Successful Shoreline Restoration

Presenter: **Bob Allison**, J.F. New & Associates

While working for JFNew for 8 years I (Bob Allison) have experienced numerous phases of shoreline stabilization and restoration of natural areas. JFNew has always focused on the utilization of native plants and various forms of bioengineering when applicable. We have researched and pioneered many techniques, methods, and material options to provide our clients with the highest quality restoration solutions. I will convey to the audience the many considerations, steps, materials, and potential methods necessary to complete a successful shoreline restoration.

We will discuss the need for shoreline stabilizations while stressing the significance of native plants and there role in the process. The initial assessment/evaluation of a potential project will lead the audience through the considerations, criteria, methods, materials, planning, and execution of a plan through the final restoration. I will use a power point presentation in conjunction with handouts, prompts, and examples to reinforce my presentation.

Deployment of an Automated Profiling Buoy on East Lynn Lake, Wayne County, West Virginia for Selective Withdrawal Operations to Regulate Tail Water Quality.

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Text: East Lynn Lake, located in Wayne County, West Virginia, is a reservoir operated by the US Army Corps of Engineers, Huntington District. To remain in compliance with federal regulations, one of the primary purposes of this project is to conserve fish and wildlife populations necessitating the monitoring of water quality. Lakes, such as East Lynn, that have outflow structures with multilevel intakes, also known as selective withdrawal systems, can be managed to regulate outflow water quality. In order to maintain healthy aquatic communities, a seasonally appropriate water temperature regime can be preserved within the tail waters. Additionally, precipitation of iron hydroxide which fouls stream sediment can be minimized by limiting the release of anoxic water. Accurate and timely water quality profile data, including temperature and dissolved oxygen, is required to accomplish this mission. An initial attempt to automate data collection occurred during the 2002 sampling season with the deployment of a R.U.S.S. (Remote Underwater Sampling Station) buoy at East Lynn Lake. This lake possesses many characteristics, including a deep, narrow channel, rugged bank topography and no cellular telephone coverage, typical of reservoirs within mountainous West Virginia. These conditions proved to be a challenge to the buoys design and operation. As a result,

the buoy functioned less than optimally during the first year of operation. These obstacles were eventually overcome through coordination with Apprise design staff. The buoy worked reliably throughout the 2003 sampling season and has become a valuable tool in the management of East Lynn Lake.

Format: Oral

Ohio's Reservoir Creel Survey Program: Design, Direction and Implementation

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Abstract:
As the primary means of assessing behavior and attitudes of anglers, angler surveys are an important component of the Ohio Division of Wildlife's (DOW) inland reservoir assessment program. Angler survey data collected from 1990-2001 were evaluated to determine the efficacy of current angler survey procedures. Angler survey methods used during the study period involved sampling an individual reservoir about 22 days per month from April through September. This type of extensive sampling resulted in a relatively small number of annual surveys. Consequently, few reservoirs were surveyed more than once in a twelve-year period. I examined peaks in angling activity to determine when creel surveys should be conducted and used standard equations to determine the number of creel surveys needed for a several different levels of precision. Angling activity on Ohio's reservoirs peaked from May through July, suggesting that conducting surveys during other months was unnecessary. Furthermore, data of adequate precision could be collected with substantially less effort per reservoir. Finally, elimination of weekday surveys did not affect resulting trend information. Incorporating this information into DOW creel survey design allows collecting of annual angler survey data from a greater number of reservoirs for a given amount of annual effort.

