Rush Lake / Upper Waukau Creek

Resource Inventory and Strategic Planning Project Summary

www.northernenvironmental.com/rushlake

Aerial photo of Rush Lake, Summer 2000. Note cloudy algae-filled water in the lake's main basin, with clearer water areas along the west shoreline.

Rush Lake covers slightly more than 3000 acres in southwestern Winnebago County and adjacent portions of northern Fond du Lac County, Wisconsin. Rush Lake's shallow depth and marshy shoreline provided ideal waterfowl habitat. The watershed was historically one of the most prolific waterfowl production areas in the Midwest. Deforestation, increased sediment and nutrient loading, artificially controlled water levels, and exotic species such as carp have all contributed to the degradation of this vast shallow lake and associated wetlands. Waterfowl production and use has been greatly reduced by these degraded conditions. Large amounts of lead shot have accumulated in Rush Lake's sediments from approximately 150 years of hunting, resulting in waterfowl mortality.

Overview of Rush Lake's History and Natural Resources

Rush Lake is classified as a "prairie pothole." Although a strict definition of prairie pothole does not exist, these water bodies typically are broad and shallow, with water levels that rise and fall in response to seasonal changes and precipitation. Prairie pothole lakes commonly partially dry out and can disappear completely during times of drought. Rush Lake is the largest prairie pothole lake east of the Mississippi River.

Rush Lake's watershed was formerly a patchwork of savanna, prairie, forest, and marsh. European and Yankee immigrants began colonizing the area in large numbers during the early- to mid-1800s. With them came sweeping land use changes. Forests and prairies were replaced with large expanses of plowed fields and pastures. Many of the marshes were drained to allow even more land to be devoted to agriculture. The water bodies were also modified by ditching, damming, and channel straightening. These changes created a situation where more sediment and nutrients are transported to water bodies, while less filtering capacity exists to absorb these pollutants.

Rush Lake's history of artificial water level stabilization and manipulation began with permanent European settlement. Controversy over the appropriate water level began during 1847, when a dam allowed the lake to expand to twice its normal size, causing flooding. Because higher water levels support submergent

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Current Rush Lake Outlet. Note partial blocking by floating cattails. This is a very common occurrence.

Dams on Waukau Creek have kept water at a relatively constant level for much of the past 150 years. However, because of the increased erosion in the watershed and relatively constant water levels, the lake is filling with sediment at an accelerated rate. Emergent plant species such as hardstem bulrush (the plant for which Rush Lake was named) are disappearing, as the lake is being transformed from a prairie pothole into a deep cattail marsh.

Winter kill of fish occurs almost every year. As a result, the lake is primarily a waterfowl lake. The management needed to significantly enhance the fishery would be detrimental to waterfowl. Carp and other rough fish are more tolerant to low oxygen levels, and therefore are more capable of surviving winter kills, and are plentiful in Rush Lake. Carp are known for degrading habitat and water quality by uprooting vegetation, consuming desirable plants, and re-suspending sediments during bottom feeding and spawning. When operating properly, the Waukau carp trap effectively blocks most Fox River carp from reaching the lake, but a second barrier may need to be established to block carp from Uihlein Marsh. Controlling carp populations will be necessary to improve Rush Lake's vegetation.

Difference between vegetation at Rush Lake in early 1900s (left) and 2001 (right).

Issues and Goals Identified

A group of local residents, state and federal officials, and others banded together to form the Rush Lake Steering Committee. The committee's goal is to revitalize the lake and surrounding wetlands, so that the area once again reaches its achievable species diversification and recreational use. The Steering Committee realized that the project would only be successful if the community understood, participated, and supported the planning process. Northern Environmental Technologies, Incorporated was contracted to assist with the resource inventory, public participation, and plan formation.

An important part of the planning process was public participation and communication. A year-long outreach program consisted of monthly meetings, two open houses, several informational presentations, quarterly newsletter publications, design and updates of a website, and formation of five study groups.

Early on in the process, the Steering Committee and public identified the following goals:

Re-establish more desirable and diverse aquatic vegetation

Design well planned water level management and control strategies

Improve waterfowl and wildlife habitat

Improve water quality

Reduce carp population/improve fisheries

Reduce effect of lead on the ecosystem

Study Groups Examine Issues and Formulate Recommendations

Five study groups (Water Level, Vegetation, Wildlife, Water Quality and Lead) consisting of volunteers, Steering Committee members, and Northern Environmental staff met over a period of several months. Recommendations from each group were the culmination of independent research, public opinion and educational opportunities. Some of the research conducted on Rush Lake to aid in understanding the ecosystem included sampling and quantifying water quality, identifying aquatic plants and estimating abundance, sampling bottom sediments for lead shot, and evaluating waterfowl gizzards bagged on Rush Lake for lead shot.

The study groups concluded that the lake water levels should be temporarily reduced to expose 50 percent of the lake bottom for two growing seasons. The existing outlet dam will most likely need to be modified to allow temporary water level reductions. These modifications should include a method of keeping carp out of the lake but allow continued migration of game fish. Drawdowns are a trusted long-term technique to help re-establish emergent vegetation after vegetation has been reduced by high water or muskrats. Lowering water levels during the growing season allows naturally occurring seeds to germinate and flood-stressed emergents to recover. A two-growing-season drawdown was chosen so that emergent plants have adequate time to develop, which will help prevent the plants from becoming dislodged when water levels are returned to the present elevation. A drawdown would also cause a significant winterkill (greatly reducing carp population), and compact loose lake bottom sediment. Game fish will also be impacted by the drawdown; however, fish from streams and other refuguia will repopulate the lake after the drawdown.

Dealing with lead shot in the lake sediments has proven to be a challenge. The Lead Study group continues to study this problem, and some success has been reported. Water jetting has successfully settled lead shot into deeper sediments, where it is less accessible to waterfowl. Lower water levels may affect waterfowl access to lead shot.

Lead shot removed from the gizzard of a duck bagged on Rush Lake

Therefore, hazing the ducks from the lake during the drawdown may be necessary to prevent lead poisoning of the waterfowl. However, the future benefits to waterfowl from the drawdown should greatly outweigh the short-term negative impacts of ingested lead. It also appears that if bulrush is reestablished, their thick rhizome (root) mats will cover the lake bottom limiting waterfowl's access to lead.

What's Next????

The study groups recommended an educational process be started so that farmers and residents in the watershed learn better methods of controlling runoff. Base-line water-quality data should be established before the management changes are made, and long-term monitoring should be designed to track water-quality changes as management strategies are implemented.

The Steering Committee has reviewed the study group recommendations, has evaluated some of the component permitting and logistical issues, and will likely ratify these recommendations. Research regarding dam design, sediment contaminants, outlet structure modifications, downstream hydraulic capacity, and financing will need to be addressed before any physical work is undertaken.

Hundreds of individuals devoted thousands of hours of time to identify and prioritize important goals, study the issues component to achieving these goals, and develop a plan that allows the most important goals to be met symbiotically. Based on a poll taken during March 2002, the public believes this process produced a meaningful and workable plan. Consequently, if funding can be obtained, the study group recommendations should have a good chance of becoming reality.

Dan Small of Outdoor Wisconsin televised episodes focusing on Rush Lake's restoration. These episodes aired during 2002.