Summer 6-2003

Water Resources Review - Summer 2003 Vol 16, No 1

Annis Water Resources Institute

WATER RESOURCES
Review

Grand Valley State University • R. B. Annis Water Resources Institute • Summer 2003 • Volume 16, Number 1

In this Issue...

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Muskegon Lake Monitoring Study

AWRI has initiated a long-term monitoring program in Muskegon Lake. As residents on the lake, we feel both a responsibility and an obligation to monitor and research the ecological health of this water body.

This study has four specific goals:

- Observe short-term and long-term changes in the ecological health of Muskegon Lake
- Understand the mechanisms behind the changes we see in the lake's ecology
- Integrate Muskegon Lake ecology to the watershed level, and to society at large
- Use the information generated from this study to remove (de-list) Muskegon Lake as one of the Areas of Concern (AOC) in the Great Lakes

Six sites are being sampled on a quarterly basis. We are currently examining a suite of physical, chemical, and biological parameters in the lake. Also, fish sampling is being conducted in conjunction with the larger monitoring effort in the lake, which includes measuring several physical (e.g., water clarity and temperature) and biological parameters (e.g., algal biomass). Fish captured in nets are identified, measured, and released back into the lake.

For more information on this project contact Dr. Alan Steinman at (231)728-3601 or steinmaa@gvsu.edu.

Round goby caught in Muskegon Lake

Director's Comments

Some of you may have noticed that AWRI did not publish a Spring Review this year. We apologize for this change, but I hope that you will appreciate and support our reasoning. The faculty and staff at AWRI have become so busy with starting up new projects, developing new programs, and interacting with new partners that we simply cannot keep up with the production of three reviews per year. Instead, we have decided to switch to two reviews per year: a mid-year *Summer Review* and the end-of-year Winter *Year in Review*. These reviews will still bring you a comprehensive overview of our activities; as always, we encourage your feedback to let us know your thoughts and ideas.

In this issue, we share with you some of our new and existing projects, provide you with an overview of our summer activities, and introduce you to some of the exciting events that have been held at the Lake Michigan Center, our home.

I am interested in hearing about your thoughts and comments, so please feel free to share them with me. I can be reached by email at steinmaa@gvsu.edu, by phone at (231) 728-3601, or by fax at (616) 331-3864.

Science Advisory Board Update

AWRI's Science Advisory Board (SAB) met for the second time this spring. The SAB consists of five internationally renown scientists who are charged with conducting an annual review of AWRI activities. The Board includes (shown from left to right in above photo) Dr. Stephen Brandt, Great Lakes Environmental Research Laboratory; Dr. Peter Meier, University of Michigan; Dr. Gary Lamberti, University of Notre Dame; Dr. Carol Johnston, South Dakota State University; and Dr. Claire Schelske, University of Florida. Preliminary discussions with the Board following the meeting suggested they were very favorably impressed with the changes that have occurred at AWRI over the past year. We are anxiously awaiting their written report for specific findings and recommendations.

