Amnicon Lake Strategic Plan

Amnicon Lake (WBIC: 2858100)
Douglas County, Wisconsin

Project Initiated by:

The Amnicon-Dowling Lake Management District, Lake Education and Planning Services, LLC, and the Wisconsin Department of Natural Resources

EXECUTIVE SUMMARY

Amnicon Lake (WBIC: 2858100) is a 390-acre, stratified drainage lake from which the Amnicon River flows located in Northwest Wisconsin in Douglas County. Amnicon lies downstream of Dowling Lake (WBIC: 2858300), and the two lakes are connected by a small, unnamed stream that is approximately 450 meters long. The two lakes are nestled in the Upper Amnicon River watershed (HUC 12), but the area that drains specifically to the lakes is rather small – 4.04 mi^2 – with mostly undeveloped woody wetlands and mixed forests (NLCD, 2016). The shoreline of the lake is virtually totally developed with homes and cabins. With a maximum depth of 31 feet, an average depth of 10 feet, and typically high levels of nutrients, Amnicon is considered borderline mesotrophic to eutrophic and impaired with excessive algal growth (WDNR 2021).

The Amnicon-Dowling Lake Management District (ADLMD) wished to develop a strategic plan by compiling past studies and reports to make informed recommendations and a plan for the future. The group hired Lake Education and Planning Services LLC (LEAPS) in 2021 to complete it.

The intent of this project was to assemble all available report and planning recommendations related to Amnicon Lake and assess current and past data to determine if those recommendations have been met and if they were successful in improving the lake. To accomplish this, a review of all publicly available reports, plans, and datasets related to lake use, fisheries, water quality, watershed land cover, shoreline habitat assessments, and aquatic plant surveys was performed to gauge the effectiveness of past management recommendations so that a clear, and more effective, plan can be made going forward.

The management recommendations in this strategic plan are the result of a combination of data analyses, discussions with the ADLMD, and an extensive review of past reports and documents. Summarized strategies for management consist of: education and information, nutrient reduction, protection of native aquatic vegetation, AIS prevention and planning, continued monitoring, and adaptive management. Ultimately, the ADLMD should be able to use this document as a guide to future management options as part of a larger comprehensive plan.

INTRODUCTION

Amnicon Lake is a popular destination for recreation and for many families with homes and cabins along the shore. The lake is the primary major outflow to the start of the Amnicon River that ultimately flows to Lake Superior and drains approximately 184,907 acres. The area that drains to Amnicon Lake is relatively small – 4.04 acres – and contains mostly natural cover in the form of woody wetlands and mixed forests (NLCD, 2016). Despite the natural state of Amnicon Lake's immediate drainage area, the lake is challenged with occasional algal blooms and increasingly eutrophic conditions. The ADLMD has made it a goal to improve all aspects of the lake in perpetuity so that its natural resources can continue to be enjoyed long into the future.

It is an immense challenge to improve water quality in a lake that is naturally teetering on the edge of eutrophic (nutrient-rich, algal blooms, poor water clarity) and mesotrophic (less nutrients, less likely to have algal blooms, and increased water clarity) conditions. The task is complicated even further by predicted changes in climate, increasing potential for pollution, land use changes, and invasive species. Protection alone is not enough. The ADLMD can only hope to meet its goals through a committed effort to improve and restore the shoreline, protecting native vegetation, decreasing nutrient flow into the lake, educating lake property owners and lake users on what they can do to benefit the lake, and taking an adaptive management approach that uses current information to inform future plans.

Given the enormity of these tasks, the ADLMD is drawing upon past research and recommendations to guide their future actions. Going forward, the group should focus on including and continuing long-term studies and problem-oriented short-term research. However, the ability of the ADLMD to fully accomplish these actions is largely dependent on a dedicated volunteer base. Commitment, structure, and forward thinking will be crucial in maintaining significant momentum so that short and long-term goals can be achieved.

This document outlines a plan of action for improving multiple facets of Amnicon Lake, including its shoreline, water quality, native vegetation, fishery, protection from invasive species, and resilience to climate change. This strategic plan is designed to make significant improvements in the ability of the ADLMD to manage resources, train volunteers, and respond to issues as they arise. As these actions are implemented, long-term monitoring of water quality will continue, recommendations on improving the shoreline and reducing runoff will be made, and surveys of the fishery and vegetation (native and invasive) will be conducted so that management recommendations can be made and/or adapted to meet the needs of the lake and its users.

The successful accomplishment of the goals, objectives, and actions outlined in this strategic plan will better prepare the ADLMD to face the significant challenge of managing Amnicon Lake into future.

PAST RESEARCH AND RECOMMENDATIONS

The past several decades have yielded research and reports that range from limnological studies to septic system surveys (Figure 1). These documents all play a valuable role in informing future management, and a summary of the reports and their recommendations, if provided, are outlined below.

WATER QUALITY

* Indicates recommendations are included in the report.

- 1974 – Douglas County Water Quality Assessment
- 1979 – Amnicon-Dowling Lake Limnological Study
- 1981 – Amnicon and Dowling Lakes Feasibility Study Results
- 1993 – Amnicon Dowling Lake Historical Data Review
- *1994 – Aerial Lakeshore Analysis of Amnicon/Dowling Lakes Report

Water Quality Analysis

- *1997 – Water Quality Analysis of Lakes Amnicon and Dowling
- *1999 – Water Quality Analysis
- *2004 – Lake Plan
- 2012 – Sediment Core Analysis
- 2019 – Septic Survey

In addition to specific studies, monitoring of water quality has been undertaken by volunteers following Citizen Lake Monitoring Network protocol since the 1970s. A timeline of these studies is included in Figure 1.

PAST WATER QUALITY RECOMMENDATIONS

† Indicates recommendation has been implemented.

