

Outdoor Heritage Fund Grant Application



The purpose of the North Dakota Outdoor Heritage Fund is to provide funding to state agencies, tribal governments, political subdivisions, and nonprofit organizations to:

Directive A. Provide access to private and public lands for sportsmen, including projects that create fish and wildlife habitat and provide access for sportsmen;

Directive B. Improve, maintain, and restore water quality, soil conditions, plant diversity, animal systems and to support other practices of stewardship to enhance farming and ranching;

Directive C. Develop, enhance, conserve, and restore wildlife and fish habitat on private and public lands; and

Directive D. Conserve natural areas for recreation through the establishment and development of parks and other recreation areas.

Exemptions

Outdoor Heritage Fund grants may not be used to finance the following:

- A. Litigation;
- B. Lobbying activities;
- C. Any activity that would interfere, disrupt, or prevent activities associated with surface coal mining operations; sand, gravel, or scoria extraction activities; oil and gas operations; or other energy facility or infrastructure development;
- D. The acquisition of land or to encumber any land for a term longer than twenty years; or
- E. Projects outside this state or projects that are beyond the scope of defined activities that fulfill the purposes of Chapter 54-17.8 of the North Dakota Century Code

NO CONSIDERATION:

In addition to those specific items in law that are ineligible for funding, in the absence of exceptional circumstances, the following projects will NOT receive consideration for funding:

- Projects that are already completed;
- Projects that are on-going (Phased projects would be considered);
- Staffing;
- Feasibility studies;
- Annual maintenance;
- Paving projects for roads and parking lots;
- Swimming pools;
- Non-permanent equipment (such as tractors, snowmobiles);
- Research;
- Projects where the applicant is not directly involved in the project.

Application Deadline

Applications for the second grant round cycle are due on **August 1, 2014 at 5:00 p.m. CT**. All information, including attachments, must be submitted by that date. See instructions below for submission information.

Instructions

Please download this Word document (available on the Industrial Commission/Outdoor Heritage Fund Program website at <http://www.nd.gov/ndic/outdoor-infopage.htm>) to your computer and provide the information as requested. You are not limited to the spacing provided except in those instances where there is a limit on the number of words. After completing the application, save it and attach it to an e-mail and send it to outdoorheritage@nd.gov or print it and mail it to the address noted in the next paragraph.

Attachments in support of your application may be sent by mail to North Dakota Industrial Commission, ATTN: Outdoor Heritage Fund Program, State Capitol – Fourteenth Floor, 600 East Boulevard Ave. Dept. 405, Bismarck, ND 58505 or by e-mail to outdoorheritage@nd.gov. The application and all attachments must be received or postmarked by the application deadline. You will be sent a confirmation by e-mail of receipt of your application.

You may submit your application at any time prior to the application deadline. Early submission is appreciated and encouraged to allow adequate time to review your application and ensure that all required information has been included. Incomplete applications may not be considered for funding. **Any item noted with an * is required.**

Oral Presentation. Please note that you will be given an opportunity to make a ten-minute Oral Presentation at a meeting of the Outdoor Heritage Fund Advisory Board. These presentations are strongly encouraged.

Open Record. Please note that your application and any attachments will be open records as defined by law and will be posted on the Industrial Commission/Outdoor Heritage Fund website.

Name of Organization * Logan County JDA

Federal Tax ID# * 45-6002221

Contact Person/Title * Eric Hoberg Director

Address * PO Box 282

City * Napoleon

State * ND

Zip Code * 58561

E-mail Address * edc@bektel.com

Web Site Address <http://www.parkrec.nd.gov/parks/blsp/blsp.html>

Phone * 701-754-2000

Fax # (if available)

List names of co-applicants if this is a joint proposal

MAJOR Directive: (select the Directive that best describes your grant request)*

Choose only one response

- Directive A.** Provide access to private and public lands for sportsmen, including projects that create fish and wildlife habitat and provide access for sportsmen;
- Directive B.** Improve, maintain, and restore water quality, soil conditions, plant diversity, animal systems and to support other practices of stewardship to enhance farming and ranching;
- Directive C.** Develop, enhance, conserve, and restore wildlife and fish habitat on private and public lands; and
- Directive D.** Conserve natural areas for recreation through the establishment and development of parks and other recreation areas.

