating Institutions and Agencies, 2006–08

University of Wisconsin Sea Grant College Program

Harvard Medical School	University of Puerto Rico
Lawrence University	University of Vermont
Los Alamos National Laboratory	University of Wisconsin–Extension
Marquette University	University of Wisconsin–Green Bay
Michigan State University	University of Wisconsin–La Crosse
North Carolina State University	University of Wisconsin–Madison
The Ohio State University	University of Wisconsin–Manitowoc
Penn State University–Erie	University of Wisconsin–Milwaukee
Plattsburgh State University of New York	University of Wisconsin–Oshkosh
Purdue University	University of Wisconsin–Stevens Point
U.S. Environmental Protection Agency	University of Wisconsin–Superior
U.S. Geological Survey	University of Wisconsin System
University of Illinois–Urbana	Wisconsin Coastal Management Program
University of Michigan	Wisconsin Department of Natural Resources
University of Minnesota	Wisconsin Historical Society
University of North Carolina	Wisconsin State Laboratory of Hygiene
University of Notre Dame	

Aquaculture Theme

***National Sea Grant Goal:** Develop the scientific, technological information and expertise needed to propagate and successfully culture fish with commercial and/or recreational value to the United States as well as the rest of the world.*

Wisconsin currently has a moderately sized yet diverse aquaculture industry that includes the production of food fish, baitfish and fish for stocking. This is a priority area for Wisconsin Sea Grant because the industry has great growth potential, particularly in the area of food fish production, due to the state's ample supplies of high-quality water, land, labor and markets. The most likely candidates for expansion in Wisconsin are yellow perch and other cool-climate, freshwater fish species. One major obstacle to achieving the state's aquaculture growth potential is conditioning these species to intensive culturing, including improving growth rates, reducing stress and disease, and controlling reproduction. Practical, cost-effective production parameters need to be developed, along with environmentally sound aquaculture systems focused on reducing water usage and waste effluents.

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Projects

Endocrine and Environmental Regulation of Growth in Yellow Perch

Jeffrey Malison, UW–Madison, (608) 263-1242, jmalison@wisc.edu

Terence Barry, UW–Madison, (608) 263-2087, tpbarry@wisc.edu

This continuing project addresses a cross-cutting priority in Aquaculture and Biotechnology of improving the growth and controlled reproduction of cultured fish through biotechnological approaches. The objective of this research is to gain a better understanding of key environmental conditions and endocrine mechanisms that control growth and reproduction in this popular food fish. Two current constraints on yellow perch aquaculture are the lack of information on growth rates to achieve market-sized fish and the inherently slow growth rate of the species. This project is attempting to develop simple, cost-effective methods to enhance growth rates of yellow perch, thereby increasing profitability and providing impetus to expand this phase of the aquaculture industry in Wisconsin. [R/AQ-38](#)

Tetracycline Antibiotics and Resistance Genes in Aquaculture Environments: Genotypic Diversity and Potential Resistance Reservoirs

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Joel Pedersen, UW–Madison, (608) 263-4971, joelpedersen@facstaff.wisc.edu

This continuing project is investigating the occurrence of tetracycline antibiotics in waters and sediments associated with aquaculture facilities to assess whether this constitutes a problem in aquaculture activities in the Great Lakes region. The researchers will also examine whether antibiotic use in aquaculture creates reservoirs of resistant microorganisms in the environment. This work also addresses a Biotechnology Theme priority and complements Wisconsin Sea Grant's longstanding focus on developing accurate approaches for assessing and predicting environmental risks to fauna and flora exposed to persistent chemical contaminants. [R/AQ-40](#)

Development of Yellow Perch Broodstocks for Selective Breeding

Rick Goetz, UW–Milwaukee, (414) 382-1742, rick@uwm.edu

Fred Binkowski, UW–Milwaukee, (414) 382-1723, sturgeon@uwm.edu

The recent decline of the yellow perch fishery in Lake Michigan and a corresponding loss of its commercial fishery have led to a shift toward aquaculture to replace this lost food resource, yet many unknowns add risk to developing a viable yellow perch aquaculture business. One is the need for a dependable supply of broodstocks with the ability to produce offspring at multiple times during the year. The investigators of this new project propose to evaluate broodstocks from wild perch derived from several geographic regions in the United States and determine genetic variation and phylogenetic relatedness of perch and their crossbreed offspring using DNA microsatellite markers. This project will test the viability of this genetic marker approach for developing aquaculture broodstock capable of out-of-season spawning. [R/AQ 41](#)

Aquaculture Advisory Services for the Great Lakes Region

Fred Binkowski, UW–Milwaukee, (414) 382-1723, sturgeon@uwm.edu

This new UW Sea Grant Advisory Services outreach and education project responds to the needs of practicing and prospective aquaculturists and aquaculture educators in Wisconsin and other Great Lakes states for efficient, accurate and effective information and technology transfer. This multitiered outreach program in aquaculture—a Wisconsin Sea Grant priority area—will provide education, hands-on training and on-site technical assistance to meet the needs of vocational aquaculture educators and aquaculture entrepreneurs at all levels of development. The USDA's Regional Extension Facilitator for the U.S. North Central Regional Aquaculture Center is located at the same UW–Milwaukee facility as the investigator, reflecting Wisconsin's unique capacity for conducting region-wide aquaculture outreach. [A/AQ-1](#)

Aquatic Invasive Species Theme

***National Sea Grant Goals:** (1) Understand AIS impacts on aquatic systems and our economy; (2) understand the biology of invasive species to develop effective means of prevention and control; (3) identify safer and more effective control strategies, and (4) identify more effective and less expensive strategies to prevent new introductions.*

This theme is another Wisconsin Sea Grant priority area because of the significant threats to coastal and Great Lakes ecosystems as well as economic costs and human health risks posed by aquatic invasive species (AIS). From parasitic sea lampreys in the 1940s to zebra mussels in the 1990s, the Great Lakes in particular have been severely impacted by invasions of nonindigenous aquatic species. Today, there are 162 confirmed invasive species in the Great Lakes. Since 1990, the Great Lakes have been invaded at a rate of one new aquatic species a year, and some studies indicate the rate of introductions is likely to increase in the future.

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Projects

Quagga Mussel Invasions: Functional Morphology, Biomechanics, Zebra Mussel Displacement and Future Spread

Carol Lee, UW–Madison, (608) 262-9225, carollee@facstaff.wisc.edu

The quagga mussel, a relative of the zebra mussel, is displacing zebra mussel populations in the eastern Great Lakes, possibly because of its ability to occupy a wider range of habitats, which means it will likely spread into the western Great Lakes and Wisconsin waters in the near future. This study is using a state-of-the-art biotechnological approach to learn how the colonization success and population growth of both species of mussel is affected by the biomechanical constraints of different habitats. Determining the genetic controls for mussel habitat preferences within lakes could indicate where future mitigation efforts should focus. This continuing project thus directly addresses the national Sea Grant priority of understanding AIS biology to develop effective means of prevention and control. [R/LR-91](#)

Predicting the Impact of Zebra Mussels on Trophic Transfers in Green Bay: Ecosystem Modeling and Lower Food Web Interactions with Fish

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Tara Reed, UW–Green Bay, (920) 465-2284, reedt@uwgb.edu

What role have zebra mussels played in recent changes in the plankton and fish communities and bottom-dwelling organisms of the Green Bay ecosystem? That's the question this project hopes to answer through a combination of ecosystem and bioenergetics models comparing conditions in the bay during the decade before and decade after 1993, when the bay was invaded by zebra mussels. Green Bay is particularly well suited for this study, and results from this continuing project will have broad applicability for inland lakes as well. Besides addressing the national goal of understanding the ecological changes caused by AIS, this project meets a Fisheries Theme priority of evaluating the biological impacts of AIS on the Great Lakes' fisheries. [R/LR-93](#)

Expanding Cattails and Shrinking Sedge Meadows: Reversible?