- 1994 – Aerial Lakeshore Analysis of Amnicon/Dowling Lakes Report
    - Determine if there is available point source data
    - Research options for centralized sewer/storm water systems
    - Research if point source data needs to be collected, a sampling plan designed, and to be implemented by spring of 1995 or sooner (if pursued, hydrologic effects on the lake should be evaluated because it could lower lake and aquifer)
    - † Determine general groundwater flow and possibility of aquifer contamination especially in low lying areas (implemented in 2003)
    - Develop a mechanism to begin strict enforcement of zoning ordinances for future construction or remodeling projects
    - Maintaining lawns to the water's edge should be discouraged
    - Install berms to control runoff from steep hillsides and impervious areas

- Install riprap to prevent erosion where appropriate

- 1994 – Water Quality Analysis
  - Explore alternative wastewater management options (centralized waste treatment systems and holding tanks)
  - Develop a relationship with the ADLMD and local zoning agencies so that development projects are reviewed before construction
  - Discreet objectives related to watershed and in-lake issues should be adopted by the ADLMD
  - Establish a steering committee to direct lake-wide implementation of watershed best management practices (BMPs)
  - Establish a steering committee to follow-up on the recommendations for the establishment of an integrated plant management plan
  - † Develop groundwater and nutrient budget for both Amnicon and Dowling
  - † Continue chemical and physical water quality monitoring
  - Work to implement recommendations of the Aerial Lakeshore Analysis

- 1997 – Water Quality Analysis of Lakes Amnicon and Dowling
  - † Continue in-lake physical, chemical, and biological monitoring
  - Establish a monitoring program for drinking water wells for evaluation of compliance to standards
  - Determine best course of action for wastewater treatment for Lake Amnicon and Dowling watershed
  - Continue and expand lakeshore BMPs

- 1999 – Water Quality Analysis of Lakes Amnicon and Dowling
  - † Temperature and dissolved oxygen profiles taken every meter July-September and February-March
  - † Surface total phosphorus taken every other week or once per month June-September
  - † Surface chlorophyll-*a* taken every other week or once per month June-September

- 2004 – Final Report Amnicon and Dowling Lake
  - Reduce P loading from human activity – septic, surface water runoff from lawns and impervious surfaces
  - Review 2006 comprehensive fish survey to assess if biomanipulation of fish is an option for reducing internal P loading (42% of loading in Dowling is internal according to this study)
  - Shoreline native vegetation buffers of 20ft or more, do not rip rap, avoid excessive fertilization of lawns, avoid making swimming beaches, do not dump leaves or lawn clippings in the lake, reduce high speed boating in shallow areas
  - Implement an information and education effort to advise residents of land use activities that could contribute nutrients to the lakes – dumping leaves, ashes, animal waste, lawn clippings, lawn fertilization, etc.
  - Recommend soil testing so residents know how much fertilizer they need and use P-free fertilizer

- † Recommend inspecting and repairing septic systems and maintain systems with periodic pumping and good use practices
- † Recommend dissolved oxygen (DO) testing December-March to check for possible winterkill conditions, with DO and temperature profiles May-September and Secchi at deep hole in both lakes