Additional Directive: (select the directives that also apply to the grant application purpose)*

Choose all that apply

- Directive A.** Provide access to private and public lands for sportsmen, including projects that create fish and wildlife habitat and provide access for sportsmen;
- Directive B.** Improve, maintain, and restore water quality, soil conditions, plant diversity, animal systems and to support other practices of stewardship to enhance farming and ranching;
- Directive C.** Develop, enhance, conserve, and restore wildlife and fish habitat on private and public lands; and

X **Directive D.** Conserve natural areas for recreation through the establishment and development of parks and other recreation areas.

Type of organization: (select the category that describes your organization)*

- State Agency
- Political Subdivision
- Tribal Entity
- Tax-exempt, nonprofit corporation.

Project Name* **Beaver Lake State Park Water Quality Enhancement**

Abstract/Executive Summary. **An Executive Summary of the project stating its objectives, expected results, duration, total project costs and participants.*** (no more than 500 words)

Beaver Lake State Park is located in Logan County, 17 miles southeast of Napoleon. The water quality enhancement project will restore the lake, which is currently being polluted with runoff from adjacent farmland.

The park is 283 acres and includes a campground, electrical hookups, sleeping cabins, boat ramp, swim beach, playground and picnic shelters. The park is centralized to area attractions such as the Lawrence Welk Home, Whitestone Battlefield State Historical Site, Slade & Long Lake National Wildlife Refuges and numerous golf courses. The park is important to the local economies.

Funding is being requested to complete a Water Quality Improvement Alternatives Assessment to determine the best method and associated costs of removing the unwanted silt and muck from the bottom of the lake and restore it back to previous conditions to provide habitat for fish, waterfowl and other species. After the alternatives are identified, additional funding will be pursued to complete the project.

Once completed Beaver Lake State Park will be a thriving habitat supporting birding, natural trails and additional water and recreational activities.

As the applicant, Logan County JDA will bring key entities together such as the Beaver Creek watershed district and the Logan County Water Resource District, Department of Health, ND Parks and Recreation Department, and ND Game and fish. ND Parks and Recreation is a key player as they own and maintain most of the west side of the lake. They have started developing

approximately 100 acres into walking, biking and birding trails. The proposed project will enhance the department's investment into the state park.

Project Duration: *six to nine months

Amount of Grant request \$ * 45,000

Total Project Costs \$* 60,000

(Note that in-kind and indirect costs can be used for matching funds)

A minimum of 25% Match Funding is strongly encouraged. Amount of Matching Funds \$* 15,000

Please indicate if the matching funds will be in-kind, indirect or cash.

\$5,000 cash and \$10,000 in-kind

Source(s) of Matching Funds*

Please provide verification that these matching funds are available for your project.

Logan County JDA established a small account in which to fund projects within the county.

Certifications *

X I certify that this application has been made with the support of the governing body and chief executive of my organization.

X I certify that if awarded grant funding none of the funding will be used for any of the exemptions noted on Page 1 of this application.

Narrative

Organization Information – Briefly summarize your organization's history, mission, current programs and activities. *

Include an overview of your organizational structure, including board, staff and volunteer involvement. (no more than 300 words)

Logan County Jobs Development Authority works to develop tourism and job development, while also increase the quality of life for residents and tourists within Logan County. The county dedicates four mills to the Job Development Authority. The staff consist of a part time director, volunteer five person executive board and up to a twenty member full board. Beaver Lake is a major asset to the county that is underutilized and the board has decided to make the lake water quality improvement a priority.

If awarded funding Logan County Job Development Authority will be the main point of contact for the engineering consultant to identify the alternatives, meet all reporting requirements, and coordinate with all of the local and state entities that are stakeholders of the project.

Purpose of Grant – Describe the proposed project identifying how the project will meet the specific directive(s) of the Outdoor Heritage Fund Program *

Identify project goals, strategies and benefits and your timetable for implementation. Include information about the need for the project and whether there is urgency for funding. Please indicate if this is a new project or if it is replacing funding that is no longer available to your organization. Identify any innovative features or processes of your project.

Logan County Job Development Authority is proposing to develop Beaver Lake State Park into a prime fishing and recreational lake in south central ND. Over the years the lake has been filling with sediment, creating a shallow muddy lake that is unsuitable for sustaining an acceptable fishery due to runoff from adjacent farmland. By mid July the lake becomes green, mossy and has an odor making it undesirable as a recreational lake. We would like to restore the lake to its once great self and we need a professional organization who can help us. Soil samples, borings, bank stabilization, identify source contamination, and estimate a cost for the repairs. Phase two of the project will be to fund the best alternative identified. The Major Directive is "Develop, enhance, conserve and restore wildlife and fish habitat on private and public lands". However, the project will touch every directive A: create fish and wildlife habitat B: through RC&D we will support practices of stewardship of farming and ranching to eliminate runoff into the lake so the problem is not repeated D: Although the park is already there, we will work with the State Park and Recreation to enhance the lands for birding and nature walks. Attached are program criteria and information from Iowa, Logan County JDA looks to replicate the effort and outcomes of Iowa's Lake Restoration Program.