Joy Zedler, UW–Madison, (608) 262-8629, jzedler@wisc.edu

Biologically diverse sedge meadows in Great Lakes coastal wetlands are being overrun by aggressive invasions of hybrid cattails. This project is evaluating the resilience of sedge

meadows to this invasion and developing options for protecting and restoring these plant communities. This continuing effort complements that of other projects in this high-priority theme area and also addresses a cross-cutting Wisconsin priority in Sea Grant's Ecosystems & Habitats Theme of research for deterring, eradicating and/or controlling invasive species. [R/LR-96](#)

Impact of the Round Goby on Yellow Perch Recruitment

John Janssen, UW–Milwaukee, (414) 382-1733, jjanssen@uwm.edu

Lake Michigan's yellow perch fishery has yet to rebound from a population crash in the early 1990s that closed the commercial fishery and severely restricted the sport harvest. Yellow perch prefer to spawn in rocky areas, such as the western side of Lake Michigan, which also happens to be prime habitat for the round goby, an invasive species that first appeared in the lake in the early 1990s and aggressively feeds on the eggs of other fish. This new project will examine the interaction between these species at multiple sites in the lake in an attempt to determine the round goby's impact on yellow perch recruitment. This AIS project also addresses a Wisconsin Sea Grant Fisheries Theme priority of identifying key factors preventing the yellow perch fishery's recovery in Lake Michigan. [R/AI-1](#)

***Cercopagis* Invasion of Lake Michigan: Predictable Responses or 'Invasional Meltdown' of the Planktonic Food Web?**

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John Berges, UW–Milwaukee, (414) 229-3258, berges@uwm.edu

Like the spiny waterflea *Bythotrephes cederstroemii* before it, the invasion of Lake Michigan by the fishhook waterflea *Cercopagis pengoi* is of great concern because it is a predatory zooplankton that competes with larval yellow perch and alewives for food. This new invasion offers an important opportunity to test the predictability of how Great Lakes ecosystems respond to repeated invasions by ecologically similar planktonic species, and this new project will examine Lake Michigan's ability to absorb this new invader by documenting the dynamics of competing predatory zooplankton populations. This work addresses a cross-cutting AIS and Fisheries priority of evaluating the effects of invasive species on Great Lakes food webs as well as an Ecosystems & Habitats priority of evaluating the importance of invertebrate species to planktonic food webs. [R/AI-2 \(FY07 Start\)](#)

Reciprocal Spread of Invasive Species in Lake Michigan Coastal Habitats

M. Jake Vander Zanden, UW–Madison, (608) 262-9464, mjvanderzand@wisc.edu

Coastal areas and ports of the Great Lakes have been a major focal point of research and monitoring for AIS. The spread of AIS is generally through human-assisted means (boat trailers, bait buckets, etc.), but one often overlooked pathway is through tributaries in the Great Lakes watershed. This new project will study the distribution and invasion processes of round goby *from* the Great Lakes and of rusty crayfish to the Great Lakes. Monitoring and modeling this movement with various management scenarios (e.g., dam removal, stream restoration, etc.) will help better understand options for future control in light of cross-habitat invasions between inland waters and the Great Lakes. This work addresses a cross-cutting AIS-Ecosystem & Habitats priority of research aimed at deterring, eradicating and/or controlling invasive species. [R/AI-3 \(FY07 Start\)](#)

Sea Grant Non-Indigenous Species (SGNIS) Web Site: Development and Support

Philip Moy, UW–Manitowoc, (920) 683-4697, pmoy@aqu.wisc.edu

The Sea Grant Nonindigenous Species Web site (www.sgnis.org)—a 10-year-old collaborative project of the Illinois-Indiana and Wisconsin Sea Grant programs—is making sure the best available aquatic invasive species research and outreach information from Sea Grant and other sources is readily accessible nationwide and globally via the Internet. At last count, the ever-growing SGNIS database contained more than 922 articles from 148 peer-reviewed science journals, 384 research and outreach conference papers, 91 issues of AIS newsletters, a 109-slide image library, and 176 education and outreach publications. In 2004, users from 125 nations visited SGNIS and downloaded more than 3 million files. About two-thirds of SGNIS users are U.S. residents, and over 70 percent of users rate it as “excellent” compared to similar sites. [A/AS-53](#)

Outreach Program

Chicago Sanitary and Ship Canal Dispersal Barrier (Moy)—UW Sea Grant’s AIS outreach specialist will continue to co-chair the Dispersal Barrier Advisory Panel, a multiagency body that meets semiannually to advise the U.S. Army Corps of Engineers on the operation and development of the invasive species barrier in the Chicago Sanitary and Ship Canal.

Hazard Analysis & Critical Control Point (HACCP) Training (Moy)—UW Sea Grant will continue to participate in a Great Lakes Sea Grant Network project to provide workshops on applying HACCP principles to prevent the potential spread of AIS through wild bait harvest, aquaculture and fish sampling activities. First used to successfully educate wild bait harvesters, this training is now being provided to field staff of the region’s state natural resources agencies.

Computer Kiosk of AIS Information (Moy)—“Great Lakes Alien Invasion,” a popular and award-winning touchscreen kiosk of information about a dozen invasive aquatic species created by Wisconsin Sea Grant, will continue to be made available over the next two years for use by passengers on the Lake Michigan car ferry *Badger* in the summer and by visitors to the Wisconsin Maritime Museum in Manitowoc during the winter.

AIS Attack Packs (Moy)—These AIS outreach backpacks contain preserved specimens, games, activities, maps and other materials about invasive species and how their spread can be prevented. Wisconsin Sea Grant will continue to produce these packs during 2006-08 and provide them at no cost to high school students and nonprofit organizations interested in using them to teach others about invasive species.

AIS Watercraft Inspectors (Moy)—With continued support from the Wisconsin DNR, UW Sea Grant will field at least three AIS watercraft inspectors at coastal Wisconsin boat landings each summer during 2006-08 to instruct boaters and anglers on how to avoid spreading invasive species.

AIS Information and Awareness (Wittman)—During the last biennium, UW Sea Grant distributed over 405,000 “Zebra Mussel Watch” cards and nearly 22,000 pieces of other AIS information. As it has for the last decade, Wisconsin Sea Grant will continue to produce and disseminate a variety of free AIS information during the next biennium, including “Protect Our Waters” brochures, “Stop Aquatic Hitchhikers!” stickers and “Zebra Mussel Watch” cards.

Biotechnology Theme

National Sea Grant Goals: *Encourage and support a wide range of freshwater and marine biotechnology research for (1) restoring and protecting aquatic ecosystems; (2) improving risk characterization of toxicants to aquatic animal life; (3) enhancing aquaculture and seafood safety, and (4) developing new pharmaceuticals, biomaterials and bioprocesses.*

From a scientific standpoint and particularly in Wisconsin, the study of freshwater aquatic organisms provides an essential complement to studies of marine organisms. For the Great Lakes region—which already supports a vibrant and growing biotechnology industry—biotechnology offers new opportunities for addressing such problems as toxic contaminants in Great Lakes fish and sediments, controlling nonindigenous species, and enhancing production at public game fish hatcheries and private bait and food fish farms.

Because persistent toxic chemical contaminants constitute a continuous threat to the health of Great Lakes aquatic life and fish consumers alike, it is a Wisconsin Biotechnology Theme priority to develop more accurate approaches for assessing and predicting the risks to feral fish populations exposed to persistent, bioaccumulative chemical contaminants; specifically, to develop gene microarrays in fish for identifying alterations in gene expression associated with chemical and physical stresses.