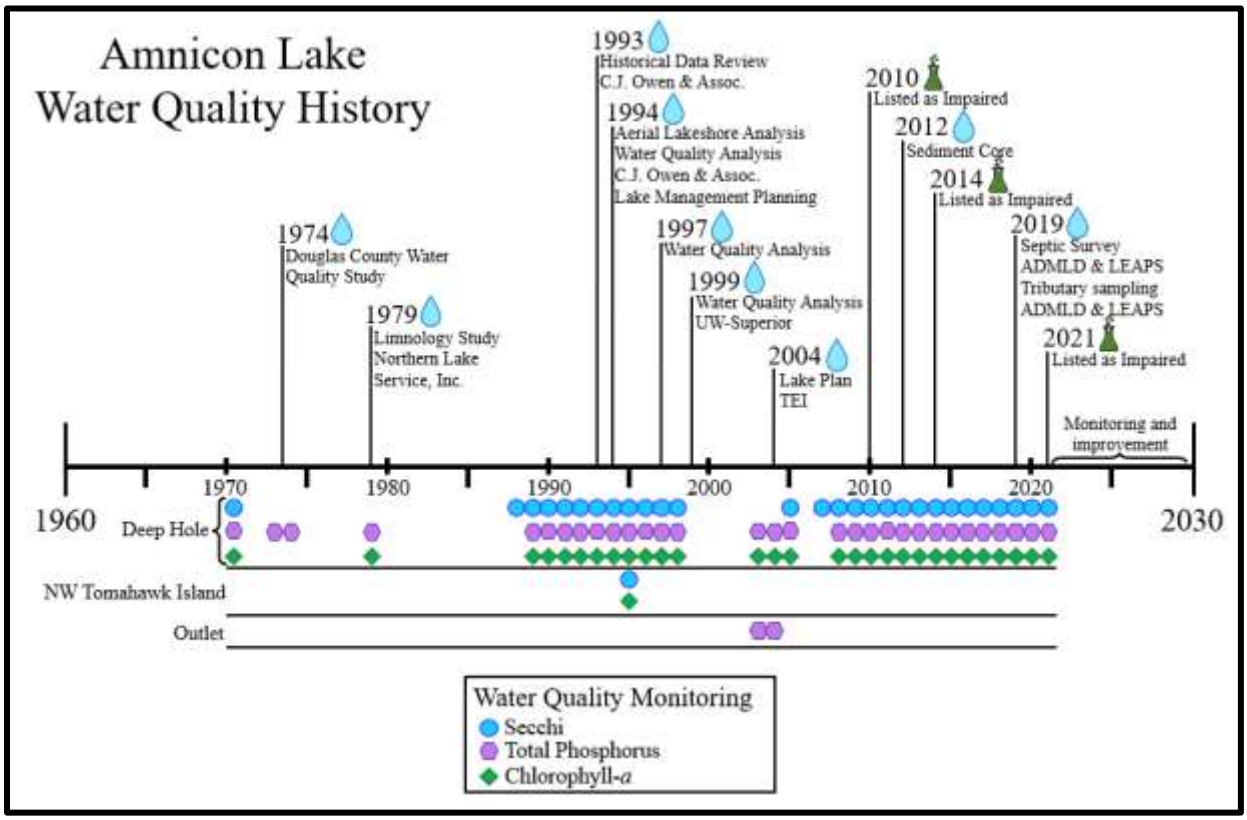

Figure 1: Timeline of water quality studies and monitoring

FISHERY

* Indicates recommendations are included in the report.

- 1947 – Fishery survey - WDNR
- 1955 – Fishery survey - WDNR
- 1962 – Muskellunge spawning survey - WDNR
- 1966 – Fishery survey - WDNR
- 1989 – Walleye fall electrofishing survey - WDNR
- 1990 – Walleye fall electrofishing survey - WDNR
- 1991 – Walleye fall electrofishing survey - WDNR
    - Fishery survey - GLIFWC
- 1992 – Muskellunge survey - WDNR
    - Walleye fall electrofishing survey - WDNR
- 1997 – Muskellunge survey - WDNR

- 1999 – Walleye survey - WDNR
- 2005 – Fishery survey - WDNR
    - Walleye fall electrofishing survey - WDNR
- *2006 – Fishery survey report - WDNR

In addition to specific surveys, fish stocking and propagation actions have been performed since the 1940s. A timeline of these studies is included in Figure 2.

PAST FISHERY RECOMMENDATIONS

† Indicates recommendation has been implemented.

- 2006 – Fishery survey report – WDNR
    - Maintain walleye abundance in Amnicon Lake at 3.2 adults/acre
    - Retain current muskellunge regulation since recruitment overfishing does not appear to be affecting size structure and abundance
    - Track recent introduction of northern pike and their effect on the fish community
    - Explore aging analysis of muskellunge as funding and future workload permits
    - Work with local residents, the Amnicon/Dowling Lake Management District, the Douglas County Land and Water Conservation Department and the WDNR lake grants program to revisit the lake management plan to ensure management objectives are being met

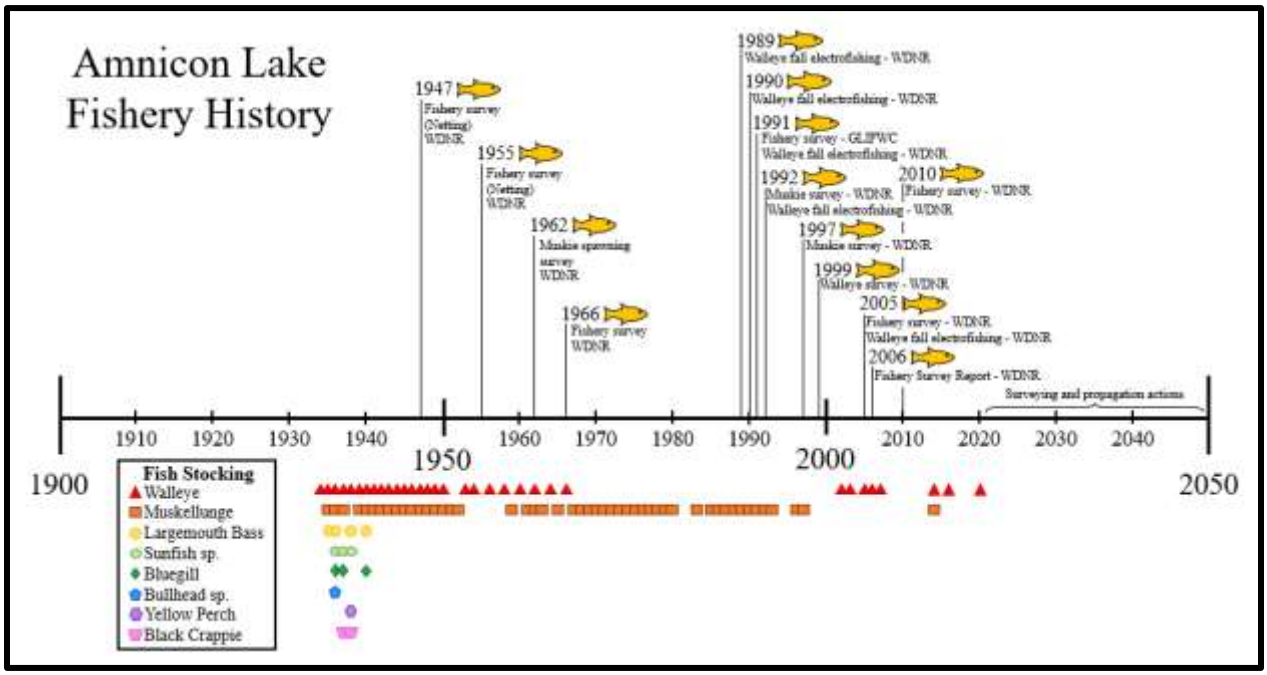

Figure 2: Timeline of fishery related activities

AQUATIC PLANT MANAGEMENT

* Indicates recommendations are included in the report.

- 1994– Macrophyte survey
- 2010 – Douglas County AIS Strategic Plan
- *2012 – Curly-leaf Pondweed and Point Intercept Survey
- *2014 – Aquatic Plant Management Plan
- *2016 – High Density Bed Mapping and Wild Rice Survey
- *2017 – Native Plant Harvesting Survey
- Aquatic Plant Management Plan

A timeline of these studies is included in Figure 3.

