



**Healthy Watersheds, Healthy Lakes:
The Community Connection**

**12th Annual Ohio Limnology Conference
and
22nd Annual OLMS Symposium**

**November 13, 2007
Conference Proceedings**

**2007 Annual Meeting of the
Ohio Lake Management Society
“Healthy Watersheds, Healthy Lakes:
The Community Connection”
Deer Creek Resort and Conference Center
www.olms.org**

Tuesday, November 13, 2007

White Oak Room

- 7:30 Registration and Refreshments
- 8:30 President's Address: Julie Berkman
- 8:40 Welcome - Jerry Boone, Manager, Deer Creek State Park
- 8:45 Ken Cunningham, ODNR Division of Wildlife, “Health of Deer Creek Lake’s Sportfish Population from the Viewpoint of a Fisheries Manager” Deer Creek Reservoir”
- 9:05 Exhibitor Presentations
- 9:30 Gary Winston, Director, National Center for Water Quality Research, Heidelberg College
- 10:00 Break/ Poster Session

**White Oak Room
Concurrent A – Managing for Healthy Lakes**

- 10:30 Bret Henninger, Hamilton County Park District, “Shoreline Re-Vegetation on the Cheap”
- 10:50 Joel Thrash, JF New, “Ecologically Functional Stormwater Basin Retrofits”
- 11:10 Amy Gillespie, Miami University, “Sediment Sources Associated With Increased Sedimentation in the Delaware and O’Shaughnessy Reservoirs, Ohio”

**Black Oak Room
Concurrent B – Lake Research**

- 10:30 Scott Hale, ODNR Division of Wildlife, “Assessment of Reservoir Fish Biomass and Availability of Gizzard Shad Prey in Ohio Reservoirs”
- 10:50 Cassandra May, Ohio State University, “Using Spatially Explicit Habitat Data to Explain Saugeye Variability in Hoover Reservoir”
- 11:10 Valerie Crane, Advanced Technical Aquatic Control, “Lower trophic level and climate impacts on Lake Erie percid year-class strength”

Upper Lobby (upstairs)

- 11:30 Luncheon
- 12:30 OLMS Membership Meeting
- 12:50 Awards Presentation

White Oak Room

- 1:00 **KEYNOTE SPEAKER**
Sean Logan, Director, Ohio Department of Natural Resources
- 1:30 Robert Carlson, Kent State University, "Citizen Lake Awareness and Monitoring: the Role of Volunteers in the Monitoring of Ohio's Lakes"

White Oak Room **Concurrent C – The Community Connection**

- 2:00 Dana Oleskiewicz, Ohio State University Extension, "Preserving Lakes Using the Human Dimension as Social Capital."
- 2:20 Gary Comer, Ohio State University Extension, "The Ohio Clean Marinas Program: Connecting the Boating Community to Lake Management and Nonpoint Source Pollution Reduction on the Lake Erie Coast"
- 2:40 Rich Carter, ODNR Division of Wildlife, "Bass Habitat Projects – Roles and Benefits of Partnering With the Bass Club Community"

Black Oak Room **Concurrent D – Lake Research**

- 2:00 Lesley Knoll, Miami University, "The Influence of Watershed Land Use on Carbon Dynamics of Ohio Impoundments"
- 2:20 Sue Pasko, Kent State University, "Community Resistance of Inland Lakes towards Invasion of an Exotic Cladoceran, *Daphnia lumholtzi*"
- 2:40 Elizabeth Dickman, Miami University, "Light, Nutrient, and Plantivory Effects on Phytoplankton Community and Stoichiometric Response, and Food Chain Efficiency"
- 3:00 Break / Poster Session

White Oak Room

- 3:30 Panel Discussion:
Robert Carlson, Kent State University
Rod Dunn, Columbus Div. of Power and Water
Scott Hale, ODNR Division of Wildlife
Bill Lynch, Ohio State University Extension
John Wilson, AQUA DOC Inc.
- 4:30 Silent Auction and Raffle (must be present to win)
- 4:45 Adjourn

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ABSTRACTS (by Author)

Title: **Citizen Lake Awareness and Monitoring: the Role of Volunteers in the Monitoring of Ohio's Lakes.**

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There is considerable interest in using probability-based (PB) sampling to monitor the current status of our lakes and rivers. PB sampling eliminates some of the bias that has traditionally gone into the selection of waterbodies.

