Abstract, Ohio Lake Management Society Annual Meeting, March 2004

Title: Boater Access and Water-based Recreational Opportunity: 2004 Watercraft Facility Database Update Results and Implications for Improving Boating Access

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Text: Public input identified boating access as a statewide priority issue for the Division of Watercraft. Thus, in 1997, the Division chartered the Boating Access Site Survey (BASS) team to address the issue of boating access and develop a boating facility database. Per the goal group charter, the project mission was *to develop a comprehensive and statewide boating needs/inventory assessment plan to determine the number, location, design standards, and maintenance/replacement plan of access sites and facilities.*

In 2004, the Division of Watercraft undertook a major update of the Watercraft Facility Database. More than 800 public access sites were field inventoried in the summer of 2004, and qualitative and quantitative data were gathered concerning the condition of the facilities and what boater amenities were extant at the sites. Global positioning system (GPS) coordinates were collected using Magellan and Garmin GPS units, and in turn, these coordinates were rendered into a geographic information system layer (shapefile) using ArcGIS software.

This poster presentation will display spatial data and analysis compiled from the 2004 inventory update and will discuss Division of Watercraft's planning initiatives to improve boating access and water-based recreation in Ohio.

Format: Poster

Bioassessment of the Fish Populations in the Ohio River Near Zimmer Power Plant, Moscow, Ohio.

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As part of ongoing research program at Thomas More College, a bioassessment of the fishes and an examination of associated physiochemical parameters were performed. The primary objectives of this year's study were to assess the composition of the fish community, examine spatial variation among the populations at a coal-burning power plant, upstream and downstream from the plant and investigate the chemical and physical characteristics of the Ohio River near the plant. The goal of the study was to determine the potential impacts of the plant on the River ecosystem. A total of 38 fish species comprising over 2000 individuals were collected by electrofishing, gill net, and hoop net techniques. At the upstream sites, 31 species were collected from a total of 1688 individuals. At the downstream sites, 32 species were collected from a total of 689 individuals. These collections revealed very comparable fish communities at both the upstream and downstream sites. Air and water temperatures followed both seasonal and daily patterns as expected. The mean air temperature was 24.37ºC and the mean water temperature was 26.72ºC. Dissolved oxygen (DO) levels showed little variation with a mean of 7.25 mg/L. There was no substantial difference between sites when measuring water pH. The mean pH value for all sites was 8.37. Overall, based on the data collected, the operations of the Zimmer Power Plant appear to have little to no impact on the fish communities and other ecosystem features of the Ohio River, near Moscow, Ohio.

Title: Assessment and Monitoring Reservoir Fisheries with the Inland Management System

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Abstract: Reservoirs are Ohio's most frequently fished inland waters and as such they are extensively stocked, regulated, and monitored by the ODNR, Division of Wildlife. The Inland Management System (IMS) was implemented by the Division in 2003 to enhance coordination and efficiency of fisheries management. This program will expand the base of information used to provide insights into reservoir ecosystems and their performance at local and regional scales. Goals of the IMS are: 1) classify Ohio reservoirs by biotic and abiotic characteristics; 2) monitor aquatic communities and habitats; 3) optimize fish management practices such as stocking and regulation; and, 4) improve identification of management issues and opportunities. Key IMS components are standardized data collection, storage, access, and security. Standardized data collections have been implemented or are planned for all public reservoirs greater than 82 hectares (203 acres) and many smaller ones. Eight reservoirs are currently designated as "reference" reservoirs, which are sampled annually and the balance are designated as "systematic" reservoirs, which are sampled less frequently. This method should improve temporal and spatial resolution of data to track long-term changes and characterize variation of fish populations among reservoirs. Data storage, access, and security are provided by the Ohio Fisheries Information System, a centralized database developed in Sequel Server and shared among staff through our network. The IMS is a complement to more than two decades of work that preceded its development and provided direction, insight, and guidance for this new approach.