Management of Project – Provide a description of how you will manage and oversee the project to ensure it is carried out on schedule and in a manner that best ensures its objectives will be met.*

Include a brief background and work experience for those managing the project.

Logan County Job Development Authority will hire an engineering firm to complete the water quality improvement alternatives. The Authority will engage all of that state regulator agencies that have an invested interest in the project. A communication schedule will be developed with the engineering firm to ensure all parties are aware of the project development and the alternatives.

Based on conversations with an engineering firm, the project should be completed in six to nine months.

The Authority will also lead grant reporting requirements as outlined by the ND Industrial Commission.

Evaluation – Describe your plan to document progress and results. *

How will you tell if the project is successful? Please be specific on the methods you will utilize to measure success. Note that regular reporting, final evaluation and expenditure reports will be required for every grant awarded.

The project will be a success when the alternatives identified provide a clear and concise method of repairing Beaver Lake State Park, outlining the costs and best method that all organizations can agree to and buy into.

Financial Information

ATTACHMENT: Project Budget – Using the standard project budget format that is available on the website at <http://www.nd.gov/ndic/outdoor-infopage.htm> , please include a detailed total project budget that specifically outlines all the funds you are requesting. Note that a minimum of 25% match funding is strongly encouraged.*

The project budget should identify all matching funds, funding sources and indicate whether the matching funds are in the form of cash or in-kind services. As noted on the standard project budget format, certain values have been identified for in-kind services. Please utilize these values in identifying your matching funds. **NOTE: No indirect costs will be funded.**

X I certify that a project budget will be sent to the Commission*

Sustainability – Indicate how the project will be funded or sustained in future years. *

Include information on the sustainability of this project after all the funding from the Outdoor Heritage Fund has been expended and whether the sustainability will be in the form of ongoing management or additional funding from a different source.

If awarded funding, the Water Quality Improvement Alternatives Assessment will identify the best solution to restore Beaver Lake State Park. Depending on the cost, additional funding will be needed to complete the construction of the alternatives.

The ND Park and Recreation will continue to fund its grasslands and park. Logan County Job Development Authority will assess the water quality annually to maintain the restored quality of lake water. It is anticipated that maintenance costs will be minimal as the construction of the alternative will be a permanent fix and the natural eco-system will sustain the lake.

Partial Funding – Indicate how the project will be affected if less funding is available than that requested. *

Depending on the amount of partial funding – the LCJDA will look to other organizations to fund the gap. No other organizations have been contacted at this point.

Scoring of Grants

All applications will be scored by the Outdoor Heritage Fund Advisory Board after your ten-minute oral presentation. The ranking sheet(s) that will be used by the Board is available on the website at <http://www.nd.gov/ndic/outdoor-infopage.htm> .

Awarding of Grants*

All decisions on requests will be reported to applicants no later than 30 days after Industrial Commission consideration. Applicants whose proposals have been approved will receive a contract outlining the terms and conditions of the grant. Please note the appropriate sample contract for your organization on the website at <http://www.nd.gov/ndic/outdoor-infopage.htm> that set forth the general provisions that will be included in any contract issued by the North Dakota Industrial Commission. Please indicate if you can meet all the provisions of the sample contract. If there are provisions in that contract that your organization is unable to meet, please indicate below what those provisions would be. *

Responsibility of Recipient

The recipient of any grant from the Industrial Commission must use the funds awarded for the specific purpose described in the grant application and in accordance with the contract. The recipient cannot use any of the funds for the purposes stated under Exemptions on the first page of this application.