PAST AQUATIC PLANT MANAGEMENT RECOMMENDATIONS

† Indicates recommendation has been implemented.

- 2012 – Curly-leaf Pondweed and Point Intercept Survey
    - Preserve native plants and the critical habitat they provide for the whole lake ecosystem
    - Work to improve water clarity and reduce excess algal growth along developed shorelines by working to limit nutrient inputs
    - Specifically, avoid mowing down to the lakeshore and reduce or, if possible, eliminate grass clippings runoff, fertilizer applications, and other sources of nutrients near the lakeshore such as pet waste and ash from fire pits
    - Encourage shoreline restoration and the establishment of native vegetation buffer strips along the lakeshore to further prevent runoff and erosion
    - Consider adding slow/no wake buoys near the wild rice beds to prevent them from being uprooted during their vulnerable floating-leaf stage
    - Monitor the size of the three known CLP beds and consider active management if they continue to increase
    - Refrain from removing native plants from the lake unless necessary as these patches of barren substrate makes it easier for CLP and new AIS to establish
    - Remove Purple loosestrife from shoreline areas wherever it occurs and dispose of away from the water
    - Continue lake's established Clean Boats/Clean Waters program which serves to inspect incoming/outgoing boats and educate lake residents and visitors about the dangers of AIS
    - Improve the signage at the lake's boat landing that warns people about the dangers of AIS
    - Consider carrying out monthly landing inspections and at least annual meandering shoreline surveys of the lake's littoral zone to look for new AIS
    - Complete an Aquatic Plant Management Plan that clarifies a potential response to a new AIS, such as Eurasian watermilfoil, if one becomes established in the lake

- 2014 – Amnicon Dowling APM Plan
    - Continue AIS prevention and monitoring

- Provide greater AIS education efforts for property owners
- Continue water quality monitoring
- Protect and enhance wild rice in Amnicon
- Continue Purple loosestrife and other AIS management efforts
- Implement aquatic plant management actions that will maintain or improve water quality in both lakes

- 2016 – High Density Bed Mapping and Wild Rice Survey
  - Releasing Purple loosestrife beetles may be necessary if populations do not increase
  - Remove Purple loosestrife flowers and plants
  - Eliminate Yellow iris along shoreline and prevent introduction
  - Continue efforts to prevent an infestation of Eurasian watermilfoil
  - Use boat traffic to maintain navigation channels to access the lake through thick vegetation
  - Limit plant removal to only what is necessary for residents to access open water

- 2017 – Aquatic Plant Management Plan
  - No active management where excess aquatic plant growth does not impact lake use, where the benefit of management is far outweighed by the cost of management, where water quality or other lake characteristics limit nuisance growth conditions, and where highly valued native plants or habitat would be negatively impacted (for example, areas with Wild Rice in Amnicon Lake).
  - A shoreline evaluation survey should be performed
  - Manual and mechanical removal of Curly-leaf pondweed (CLP)
  - The ADLMD should purchase and operate a small aquatic plant harvester to manage native aquatic vegetation and CLP

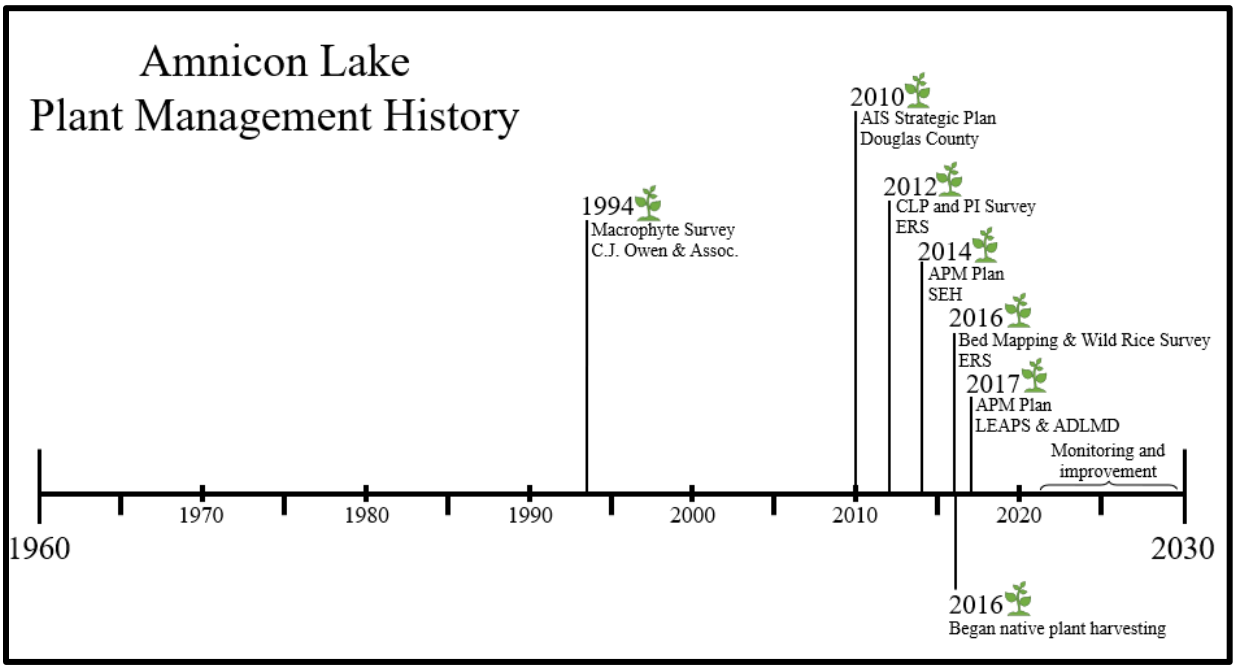

Figure 3: Timeline of aquatic plant management

FUTURE RECOMMENDATIONS

Managing a lake to improve water quality is complicated, multifaceted task that requires the collaboration of multiple stakeholders and the participation of an active lake group. The following recommendations are designed to be performed by the ADLMD with the help of the WDNR and other resources.