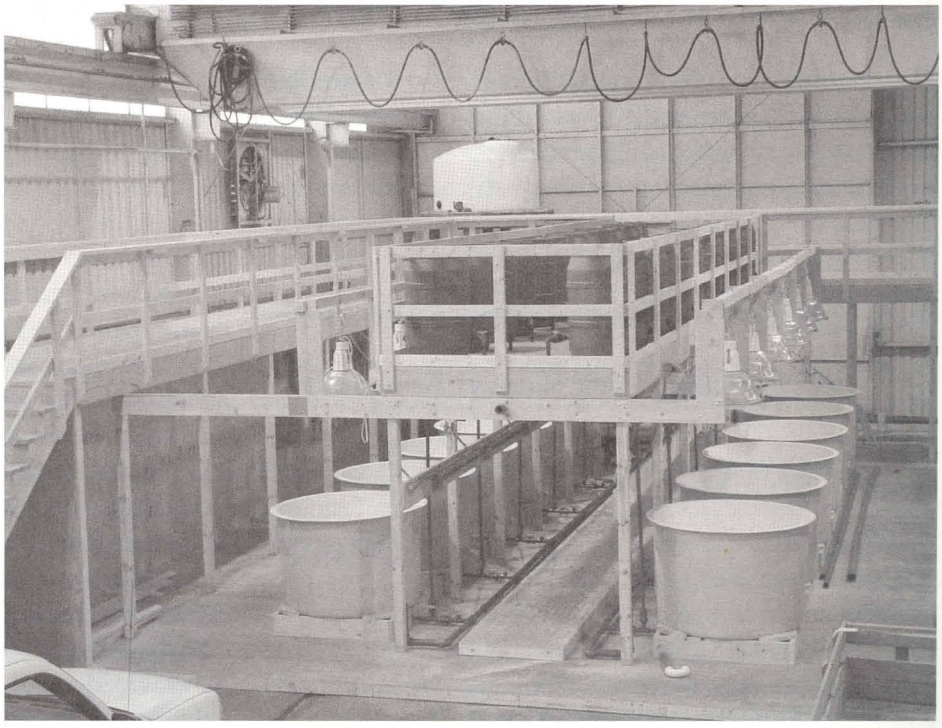
Director's Office Activities

It has been a very busy half-year in the Director's office. We successfully secured funding for new projects dealing with groundwater in Mecosta County and phosphorus in Spring Lake (see details inside), completed the renovation to the office and laboratory space at the Lake Michigan Center, and initiated research on our new mesocosm facility in the field station. Bob Udell is finishing up his feasibility study on the conversion of the AWRI vessels from petrodiesel to biodiesel. Lori Nemeth, research assistant, has provided the technical glue and expertise to keep our projects running smoothly.

On a personal level, I have been involved in a suite of environmental policy issues at the local, state, and federal levels. As a member of the West Michigan Strategic Alliance's Green Infrastructure Task Force, I have been able to provide input on water resources issues. In addition, the Alliance is contracting with AWRI to provide Geographic Information System (GIS) products. At the state level, I provided technical input and testified in Lansing at the request of Senator Birkholz regarding Senate Bill 289, the aquifer protection bill in Michigan. Finally, as a founding member of the Sustainable Water Resource Roundtable, a public-private initiative mandated by U.S. Congress to develop criteria for the water resources in the United States, I helped develop a conceptual framework for this initiative.

Mesocosms Ready For Research

There is a new and exciting addition at the Annis Water Resources Institute: a mesocosm facility. Mesocosms are experimental tanks that are larger than aquaria (i.e. microcosms) but smaller than natural ponds (i.e. macrocosms). We have 12 tanks, each of which holds about 350 gallons of water. Water is pumped from Muskegon Lake, passed through filters, and enters each tank individually. In addition, a small amount of the electricity that we use to power the artificial lights that hang above each tank comes from solar (photovoltaic) panels, that are attached to the front of our field station. Our thanks to Dr. Jim Wolter, at GVSU's Seidman School of Business, who worked with us on obtaining the funding to get the solar panels built and installed.



This facility tremendously increases our capability to conduct experimental research at AWRI. This summer we are examining the effect of light on the growth of phytoplankton (tiny plants that grow in the water column) and their ability to develop nuisance algal blooms. In the future, we plan on looking at the effects of nutrients on plant growth, the role of invasive species in Great Lakes food webs, and the impact of toxic sediments on aquatic life.

The mesocosm facility also includes a walkway above the tanks, which allows students to view the experiments while they are underway. This type of student-research interaction is at the heart of AWRI's mission, and hopefully will inspire some of our students to be our future scientists. Thanks to Al Steinman and Mark Luttenton for mesocosm design, and Tony Fiore and Chris Drake for construction and implementation of the facility.

Recent Peer Reviewed Publications

Biddanda, B.A. 2003. The Role of Free and Attached Microorganisms in the Decomposition of Estuarine Macrophyte Detritus. Estuarine, Coastal and Shelf Science 56:197-201.

Biddanda, B.A. and J. B. Cotner. 2003. Enhancement of Dissolved Organic Matter Bioavailability by Sunlight and Its Role in the Carbon Cycle of Lakes Superior and Michigan. Journal of Great Lakes Research 29: 228-241.

Ruetz III, C.R., A. L. Hurford, and B. Vondracek. 2003. Interspecific Interactions between Brown Trout and Slimy Sculpin in Stream Enclosures. Transactions of the American Fisheries Society 132(3): 611-618.

Ruetz III, C.R. and D. W. Stephens. 2003. Site Selection Under Differential Predation Risks by Drifting Prey in Streams. Oikos 102: 85-94.

Baron, J.S., N.L. Poff, P.L. Angermeier, C.N. Dahm, P.H. Gleick, N.G. Hairston Jr, R.B. Jackson, C.A. Johnston, B.D. Richter, and **A. D. Steinman**. 2003. Sustaining Healthy Freshwater Ecosystems. Issues in Ecology: (10).

Vail, J.H., R. Morgan, C. R. Merino, F. Gonzales, R. Miller, and J. L. Ram 2003. Enumeration of Waterborne Escherichia Coli with Petrifilm Plates: Comparison to Standard Methods. Journal of Environmental Quality 32: 368-373.