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Projects

AhR Signaling in Rainbow Trout and Zebrafish

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Richard E. Peterson, UW–Madison, (608) 263-5453, repeterson@pharmacy.wisc.edu

To help state, national and international organizations develop more efficient and reliable methods for assessing the risks posed to wild fish populations by dioxins, furans and PCBs, researchers in this continuing project are elucidating the specific biochemical mechanisms by which these environmental contaminants exert their toxic effects on fish. Besides providing detailed knowledge about toxic pathways in fish at the molecular level, the results of this project will enable risk assessment efforts to be more rigorous, thus also addressing the Wisconsin Urban Coast Theme priority of assessing the threats to human health and aquatic life posed by chemical contamination of aquatic ecosystems as well as the national Biotechnology Theme goal of improving risk characterization of toxicants to aquatic animal life. [R/BT-17](#)

Latent Toxicity in Adult Zebrafish Following Early Life Stage Exposure to 2,3,7,8-Tetrachlorodibenzo-*p*-Dioxin

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Exposure to 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) in the early stages of fish development can have lasting influence. Sublethal concentrations of TCDD may adversely affect feeding, predation-avoidance behavior and reproduction in wild fish populations. This new project will use the small, nearly transparent zebrafish to determine whether sublethal levels of TCDD can disrupt development, damage organs, inhibit feeding, affect body growth or diminish reproduction. Building on previous and continuing work by these investigators, this new project will help determine whether such effects are permanent or reversible. [R/BT-20](#)

**Parallel Toxicogenomic Resources for Zebrafish and Rainbow Trout:
Identifying Conserved Molecular Biomarkers of Toxicant Exposure**

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Michael Carvan, UW–Milwaukee, (414) 382-1706, carvanmj@uwm.edu

This new project will use genomic tools to identify toxicant-response molecular biomarkers in zebrafish and rainbow trout for use in assays evaluating the potential effects of exposure to persistent, bioaccumulative toxicants on fish. The investigators will combine DNA microarray work with quantitative reverse transcription-polymerase chain reaction methodologies to identify embryonic and larval genes responsive to dioxin (TCDD), polychlorinated biphenyls (PCBs) and methylmercury (MeHg) exposure. They plan to sequence about 20,000 toxicant-response transcripts for zebrafish and rainbow trout and create publicly accessible, functionally annotated, expressed sequence tag databases—a biomarker library that can be used as reference for examining toxicant responses among Great Lakes wild fish species. [R/BT-21](#)

Genomic Approach to Understanding TCDD Toxicity in Zebrafish

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This new project will address gene expression changes in zebrafish associated with TCDD exposures. Besides being nearly transparent, the zebrafish is the first fish to have had its genome mapped, which makes it ideal for research on the genetic effects of exposure to toxic contaminants. The goal of the project is to determine whether different TCDD responses in tissues correspond to a distinct gene expression pattern. Using DNA microarrays, the investigators hope to determine whether gene expression patterns can be used to predict sublethal toxicity; if successful, the microarray approach may be used as a screening tool to predict responses in wild fishes. This work directly addresses the strategic priority of developing gene microarrays in fish for identifying alterations in gene expression associated with chemical and physical stresses. [R/BT-22 \(FY07 Start\)](#)

Coastal Communities & Economies Theme

***National Sea Grant Goals:** (1) Strengthen coastal planning through better evaluations of coastal resources and amenities (“natural capital”) and by educating coastal planners and decision makers; (2) stimulate integrated coastal management by constructing frameworks for sustainable development and developing decision-support systems, and (3) contribute to community and economic development by building leadership, supporting the development of science-based ocean, coastal and Great Lakes policies, and revitalizing economically depressed coastal communities.*

The continuing economic growth occurring within our nation’s coastal regions stimulates land use change and competing demands for the use of the shoreline. Without sound planning, it is likely that coastal degradation associated with coastal development and urbanization will continue. Sound planning can also help minimize risks to regional economies posed by such natural disasters as hurricanes, storm-driven coastal flooding and dramatic changes in sea level elevations caused by climatic variations. Balancing economic growth and coastal resource quality are important issues for all of the nation’s coastal communities—including those around the Great Lakes.

Wisconsin priorities in this national theme include developing and validating new techniques for economic valuation of Great Lakes resources, and applying geographic information systems (GIS) and other state-of-the-art techniques to improve coastal resources management and educating decision makers in the wise, science-based planning and development of coastal watersheds and shorelands.

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Projects

Measuring Interrelated Demands for Commercially Caught Fish

Richard Bishop, UW–Madison, (608) 262-8916, rcbishop@wisc.edu

This continuing project is using leading-edge economic models to estimate demand for major finfish species landed in several regions of the United States. It is a collaborative effort involving Bishop and Matthew Holt at North Carolina State University, two world-class social scientists who have done groundbreaking work in economic evaluation of Great Lakes and Mid-Atlantic fish harvests, respectively. Bishop and Holt are updating and expanding unit-price landings data for a large number of fish species in an effort to obtain econometric estimates of multiregional, multispecies demand models. The results will be useful for policy analysis by public fisheries management agencies and in price forecasting for commercial fishing industries nationwide. [R/PS-57](#)

Outreach Program

Community Planning Resource for Great Lakes Coastal Communities (Hart)—The Community Planning Resource (CPR) is a Web site designed to provide access to a broad selection of planning resources to help elected officials, planning professionals and others concerned about land use planning and development issues. UW Sea Grant's GIS specialist is enhancing the Great Lakes Coastal Communities section of the CPR to provide a GIS-based toolkit to support comprehensive planning and sustainable development along Wisconsin's Lake Michigan and Lake Superior coasts.

Comprehensive Planning Training Program (Hart)—Michigan State University Extension developed the Citizen Planner Program to address the basic training needs of citizens appointed to serve on local planning boards and commissions. UW Sea Grant's GIS specialist will work with Michigan Sea Grant, the NOAA Coastal Services Center and U.S. Environmental Protection Agency to examine the applicability of specific Citizen Planner Program modules for use in Wisconsin.

Nonpoint Education for Municipal Officials (Harris)—NEMO is a national network of education programs coordinated by the University of Connecticut that teaches local land use decision makers about the relationship between land use and natural resource protection. During 2006–08, UW Sea Grant’s water quality specialist will provide NEMO presentations and educational materials to Wisconsin municipalities and counties in the Lake Michigan watershed.

Local Watershed Stewardship Assessment (Harris)—UW Sea Grant’s water quality outreach specialist is working with the Lake Michigan Lakewide Management Plan Forum to assess and evaluate the capacity for local stewardship in Lake Michigan watersheds. She will engage community leaders, agencies and interested groups in identifying water quality impairments and recommending ways to reduce the amount of pollutants in runoff to Lake Michigan.

Coastal Natural Hazards Theme

***National Sea Grant Goal:** Enhance preparedness to prevent or greatly reduce human deaths, injuries, property and environmental damages, and associated economic losses caused by coastal natural hazards.*

This national theme is aimed primarily at mitigating the risks and damage posed by hurricanes and tsunamis along the nation's saltwater coasts. In the Great Lakes region, the principal coastal natural hazards are coastal flooding, storm surges and wave run-up, especially during times of above-normal water levels, which can cause severe erosion and damage or destroy coastal structures. Conversely, below-normal water levels reduce navigation safety in shallow channels and the entrances to ports and marinas for mariners, commercial fishers and recreational boaters alike. Storms, extreme water levels and winter ice on these freshwater seas pose significant risks to profitable and safe navigation and to coastal infrastructure. Hazards for swimmers include coastal rip currents and bacterial contamination of beach waters. Hypothermia is an ever-present natural hazard to everyone exposed to these cold northern seas.