Volunteer monitors are highly biased, both statistically and emotionally, about the lakes that they monitor. Studies indicate that volunteers select larger lakes, possibly because they are more accessible for recreation, and they tend to select lakes in which they have a vested interest. These selective biases make volunteer data suspect if used to estimate the average condition of Ohio's lakes.

The volunteers' bias in choice of lakes increases the chances that the volunteer will sample multiple times over the season and over multiple years. Volunteer data provide much-needed information on seasonal variation, effects of weather conditions such as drought, year-to-year variation, and trends. Although these data could be gathered by agency personnel, the cost would be prohibitive to sample an equal number of times per season and per year.

Volunteer monitored data may also be a much more sensitive index of change than the PB approach. The PB method involves comparing the central tendencies of the data at some time interval for a significant change. CLAM and Secchi Dip-In data suggest while some lakes are increasing in transparency, others are decreasing. The PB approach can only test the significance of the net change in Ohio's lakes. The CLAM data can pinpoint which monitored lakes are changing and in which direction, thus allowing lake-specific management. PB approaches can make important statements about the average condition of Ohio's lakes, but the multiple dates, multiple year capacity of volunteer data can provide specific information on lakes which Ohio residents find important.

Title: **Bass Habitat Projects – Roles and Benefits of Partnering with the Bass Club Community.**

Author: *Rich Carter*
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Bass are the most sought after sportfish in Ohio's inland lakes. Many of the anglers that fish for bass belong to local bass clubs that are affiliated with the Ohio Bass Federation (OBF) or Ohio Bass Anglers Sportsman's Society (B.A.S.S.) Federation Nation (OBFN), the state chapters of the national FLW Outdoors or Bass Anglers Sportsman's Society, respectively. State/national affiliation requires each bass club to conduct an annual conservation project. The Ohio Department of Natural Resources Division of Wildlife (DOW) and Division of Parks and Recreation recently formed conservation partnerships with the OBF for the Buckeye Lake Spawning Habitat Improvement Partnership (SHIP) and with the OBFN for the Indian Lake Blackbird Basin More Fish Project (BBMFP). The SHIP involved the construction and placement of 100 bass nesting boxes in habitat deficient areas of Buckeye Lake. The BBMFP will be conducted in 2008 and will involve placement of stone to protect the eroding shoreline of Blackbird Basin and habitat improvements within the basin. Each project has or will play a key role in the protection and improvement of fish and wildlife resources and habitat in these reservoirs. Benefits include promoting conservation, inspiring and educating youth and adults, partnership synergy, public relations, and increased awareness of the importance of habitat and conservation. In addition, bass clubs provide DOW with bass tournament results that are used to more effectively manage Ohio's bass populations. Opportunities for potential new lake monitoring partnerships are explored.

Title: **The Ohio Clean Marinas Program: Connecting the Boating Community to Lake Management and Nonpoint Source Pollution Reduction on the Lake Erie Coast.**

Authors: *Gary L. Comer, Jr.*¹ and David Kelch
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The Ohio Clean Marinas Program (OCMP) was developed by Ohio Sea Grant with cooperating partners in 2003. The primary goal of the OCMP is to assist the approximately 300 Lake Erie marinas in voluntarily addressing water pollution concerns. The OCMP is a proactive partnership with: Ohio Department of Natural Resources, Office of Coastal Management, Division of Watercraft, and Division of Soil and Water Conservation; Ohio Lake Erie Commission, Ohio Environmental Protection Agency;

Ohio Department of Health; Ohio Department of Commerce, Ohio State Fire Marshals Office; U.S. Coast Guard; U.S. Army Corps of Engineers; Lake Erie Marine Trades Association, Greater Cleveland Boating Association, and the Inter-Lakes Yachting Association. The OCMP encourages marina, owners, managers and patrons to be good stewards of the environment through voluntary adoption of best management practices (BMPs). The OCMP also addresses conditions required in Ohio's Coastal Nonpoint Pollution Control Program.