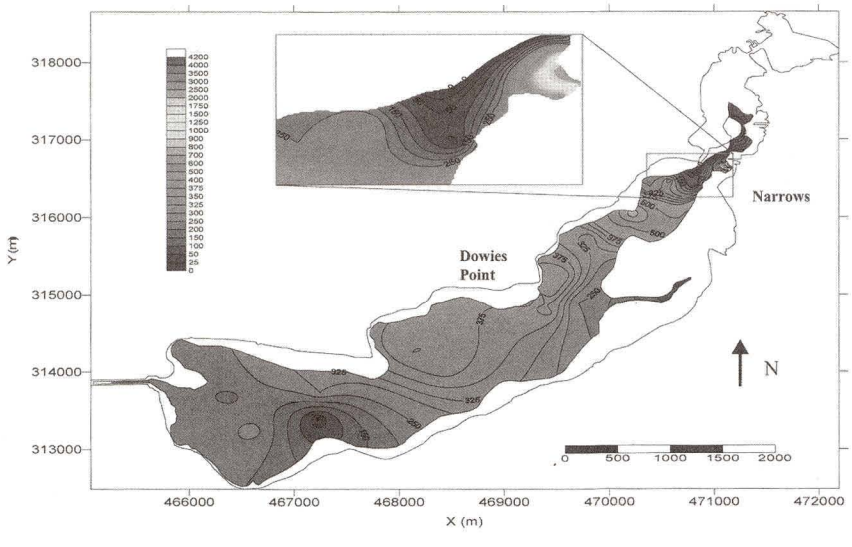
AWRI Completes Phase II Investigation Of Contaminated Sediments In White Lake

The Environmental Research Laboratory at AWRI completed a grant from the Great Lakes National Program Office to conduct a Phase II assessment of Sediment Contamination in White Lake. High levels of chromium were found to cover a majority of the lake bottom and to extend 8 km from the Tannery Bay. All locations sampled west of Tannery Bay exceeded the Probable Effect Concentration (PEC). High concentrations of PCBs were found near the outfall of the former Occidental/Hooker Chemical facility. These levels also exceeded PEC guidelines. Sediment toxicity was observed in the east bay area and at the Occidental/Hooker Chemical outfall. Toxicity near the Occidental/Hooker Chemical outfall was probably due to the presence of PCBs. No obvious toxicant was present in the sediments from the east bay.

Benthic macroinvertebrate communities throughout White Lake were found to be indicative of organically enriched conditions. The locations in the east bay were significantly different than reference sites, as indicated by a shift to chironomids that were predators and sprawlers. Chironomid populations in the remainder of the lake were burrowers and detritivores. Higher densities of nematodes and reduced tubificids populations were associated with the stations with elevated chromium levels (> 400 mg/kg). The metal also was correlated with an increase in the trophic status of chironomid populations. Chromium accumulation was observed in chironomid populations throughout White Lake. In addition, macrophytes and zebra mussels in Tannery Bay were observed to accumulate the metal in their tissue.

The proximity to the drowned rivermouth currents to Tannery Bay and the wind induced resuspension provided conditions that facilitated the advection and dispersion of a sediment plume 8 km from its source. Higher concentrations of chromium (300-500 mg/kg) were found in the three deep deposition basins. In contrast, the PCBs discharged by the Occidental/Hooker Chemical outfall remained within 100 m of the outfall pipe. The depth of the discharge (15 m) plus the depositional nature of the discharge zone acted to confine the contaminants to a small area. The removal of contaminated sediments in Tannery Bay and the Occidental/Hooker outfall are proposed to be completed by the end of 2003.

Dr. Richard R. Rediske was the Principal Investigator for the project. Don Uzarski and Michael Chu from AWRI and Graham Peaslee from Hope College were collaborators.