Wisconsin Sea Grant's priorities in this thematic area are to (1) develop an understanding and communicate scientific, technical and public information on the impacts of climate change on Great Lakes communities; (2) develop and apply geographic information systems (GIS) for assessing and reducing natural coastal hazard risks; (3) evaluate impacts of extreme Great Lakes water levels on coastal infrastructure; (4) develop an understanding and communicate to user groups the causes of and effective strategies for coping with coastal slope failures, shore erosion and flooding due to storm waves, lakebed erosion, storm surges and high Great Lakes water levels, and (5) increase public safety through greater awareness of Great Lakes hazards (navigation hazards, hypothermia, rip currents, bacterial contamination of beaches, etc.).

While Wisconsin Sea Grant will not be funding any projects specific to this theme during the biennium, several projects in other themes have relevance to this one, and most of these priorities will be addressed through outreach program activities.

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Outreach Program

Climate Change and Coastal Communities (Clark)—Involving nearly every member of UW Sea Grant’s outreach staff, this new initiative addresses a NOAA goal of understanding climate variability and change to enhance society’s ability to plan and respond. The objectives of this outreach effort are to provide Great Lakes property owners, coastal facility managers, and local, state and regional decision makers with a comprehensive, up-to-date source of scientifically sound, nonadvocate information and technical guidance to help them prepare for the likely consequences of predicted climatic change. **Additional funding:** [Wisconsin Coastal Management Program](#)

Coastal Recession Mapping (Hart)—As a member of the state’s Coastal Hazards Work Group, UW Sea Grant’s GIS specialist is using historical photography to map coastal recession rates to help Wisconsin coastal communities develop better coastal construction setback standards. Using the latest high-resolution elevation data available from local governments, he is also using GIS to visualize and analyze the impacts of changing Great Lakes water levels on floodplain mapping for coastal communities.

Coastal Engineering (Clark)—A wide range of information about coastal erosion, recession, slope failure and storm surges along Wisconsin’s Great Lakes shores will be disseminated via publications, UW Sea Grant’s Coastal Natural Hazards Theme Web site, workshops for coastal property owners and, when appropriate, direct engineering assistance. UW Sea Grant’s coastal engineering specialist will provide direct access to coastal hazards information through partnerships with the Wisconsin Coastal Management Program and relevant regional and national agencies and organizations.

Boating & Water Safety Education (Lubner)—UW Sea Grant’s marine safety outreach specialist will continue to offer two to three accredited Great Lakes boating safety courses for at least 50 youths and adults annually. In cooperation with state and national partners, he will provide training for boating safety organizations, such as the U.S. Coast Guard Auxiliary and the U.S. Power Squadrons, and conduct seminars on hypothermia, maritime weather, and boating rules and requirements as requested.

Rip Currents and Trap Nets (Lubner/Clark/Wittman)—As part of a National Weather Service-U.S. Lifesaving Association-Sea Grant campaign to increase public awareness of rip currents, UW Sea Grant will continue to distribute annual news releases and provide Spanish as well as English versions of NOAA rip current warning signs and flyers free of charge to all of the state’s coastal public beaches. In partnership with commercial and recreational fishing groups, UW Sea Grant will also continue to provide annually updated posters showing the location of commercial fishing trap nets in state waters of the Great Lakes along with brochures on how boaters can avoid or escape entanglement in one.

Digital Ocean-Great Lakes Geospatial Technologies Theme

***National Sea Grant Goal:** Develop tools to assimilate data from distributed observatories, or individual networked ocean sensors, and then connect this assimilated data with the various existing computer models of ocean processes.*

Imagine placing the global ocean on a microchip. That's essentially what Sea Grant's Digital Ocean Theme aims to do by developing methods to create extensive digital representations, or models, of ocean resources and phenomena, such as El Niño events. Such models will be able to translate chemical, biological and physical data into tools that will help us learn how best to use and tend to our marine resources.

As part of this national effort, Wisconsin Sea Grant's priority in this theme is to begin putting the Great Lakes on a microchip by developing research and monitoring tools, computer models and methods for continuously tracking and assessing in real time the nature and extent of chemical, biological, geological and physical changes in marine and Great Lakes waters. The ultimate goal is the seamless integration of data from observation systems in the Great Lakes and geographic information systems (GIS) data from the watershed with satellite remote sensing data.

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Projects

LakeSat: Near Real-Time Monitoring of Water Quality in Green Bay and Wisconsin's Lake Michigan Coastal Waters via Satellite Remote Sensing

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Thomas Lillesand, UW–Madison, (608) 263-3251, tmlilles@facstaff.wisc.edu

The investigators of this continuing project are using the latest satellite technology to develop and demonstrate a prototype Web-based information system for providing water quality data for Green Bay and western Lake Michigan in nearly real time. The system will combine satellite remote sensing and field data, including measurements of water clarity, chlorophyll *a*, suspended solids, turbidity and temperature. [R/MW-88](#)

Geospatial Technologies for Land Use Planning in Great Lakes Coastal Communities

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This new project expands our geospatial technologies outreach activities aimed at enabling stakeholders to take advantage of such new technologies as integrated observation systems, automated retrieval of archived records and visualization by empowering local, regional and tribal governments to use GIS, Web mapping and spatial models in their planning efforts. This project also addresses a Coastal Communities & Economies priority of applying GIS and other advanced techniques to improve coastal resources management through science-based planning for watershed and coastal development. UW Sea Grant's GIS outreach specialist will work closely with the investigator to ensure effective transfer and application of this technology. [R/DO-1](#)

Outreach Program

Dynamic and Distributed Coastal GIS (Hart)—UW Sea Grant’s GIS outreach specialist is working to develop a truly integrated land/water system that links local government land use information to near real-time measurements of Great Lakes water quality. His efforts during 2006–08 will include conducting outreach for development of the Great Lakes Observing System in Wisconsin waters and developing “dynamic and distributed” GIS for the Lake Superior and Lake Michigan coasts of Wisconsin, including GIS technical assistance to the tribal governments of the Bad River and Red Cliff Indian reservations on Lake Superior.

Coastal Visualization (Hart)—Information collected about coastal processes is often very technical in nature and difficult for coastal landowners to comprehend. UW Sea Grant’s GIS specialist will integrate animation, aerial photography, pictures, charts and text to help the public better understand the natural process of coastal erosion, how local land development decisions affect coastal erosion and the case for scientifically based coastal development setbacks. He will develop an integrated bathymetric/topographic digital elevation model of the state’s Great Lakes coast to visually illustrate changing lake levels and coastal setback alternatives.

Great Lakes Circle Tour Coastal Access Guide (Hart)—UW Sea Grant’s GIS outreach specialist is using internet mapping techniques to advance ecotourism by developing interactive online information linking Wisconsin coastal parks, public access points and other features to the “Great Lakes Circle Tour” route established by the Great Lakes Commission (www.great-lakes.net/tourism/circletour). Funding source: Wisconsin Coastal Management Program

Ecosystems & Habitats Theme

National Sea Grant Goals: (1) *Develop a quantitative understanding of the structure and function of critical nearshore habitats and coastal ecosystems, and (2) identify the processes that control the transport, transformation and fate of biogeochemically important materials in the nearshore area, the impact of riverine inflows, and the influence of watershed management on coastal and estuarine systems.*

Nowhere is an understanding of the linkages between terrestrial and aquatic environments more critical to resource quality, sustainability and management than in the Great Lakes region. With nearly 9,500 miles of shoreline, the Great Lakes are aquatic systems dominated by their coastal watersheds.

Wisconsin Sea Grant's priorities related to this theme include developing technologies for better spatial and temporal characterization of nearshore environments and coastal ecosystem dynamics, better understanding Great Lakes food webs and how invasive species affect them, and improving the design, function and assessment of coastal habitat rehabilitation and restoration projects.