If you have any questions about the application or have trouble submitting the application, please contact Karlene Fine at 701-328-3722 or kfine@nd.gov

Revised July 3, 2014

- | | |
|------------------------|---|
| | Recent publication of the USDA, National Agricultural Statistics Services, North Dakota Field Office |
| • Permanent Equipment | Any equipment purchased must be listed separately with documentation showing actual cost. (For example: playground equipment) |
| • Equipment usage | Actual documentation |
| • Seed & Seedlings | Actual documentation |
| • Transportation | Mileage at federal rate |
| • Supplies & materials | Actual documentation |

More categories will be added as we better understand the types of applications that will be submitted. We will use as our basis for these standards other State and Federal programs that have established rates. For example the North Dakota Nonpoint Source Pollution Management Program has established rates. If your project includes work that has an established rate under another State Program please use those rates and note your source.

Approved by OHF Advisory Board: October 17, 2013
 Approved by Industrial Commission: October 22, 2013
 Revised by OHF Advisory Board: January 22, 2014
 Approved by Industrial Commission: January 29, 2014
 Revised by OHF Advisory Board: May 13, 2014
 Approved by Industrial Commission: May 27, 2014



◇ Memorandum

Date: 7/25/2014
To: Eric Hoberg
Copy to: File
From: Jim Jackson
RE: Beaver Lake Application - Engineering Services

REMARKS

Eric,