Chromium Concentration Contours for White Lake Surficial Sediments

Summer Interns Assist Staff

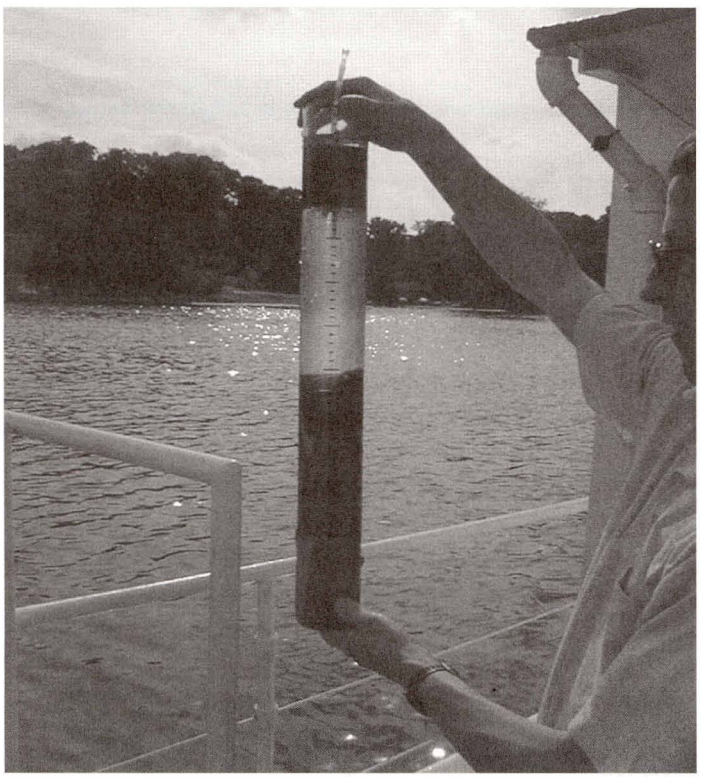
Through the generous support of the D. J. Angus-Scientech Educational Foundation of Indianapolis, Indiana, AWRI is privileged to have four summer Scientech interns. The interns were on hand for the annual visit of the Scientech group and the Indiana Science Fair winners in June. Andrew Stille, a senior in Natural Resource Management, is working with Kurt Thompson of the AWRI Information Services Center. His projects include the Mecosta County Well Water Study, Newaygo County Road/Stream Crossings, and Kent County Car-Deer Accidents. Shelly Kennedy is hoping to pursue a teaching certificate and she is working on outreach and education projects for Dr. Janet Vail. Marjory Hool is a junior majoring in Biology with an emphasis in Secondary Education. She is working on Great Lakes coastal wetlands (of Lakes Michigan, Superior, and Huron) and inland depressional wetlands of Michigan for Dr. Don Uzarski. Betsy Haak, a junior majoring in Biology, is monitoring *E. coli* bacteria at beaches for Dr. Rick Rediske's project for the Muskegon County Health Department.

Spring Lake Study

Al Steinman and Rick Rediske received $25,000 from the Spring Lake – lake board to conduct a study examining the release of phosphorus from the bottom sediments in Spring Lake.

Spring Lake faces some of the most critical water quality challenges in west Michigan. Recent phosphorus concentration measurements indicate that Spring Lake is severely impacted by high phosphorus loading and nuisance algal blooms. Historically, field measurements of phosphorus concentration in watersheds have concentrated on the "external" loading of phosphorus. This is the contribution of phosphorus from the watershed currently flowing into a waterbody. The contribution of phosphorus being released from the sediments, or the so-called "internal" load, often gets overlooked. However, in highly eutrophic lakes, internal loading can account for a substantial amount of the total phosphorus load.

Our study is looking at how important internal loading is in Spring Lake, and whether the application of alum, which can bind to phosphorus in sediments and prevent it from entering the water column, is an effective means to reduce internal loading. With the assistance of Eric Nemeth, Tony Fiore, and Augie Kotlewski, we have designed a system in our growth chamber to manipulate experimental conditions to test these processes.



Sediment core from Spring Lake

Hydrologic Modeling For The Mona Lake Watershed

AWRI Researcher, Dr. Xuefeng (Michael) Chu, has been preparing a hydrologic model for the Mona Lake watershed. The objective of this modeling effort is to provide detailed hydrologic information of the watershed, specifically including the quantity of the surface water (how much water drains from tributaries into Mona Lake), variability (how water flows vary temporally and spatially), as well as sources of the surface water. The modeling system incorporates the U.S. Geological Survey Digital Elevation Model of the watershed, land use and soil type geographic information system (GIS) data, and other hydrologic information in a user-friendly interface, and integrates watershed characterization and GIS-based hydrologic modeling.

Simulation results indicate that the inflow of Mona Lake primarily comes from the Black Creek tributary and the overall average percent contribution is 79.92%. However, percent contributions of inflow from tributaries/subbasins could change significantly over short periods of time. The modeling also reveals that base flow plays an important role in the hydrosystem. According to the overall water budget analysis, more than 70% of the stream water originates from base flow, although direct runoff may account for more than 90% during rainfall periods. This modeling effort provides fundamental hydrologic information pertinent to quantity, variability, and sources of the tributary stream water and inflows of Mona Lake, which will allow us to better understand fate and transport dynamics of various contaminants, and further identify proper water quality management strategies.