Format: Oral

Assessment of Gizzard Shad Size, Abundance and Biomass in Ohio Reservoirs

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Degan, Donald J., Aquacoustics, Inc., 29824 Birdie Haven Court, Sterling, Alaska 99672-1473, 907/260-6341, djdegan@aquacoustics.com

Abstract: Gizzard shad *Dorosoma cepedianum* have important roles in Ohio reservoirs as prey for sportfish, competitors with plantivores, and recyclers of nutrients, but estimating gizzard shad size, abundance, and biomass with precision has been difficult due to their small size and patchy distribution. We quantified gizzard shad size, abundance, and biomass in 13 reservoirs during 1999-2003 with acoustic surveys to characterize spatial and temporal variation. Reservoirs were 155-1,328 ha surface area with mean depths of 3-11 m, Secchi transparency of 43-125 cm, and typically with thermoclines from 3-7 m. Twenty-nine mobile acoustic surveys were conducted at night during August through September with a BioSonics DT echosounder equipped with two split-beam 200-kHz, 6-degree circular transducers. Transducers were positioned to survey vertically from 2 m to the bottom and horizontally from the surface to 2 m. Mean lengths of gizzard shad ranged from 38-129 mm (0.7-20.1 g) during late summer. Abundance ranged from 981-280,033 fish/ha among all reservoirs and years. Annual variation was less between years within the same reservoir, and generally increased with reservoir fertility. Biomass exceeded 400 kg/ha in some reservoirs but was more commonly 50-100 kg/ha. Acoustic surveys provided excellent precision in most reservoirs with the coefficient of the variation of the mean typically less than 15% for abundance and biomass estimates. The wide range of spatial and temporal variation in mean length, abundance, and biomass characterized the dynamic influence of gizzard shad as prey, planktivores, and nutrient recyclers in reservoir ecosystems.

Format: Oral Presentation

Evidence of anthropogenic impact on the Summit Lake ecosystem: Akron, Ohio

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Lake sediments preserve a history of change to both the lake and its watershed. Study of a lake sediment core can reveal the impact that changes in land use have had on a lake ecosystem. A 7-meter long sediment core from Summit Lake, a kettle lake in Akron, Ohio, exhibits changes in trace metals, magnetic properties, organic content, color, and grain size resulting from anthropogenic activity within the watershed. Between 725 cmblf – 275 cmblf, a highly organic gyttja with low trace metal concentrations was deposited in pre-European settlement times when there was little disturbance of the surrounding tamarack swamp. With the construction of the Ohio-Erie Canal, the lake was drained to one quarter of its original surface area in 1827 and the canal was completed through Summit Lake in 1830. The canal and associated activity in the watershed is recorded in the sediment as a transition from gyttja to layered mud at about 275 cmblf. Organic content decreases and mineral content increases above 275 cmblf as land disturbance in the watershed increases sediment erosion. Industrial activity greatly increased between the 1890's and the 1970's. Industrial activity, urban growth, increased impervious surfaces and highway construction within the lake's watershed all contributed to elevated trace metals concentrations. ^{210}Pb dating is currently underway in order to place the sediment record in a better temporal context thereby aiding the interpretation of the effects of anthropogenic activity on the Summit Lake ecosystem.

Format: Oral session

Reservoir Fisheries Management for a Small Agency: Steps Toward a Comprehensive Program.

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The Hamilton County Park District is a regional park agency in the Cincinnati, Ohio metropolitan area that currently manages four small reservoirs from 11 to 78 hectares in size for biological diversity, and recreational fishing and boating. A new aquatic resource management program was initiated at the Hamilton County Park District in 2000 that encompassed existing water quality monitoring, aquatic vegetation management and fish stocking activities, while adding fish population sampling and a creel survey. The goal of the program is to formulate comprehensive management strategies for each reservoir that take into account water quality, aquatic plant management, and quality of the angling experience. By establishing relationships with universities for assistance in data collection, collecting other data in-house, and receiving technical support from state agencies, the Hamilton County Park District has begun to reap the benefits of a more comprehensive program.

Oral presentation preferred.