WATER QUALITY

- **Water Quality Monitoring**
    - Continue chemical and physical water quality monitoring using CLMN protocol
    - Determine general groundwater flow and possibility of aquifer contamination

- **Nutrients**
    - Determine point source pollutants and develop a plan to reduce nutrient inflow to the lake
    - Examine the previous shoreline habitat assessment survey and make recommendations for reducing nonpoint source pollutants
    - Perform a survey of septic systems to determine if they are a source of nutrients to the lake
    - Determine the role of sediment release of phosphorus in the lake
    - Explore options for nutrient reduction
    - Develop nutrient reduction plan

WATERSHED

- Develop a plan to identify and improve areas in the watershed where runoff may be an issue
- Identify inlets to Amnicon Lake and determine if there is sufficient flow to monitor
- Monitor flow in the inflow and outflow of the lake

SHORELINE

- Develop a mechanism to begin strict enforcement of zoning ordinances for future construction or remodeling projects
- Complete Land Use Digitizing of the developed area of Amnicon Lake
- Implement an education campaign focused on Healthy Lakes projects
- Develop a Shoreland Improvement Outreach Project that incorporates the Shoreland Habitat Assessment completed in 2017
- Develop goals and a timeline for shoreline restoration projects
- Identify properties in a natural state and plan how to keep them that way

AQUATIC PLANT MANANGEMENT

- Develop an AIS monitoring schedule
- Schedule future point-intercept surveys
- Compare all point-intercept data
- Review and update the existing APM Plan for Amnicon Lake

FISHERY

- Work with WDNR officials to understand the fishery and future needs

GENERAL HISTORY

To give a more general picture of the management planning and implementation history for lakes Amnicon and Dowling, figure 4 includes all of the previous timelines in one place.

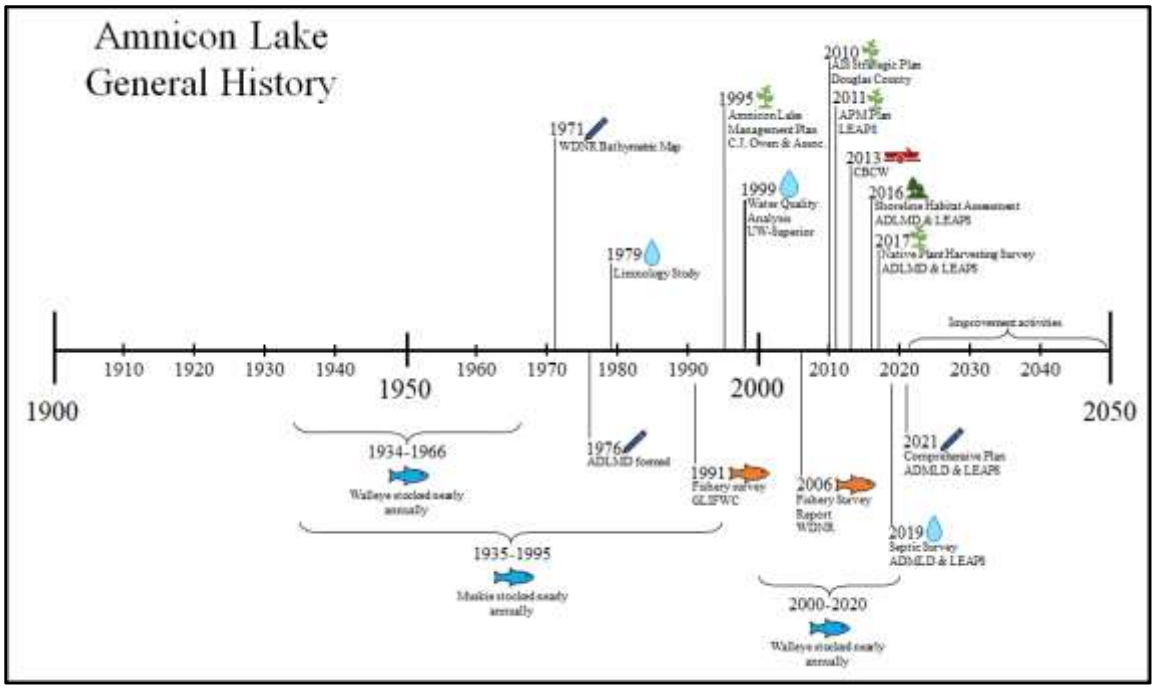

Figure 4: Historic timeline for water quality, aquatic plant, and fisheries management planning and implementation

DOWLING LAKE COMPREHENSIVE LAKE MANAGEMENT PLAN

A Comprehensive Lake Management Plan has been completed in draft form for Dowling Lake. Within the Dowling Lake Plan are many goals, objectives, and actions that also apply to Amnicon Lake. In the following sections, potential goals, objectives, and actions are laid out for Amnicon Lake. They are also included in an Implementation Matrix for Amnicon.

Amnicon Lake Preliminary Goals, Objectives, and Actions

The following Goals, Objectives, and Actions should be considered for inclusion in a Comprehensive Lake Management Plan for Amnicon Lake and are recommended for implementation over the course of the next 10 years (2022-2031).

Goal 1: Provide information and education with the intent of changing stakeholder behaviors to protect Amnicon Lake.

Getting support and buy in from all Amnicon Lake property owners and lake users, along with support from local agencies is imperative to successfully manage the lake.