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Projects

Impact of a Shifting Wind Field over the Laurentian Great Lakes on Accumulation and Resuspension of Sediments in Green Bay, Lake Michigan

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The direction of summer winds over the Great Lakes has shifted dramatically since the early 1990s, which is bound to influence sedimentation rates, especially in the shallower areas of the lakes. Lake Michigan's Green Bay historically has received some of the highest loads of persistent chemical contaminants in the entire Great Lakes Basin. Since the behavior of these contaminants is closely associated with sediment behavior, it is important to determine what effect these wind shifts will have on sedimentation and resuspension rates. This continuing project is determining how wind direction affects Green Bay in terms of thermal structure, circulation, sediment retention and frequency of sediment resuspension. [R/EC-10](#)

Compensatory and Spatial Dynamics in Great Lakes Food Webs

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Most researchers and resource managers in the Great Lakes give high priority to understanding the ecological effects of invasive species. This continuing project is developing both empirical and theoretical tools for evaluating the spatial dynamics and compensatory responses of Great Lakes food webs as indications of changes in predator-prey interactions at different trophic levels. This work will provide Great Lakes fisheries managers with much-needed information on how various fisheries will be affected by changes in food web dynamics caused by invasive species. [R/LR-94](#)

Lake Superior Food Web Dynamics: Modeling at Multiple Scales

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Trophic interactions occur at multiple scales, ranging from predator-prey interactions that govern population dynamics and community structure, to daytime-nighttime vertical and horizontal migrations that regulate the daily feeding activity and growth rates of individual aquatic species. This new project will develop a model to assess diel changes in predator-prey encounters as a function of time of day, depth, and nearshore versus

offshore habitats. Complementing a Minnesota Sea Grant study, this work is novel in developing the first simulation model of diel changes in predator-prey relationships specific to the Lake Superior food web. [R/EH-1 \(FY07 Start\)](#)

Outreach Program

“The State of the Bay” Web Site (Harris)—A “State of the Bay” Web site is being developed to educate local officials, user groups and students about the chemical, physical and biological interrelationships of the Green Bay, Lake Michigan, ecosystem and the impacts of human activities on its water resources. Representing a partnership of UW Sea Grant and UW–Green Bay, Green Bay Metropolitan Sewerage District, Wisconsin Department of Natural Resources (DNR) and the Science & Technical Advisory Committee for the Lower Green Bay and Fox River Remedial Action Plan, this Web site will report on the status of beneficial-use impairments in lower Green Bay, identify emerging problems, and document progress toward meeting the objectives of the Lower Green Bay and Fox River Remedial Action Plan.

Critical Coastal Lands Acquisition (Hart)—UW Sea Grant’s geographic information system (GIS) specialist is working with the Wisconsin Coastal Management Program and the Wisconsin DNR to provide GIS support for the development of a Coastal and Estuarine Land Conservation Plan. This involves integration of digital parcels with tax assessment data for coastal counties to determine different classes of public ownership and the use of an interactive “smart board” to help stakeholders prioritize coastal land acquisition.

Fox River-Green Bay Restoration (Harris)—UW Sea Grant’s habitat restoration specialist will continue to be actively involved in remediation and restoration efforts regarding the heavily contaminated Fox River estuary and lower Green Bay. An active member of the Green Bay Remedial Action Plan Biota and Habitat Work Group, she is helping the work group, U.S. Army Corps of Engineers and Brown County Port Authority design the restoration of a chain of barrier islands in southern Green Bay using dredged materials from the navigation channel.

National Sea Grant Goals: (1) *Develop an ecosystem perspective in renewable resource management;* (2) *understand the ecological changes effected by exotic aquatic species;* (3) *restore habitat and ecological conditions required by native species, and* (4) *understand ecological variability and its role in resource management practices.*

The fisheries of the Great Lakes have been strongly influenced by ecological changes brought about by deliberate as well as unintentional introductions of exotic species. Sea lampreys contributed to the collapse of native fish populations. Alewife and smelt replaced the native forage fishes. Thriving recreational fisheries have developed around the introduced Pacific salmon species. New invaders—such as zebra mussels, round goby, ruffe and white perch—pose different and equally significant challenges. Key research challenges include developing ways to control the spread of exotics, creative methods for reducing their adverse ecological effects, and the combination of conceptual and analytical tools required to evaluate the future of fishery restoration efforts.

Wisconsin priorities in this theme include the development of methods and models to improve management of Great Lakes commercial and recreational fisheries from a whole-ecosystem perspective, and identification of the factors and conditions necessary for rehabilitation of self-sustaining populations of lake trout, yellow perch and other native fish species.

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Projects

A Retrospective Analysis of Lake Michigan and Lake Superior Food Webs

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In an effort to reconstruct food web changes in Lakes Michigan and Superior due to invasive species and other causes, this continuing project is looking at stable isotopes in samples from fish and invertebrates archived in natural history museums. Analysis of these samples will enable researchers to assess historical changes to the lakes' food webs and the challenges such ecosystem changes pose to restoring native fish populations. [R/LR-92](#)

Sustainability of Lake Trout Fisheries in Lake Superior

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All fish stock size estimates are based on a number of assumptions that are questionable—particularly annual harvest quotas, which are based on an assumed total mortality rate. This approach has never been shown suitable for maintaining sustainable lake trout stocks in Lake Superior. This project is developing a dynamic, age-structure computer model of lake trout abundance and recruitment in the Wisconsin waters of Lake Superior that can be used by resource managers to estimate the maximum sustainable rate of total annual mortality and to evaluate the long-term effects of different sport and commercial harvest quotas on the lake trout population. [R/LR-95](#)

Hydrodynamics, Chlorophyll and Larval Fishes

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The strength of each year class of fish is largely determined by the end of its larval stage. In spring, when larval fish emerge, the hydrodynamics of changing water temperatures and density in Lake Michigan cause wedges of warm coastal water to be carried away from shore, creating plumes of relatively warm water that temporarily concentrate chlorophyll and the plankton that larval fish feed on. This new project will examine the effect of such thermal structures on the survival and growth of nearshore and open-water populations of larval fish. If variations in year-class strength of these can be related to hydrodynamic changes in chlorophyll concentrations, it will be strong evidence that fish recruitment can be affected by changes in chlorophyll concentration caused by invasive plankton consumers like zebra mussels as well as changes in climate. [R/FI-1 \(FY07 Start\)](#)

Outreach Program

Critical Outreach Issues in Great Lakes Fisheries (Moy)—This outreach project is directed at resolving the conflict between commercial and recreational fishers over trap netting in the Sheboygan-Manitowoc-Two Rivers area of Lake Michigan. UW Sea Grant's Advisory Services fisheries specialist will work with area commercial fishers, anglers and area businesses to reduce friction through the production and distribution of posters showing trap net locations and handouts that describe how to identify trap nets and avoid or escape entanglement in one.

Lake Michigan Fisheries Forum (Moy)—UW Sea Grant's fisheries specialist will continue to chair monthly meetings of the Lake Michigan Fisheries Forum, an advisory body formed by the Wisconsin Department of Natural Resources (DNR) to address issues related to Lake Michigan fisheries. The forum facilitates information exchange between the DNR and interested groups and individuals, promotes discussion of issues of concern, develops consensus among diverse interests on matters of common concern, and provides public advocacy for policies of general interest.

"History of Sturgeon in the Lake Winnebago System" (Schmitt/Binkowski)—Sturgeon populations throughout the northern hemisphere, including the Great Lakes region, have been driven to the brink of extinction by overharvest, pollution, loss of habitat and dams. The largest and healthiest remaining lake sturgeon fishery in the world exists in Wisconsin, which has been successfully managing its sturgeon stocks for more than 100 years. The goal of this outreach project is to raise the profile of a native species once common throughout the Great Lakes region and recognize Wisconsin's leadership in sturgeon research, management and conservation. A collaborative effort involving a UW Sea Grant science writer and sturgeon researcher, DNR sturgeon fishery manager, Sturgeon for Tomorrow and the Wisconsin Historical Society, this project will create a Web site, illustrated historical book and traveling educational display documenting the lake sturgeon's prominent place in the state's cultural heritage.