Shoreline stabilization, stormwater, runoff, and proper boat fueling are among pollution reducing practices referenced within the BMP guidelines. Additionally, the OCMP Guidebook details specific BMPs marina operators should voluntarily implement to control impacts to water quality. To be certified as an "Ohio Clean Marina", a marina operator must attend a workshop, pledge to meet program guidelines, and then pass an 83 point inspection conducted by the OCMP Site Review Team. Currently there are 33 Certified Clean Marinas and 20 pledged marinas working toward certification. For more information regarding the Clean Marina Program, please visit the following website: www.ohiocleanmarina.osu.edu.

Title: **The Ohio Clean Marinas Program: Boat Shrink Wrap Recycling Program Connects the Boating Community to an Increased Environmental Awareness.**

Authors: *Gary L. Comer, Jr.*¹ and David Kelch
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Shrink wrap is commonly used for protecting recreational boats stored outside during the winter from snow, ice, water and debris. In spring, used shrink-wrap normally ends up in landfills. In addition, improperly discarded plastics are a source of marine debris that can have detrimental effects on aquatic wildlife. Disposal of waste plastic is expensive and time consuming for boaters and marina operators. To address this problem the Ohio Clean Marinas Program and Mondo Polymers Technologies Inc. began a two year pilot program in 2006. Mondo recycles the plastic into guard rail blocks approved for use on highways in all but 10 states. During 2006 and 2007, the program recycled more than 230 tons of shrink wrap; enough to cover Ohio's 312-mile Lake Erie coastline with an 8.6-foot wide strip. In 2007, the program grew 46% with an increase in marina participation from 70 in 2006 to 102 in 2007. When asked the dollars saved by avoiding waste removal and landfill fees, marina operator responses ranged from \$200-\$1500. The average savings was \$407 giving an estimated value of the program approximately \$41,514 in 2007.

Additionally, a partnership, established through The Ohio Clean Marinas Program, with OSU Extension Horticulture has recycled more than 50 tons of greenhouse plastic over the past two years. The program has also opened the door for other organizations to develop similar programs. In 2007, Michigan Sea Grant implemented a pilot shrink-wrap recycling program in Southeast Michigan partnering with Mondo Polymer Technologies, Inc. collecting over 60 tons. For more information regarding this program, please visit the following website: www.ohiocleanmarina.osu.edu .

Title: **Lower Trophic Level and Climate Influences on Lake Erie Percid Year-Class Strength.**

Authors: *Valerie C. Crane*¹, Joseph D. Conroy, Elizabeth A. Marschall, Jeff Tyson, Roger Knight, and David A. Culver
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The recruitment of walleye and yellow perch in the western basin of Lake Erie is highly variable, both spatially and from year-to-year. For this reason, we examined the impact of weather and lower trophic level factors on the year–class formation of these species for the period from 1988 to 2005. We hypothesized that the temporal and spatial match/mismatch of the age-0 fish with their zooplankton prey would influence YCS. We split our data into four western basin areas (island area, west of island area, Maumee Bay, Sandusky subbasin) and used multiple regression analysis with Akaike’s information criterion for model selection to identify the most important factors in determining recruitment. We found that the relative influence of lower trophic level factors differed by area, with zooplankton variables being more important in the less productive areas. Weather factors, however, were important in all areas. Previous winter temperature was found to be very important in shaping the year-classes of both of these percid. Of the lower trophic level variables, the date of the midseason crustacean zooplankton decline and May copepod productivity were the most important factors in yellow perch recruitment, while May cladoceran productivity and May percent *Daphnia* were most important in walleye recruitment. Our results show that even within the same system spatial differences in habitat can lead to different recruitment mechanisms.