Format: platform (oral)

Chemical and Microbiological Studies of the Effectiveness of Bioaugmentation to Prevent Algal Growth in Two Shaker Heights Lakes in the Doan Brook Watershed

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The Doan Brook Watershed is located in the City of Cleveland and surrounding suburbs, ultimately emptying into Lake Erie. Several lakes are located in its headwaters and have experienced excessive algal growth during the past few summers, reducing habitat and aesthetic quality. To curb the algal growth, the City of Shaker Heights, OH decided to use bioaugmentation; a private firm was hired to spray the lakes with a proprietary mixture of three bacteria that would remove ammonia from the system preventing algal growth, and also oxidize organic material in the lake sediments, effectively dredging the lake bottom. A bi-weekly treatment routine was enacted between June and October, 2004, with extensive chemical and biological monitoring of the two treated lakes and a third untreated "control" lake to determine the treatment's efficacy. The results of these studies will be presented. It was found that the lake sediments only contained 10-15% volatile (mostly organic) solids and therefore, the treatments would not increase the depth of the lake significantly. Microbiological studies indicated that one of the treated lakes had very high E. coli concentrations, most likely from urban or sewer run-off infiltration. Algal growth was limited in both treated and untreated lakes, however, the chemical studies, particularly analysis of ammonia and phosphorous, were inconclusive as to whether the bioaugmentation treatments were successful. Future chemical studies are planned for this coming summer to further investigate the water quality in these lakes and gain more information on to the cause and potential prevention of algal growth.

The Evaluation of Aquatic Biomonitors for Source Water Protection

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This project is part of the deployment of a stand-alone, water quality monitoring station (WQMS) incorporating both physiochemical and biological water quality monitoring technologies with data telemetry, data analysis, and water sampling capabilities on the Ohio River at the Thomas More Biology Field Station. This pilot station will provide information regarding design and technical issues for stream-side WQMSs to be incorporated into later work resulting in an early warning system (EWS) network of WQMSs strategically placed throughout the watershed for the protection of source water resources. Photosynthetic activity can be measured using Pulse Amplitude Modulated (PAM) fluorometry. In the present study PAM fluorometry is used to measure the photosynthetic activity of the green alga *Pseudokirchneriella subcapitata* upon exposure to varying concentrations of cyanide. *P. subcapitata* is one of four organisms being tested by the United States Environmental Protection Agency (USEPA) as potential bioindicators of water quality in the Ohio River watershed. *P. subcapitata*, along with *Lepomis macrochirus, Daphnia magna, and Corbicula fluminea* will eventually be placed *in situ* at various sites along the Licking and Ohio rivers to monitor the quality of the water. Data telemetry will allow researchers have real-time access to the data. Presently, baseline responses are being established in laboratory conditions to set critical values for behavioral endpoints. When these critical values are breached, an alarm is sent to the laboratory and the risk assessment begins. In this study, *P. subcapitata* was exposed to four different concentrations of cyanide. The results of this cyanide-induced algal inhibition were used to calculate an LC-50 (the lethal concentration for 50% of individuals). This, along with further testing, will be used to establish a critical value at which these *in situ* monitoring systems will alarm.

Environmental Monitoring Systems

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Title: OPTICAL DISSOLVED OXYGEN SENSORS IMPROVE DATA, MINIMIZE DOWNTIME

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Format: Oral

Text:

There are generally three methods for measuring dissolved oxygen in surface waters: Winkler titration; membrane covered electrochemical sensors; and newly developed optical-based sensors. The optical technology for measuring Dissolved Oxygen (DO) is becoming well accepted due to advantages over membrane-based sensors, and excellent correlation to Winkler titrations. This paper will present a comparison of the various strengths and weaknesses of the current methods, with a focus on accuracy and resistance to biofouling over long-term deployments. Comparative data from impartial studies will be presented.

Optical sensors rely on lifetime-based florescence to measure DO levels *in-situ*. A lumiphore is illuminated with a blue LED, becomes excited, and emits back a red luminescent light with a lifetime that is inversely proportional to DO levels.

Optical technology has many advantages over membrane electrodes. Optical sensors are especially accurate below 2 ppm—a range in which most membrane sensors routinely give poor results. When monitoring anoxia in open bodies of water, achieving accurate readings below 2 ppm allows researchers to reliably characterize nutrient-related hypoxic zones.

Optical DO sensors require almost no maintenance other than an occasional cleaning with a soft cloth. The sensing element is long-lived—in some cases requiring replacement only once every 5 years. Optical sensors exhibit fast response with little or no drift over long deployments, minimizing the need for frequent maintenance and calibration. Users of optical DO sensors report that cost of ownership is drastically reduced, quality of data is improved, and potential for user error is virtually eliminated.