Marine & Aquatic Science Literacy Theme

***National Sea Grant Goal:** Provide national leadership in the development of well-prepared professionals who understand marine and aquatic science and research, and to be a leader in enhancing public aquatic sciences literacy from “cradle to grave.”*

Virtually every serious study of national goals for the new millennium underscores the critical importance of education to national prosperity. To sustain a growing economy, we must also be stewards of the natural environment upon which all life depends.

UW Sea Grant contributes to this national Sea Grant theme by providing leadership in the development of well-prepared professionals who understand and are conversant in Great Lakes and aquatic science, by supporting teachers to advance and develop their scientific skills through formal and informal educational opportunities, and by extending science education beyond schools and into families and communities. In pursuit of institutional as well as thematic priorities, UW Sea Grant is creating opportunities for K–12 teachers—especially those of underrepresented groups—to increase their marine/aquatic science literacy.



Projects

Earthwatch Public Service Radio Program

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The longest-running program of its kind on radio, “Earthwatch Radio” is a weekly series of five two-minute programs on science and the environment that’s carried by about 125 stations across North America and the international Armed Forces Radio & Television Services network. The service is free to stations that use the programs regularly. Two to three graduate and/or undergraduate student writers are employed on this continuing Communications project annually. A priority during 2006-08 is to expand delivery of “Earthwatch Radio” programs via email, the Web and the Internet using RSS technology and “podcasting,” which automatically delivers audio content to iPods and other portable media players for playback at the listener’s convenience. *C/C-2*

Wood, Steel and Steam: Shipwreck Archaeology, Preservation and Public Education

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John Karl, UW–Madison, (608) 263-8621, jkarl@aqu.wisc.edu

Shipwrecks are an exciting medium through which the larger story of Wisconsin’s maritime history can be told, and telling this story effectively increases public support for historic preservation. This new Communications project will help Wisconsin maintain its position as a recognized leader in maritime heritage preservation by conducting archaeological surveys on two steam propeller shipwrecks and presenting research results via the “Wisconsin’s Great Lakes Shipwrecks” and “Notes from the Field” Web sites (www.wisconsinshipwrecks.org and www.maritimetrails.org/participate.cfm, respectively). In addition, two lakeshore historical markers and site guides for divers will be produced, and about 25 multimedia presentations will be provided to students, teachers and the public. *C/ML-1*

Sea Grant Industrial Fellowship to Develop a Hybrid Photocatalytic/Disinfecting Point-of-Use Drinking Water Treatment Device

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Arsenic removal and microbial disinfection are currently two leading concerns in water treatment. In partnership with Pentair Water Treatment, Brookfield, Wis., the goal of

this continuing project is to develop commercially viable point-of-use water treatment systems using a hybrid photocatalytic device that will not only enhance the removal of arsenic and heavy metals from drinking water, but also help disinfect it. [E/E-49](#)
Funding source: National Sea Grant Office, National Oceanic & Atmospheric Administration, and Pentair Water Treatment

Recent Advances in Limnology and Oceanography Seminar Series

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Arthur Brooks, UW–Milwaukee, (414) 382-1704, abrooks@uwm.edu

It is a Wisconsin Sea Grant priority to provide support for special on-campus symposia, workshops and lecture series on marine and aquatic sciences and Great Lakes, coastal and ocean topics. This popular 32-year-old Sea Grant-sponsored series of seminars at UW–Milwaukee features lectures by eminent scientists on Great Lakes and oceans topics that regularly attract 25 to 50 attendees as well as a dozen or so advanced undergraduate students and graduate students who enroll in the course. Free and open to the public, the series encourages the sharing of ideas and informed discussions about topics ranging from the economic valuation of natural resources to global climate change among faculty, students, resource managers, policymakers, science teachers, journalists and interested citizens. [E/ML-1](#)

Lake Sturgeon Bowl: Wisconsin's Regional Academic Competition for the National Ocean Sciences Bowl

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Barbara Duffly, UW–Milwaukee, (414) 229-2924, bduffly@uwm.edu

Launched in 2001, the annual Lake Sturgeon Bowl helps focus students on oceanography and aquatic sciences. Up to 24 teams of five students from high schools throughout Wisconsin participate in this regional “quiz bowl” competition held in February at UW–Milwaukee in preparation for competing in the National Ocean Science Bowl each April. During 2006-08, UW Sea Grant’s education program coordinator will continue to help organize the competition; train teacher-coaches, students and event volunteers; serve as a competition official, and accompany the winning team to the national finals. Cosponsors include UW–Milwaukee and the UW Great Lakes WATER Institute. [E/ML-2](#)
Additional funding: Consortium for Oceanographic Research & Education

Outreach Program

Great Lakes Center for Ocean Science Education Excellence (Lubner)—The goal of this recently funded five-year Great Lakes Sea Grant Network project is to develop a Great Lakes Center for Ocean Science Education Excellence (COSEE), which is designed to help teachers deliver high-quality educational programs in aquatic sciences by creating dynamic linkages between Great Lakes researchers and 4th- to 10th-grade educators and their students. The goal of the seven regional COSEEs is to help U.S. citizens become more scientifically literate and environmentally responsible through standards-based science curricula and programs. **Funding sources:** [National Oceanic & Atmospheric Administration](#) and [National Science Foundation](#)

Science of the Great Lakes for the K–12 Classroom (Lubner)—In partnership with such organizations as PIER Wisconsin, the Schlitz Audubon Nature Center and UW Great Lakes WATER Institute, UW Sea Grant’s education coordinator will continue to develop programming for K–12 teachers on a diversity of Great Lakes issues. Courses and workshops provide educators with content knowledge about the Great Lakes and hands-on activities for use in their classrooms. Courses often include on-the-water and other field experiences that are available for credit.

Marine Science at Sea: A Hands-on Laboratory (Lubner)—This three-credit UW–Milwaukee course provides a hands-on, shipboard opportunity to learn the basics of oceanography and nautical science. Students sail aboard the *S/V Denis Sullivan*, a replica of an 1880s three-masted schooner, for two weeks as it travels from its winter port in Florida to Bahamian waters. They become members of the crew and engage in all aspects of shipboard operations while learning about the physical, chemical, biological and geological aspects of the ocean as well as the history and culture of the Bahamas.

Grandparent’s University (Lubner)—This Wisconsin Alumni Association “university” is a two-day program of coursework in a number of subject areas that is offered each summer for youngsters and their grandparents. UW Sea Grant and the UW–Madison Center for Limnology will continue to take part in the program, offering a popular course on the study of lakes that includes taking water samples aboard a research vessel, hands-on operation of underwater robotic technology and activities involving aquatic invasive species.

“Interactive Fish Identification and Bioenergetics Lab” (White)—During 2006–08, UW Sea Grant will continue to help publicize and market this unique new educational tool to teachers, students, fisheries managers, anglers and other interested individuals throughout Wisconsin and beyond. Developed in partnership with the UW–Madison Center for Limnology and Wisconsin Department of Natural Resources, this comprehensive database-driven Web site and software enables students to study fish identification, ecology and physiology using the latest techniques and scientific information.

“Great Lakes: Great Maps” Exhibit & Lectures (Savoy/Reeb)—In partnership with the UW–Milwaukee Libraries’ American Geographical Society Library, Wisconsin Historical Society Archives and UW–Madison Libraries Department of Special Collections, UW Sea Grant will develop a three-month-long exhibit in Madison in early 2007 and a Web site based on it that uses historical and modern maps of the Great Lakes to illustrate the influence of the Great Lakes on the development of Wisconsin and advances in cartography since the 1600s.