Title: **Light, Nutrient, and Plantivory Effects on Phytoplankton Community and Stoichiometric Response, and Food Chain Efficiency.**

Authors: *Elizabeth M. Dickman*¹, Jennifer M. Newell, Michael J. Vanni, and María J. González
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The community composition and C:nutrient stoichiometry of phytoplankton communities is widely variable, and the response of the phytoplankton has implications for food web processes. Specifically, it has been predicted that these responses of the phytoplankton will have implications for energy transfer through the food chain. In this study, we addressed the effects of light, nutrients, and grazing on phytoplankton, and the subsequent effects of the phytoplankton response on food chain efficiency. The relative supply of light, nutrients, and planktivory had strong main and interactive effects on phytoplankton community structure and stoichiometry. Both the taxonomic and stoichiometric food quality of the phytoplankton, as well as the community composition of the zooplankton, affected food chain efficiency across three trophic levels. Since zooplankton as well as phytoplankton response to environmental factors affected the food chain efficiency, this highlights the importance of considering the effects of intermediate trophic levels on food web processes.

Title: **Sediment Sources Associated with Increased Sedimentation in the Delaware and O'Shaughnessy Reservoirs, Ohio.**

Authors: *Amy M. Gillespi*¹, William Renwick and John Maingi
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Reservoir sedimentation reduces the storage capacity of our reservoirs, impairs recreational uses, requires costly dredging, and carries adsorbed nutrients and other pollutants to reservoirs. The reservoirs of concern in this study, the O'Shaughnessy Reservoir and Delaware Lake, have experienced dramatic increases in sedimentation rates in recent decades. Many factors may affect variations in sedimentation rates, including 1) source-area erosion related to either agricultural land use or urban development 2) variations in channel conveyance and/or erosion related to changes in hydrologic regime and 3) occurrence of significant storm events. We do not know which of these factors may be most significant in causing the increase in sedimentation rates in Delaware and O'Shaughnessy reservoirs. The purpose of this study is to determine

sediment sources to the Delaware and O'Shaughnessy reservoirs. We did this first by using remotely sensed imagery, to find changes in impervious surface area within the Delaware and O'Shaughnessy watersheds over the last thirty years. Next, we measured the bankfull width and depth of streams in both urban and rural watersheds. Comparison of these channel dimensions to values found with the USGS Region A bankfull prediction equation suggests that channels in the Delaware and O'Shaughnessy watersheds are not enlarged, implying that channel sources are not the cause of increased sedimentation. We used sediment source fingerprinting to examine further the degree to which channel erosion or soil surface erosion contributes the greatest amount of sediment to the reservoirs, and these data suggest that soil surface erosion is the dominant source. It is unclear whether recent improvements in soil conservation have had any impact on reservoir sedimentation rates.

Title: **Assessment of Reservoir Fish Biomass and Availability of Gizzard Shad Prey in Ohio Reservoirs.**

Authors: *R. Scott Hale*¹, Donald J. Degan, William H. Renwick, Michael J. Vanni, and Roy A. Stein