Effects of AMD on the Ecology of Lake Hope

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Text:

Lake Hope, a reservoir in southeastern Ohio, has received a continuous influx of acid mine drainage (AMD) since its creation in 1939 because of numerous coal mines in the upper reaches of its ten-square-mile watershed. AMD is typically characterized by increased acidity and metal concentrations. This investigation seeks to elucidate the processes of AMD attenuation within Lake Hope and its impact on the ecology of the lake. Seven sampling sites were chosen based on access to AMD input. In Spring 2003, offshore sediments, their pore water, benthic organisms (*Chironomus* sp. and Tubificidae), and the overlying lake waters were sampled at each site. Conductivity, pH, dissolved oxygen, temperature, depth, acidity, alkalinity, and sulfate and chloride concentrations were measured in the water column. Percent organic matter and grain size of the sediments were assessed. Concentrations of the metals Al, As, Cd, Cu, Cr, Fe, Mn, Ni, Pb, and Zn were measured in the benthos, sediments, pore water, and overlying water at each site. Sediments were subjected to a sequential extraction scheme in order to identify metal partitioning among five geochemical phases. Results will illustrate relationships among tissue metal concentration in the organisms and corresponding physical and chemical data. This will clarify the extent of the mobility and bioavailability of AMD metals in the sediments and into the bottom of the food chain of the lake. This type of analysis is rare for lakes within watersheds impacted by AMD and may be important in appraising the health of fish caught for recreation.

Format: Poster

Document: Microsoft Word X

Livestock Manure Violations Impact on Water Quality in Ohio Lakes and Streams

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Ohio fish kills have declined each decade from 2330 cases (1973-1982) to 1473 cases (1993-2002), a 37% decrease. Livestock manure fish kills have increased 73% from 180 to 311 for each respective time period. Agricultural fish kills (leading cause) accounted for 22.5% (80 cases) of the 356 fish kills in Ohio that were investigated from 1997-2002, and livestock manure fish kills accounted for 72% (58 cases) of those cases. Over 560,000 fish were killed covering 430 miles of Ohio streams and lakes.

Investigations reveal that liquid manure from tile lines is the main source of water quality contamination. Mid-size and large swine (42 cases), dairy (37 cases), and poultry (13 cases) were the main pollution sources. Water quality tests show that BOD5 levels are 120X higher (448.29 mg/L) downstream from a manure spill. Ammonia tests are 47.43X higher (44.79 mg/L) downstream, and total phosphorous levels 3.24X higher (34.09 mg/L) higher downstream from a manure spill.

Major causes of liquid manure in tile lines are due to excess rain, poor management, lack of manure storage, over application, broken/shallow tile and other factors. Surface manure applications by irrigation and surface tanker applications along with deep knife injection applications were identified as major equipment application problems. Poor calibration and over application were problems identified. Tile plugs were found to be only 50% efficient at preventing liquid manure pollution in tile lines. Regular inspection of tile lines, proper calibration of equipment, lower manure application rates, and good management could prevent most agricultural fish kills.

Format:

Prefer oral 30 to 60 minute power point presentation (No Poster Presentation has been created yet. Not sure if adequate time or money to have a poster created).

Using Tree Ring Chronologies to Reconstruct Historic Lake Erie Water Levels

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Lake Erie is an important resource and its fluctuations have a large impact on both the environment and the economy. Lake levels fluctuate in response to a variety of climatic conditions within the basin which in turn are linked to larger scale atmospheric teleconnections via the Pacific/North American Oscillation (PNA).

Comparison of NOAA monthly Lake Erie level variations with moisture sensitive tree-ring chronologies from sites within the basin show strong positive correlation with spring lake levels. Tree growth in the basin reflects the overall moisture budget of the region as do lake levels. Local tree ring chronologies alone are not sufficient to model past lake levels and we have exploited the PNA see-saw between the upper Midwest and the North Pacific climate, by including a set of coastal Gulf of Alaska ring-width series. These tree ring chronologies are temperature sensitive and have a strong negative correlation with spring lake levels in Lake Erie. Warm, moist springs in the Gulf of Alaska are associated with drier conditions in the Midwest.

Preliminary dendroclimatic models based on North Pacific and Midwestern tree ring series explain over 50% of the variation in March lake levels. The common period between tree growth and lake level data is 56 years. The goal of this research is to use chronologies from Alaska as well as other chronologies from around the Lake Erie Basin and within the Great Lakes basin to reconstruct a 200 year proxy for Lake Erie water levels.

Management of Fish Populations in Ohio Inland Lakes- Approaches to Stocking and Habitat Improvement.