The following is an estimate showing the breakdown of Engineering services and costs for the Beaver Lake project. Let me know if you have any questions.

Phase I: This phase would include compiling water quality data for Beaver Lake as well as available records of conservation practices funded through the Beaver Creek Watershed that may be applicable to Beaver Lake. All the data would be compiled and a meeting would be coordinated with regulatory agencies including Park and Recreation, Game and Fish, Department of Health and Logan County Water Resource District (as well as other interested parties). It is anticipated that alternatives for improving water quality would be carried forward and funding efforts would be identified. This phase would also include discussion and identification of permits required for each alternative. Deliverables from Phase I would include compiled data on Beaver Lake, identification of alternatives for water quality improvements, high level cost estimates of alternatives and potential funding efforts for the alternatives. Estimated cost of services outlined in Phase I would be \$50,000.

Phase II: This phase would include securing funding for the project, securing necessary permits, project design and bidding of the construction contract. This cost could vary depending on the alternative chosen. Estimated cost is \$300,000.



Phase III: This phase would include construction of the project and all associated tasks. Estimated cost is based on alternative chosen.

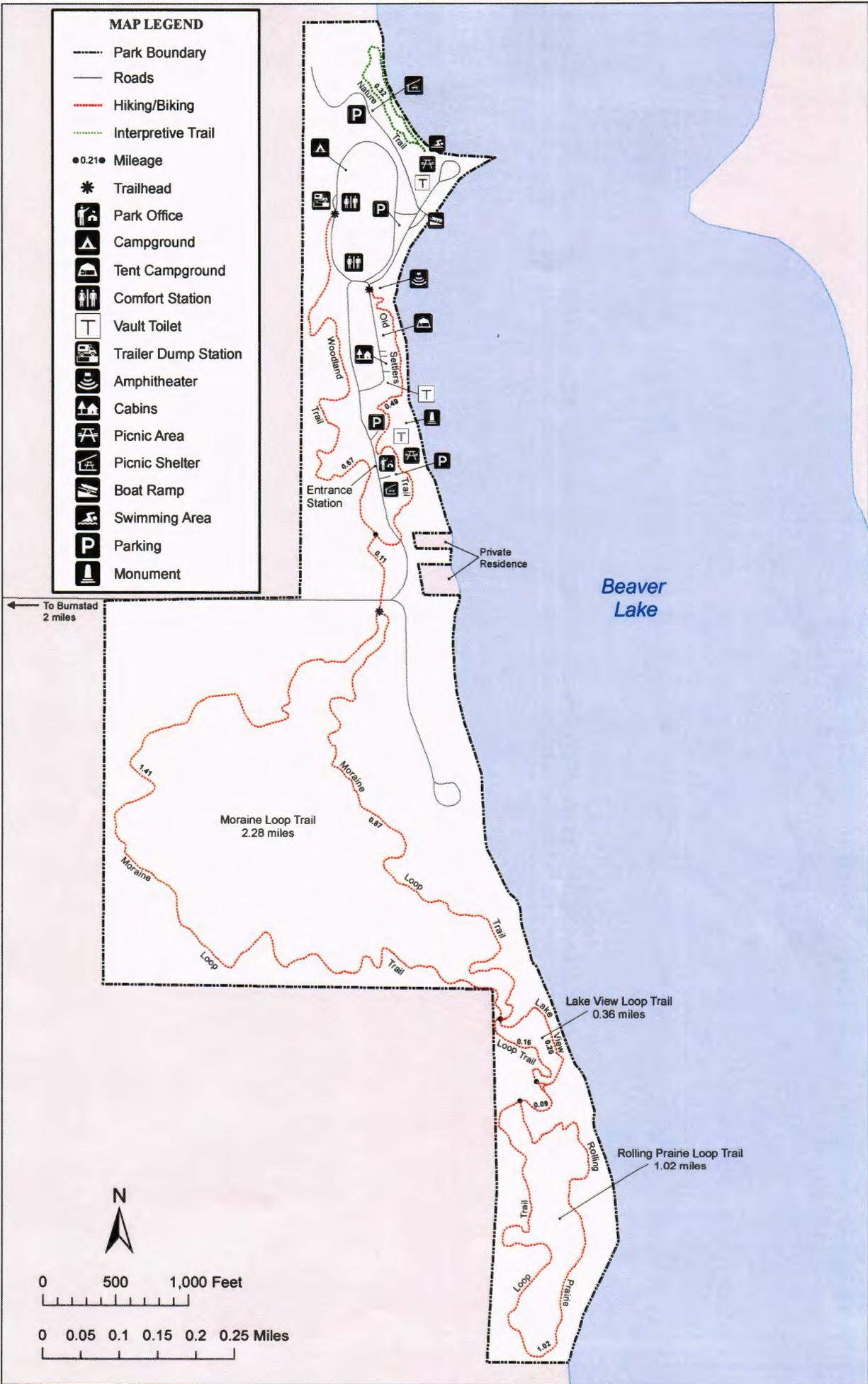
If you have any further questions at this time please feel free to contact me.