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Reservoir biomass varies annually in response to abiotic and biotic factors, some of which provide bounds for potential productivity and others which produce sources of annual variation. We sought to quantify reservoir biomass on a broad scale across Ohio reservoirs to better understand the availability of gizzard shad as prey availability for stocked piscivores and their complex role in reservoir ecosystems. Reservoir biomass varied from 10-897 kg/ha from 53 acoustic surveys conducted on 16 reservoirs during 1999-2006. Among 15 variables associated with reservoir trophic state, watershed area, reservoir area, and reservoir volume accounted for 84% of variation in reservoir biomass, and trophic state and watershed area alone could account for 77% of variation in fish biomass. In addition, hydraulic flushing rate and mean depth could explain 64% of variability in biomass. Results supported our hypothesis that acoustic estimates of fish biomass in Ohio reservoirs are essentially estimates of available gizzard shad prey. Classification of reservoirs based on acoustic estimates of fish biomass and watershed, reservoir, and productivity attributes will provide fisheries managers with a means to bracket production potential of reservoirs that complements reservoir-specific assessments of highly variable prey availability.

Title: **Shoreline Re-vegetation on the Cheap.**

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Much information has been disseminated on the value of littoral vegetation for functional lake ecology. Despite this, the traditional suburban land use ethic in the near shore and shallow water habitats continues to cause degradation of lakes and reservoirs. The author has set out to implement a few traditional shore land BMPs on a shoestring budget, and has met with both success and failure. The lessons learned may help willing landowners re-vegetate their shorelines, and at least persuade them to preserve the vegetation they have on their shoreline. Small scale BMPs can be done inexpensively by homeowners with little expertise. Poor shore land management can lead to extremely expensive problems; therefore, a vegetated shoreline is a wise economic as well as ecological choice.

Title: **The Influence of Watershed Land Use on Carbon Dynamics of Ohio Impoundments**

Authors: *Lesley B. Knoll¹*, Michael. J. Vanni, Elizabeth. K. Cable, and
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Freshwater systems are largely ignored in global and regional carbon budgets, likely because they comprise < 3% of the Earth's surface. However, recent studies indicate that lakes and human-made impoundments are important to consider for carbon budgets. Determining if an impoundment is considered a source or sink of carbon depends on the carbon form considered (dissolved and particulate inorganic, and dissolved and particulate organic) and the temporal scale. Human-made impoundments are potentially significant carbon sinks because they are widespread and can receive large quantities of carbon from their watersheds. Impoundments in agricultural watersheds often receive larger quantities of sediment and nutrient subsidies than those in forested landscapes. We examined the relative contribution of carbon form from incoming streams for two Ohio impoundments (Acton Lake and Burr Oak Lake) of varying watershed land use during base flow and storm events. Acton Lake has a watershed dominated by agricultural land use (89%), while the Burr Oak watershed is dominated by forested land use (81%). During base flow, dissolved inorganic carbon (DIC) comprised the largest percentage of carbon form in both Acton and Burr Oak streams. However, during storm events

particulate organic carbon (POC) became the dominant carbon form in Burr Oak while DIC remained the dominant form in Acton. Results indicate that watershed land use and precipitation both play a role in the relative contribution of carbon form exported from streams.

Title: **Using Spatially Explicit Habitat Data to Explain Saugeye Variability in Hoover Reservoir.**

Authors: *Cassandra May*¹, Libby Marschall, Derek Aday, and Scott Hale
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Understanding habitat use in fish requires exploration of both biotic and abiotic aspects of the environment. Saugeye (*Sander vitreum* X *S. canadense*) are a stocked sport fish in Ohio that show variable success across reservoirs. As a step toward understanding what limits saugeye growth and abundance in some reservoirs, we are combining a telemetry and depth-recording tagging study of saugeye with a comprehensive GIS-based exploration of their habitat. The GIS contains spatially explicit information about prey availability, depth, slope, and substrate from Hoover Reservoir, Ohio. We used hydroacoustics to measure prey availability and substrate composition. Results show that saugeye locations do not track prey locations. Saugeye avoid mucky substrate and prefer areas less than 5 m deep. Our results suggest that decisions on stocking densities should be based on habitat availability rather than only on reservoir size.