Applied GIS Workshop for Urban Planners (Hart)—As part of his affiliation with the UW–Madison Department of Urban and Regional Planning, UW Sea Grant’s GIS specialist will teach an applied GIS workshop focusing on coastal and environmental resource management issues each spring semester during 2006–08. The spring 2006 course is a partnership with Louisiana Sea Grant on using GIS to explore alternatives for rebuilding the Hurricane Katrina-devastated areas of New Orleans, where he was a senior city planner during 1987–93.

Water Quality Education Outreach (Harris)—UW Sea Grant’s water quality outreach specialist will continue to organize and host the “Edge of the Lake” seminar series at UW–Green Bay during 2006-08 and at least three forums/workshops annually for local officials, decision makers and citizens. She also will teach a five-week course on Wisconsin’s water resources for the Institute for Learning in Retirement at UW–Green Bay.

Allied Drive Story Hours (Savoy)—During 2006–08, UW–Madison Water Resources Library staff will continue its series of story hour programs for children in the Allied Drive neighborhood of Madison, who have the lowest average reading test scores in the school district. Each story hour is organized around a water-related theme and includes art projects and snacks. These monthly events are conducted in partnership with the UW-Madison School of Library and Information Studies, the Madison School & Community Recreation Safe Haven Childcare Program and six other UW–Madison libraries.

Wisconsin’s Water Library (Savoy)—UW Sea Grant will continue to develop and promote “Wisconsin’s Water Library” (www.aqua.wisc.edu/waterlibrary) during the next biennium, including annotated reading lists emphasizing Wisconsin issues in each national Sea Grant theme. Created in partnership with UW–Madison Libraries, Wisconsin Public Libraries and Wisconsin Libraries’ Delivery Network, this Web site provides all Wisconsin residents easy access to reliable sources of water information, including more than 30,000 volumes of water-related information at the UW–Madison Water Resources Library.

Seafood Science & Technology Theme

***National Sea Grant Goal:** Improve the safety, quality, shelf life and marketability of existing and new seafood and seafood-derived products.*

This national theme aims to develop new ways for Americans to reap the bounty of our waters on a sustainable basis. Sea Grant-sponsored research and technology transfer in this thematic area help the seafood industry by improving processing technology, products and methods for assuring seafood safety. As wild fish stocks decline, we need to find new ways to reduce waste and by-catch by improving fishing gear, developing markets for underused species, and ensuring the safety and quality of products through better storage, processing and packaging techniques.

Examples of previous Wisconsin Sea Grant-supported research and technology transfer in this theme include applying Hazard Analysis Critical Control Point methods in commercial processing to ensure seafood safety, developing super-absorbent gels from fish protein extracts, and finding ways to use omega-3 fatty acids common in fish oils as nutraceuticals—foods or food additives that confer nutritional, therapeutic or preventative medical benefits to individuals at risk for cardiovascular disease, certain forms of cancer and diabetes, hypertension, and other health problems.

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Outreach Program

Commercial Fisheries for Siscowet and White Perch (Moy)—A Wisconsin Sea Grant priority in this theme is to develop new markets for seafood and Great Lakes fisheries products and by-products, including creating new fisheries and finding novel uses for by-catch, invasive exotic fishes and underutilized species. During 2006–08, UW Sea Grant’s fisheries specialist will partner with Minnesota Sea Grant and Lake Superior commercial and tribal fishers to investigate possible uses and market interest for developing a commercial fishery for siscowet (“fat trout”) on Lake Superior. He will also continue working with the Wisconsin Department of Natural Resources and Green Bay commercial fishers to explore and test the feasibility of developing a new gillnet fishery on Green Bay, Lake Michigan, based on the white perch, an invasive species. A commercial market for white perch could provide local fishers with a much-needed alternative to the depressed native yellow perch fishery as well as help control the population of an invasive species in the bay.

National Sea Grant Goals: (1) Resolve water quality, beach access, coastal land use and development, and similar coastal issues; (2) reduce contaminants, nutrients and other non-point-source pollution from urban watersheds; (3) enhance ports, harbors and marinas to meet growing demands for service while addressing concerns about impacts on the local community and environment, and (4) resolve conflicts over existing and proposed uses of coastal space and resources.

Economic growth since 1950 has sparked increased urbanization of coastal areas—with corresponding rises in pollution and environmental degradation. In an urban setting, a shoreline has significant appeal, as shown in the demand for recreational, business and residential developments near the water. Communities and states must balance economic and environmental values, manage the impacts of nutrient runoff and waste disposal, and consider needs for transportation, recreation and commerce—all while maintaining the integrity of coastal ecosystems that provide critical habitat and nursery areas for countless species.

Millions of Americans and Canadians depend on the Great Lakes for drinking water as well as the multibillion-dollar fisheries, shipping and tourism/recreational industries the lakes support. Wisconsin Sea Grant's principal priorities in this theme area include identifying the mechanisms, sources and fate of bacterial and viral contamination responsible for beach closings in the Great Lakes and other coastal areas; developing tools, technologies, methods and strategies for the maintenance of Great Lakes harbor and marina infrastructure, and evaluating potential impacts of changing climate and lake levels on the vulnerability of coastal urban infrastructure.



Projects

Sources and Transport Mechanisms for *Escherichia coli* Contamination at Lake Michigan Beaches

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Beach closures due to bacterial and viral contamination are becoming a perennial problem at many beaches in the Great Lakes region and elsewhere. This continuing project promises to advance the science of indicator research through such biotechnological approaches as DNA fingerprinting and antibiotic-resistance profiling as the investigator attempts to track down and identify the transport mechanisms, sources and fate of bacterial and viral contamination of Lake Michigan beaches. [R/MW-89](#)

Evaluation of the Algal Nuisance *Cladophora* and its Effect on *E. coli* and Beach Closures

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In recent years, the growing number of beach closings has coincided with growing amounts of the nuisance alga *Cladophora* washing up on the shores of Lake Michigan. In this new study, a multidisciplinary team of investigators is testing the hypothesis that there may be a link between *Cladophora* mats and elevated *E. coli* counts that trigger beach closings. The results could have widespread implications for management of this nuisance alga and for interpretation of sources of the coliform bacteria that lead to beach closings. [R/UC-1 \(FY07 Start\)](#)

Development and Application of Molecular-Based Methods for Identifying Sources of Fecal Pollution at Lake Michigan Beaches

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The indicator organism for determination of beach closures is *E. coli* bacteria. The diverse sources of *E. coli*—ranging from human sewage to gull feces—make it difficult to develop appropriate and effective mitigation strategies. This new project proposes to refine methods that use genetic markers to pinpoint sources of fecal contamination, validate these methods in the field and develop methods to help better address sources of contamination. [R/UC-2 \(FY07 Start\)](#)

Outreach Program

Cladophora and Beach Closings (Harris)—UW Sea Grant’s water quality specialist will continue to educate Lake Michigan coastal residents about the suspected causes and potential solutions to the *Cladophora* nuisance algae problem as well as its possible role in beach closings in connection with communicating the results of the Sea Grant-funded research described above.

Ports-Harbors-Marinas Maintenance & Growth Issues (Clark)—UW Sea Grant’s coastal engineering specialist will continue to help Wisconsin ports, harbor and marina managers and owners identify and respond to facility-related issues, such as maintenance dredging, the accelerated corrosion of sheet pilings in Duluth-Superior harbor and deteriorating timber piles and crib structures observed at Wisconsin’s other major ports. He is also assessing the interest and potential support of state and local government agencies and the private sector in initiating a coastal “Clean Marina” program.