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Fish populations in inland lakes are influenced by a wide variety of factors including water quality, habitat quality, and competition between like and dissimilar species. This presentation will provide an overview of these factors and will include recommendations for assessing current conditions in the lake and watershed, identifying fishery management goals, stocking programs, and habitat improvement.

The Analysis of Largemouth Bass growth and slot fishing in SW Ohio lakes.

by Michael C. Miller, Diane McCubbin, Bernard J. Moller, Department of Biological Sciences, University of Cincinnati.
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Electrofishing and bass tournament data provide the data base to examine length and weight frequency distributions and assign likely ages to Bass 1-5 years old. Scale analyses are more variable in our hands. The food web base for bass is variable but includes small bluegill sunfish, gizzard shad, and crayfish depending upon the lake. Bass clubs want trophy bass; many home owners want many fish to reinforce less determined fisher-persons. Lakes where catch and release is the rule LMB may be stunted by intraspecific competition. Others may have insufficient large 'trophy' predators to control the larger prey species. In all lakes growth rates of bass have been very good, only growth into trophy status varies.

Site Selection of Sediment Deposits in A Man-Made Lake

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Abstract

Wetland restoration using dredged materials in a man-made lake has been commonly practiced in the country. The dredging project was to remove materials from undesired locations and to place them at acceptable locations within the same lake. The simplest dredging process known as agitation dredging involves disturbing bed materials by forcing them into suspension, after which they will be moved by natural water flow for depositing elsewhere. Pipelines would be used to transport dislodged and suspended bed materials to deposit locations. This study conducted the investigation of pipeline criterion for best selecting deposit sites using geographic information system (GIS). Pipeline length was used as one of the evaluation criteria based upon the ArcView GIS for site selection. Multicriteria decision analysis techniques were incorporated into GIS to enable the development of the model that produced standardized commensurate map layers. The maximum score and score range procedures were used for linear scale transformation. It was introduced to transform input data into commensurate criterion maps. The minimum value map is subtracted from the maximum value map to obtain the range map layer. The raw data map is then subtracted from the maximum value map to obtain the maximum difference map that is then divided by the range map for the minimization of the linear scale transformation. Finally, the pairwise comparison method was used to determine the criteria weights by normalizing the eigenvector associated with the maximum eigenvalue of the ratio matrix. Based on statistical and heuristic theory, the method can precisely select the appropriate level of importance for each criterion. The model was applied to the dredging program at Charles Mill Lake of Ohio. Out of the six evaluation criteria, pipe length was ranked the second based on the pairwise comparison selection used.

KEY WORDS: Dredging, Sediment, Reservoir, GIS, Pairwise

Updating Ohio's Reservoir Maps

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The Ohio Department of Natural Resources (ODNR), Division of Wildlife (DOW) is updating bathymetric maps of reservoirs to reflect changes in reservoir morphology, surface area, and volume. Reservoir maps originally published by the ODNR were created using pre-impoundment relief data from 7.5 minute topography quadrangles. Since that time Ohio reservoirs have changed due to sedimentation and facilities updates, and mapping technology has improved with the advent of global positioning systems (GPS). During 1998, the DOW developed methods for collecting, analyzing, modeling and geo-referencing point data to produce new maps with highly accurate depth contours. The maps are developed by surveying reservoirs with a Raytheon bathymeter and Trimble (GPS), then modeling data and incorporating results in an ArcView Geographic Information System (GIS). Advantages of our methods include rapid data collection, multi-purpose use of data, speed and accuracy of data queries, and ease of editing and updating data. Spatial analysis will enable us to combine digital map layers to further enhance our ability to monitor changing reservoir habitats, manage fisheries, identify facilities locations, and provide anglers with accurate maps. Thirty-two updated maps have been published to date, and are available in on-line (DOW website) and hard copy formats. Additional surveys will be conducted until all maps of public reservoirs >30 acres have been updated or created. Future additions to each reservoir GIS will include habitat and fish survey layers assembled from standardized fisheries surveys.

Format: oral