Thanks,

Jim Jackson

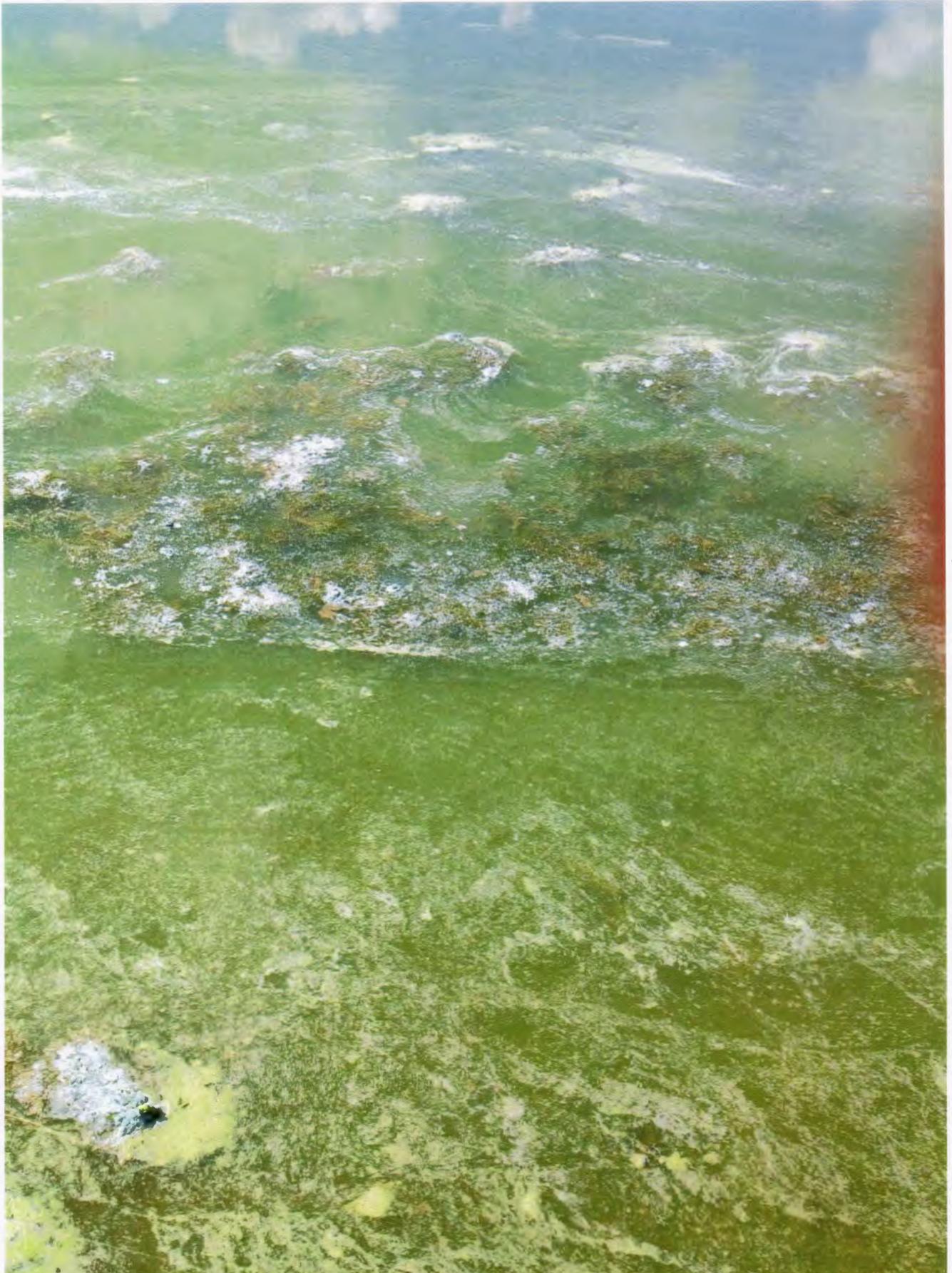
MAP LEGEND

-  Park Boundary
-  Roads
-  Hiking/Biking
-  Interpretive Trail
-  0.21 Mileage
-  Trailhead
-  Park Office
-  Campground
-  Tent Campground
-  Comfort Station
-  Vault Toilet
-  Trailer Dump Station
-  Amphitheater
-  Cabins
-  Picnic Area
-  Picnic Shelter
-  Boat Ramp
-  Swimming Area
-  Parking
-  Monument











DNR Lake Restoration Prioritization Process and Program

Key Concepts and Facts

- Six of ten Iowans visit lakes each year; they will visit these lakes eight times during the year
- Iowans prefer lakes with better water quality
- Statewide our lakes generate \$1.9 billion in annual spending by Iowans
- A lake is a reflection of both watershed and lake management
- Lake restoration starts in the watershed; it relies on strong local involvement and voluntary participation of landowners

Current Prioritization and Program

- Modeled after the Federal Clean Lakes Program established in the 1970s
- IDNR provided the 2006 legislature with a priority list of 35 lake candidates
 - Priorities based on a 5-year ISU/IDNR assessment of water quality
 - Technical feasibility of restoration
 - Potential economic benefits
 - Use by Iowans, and local interest/involvement
- Projects require a lake and watershed restoration assessment and plan
- Projects require local resources in combination with state and federal funds
- Local groups can petition to have their lake added to the priority list
- Project Status
 - 21 Completed or near completion
 - 21 Active projects in-progress
 - 13 Initial public outreach, evaluation or planning stage
- IDNR provides an annual progress report to the legislature that includes a work plan and budget
- Program follows a ten-year plan to address priority lakes for restoration

Water Quality Goals

Stipulated in 2006 State Legislation (HF2782):

- Delivery of phosphorous and sediment from the watershed will be controlled before lake restoration begins
- Shallow lakes management will be considered among options for restoration
- Water quality targets
 - Clarity. 4 ½ foot water transparency 50% of the time from April – September
 - Biota. A diverse, balanced, and sustainable aquatic community must be maintained
 - Impairment. Water quality impairments must be eliminated
 - Sustainability. The water quality and public use benefits must be sustained for 50 years