Urban Coastal Infrastructure Value & Vulnerability (Hart)—UW Sea Grant’s GIS specialist is using land information records to develop an inventory and indices of coastal land valuation and ownership. These indices will be coupled with other datasets, such as land elevation, to assess the vulnerability and value of coastal property and infrastructure likely to be affected by fluctuations or extreme changes in Lake Michigan water levels.

Eighth International Conference on Mercury as a Global Pollutant (Hurley)—More than 800 scientists from around the world are expected to attend this August 2006 conference in Madison. Cosponsored by Wisconsin Sea Grant, the theme for this landmark event is “Integration of Science, Policy and Socioeconomics.” The conference will feature the latest scientific findings on the health risks, sources and atmospheric transport, effects on fisheries, and societal consequences of global mercury pollution.

Innovative Science & Technology Theme

Wisconsin Sea Grant Goal: *Provide an opportunity for university scientists and engineers to undertake original and innovative Great Lakes, coastal and ocean research, especially work that reaches beyond the established national Sea Grant research, outreach and education themes.*

Investigations of the Great Lakes and ocean environments may be sweeping or sharply focused, aimed at specific locales or at vast regions. They may examine short or long periods of time; they may explore specific technologies or generic problems. Given the breadth of research possibilities, UW Sea Grant encourages scientists and engineers to undertake innovative and original research projects that fall outside the confines of present Sea Grant thematic areas. This includes the development of initiatives that take full advantage of special opportunities, apply state-of-the-art scientific techniques and new technologies, and tap the full spectrum of unique talents available in the Wisconsin scientific community.

Potent areas for such research include the ocean's role in climate change and the potential effects of climate change on Great Lakes hydrology and ecosystems; the application of state-of-the-art technology to marine resource utilization and ocean exploration, and a host of marine and Great Lakes-related human safety issues, particularly with regard to undersea exploration. Given UW–Madison's unique capabilities in this area with regard to both expertise and facilities, it is a Wisconsin Sea Grant priority to improve the safety and cost effectiveness of diving through better understanding of physical and mental responses to the underwater environment, and to facilitate the transfer of research results to members of the diving community, medical professionals and other concerned groups.

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Projects

Improving Risk Estimation, Safety and Cost-Effectiveness in Scuba Diving

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Charles Lehner, UW–Madison, (608) 262-8793, celehner@facstaff.wisc.edu

Recreational, seafood, governmental, commercial and scientific divers engage in some diving practices that carry health risks not fully understood by divers, attending physicians and physiologists. Building on their previous work on the effectiveness of diagnostic evaluation and screening, the investigators in this new project are characterizing the risk of decompression sickness and dysbaric osteonecrosis to recreational and seafood divers, examining the onset and development of these injuries, assessing the usefulness of blood tests and bone scans as low-cost means of screening populations at risk of developing osteoarthritis, and providing recommendations for safer diving procedures. [R/ST-1](#)

Outreach Program

Communicating Health Risks to Divers (Karl/Wittman)—In connection with recently completed diving physiology research noted above, UW Sea Grant communications specialists plan to partner with the investigators on a major outreach effort during 2006–08 to alert divers to the risks of decompression sickness and dysbaric osteonecrosis. This effort will involve a multilingual national outreach in partnership with Puerto Rico Sea Grant, Divers Alert Network, NOAA Diving Program and national scuba diving industries.

Sea Grant Fellowships/Scholarships

Dean John A. Knauss Marine Policy Fellowship

www.seagrants.noaa.gov/knauss/knauss.html

Contact: Anders W. Andren, Director, UW Sea Grant Institute, (608) 262-0905

This competitive program provides an opportunity for one-year expenses-paid internships with a federal legislator or agency in the Washington, D.C., area. Fifteen Wisconsin students have been among those selected for Knauss fellowships since 1982.

Funding source: National Sea Grant Office, National Oceanic & Atmospheric Administration

Sea Grant Industrial Fellowship

www.seagrants.noaa.gov/funding/industryfellowship.html

This fellowship provides support for graduate students who are pursuing research and development projects in topics of interest to a particular industry or company. In a true partnership, the student, his/her faculty advisor, the local Sea Grant program and industry personnel work together on a project from beginning to end.

Funding source: National Sea Grant Office, National Oceanic & Atmospheric Administration

Sea Grant/NOAA Fisheries Graduate Fellowship

www.seagrants.noaa.gov/funding/fisheriesgradfellowship.html

This fellowship program in population dynamics and marine resource economics was established by NOAA Sea Grant and NOAA Fisheries for Ph.D. students who are interested in either of these two disciplines.

Funding source: National Sea Grant Office and National Marine Fisheries Service, National Oceanic & Atmospheric Administration

Carl J. Weston Memorial Scholarship

Contact: Mary Lou Reeb, UW Sea Grant Institute, mlreeb@aqu.wisc.edu

Established in 1995, the Carl J. Weston Memorial Scholarship fund provides support for deserving undergraduate students working on Wisconsin Sea Grant-supported projects.

Funding source: Dr. and Mrs. Carl B. Weston

Useful Wisconsin Sea Grant Web Sites

for Investigators, Staff and Students

Wisconsin Sea Grant-Great Lakes Online

www.seagrant.wisc.edu

Find links to and launch searches of all UW Sea Grant Web sites, including Wisconsin activities in each of Sea Grant's national theme areas and various products of UW Sea Grant-funded research, outreach and education.

Funding

www.seagrant.wisc.edu/funding

Provides links to information about grant opportunities, graduate student competitions and more.

Interactive Project Reporting Online (iPRO) System

www.aqua.wisc.edu/ipro

Permits project investigators to manage, report progress and view information about their project(s), including results, accomplishments, benefits, student activities and budget.

Projects

www.seagrant.wisc.edu/projects

Information about the research, education and outreach projects currently funded by UW Sea Grant.

Great Lakes Internet Resources

www.seagrant.wisc.edu/communications/greatlakes/internet.html

Annotated links to the Web sites of key Great Lakes-related U.S. and Canadian research institutions and management agencies.

National Sea Grant Network

www.seagrant.wisc.edu/communications/national

Links to online directories of federal and university Sea Grant staff nationwide and the Web sites of every Sea Grant program, the National Sea Grant Library and the Sea Grant Association.

Special Program Resources

Aquatic Sciences Chronicle

www.aqua.wisc.edu/chronicle

Published four times a year, this four- to eight-page newsletter reports on the activities of the Wisconsin Sea Grant and Water Resources programs. It is available free of charge to anyone interested in receiving it. To get on the mailing list, contact Linda Campbell (see “Key Contacts”).

Earthwatch Radio

ewradio.org

“Earthwatch” is a weekly series of five two-minute public service programs distributed monthly on CD free of charge to interested commercial, public, school and community radio stations. Listen to it online or download it to a portable media player. To subscribe, contact Rich Hoops (see “Key Contacts”).

Aquatic Sciences Center Publications

www.aqua.wisc.edu/publications

This Web site features an annotated listing of our most popular publications, including brochures, fact sheets and posters, as well as online access to a wide range of other UW Sea Grant and Water Resources program information. The site includes an online shopping feature that allows users to make purchases with a credit card or obtain items free of charge.

Water Resources Library

wri.wisc.edu

This UW–Madison library contains nearly 30,000 volumes of water-related information, with particular emphasis on issues concerning Wisconsin and the Great Lakes, available for loan to all Wisconsin residents. The collection also contains publications from state Water Resources Research Institutes nationwide. For more information, contact JoAnn Savoy (see “Key Contacts”).

National Sea Grant Library

nsgd.gso.uri.edu

As the official national program archive, the NSGL maintains a complete collection of Sea Grant-funded documents on a wide variety of subjects. The NSGL's searchable 36,000-record bibliographic database contains citations and abstracts of all Sea Grant publications and online access to a full-text copy of many of these documents as well.

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