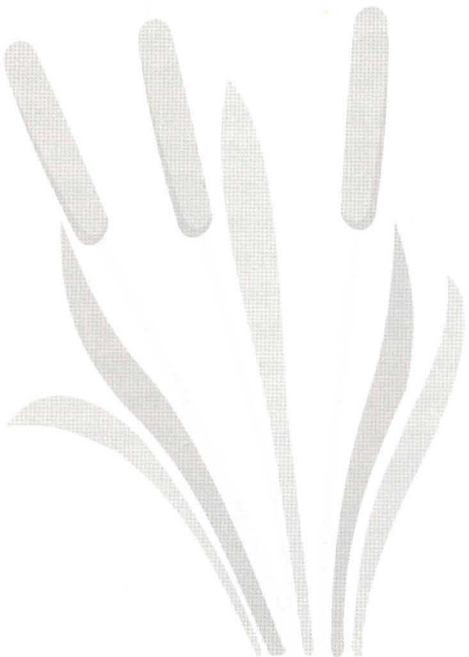
AWRI Researcher Studies Microbial Ecology And Carbon Biogeochemistry

Dr. Bopi Biddanda's research is aimed at describing the microbial life and quantifying the flow of carbon within aquatic ecosystems. Carbon is the central element of life, and ubiquitous microorganisms are major movers of bioactive elements in the biosphere. However, much of the microbial life in our natural waters still remains to be discovered, and the magnitude of carbon flow – especially that mediated by microorganisms – is also uncertain. Therefore, the study of aquatic microbial ecology and carbon biogeochemistry - encompassing microscopic to global scale phenomena - is an exciting field of interdisciplinary research today.

This summer, Dr. Biddanda is involved in carrying out the following five research projects:

1. "Fate of terrestrial carbon in the aquatic environment" - A Michigan Space Grant Consortium funded project that supports Dan Kroll as a summer student. This study examines how microbes and sunlight transform carbon traveling downstream along the land-lake continuum.
2. "Effects of land use on aquatic plankton" - A GVSU Student Summer Scholar Program funded project that supports Stephanie Gamble as a summer student. This study explores the question of how aquatic plankton metabolism is affected by different kinds of land use in the surrounding landscape.
3. "Ecology of plankton and periphyton in western Michigan streams" - An AWRI funded Faculty Research Grant project with Biology faculty member, Dr. Eric Snyder. This study considers the relative roles of plankton and periphyton in the metabolism of different west Michigan streams.
4. "Nutrient bioassays on Mona Lake plankton and Muskegon Lake monitoring project" - Two AWRI funded projects in collaboration with AWRI faculty and staff. The Mona Lake study attempts to identify what is limiting the growth of phytoplankton during different seasons of the year. The Muskegon Lake project is designed to gather long-term baseline data on this highly disturbed lake (presently listed as an Area of Concern by the U.S. EPA) for possible use in future delisting.
5. "Plankton processes in Lake Michigan, Lake Huron and Lake Erie" - Collaborative projects with NOAA scientists. These studies are designed to quantify the flow of carbon through the plankton organisms. Initial findings indicate that tiny bacteria process more than half of primary production in these large lakes.

For information on these projects, contact Dr. Biddanda at (616) 331-3978.



Researchers Study Michigan Wetlands

In collaboration with researchers from Michigan State University, Dr. Don Uzarski is currently exploring the effects of anthropogenic disturbance on wetland ecosystem structure and composition. Dr. Uzarski and his research assistants have been sampling macroinvertebrates and fish in addition to accompanying chemical and physical parameters from Great Lakes coastal and inland depressional wetlands spanning Michigan. The project is funded by the MDEQ Michigan Coastal Management Program of the Environmental Science and Services Division, MDEQ Geological and Land Management Division of the Michigan Department of Environmental Quality, the Michigan Great Lakes Protection Fund; the USEPA Great Lakes National Program Office, and the Great Lakes Commission.

AWRI-MDEQ Liaisons

For the eighth year, AWRI has organized the Hazardous Waste Management Workshop in partnership with the Michigan Department of Environmental Quality and the West Michigan Chapter of the Air & Waste Management Association (AWMA). The 2003 workshop was held at the GVSU DeVos Center in Grand Rapids. AWRI has been a co-sponsor for MDEQ events such as Annual Wastewater Reporting Workshops, Environmental Regulations 101, and Michigan's Land and Water Permits Workshops. Additionally, AWRI and MDEQ work closely on watershed and remediation projects.

Dr. Janet Vail of AWRI is serving a two-year term on the MDEQ Environmental Advisory Council (EAC). According to MDEQ Director Steve Chester, "the EAC was formed to advise the MDEQ staff and me on major issues affecting our programs, policies, and operations." The EAC has 24 representatives from throughout the state representing a diversity of interests. Director Chester believes that "the MDEQ should be an agency that is open and inclusive to all those affected by its decisions" and this council will help to achieve this.