Objective 1. Establish a constituent supported "committees" structure to address major areas of lake management.

- Education and Information
    - Main task would be communication and information sharing through Facebook, webpage, newsletter, and other social media outlets
- Shoreland Improvement
    - Main task would be to encourage, promote, and support activities to improve shorelands
- Water Quality
    - Main task would be to collect water quality data on the lake, report it, and share with other stakeholders
- Aquatic Plants, Algae, and Aquatic Invasive Species
    - Main task would be to support aquatic plant (and algae if determined necessary) monitoring and potential management
- Fisheries and Wildlife
    - Main task would be to work with WDNR and other partners to support fish stocking and other management actions
- Government and Grants
    - Main task would be to coordinate efforts between the ADLMD, Town, County, University, and State. Would also take the lead on soliciting grant funding.

Objective 2. Use existing channels to deliver at least one focused educational message per quarter to meet the goals of this plan.

- Community forums, Web and Facebook pages, Newsletters, Emails, Presentations and brochures at the ADLMD meetings, and Press releases in local newspapers
- Special educational sessions such as pontoon classrooms, property tours, Healthy Lakes workshops, and CBCW trainings
- Create stickers or signs to symbolize participation in different lake improvement program as a way to start a conversation with neighbors

Goal 2: Reduce nuisance algae growth by reducing sources of phosphorus

Amnicon Lake is on Wisconsin's Impaired Waters List under the Federal Clean Water Act, Section 303(d). Sources of phosphorus should be reduced such that Dowling Lake is removed from the Impaired Waters List as indicated by an in-lake average seasonal total phosphorus concentration of 30µg/L and in-lake chlorophyll value of less than 20µg/L for 30% of the days in the sampling season. Both external and internal sources of phosphorus and other nutrients need to be addressed.

<u>2A - External Loading</u>

Objective 1. Document land use within the developed area around the lake.

- Complete land use digitization of the developed area around the lake

Objective 2. Plan and install 1-3 shoreland improvement projects annually.

- Develop and deliver an educational message regarding the importance of and what constitutes a healthy shoreland area and how it reduces sources of P

- Organize annual workshops to encourage property owner participation healthy lakes projects: native plantings, rain gardens, diversions, and infiltration practices
    - Use results from the Shoreland Habitat Assessment as a guide
- Identify property owners interested in installing practices
- Prepare Healthy Lakes Grant applications to provide technical assistance and cost sharing to fund practices
- Implement shoreland improvement projects

Objective 3. Reduce the amount of foreign debris (grass clippings, leaves, road salts, sand and sediment, etc.) that get into the lake.

- Develop and deliver an educational message regarding the importance of appropriate disposal of lawn debris (encourage sweeping and raking, bagging, composting, mulching, etc.)
- Work with the local Township to come up with ways to clean up/reduce sand and salt applied to roads around the lake (curbs and catch basins, street sweeping, etc.)

Objective 4. Upgrade 100% of existing non-compliant or failing, and drainfield-based septic systems; eliminate all gray water discharge to the lake.

- Develop and deliver an educational message regarding the relationship between increased phosphorus in the lake and non-compliant or failing septic systems, septic systems that rely on drainfields, and graywater discharge
- Identify shoreline property owners willing to upgrade their septic system
- Support non-mandatory upgrades to existing septic systems with WDNR Surface Water or other funding if possible

Objective 5. Protect and preserve undisturbed/undeveloped property around the lake.

- Identify areas of the lake to protect and preserve
- Research and explore the formation of a conservancy, purchase of easements, grant funding, and other opportunities for protecting and preserving land
- Identify property owners who may be interested in preserving property around the lake

Objective 6. Restore wetlands adjacent to Amnicon Lake.

- Identify restorable wetland areas adjacent to the lake
- Identify property owners willing to participate in wetland restoration projects
- Develop a wetland restoration plan in cooperation with Douglas County and the WDNR and implement it

Objective 7. Prevent forestry timber management operation from negatively impacting Amnicon Lake.

- Monitor forestry activities within the direct watershed of Amnicon Lake
- Communicate forestry concerns to Douglas County

2B - Internal Loading

Objective 8. Reduce sediment disturbances caused by boating.

- Develop and deliver an educational message regarding the relationship between boat traffic and P release from the sediment to property owners and visiting boaters
- Consider a boating or wave restriction ordinance to minimize sediment disturbance caused by boating

Objective 9. Maintain or increase the amount of existing shallow lake and wetland/lake fringe vegetation (See Goal 4, Objectives 2-4).

- Develop and deliver an educational message regarding the importance and value of aquatic vegetation along the shore and in the shallow areas of the lake in reducing shoreland erosion and sediment resuspension
- Consider a boating or wave restriction ordinance

Objective 10. Gather data that can be used to update septic system contributions to the lake.

- Develop a survey to collect basic septic system data including people hours and type of septic system in place

Objective 11. Determine the role of phosphorus released from the sediment.

- Complete a sediment release study

Objective 12. Consider the use of biomanipulation to improve water quality.

- Work with the WDNR and/or Tribal Resources to complete a fisheries survey
- Continue stocking of walleye and other predator fish species
- Complete a zooplankton survey

Goal 3: Prevent the introduction of new invasive species and manage existing invasive species.

Currently purple loosestrife and yellow iris, two shoreland emergent plants are relatively common along the shoreline of Amnicon Lake. New efforts should be made to control purple loosestrife and the impact of yellow iris and the ability to control its spread should be evaluated. Curly-leaf pondweed is the only submerged aquatic invasive species listed to be in the lake. Annual bedmapping survey should be completed to determine the extent of CLP in the lake and if its distribution and density increases over time.

Efforts should be made to keep AIS not already in the lake, out. EWM, giant reed grass (non-native phragmites), zebra mussels, New Zealand Mudsnails, and spiny waterflea are all present in nearby waters.