IDNR Contacts

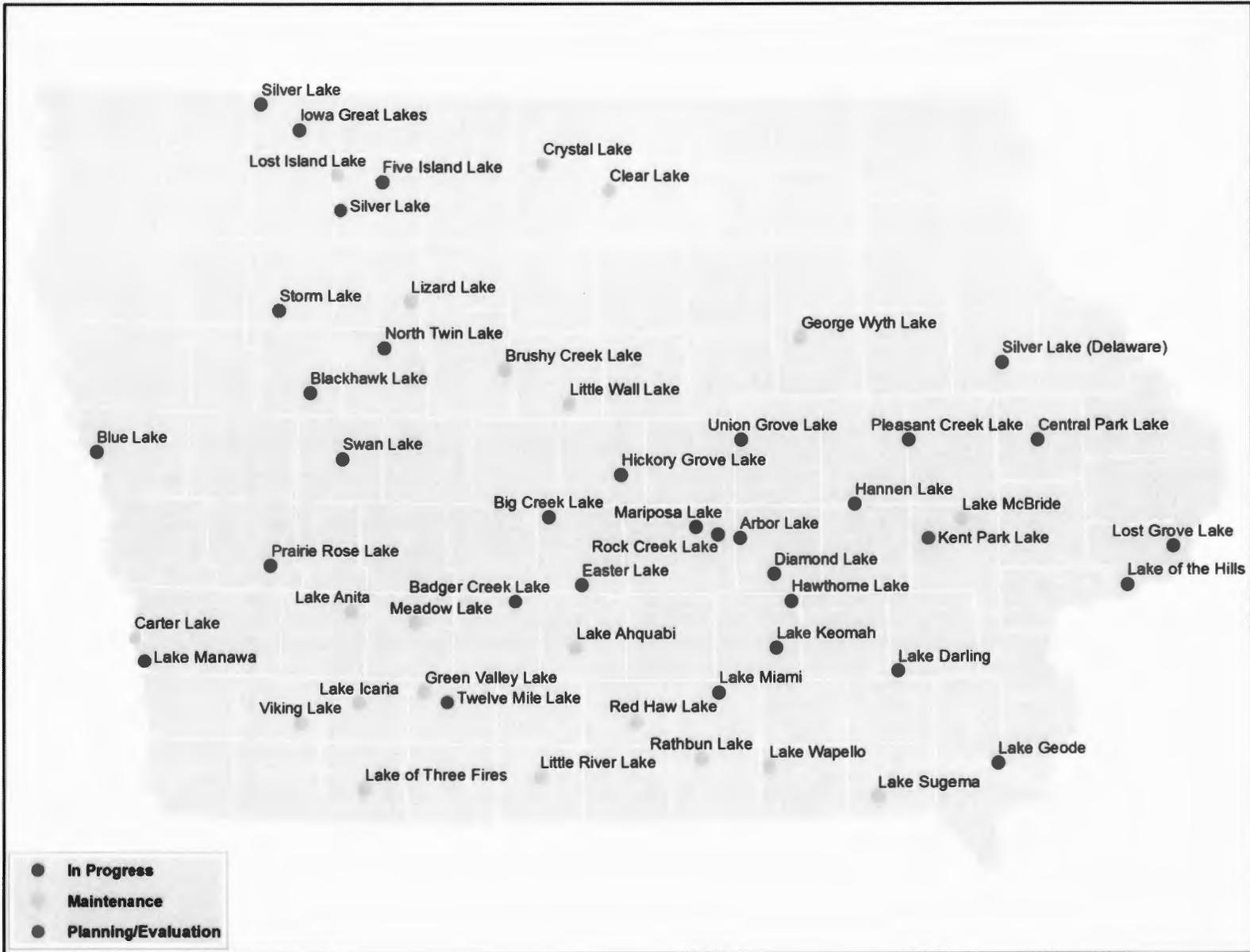
Mike McGhee (515-281-6281) mike.mcghee@dnr.iowa.gov

George Antoniou (515-281-8042) george.antoniou@dnr.iowa.gov

Web Page: <http://www.iowadnr.gov/Environment/WaterQuality/LakeRestoration.aspx>



DNR Lake Restoration Program Status as of FY2014



Taking steps for cleaner water

WATER QUALITY IMPROVEMENT FRAMEWORK FOR LAKES



clean water
starts with you.

START YOUR CLEAN WATER JOURNEY

Water quality in Iowa's lakes results from a variety of factors in the watershed and within the lake itself. The complexity and interactions among these factors make restoration and water quality protection a challenge. But success relies on communities committed to making changes on the land and in the home to improve their local lakes.

Improving water quality in a measurable and observable manner takes a targeted, system-wide, locally-led approach that relies on community support and involvement. There are three major components that need to be addressed to achieve better water quality: the watershed, the lake basin and the social/cultural climate.

Much like a road map directs you from the beginning of a journey to the end, this document provides a framework or pathway for water quality improvement in lakes built on past successes with Iowa communities.

Questions?

Steve Hopkins

DNR Watershed Improvement

(515) 281-6402

Stephen.Hopkins@dnr.iowa.gov

Mike McGhee

DNR Lake Restoration

(515) 281-6281

Mike.McGhee@dnr.iowa.gov

Chris Larson

DNR Fisheries

(712) 769-2587

Chris.Larson@dnr.iowa.gov



IDENTIFY

IDENTIFY CONCERNS, BUILD SUPPORT

Community involvement is crucial to implementing and sustaining water quality improvement efforts in public waters. Involving stakeholders, including citizens, in the initial stages of project development by listening to their concerns and ideas helps ensure long-term success (see Appendix A).