Dr. Rick Rediske serves on the Michigan Water Quality Monitoring Advisory Board. There are five members who have expertise in one or more of the following areas:

- Water Quality Monitoring and Ecological Risk Assessment
- Statistics and Experimental Design
- Aquatic and Mammalian Toxicology
- Chemistry
- Aquatic Biology
- Data Management, Quality Assurance, and Quality Control

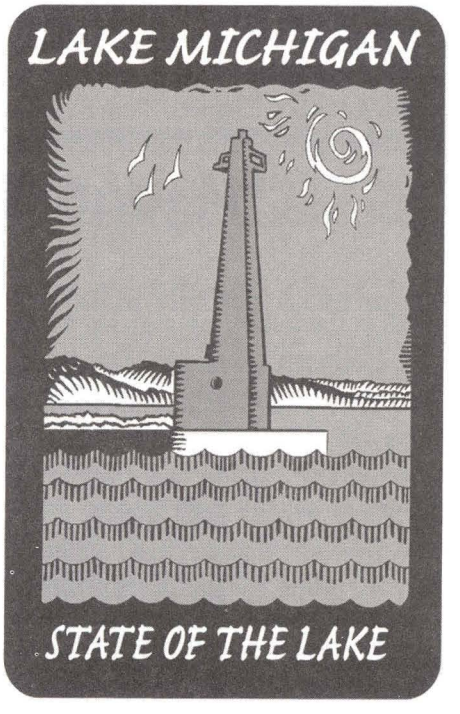
The MDEQ Surface Water Division provides staff support for this Board.

Lake Michigan: State Of The Lake '03 Conference

Mark your calendars for Lake Michigan: State of the Lake '03 Conference on October 21-22, 2003 in Muskegon. As a follow-up to the ***Lake Michigan: State of the Lake '99*** and ***'01*** conferences and the International Joint Commission Biennial Meeting, ***Lake Michigan: State of the Lake '03*** is an opportunity for scientific researchers, government agencies, policy makers, and the general public to communicate with one another on current Lake Michigan issues. This two-day event will have plenary and breakout sessions as well as posters and displays. The conference is funded by the U.S. EPA Great Lakes National Program Office.

High School students can get involved in the conference by participating in an essay contest on invasive species management. The winners will be honored at the conference. A poster contest for young students and a teacher workshop are being planned. Prior to the conference, the Muskegon Chronicle will be preparing a special publication on invasive species.

Check our website at www.gvsu.edu/wri for details about the conference and e-mail Janet Vail at vailj@gvsu.edu about the invasive species project.



LMC Events

An early vision for the GVSU-AWRI Lake Michigan Center (LMC) was that it would serve as a gathering place for those interested in scientific, policy, and environmental issues in the Great Lakes. In recent months, the LMC has hosted a variety of events that fulfill this vision.

On April 25, 2003, a workshop on implementing the Great Lakes Legacy Act was held at the LMC. U.S. Congressman Peter Hoekstra explained that this Act addresses sediment remediation in the Great Lakes. Among the workshop panelists were: (shown from right to left in photo above) Alan Steinman, Moderator and Director of AWRI; Pete Hoekstra, U.S. Congressman; Michael Donahue, President of the Great Lakes Commission; Lt. Colonel Thomas Magness, U.S. Army Corps of Engineers; Gary Gulezian, Director of the U.S. EPA Great Lakes National Program Office; Steve Chester, Director of MDEQ; Dennis Schornack, U.S. Chair of the International Joint Commission; and Kathy Evans, Michigan State Public Advisory Council. Tom Skinner, Administrator of U.S. Environmental Protection Agency Region 5, was the keynote speaker during lunch.

The U.S. EPA Lake Michigan Forum, which is the public input group for the Lake Michigan Lakewide Management Plan, held its quarterly meeting at the LMC. The Forum is currently working on a pilot project to develop a stewardship evaluation tool for watersheds. Mona Lake in Muskegon County has been selected for this project. Forum members and Judy Beck, U.S. EPA Lake Michigan Team Manager, toured the Mona Lake watershed and networked with local stakeholders. Dr. Janet Vail of AWRI serves as co-chair of the Forum.

Some recent major events at the LMC have been:

- June 9th - The MDEQ convened a meeting to discuss the Total Maximum Daily Load (TMDL) allocations for Little Black Creek.
- June 17th - Dr. Rick Rediske of AWRI hosted a strategy meeting with MDEQ and U.S. EPA for the development of cleanup criteria for Ruddiman Creek.
- July 8th - A community reception was held for the new directors of the SmartZones in Grand Rapids and Muskegon.
- July 17th - A region-wide watershed meeting was hosted by Arn Boezaart of The Community Foundation for Muskegon County.
- July 28th – The annual poster session day was held for GVSU students doing summer research projects.

Other 2003 events at the LMC have included a beach-monitoring meeting sponsored by the Muskegon Public Health Department and the Lake Michigan Federation (LMF), an Earth Day Celebration with LMF, a fisheries workshop, monthly executive committee meetings of the Muskegon County Environmental Coordinating Council, a regional environmental education meeting, and events associated with the return of the Tall Ships to Muskegon in August. During the academic year, monthly science seminars are held at the LMC.