Objective 1. Monitor and manage existing AIS.

- Purple loosestrife (survey work, physical removal and/or bio-control)
- Yellow iris (survey work, physical removal and/or aquatic herbicides)
- Curly-leaf pondweed (survey work, physical removal)

Objective 2. Prevent the introduction and spread of new aquatic invasive species.

- Participate in a Clean Boats, Clean Water monitoring and education program at each boat landing

    - Combine both the Lake Amnicon and Dowling Lake into one CBCW monitoring program
    - Participate in additional WDNR statewide programs including the Landing Blitz and Drain Campaign
- Place and update AIS signage at the boat landings as necessary
- Participate in the Citizen Lake Monitoring Network AIS Monitoring program
- Develop and implement an AIS Rapid Response Plan

Goal 4: Protect and enhance native aquatic plant growth

Increasing the amount of aquatic plant growth in Amnicon Lake will be critical to improving water quality. The last whole-lake aquatic plant survey was completed in 2012, with a lesser survey completed in 2016. For better information related to density, distribution, and diversity the whole lake needs to be surveyed again as soon as possible, likely in the second year of this plan's implementation. Property owners should be encouraged to minimize any plant removal they might participate in, in an effort to protect what is already present.

Objective 1. Document changes in native aquatic plant density, distribution, and diversity.

- Redo a spring and summer whole-lake, point-intercept, aquatic plant survey
    - Apply for grant implementation money in 2022 and with the survey completed in 2023
    - Repeat again in 2028

Objective 2. Protect existing native aquatic vegetation in the nearshore and wetland fringe area of the lake.

- Develop and deliver an education and information program to promote the benefits and importance of aquatic plants to improving water quality
- Provide recognition signs to property owners who support no management or re-establishment of aquatic plants on their shoreline

Goal 5: Evaluate the progress of lake management efforts and needs through monitoring

The main goal of this plan is to maintain or improve water quality in Amnicon Lake. The main metric for measuring this is positive changes in water clarity, chlorophyll-a, and total phosphorus. These are the values that will be looked at in future impaired waters listings (2024, 2026, 2028, and 2030) included in 10 years covered by this plan. ADLMD volunteers on Amnicon Lake should continue their involvement in the expanded level of CLMN. Amnicon Lake is already and will continue to be a WDNR Long-term Trend Lake which will provide additional lake chemistry parameters.

At least one whole-lake management action is recommended in this plan – biomanipulation. This action includes certain additional parameters to be monitored including zooplankton (see Section 7.3.1), lake level, and precipitation. Once inlets to Amnicon Lake have been identified, tributary monitoring should be repeated at least twice during the 10 years of implementation. Each time it should be collected monthly and with storm events for a minimum of two years in a row, three would be better.

Shoreland improvements and a campaign to replace all conventional septic systems with holding tanks justifies additional monitoring for dissolved forms of nitrogen and phosphorus, pH, conductivity, and

bacteria/E-coli. Multiple studies have indicated that nitrogen is either more limiting than phosphorus or co-limiting with phosphorus it terms of supporting the growth of algae. In addition, tracking changes in shoreland development either by protecting undeveloped properties or by making improvements to existing shoreland is necessary.

Finally, while bio-control of purple loosestrife has been in place on Amnicon and Dowling lakes for many years, an official survey to determine the extent of the beetle population has not been done.

Objective 1. Monitor short and long-term changes to water chemistry as a reflection of water quality.

- Continue to monitor Chlorophyll-a and Total Phosphorus – CLMN expanded monitoring program
- Complete monitoring for the dissolved forms of nitrogen and phosphorus
- Complete NDS testing to help provide greater clarity as the limiting nutrient in Amnicon Lake
- Collect pH and conductivity data
- Monitor for bacteria and E-coli

Objective 2. Monitor physical lake characteristics.

- Water clarity – CLMN program using a Secchi disk
- Lake level – CLMN program or WDNR/County water level monitoring
- Precipitation – Community, Collaborative, Rain, Hail and Snow monitoring program
- Dissolved oxygen and temperature profiles – CLMN program, digital meter owned by the ADLMD

Objective 3. Document tributary loading of nutrients.

- Collect flow, volume, and N and P parameters monthly and during storm events at three inlet sites and the outlet
    - Collect data for a period of 2-3 consecutive years, twice during the 10 year period of this Plan
- Consider upgrading sampling methods for more consistent data

Objective 4. Document progress made in shoreland improvement.

- Repeat a Shoreland Habitat Assessment again year 5 and year 10 of implementation

Objective 5. Document the status of past Galerucella beetle rearing and release projects.

- Complete a general survey of the beetle population around Amnicon Lake

Goal 6: Follow through with implementation of this plan

Not every action in the plan is intended to be implemented immediately. Some are intended to be implemented on an annual basis throughout the entire timeframe covered by the plan. Others have a specified time frame. Some actions will require additional support from consultants and the WDNR through its grant funding programs, and some can be done by the ADLMD or other entities with little implementation costs.

Included in the Implementation Matrix is a list of all the individual goals, objectives, and actions that are to be implemented over the course of the next ten years and a when during that ten year period, each of

the actions should be implemented. It is important for the ADLMD to view this schedule and determine what parts of it are of highest priority to them so both human resources and financial support can be appropriated. The Implementation Matrix provides a place for the ADLMD to prioritize the actions. Once that has been done, implementation begins leading to the objectives associated with this goal.

Objective 1. Complete project implementation and assessment reports annually.

- Prepare annual summary reports of the actions implemented in each year
    - Adapt as necessary

Objective 2. Complete mid- and end-of-project reports.