Title: **Preserving Lakes Using the Human Dimension as Social Capital.**

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Protecting natural resources requires a change in land use activities, which often requires a change in how management decisions are made and also who is involved in the decision-making. Communities are seeking to increase their capacity to effectively use stakeholder participation in resource management decisions. The goal is to increase the social capital of a community so that valuable natural resources, such as Ohio lakes, can be protected using collaborative partnerships.

Local stakeholders and effective partnerships are viewed as critical for achieving environmental goals. This presentation will focus on aspects of community capacity building and will outline how to structure for resource management so that collaborative decision-making and a high level of stakeholder participation is utilized.

The presentation will also address the implications of viewing natural resource management issues as social issues and not merely as technical problems to be fixed by convincing landowners to adopt certain best management practices. Participants will have an opportunity to learn the benefits and challenges of taking a social change approach to natural resource management.

Title: **Community Resistance of Inland Lakes Towards Invasion of an Exotic Cladoceran, *Daphnia lumholtzi*.**

Authors: *Susan Pasko* and Robert Carlson
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A recent invader to Ohio lakes is the cladoceran, *Daphnia lumholtzi*. Archived zooplankton samples from the Ohio Environmental Protection Agency along with contemporary samples were used to investigate the current distribution of *D. lumholtzi* within Ohio lakes. The presence of *D. lumholtzi* was detected in 19 of the 90 lakes and reservoirs surveyed. Surface area was the only abiotic characteristic that exhibited a significant difference between invaded and non-invaded localities, thus it seems unlikely that environmental conditions would prohibit invasion of *D. lumholtzi*. Additionally, *D. lumholtzi* was found to associate with smaller sized zooplankton communities, suggesting that the species may be a stronger competitor than smaller zooplankton while its elongated spines may allow it to persist in predator-dominated communities.

Sediment cores were collected from invaded and non-invaded localities and processed for cladoceran remains. Results from this paleolimnological study revealed that lakes with higher species diversity or the presence of larger sized zooplankton species may be able to resist invasion of *D. lumholtzi* as the species is unable to achieve a high percentage in such communities. In contrast, *D. lumholtzi* has been able to establish in communities dominated by smaller sized zooplankton. The sediment core analysis has also shown a change in species diversity following the invasion of *D. lumholtzi*. This shift involves a decrease in native cladoceran species as well as an increase in littoral species. These results indicate that the establishment of *D. lumholtzi* into lake ecosystems may lead to abrupt shifts in zooplankton community structure.

Title: **Ecologically Functional Stormwater Basin Retrofits.**

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The need to meet post-construction stormwater quality standards set forth by States and regulated municipalities under the auspices of the NPDES Phase II program has become increasingly stringent – and for good reason. Improper stormwater management leaves a distinct, detrimental fingerprint on downstream water quality, urban flood control and receiving stream stability in developing landscapes. Prior to NPDES stormwater regulation, stormwater runoff was almost always locally managed and for no other purpose than to hold back very large, infrequent storm events. Multiple states have now adopted post-construction water quality regulations to address both storm water quantity and stormwater quality in equal perspectives. In Ohio, for example, the Ohio EPA’s NPDES stormwater program defines a post-construction water quality volume (WQv) as the first 0.75 inches of precipitation over a defined drainage area and factors in appropriate runoff coefficients to determine a volume (WQv) of water that must be detained and released within 24-48 hours. Post-construction stormwater requirements such as these regulate to the heart of the ‘first flush’ concept by requiring detainment of runoff and pollutants which are generally discharged at their highest concentrations during the early stages of storm events, especially in urban landscapes. Research has demonstrated that this initial volume of water, previously ignored by traditional stormwater regulation, results in severe impacts to receiving water quality and magnifies baseflow conditions in receiving waters by upwards of an order of magnitude. This article discusses how existing stormwater basins can be retrofitted to meet current standards, and more importantly, how ecological functionality can be incorporated into future stormwater basins to improve water quality, increase stormwater residency times, provide wetland/riparian habitat functions, and improve the economic/aesthetic value of the land.