SWAP Wrap-Up

The AWRI Information Services Center's project with Michigan Department of Environmental Quality (MDEQ) and Michigan State University (MSU) is nearing completion. The Source Water Assessment Program (SWAP) began five years ago as an effort to collect detailed information about all of the Type II Transient Non-Community Public Water Supplies in Michigan. Across the state some 10,000 Type II wells are known to exist and MDEQ developed the SWAP program as the vehicle to safeguard these potable water sources. As a Groundwater in Michigan Regional Center, the AWRI was asked to participate in the program and facilitate the process at the local level. AWRI has, over the span of five years, collected data for approximately 2500 of these Type II wells spread across sixteen different counties within six State Health Department jurisdictions. September, 2003 will mark the end of AWRI collaboration on the SWAP program.

Making Lake Michigan Great '03 On Its Way

The AWRI *W.G. Jackson* vessel reached the four states in the Lake Michigan basin on its annual Making Lake Michigan Great Tour this summer. As a project of the USEPA Lake Michigan Forum, the purpose of the tour is to highlight the USEPA Lakewide Management Plan and to increase citizen understanding of lakewide issues. Ports of call included the Port of Indiana at Burns Harbor, Navy Pier in Chicago, Muskegon, White Lake, Milwaukee, and Sheboygan, Wisconsin. Partners in the tour are the Indiana Dunes National Lakeshore, the Indiana Dunes Environmental Learning Center, Roosevelt University, members of Area of Concern groups, and others. The tour is funded by the USEPA Great Lakes National Program Office.

Chicago, Illinois

As an addition to the Making Lake Michigan Great tour, the AWRI education staff traveled to Waukegan, Illinois in April to put on special programs for the Waukegan Area Citizens Advisory Group (CAG). Susie Schreiber of the CAG coordinated the groups from local schools who participated in water quality sampling and analysis. AWRI staff used the *Neeskay* vessel from the University of Wisconsin Great Lakes Water Institute for three days of activities.

Junior Scientech group in Indiana


Waukegan, Illinois

GVSU-AWRI GLOBE Partnership Honored

The Grand Valley State University Global Learning and Observations to Benefit the Environment Program (GLOBE) partnership was honored at the international GLOBE Learning Expedition (GLE). Dr. Janet Vail, GVSU GLOBE training coordinator, traveled to Sibenik, Croatia this summer for the GLE. Students from 22 countries attended the event and they presented scientific papers using GLOBE data. Since 1999, GVSU has conducted teacher-training workshops for GLOBE, a worldwide student environmental monitoring program that links students with scientists. The AWRI in cooperation with the GVSU Regional Math & Science Center and the Michigan Environmental Council has led this effort. Over 140 teachers have been trained in workshops supported primarily by the Dart Foundation. The annual GLOBE teacher-training workshop will be held on October 3rd and 4th at the Lake Michigan Center and it is open to area educators.

Through a grant from the Michigan Space Grant Consortium and a gift from the Robert B. Annis Educational Foundation, over 500 students were able to participate in hands-on GLOBE science activities in AWRI's R.B. Annis Educational Foundation classroom. Participating schools were Daisy Brook Elementary from Fremont, St. Andrews and Westwood Middle School from Grand Rapids, and Cherry Creek Elementary from Lowell. AWRI staff presented programs at Central Elementary in North Muskegon and Oakridge Lower Elementary in Muskegon County. For more information on the GLOBE workshop or classroom opportunities, contact Janet Vail at 616-331-3048 or vailj@gvsu.edu.

Coldwater Management Plan Completed

The AWRI was approached by the Coldwater River Watershed Council (CRWC) to complete a Nonpoint Source Watershed Management Plan for the Coldwater River Watershed. The purpose of developing this plan is to first identify existing and expected water quality problems and then to develop a strategy for improvement and protection of the water resources in the watershed. The CRWC is looking to oversee future efforts in the watershed using the plan as a guide.

The Coldwater River Watershed covers approximately 120,737 acres and is located in parts of four counties including Kent, Ionia, Barry, and Eaton. Included in the watershed are four feeder tributaries: Pratt Lake Creek, Tyler Creek, Duck Creek, and Little Thornapple River. The Little Thornapple River is the headwaters of the Coldwater River.

In order to complete this plan: AWRI reviewed past research and conducted new studies to evaluate water quality; identified nonpoint source pollutants; and recommended actions for better watershed health. A three-year, five part, strategy was developed to reduce nonpoint source pollution. Components of the plan include:

- physical repairs done through recommended best management practices.
- an information and education strategy created for specific audiences that will create awareness about good watershed stewardship behavior.
- recommended tools that would be needed by CRWC to further all of these efforts.
- a list of ordinance resources for local townships.
- a recommended process for the evaluation of future efforts.