Foibles, Brambles, and Conundrums – Cyanobacteria

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Understanding cyanobacteria ecology, bloom dynamics, and their toxins is key to mitigating these troublesome odor, taste, and sometimes toxic organisms. PAK™27 algaecide is approved for use as an algaestat or algaecide for the selective control of blue-green algae in ponds, lakes, and drinking water reservoirs. It is a granular addition compound of sodium carbonate (Na_2CO_3) and hydrogen peroxide (H_2O_2). This environmentally sound compound is not persistent and is nontoxic to the ecosystem at recommended dosage. Applications of various other algaecides to dense algal blooms may cause oxygen depletion that can result in fish kills. PAK™27 is not likely to cause oxygen depletion as it selectively removes blue-green algae, leaving green algae, diatoms, and other desirable algal forms intact. It initially adds oxygen to the system and the beneficial chlorophyll *a* oxygenators are retained in the water column producing oxygen to support fish and obligate aquatic organisms. Noxious sulfur compounds are oxidized by PAK™27 and it has been shown to reduce the taste and odor contaminants, geosmin and 2-methylisoborneol. Blue-green algae toxins should be readily oxidizable but no definitive studies have been done. The toxins of blue-green algae can best be minimized by using PAK™27 as an algaestat to “prune the bloom” before it becomes problematic. The Case Study in Bradenton, FL shows the efficacy data. PAK™27 is the ideal, environmentally sound, selective blue-green algaecide.

OLMS 2005: Life Below the Surface

Lake Management in Ohio – A Watershed Approach

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Water is a threatened natural resource. The human use of land is intense, which has a negative impact on the water that we need. Protecting water resources, such as our beloved lakes, requires a change in land use, which often means a change in how and who makes the management decisions – thus requiring a social change approach to water protection.

In Ohio, local stakeholders are viewed as critical for achieving environmental goals. This approach utilizes collaborative decision-making and a high level of stakeholder participation. In essence, natural resource management should be viewed as a social issue and not merely as a technical problem to be fixed by convincing landowners to adopt certain best management practices.

Three core components to effective watershed planning and implementation are: science-based, community-led, and sustainable[1]. These elements overlap and must be in balance using diverse stakeholder involvement where effective participation is achieved. As such, watershed groups seek to increase their capacity through enhancements to the people involved, technical knowledge, financial ability, networking skills, organizational development, and legitimacy within the community[2].

Ultimately, watershed planning results in land use decisions based on best management practices. For lakes, using a watershed approach means applying appropriate best management practices according to location. There are four lake zones to consider: shoreline, shoreline buffer, shoreline protection area, and the contributing watershed[3]. Each zone can handle certain allowable uses, whereas other activities should be limited or non-existent. These guidelines might not address what the community desires; however, the more it is adhered to, the less money that will be needed for in-lake algae and weed control.

References:

[1]Ohio's Nonpoint Source Management Plan, 2005-2010. To access, visit the document at http://www.epa.state.oh.us/dsw/nps/NPSMP/index.html.

[2]Steelman, T.A., 1999. "Community-Based Environmental Management: Agency- and Community-Driven Efforts." Presented at the 21st Annual Research Conference of the Association for Public Policy Analysis and Management. Graduate School of Public Affairs, University of Colorado: Boulder, CO.

[3]Caraco, Deborah. 2001. "Nonpoint Source Control in Urban Lakes". Presented at the 14th Annual National Conference on Enhancing the States' Lake Management Program. Center for Watershed Protection: Ellicott City, MD. For more information, visit www.cwp.org and www.stormwatercenter.net.

OLMS Abstract

IS MERCURY IMPACTING FISH IN OHIO'S LAKES?

Purpose: Ohio EPA, Ohio Department of Natural Resources, and Ohio Department of Health jointly sponsor Ohio's Sport Fish Consumption Advisory program. The purpose of the program is to collect data and disseminate information to the public regarding the safety of eating the fish they catch. Over the past several years, a small number of inland lakes have received consumption advisories for predator species, especially largemouth bass, due to elevated mercury concentrations.

Significant Results: Since 1993, more than 100 lakes in Ohio have been sampled for fish tissue. Fourteen of 18 existing fish advisories on inland lakes are due to mercury contamination from aerial deposition. Among these are some of Ohio's best known fishing lakes, including Punderson Lake and Lake La Su An. In addition, Ohio's statewide "one meal per week" advisory is applicable to all fish from all inland lakes.

Main Conclusions: Over the past five years, Ohio has issued 14 mercury advisories for fish from inland lakes, a trend expected to continue as more data are collected. Lake contamination is due to aerial deposition of mercury. As public awareness increases, Ohio receives more inquiries from anglers concerned with the safety of consuming sport fish. Without appropriate education, contamination may negatively impact Ohio's sport fishing industry as more advisories are issued. Ultimately, the advisory program may be used as a tool to track mercury levels for information on source control. Controlling sources of mercury will further the goal of unrestricted fish consumption from Ohio's waters.

Format: Oral presentation.

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