- Take stock of the actions that have and have not been accomplished midway through the implementation
    - Evaluate the focus of the first five years and modify if necessary for the second five years
- Take stock of the actions that have and have not been accomplished near the end of implementation
    - Fully evaluate the accomplishments of the 10 year project
    - Identify actions that still need to be accomplished, that should be removed, or that should be added for the next 10 years

Objective 3. Develop and maintain the necessary partnerships to support implementation.

- Maintain the open dialogue, constituent involvement, partner involvement, etc. necessary to complete the actions in this plan
- Identify new partners and resources that could help implement the actions in this Plan

FUNDING SOURCES

In addition to the outside resources and expertise needed to successfully implement recommended actions, financial assistance will be needed. While outside sources of funding exist, the ADLMD will have to contribute, making it imperative that the constituency be fully aware and supportive of what is planned and implemented. The following lists other sources of funding, but is not exhaustive. Other funding sources will likely have to be identified and explored as well.

Douglas County Environmental Reserve Fund

A significant sum of money from the ATC came with that agreement to be used for environmental purposes as a way to mitigate environmental impacts of the new line. Douglas County combined some of this money with other sources to develop the Environmental Reserve Fund, administered by the Douglas County Land Conservation Committee (LCC) with oversight by the Administration Committee and County Board. The purpose of the fund is to make available modest amounts of money to small, Douglas County entities working on environmental issues; while earning interest, which will be applied to the principal, to continue the fund into the future.

https://www.douglascountywi.org/718/Environmental-Reserve-Fund

WI-DNR Surface Water Grants[1]

The surface water grant program provides cost-sharing grants for surface water protection and restoration. Funding is available for education, ecological assessments, planning, implementation, and aquatic invasive species prevention and control. With many different projects eligible for grant funding, you can support surface water management at any stage: from organization capacity development to project implementation.

- Education
- Planning
- Comprehensive Management Planning
- County Lake Grants
- Healthy Lakes and Rivers
- Surface Water Restoration
- Management Plan Implementation
- Clean Boats, Clean Waters
- AIS Supplemental Prevention
- AIS Early Detection and Response
- AIS Large- or small-scale Population Management
- AIS Research and Demonstration
- Land Acquisition
- Early Detection and Response Projects
- Established Population Control Projects
- Maintenance and Containment Projects
- Research and Demonstration Projects

Grant Funding History

The WDNR Surface Water Grant program has been used in the past to obtain financial resources to complete management planning and implementation. Figure 5 provides of timeline for previous grants that have been obtained to support management planning and implementation, and lake protection since the early 1990's.

[1] For more information on WI-DNR Surface Water Grants go to: https://dnr.wisconsin.gov/aid/SurfaceWater.html

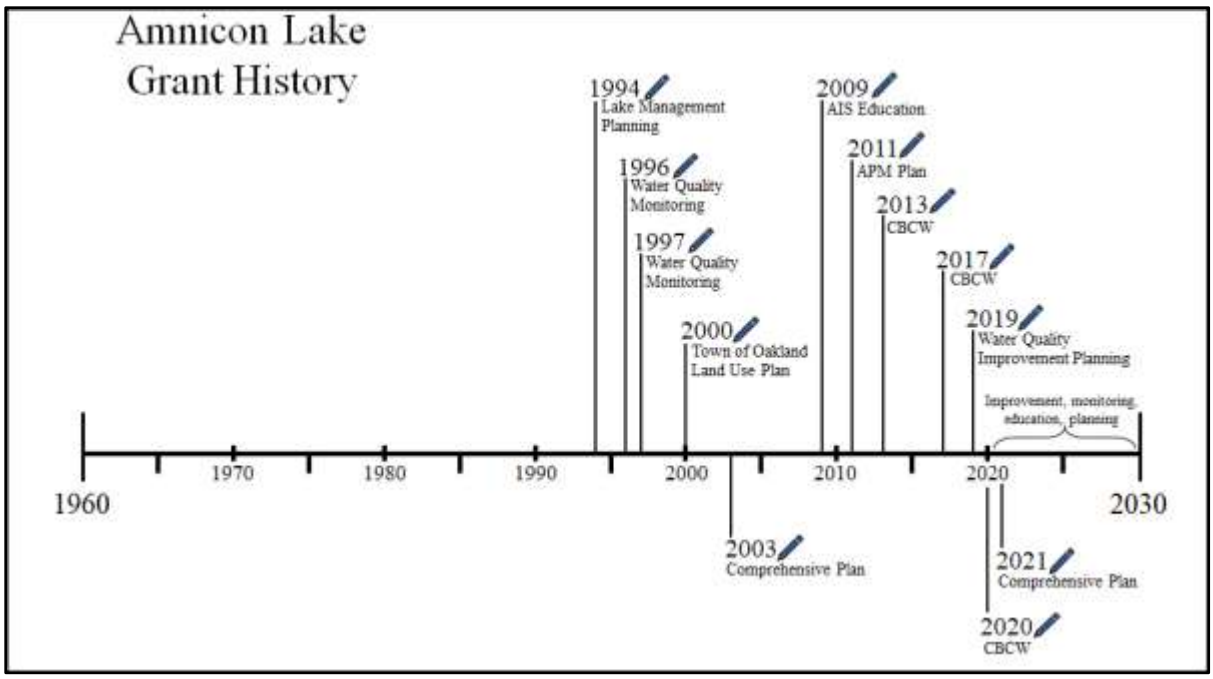

Figure 5: Timeline of WDNR Surface Water grant funding obtained by the ADLMD

SUPPLEMENTAL DOCUMENTS

2022-2031 Amnicon Lake Management Implementation Matrix

AIS of Concern

Amnicon Strategic Planning Figures - PowerPoint Presentation

2016-17 Amnicon Lake Shoreland Habitat Assessment Results