For more information about the Coldwater River Watershed Management Plan contact Abigail Matzke, Program Manager at 616-331-3749 or matzkea@gvsu.edu.

Muskegon River Land Use/Cover Completed

For the last two years the AWRI and Michigan State University's Center for Remote Sensing and Geographic Information Science have been working on an inventory to update land use and cover maps for the Muskegon River Watershed. The original data, developed in the early 1980's by the State of Michigan, provided a framework in which to start the process. The inventory is a major component of the "Building a Sustainable Future for the Muskegon River Watershed: A Decentralized Approach" project funded by The Wege Foundation with assistance from the Fremont Area Community Foundation.

The Watershed covers approximately 2,725 square miles and is contained within twelve counties in northern Michigan. For the inventory, 117 survey townships were updated to 1998 conditions. In this inventory, land uses, which consist of land modified for use by people, are combined with land covers, which are typically more natural areas having extensive vegetation or water. Changes in land use and land cover have been identified as major factors in environmental problems both globally and locally. Knowing what the land use and cover conditions are and how they have changed over time provides decision-makers critical information when planning for the future.

To get this information into the hands of decision-makers, the AWRI is creating a Land Use/Cover Resource Atlas product that will be distributed to each of the townships within the watershed. The Atlas attempts to characterize the landscape of each individual township by taking a close look at its surface geology, topography, presettlement landscape, and its 1978 and 1998 land use and cover conditions. The geographic information system data will also be made available for use by any interested organization or individual.

For more information about the project, contact Rod Denning at (616) 331-3793 [denningr@gvsu.edu].

Rogue River Watershed Project Update

The "Rogue River Celebration", a free watershed fair for children, took place on May 31, 2003. The event was held from 9:00 a.m. until 2:00 p.m. at Parkside Elementary in Rockford, MI. Fair sponsors included the AWRI and the Dwight Lydell Chapter of the Izaak Walton League of America. More than 200 fair participants and over 100 volunteers were present, making the fair a success.

As part of the Rogue River Watershed Project, a council has been formed for the long-term protection and enhancement of the Rogue River Watershed. Since the summer of 2000, the Annis Water Resources Institute (AWRI), Grand Valley Metro Council (GVMC), and the Schrems West Michigan Trout Unlimited have been writing bylaws and actively promoting membership. The AWRI and GVMC have visited and held discussions with forty-one municipalities and organizations within the watershed about membership into the council.

The Rogue River Watershed Council has been meeting monthly since February of this year. To date, current membership includes eight local units of government, five organizations, and one state program. The council has been brainstorming about ways to bring more municipalities and organizations to the table.

Some of the general purposes and functions of the watershed council include:

- Development of a comprehensive information program to assess and characterize the natural resources and water quality conditions in the watershed.
- Development of a broad-based public education and communication program.
- Sustenance of a dynamic and comprehensive watershed plan.
- Implementation of management practices aimed to protect ecological systems and water quality.
- Investigations of water resources of the Rogue River Watershed.
- Establishment of a forum for federal, state, and local agencies, resource organizations, and watershed residents to work together to protect the Rogue River Watershed.

Watershed councils must have widespread support and effective involvement of all those who care about the watershed. If you would like more information about the council or wish to become involved in any aspect of the Rogue River Watershed Project, please call Andy Bowman at (616) 776-7611 or Nichol Stout at (616) 331-3092.

Reaching Out To Mecosta County

The Annis Water Resources Institute was one of three recipients of Year 1 funding from the Ice Mountain Stewardship Fund of the Fremont Area Community Foundation. This Fund is designed to support projects in the Muskegon River Watershed. The title of our project is "Environmental Analysis of Well Water in Mecosta County: A Comprehensive and Integrated Approach"

This project is truly a multidisciplinary effort by AWRI faculty and staff, drawing upon the groundwater and GIS expertise of Kurt Thompson and John Koches, the microbiological knowledge of Bopi Biddanda, the water quality and chemistry expertise of Rick Rediske and Al Steinman, the modeling abilities of Xuefeng Chu, and the education/outreach skills of Janet Vail. The three main objectives of this project include:

- Create a GIS (Geographic Information System) database of groundwater information in Mecosta County.
- Sample a statistically-determined subset of wells for water quality and coliform bacteria
- Develop a conceptual groundwater model for the region

In a separate project, AWRI will be helping to coordinate a Project WET (Water Education for Teachers) community water festival in Mecosta County on September 26th. As the State of Michigan coordinator for Project WET, AWRI also will be assisting with water festivals in Ionia, East Jordan, Mount Pleasant, and White Lake. Nestle Waters, parent company of Ice Mountain, is funding these festivals.