- Contact local organizations and agencies with an interest in improving water quality in the lake. This includes elected officials, natural resource agencies, local community groups and others that have an impact on the resource.
- Identify other local leaders that might support the water quality effort. Who in your community “gets things done?” They may not be an elected official or work for a resource agency, but people respect them and their ideas.
- Meet with resource agencies and local leaders to create a technical advisory team (TAT). Discuss the water quality improvement process, timelines and responsibilities. The TAT includes key natural resource experts from agencies who have an interest and/or can provide information about the resource, including water quality issues and improvement options. This group also includes representatives from agencies and organizations who have technical and financial resources to help implement solutions.
 - Potential TAT representatives: SWCD, NRCS, DNR, IDALS, RC&D, CCBs, County Board of Supervisors, city officials, local leaders, lake associations, etc. (Appendix B).
- Determine local project sponsor(s) – for example, city and county governments, SWCDs, CCBs, solid waste agencies, DNR, etc. –and a lead coordinator for your effort.

INITIALS AND ACRONYMS USED

DNR:

Department of Natural Resources

NRCS:

USDA Natural Resources Conservation Service

SWCD:

Soil and Water Conservation District

IDALS:

Iowa Department of Agriculture and Land Stewardship

RC&D:

USDA Resource Conservation and Development

CCB:

County Conservation Board

TAT:

Technical Advisory Team



IDENTIFY

- Begin planning your public outreach efforts, focusing on attracting stakeholders and landowners to meetings, and building community support in the improvement effort. Develop a list of contacts for future communications (Appendix A and C). To begin, select dates for two public meetings.
- Hold public meetings to get your neighbors involved and identify their concerns.
 - Public meeting # 1
Present information to help your community understand how the resource affects them: water quality problems, what often causes them, local benefits of water quality improvement, restoration needs and possible solutions. Explain, in simple terms, the water quality improvement process and community based planning concept.

Solicit attendees' and stakeholders' participation in a local watershed steering committee. Provide a sign-in sheet near the entrance to the meeting place to count attendance and collect follow-up contacts. Provide a space for them to indicate if they are interested in serving on the steering committee (Appendix D). Announce date for the next public meeting. *Note:* If key stakeholder groups are not represented at the meeting, seek them out and share information with them. Invite them to the next meeting.

WHO'S THAT?

STAKEHOLDER: Anyone with an interest in your effort. This can include individuals, organizations, businesses, schools, colleges and government agencies, for example.

TECHNICAL ADVISORY TEAM: A group of natural resource experts with representatives from organizations with technical, scientific and financial resources to help the effort.

STEERING COMMITTEE: A group that works in the community to move the effort forward and can provide input on the community's use and value of the water.



- **Public meeting # 2**

Large turnout at first public meeting (more than 20 attending) or urban watersheds:

Within two to three weeks, conduct a facilitated public meeting to gather stakeholder resource concerns, create a vision statement of how the resource should look in 50 years and solicit participation in a local watershed steering committee. Again explain, simply, the water quality improvement process and community based planning concept. Provide a sign-in sheet near the entrance to the meeting place to count attendance and collect follow-up contacts. Provide a space for them to indicate if they are interested in serving on the steering committee (Appendix D).

Small turnout at first public meeting (less than 20 attending) or rural watersheds:

If participation in the first public meeting was low, then consider holding a meeting only with landowners and other stakeholders or one-on-one meetings with landowners and stakeholders. If you have a small number of landowners to work with, in most cases you'll be much farther ahead scheduling one-on-one meetings to discuss the issues and causes, review the needed improvements, identify critical areas, discuss conservation practice options and available financing. It is also important to note that the water quality problem and cause of the problem you're trying to address will have various levels of acceptance by the landowners.

Create a vision statement of how the resource should look in 50 years and solicit participation in a local watershed steering committee. Again explain, simply, the water quality improvement process and community based planning concept. Provide a sign-in sheet near the entrance to the meeting place to count attendance and collect follow-up contacts. Provide a space for them to indicate if they are interested in serving on the steering committee (Appendix D).

- Following the public and/or one-on-one contact meetings the TAT should meet to select and organize a local steering committee of willing participants and key local leaders.
 - If there is a large list of participants - identify and select a representative from specific user groups (e.g. anglers, boaters, campers, bird watchers, landowners, etc.).



IDENTIFY

- Initiate and schedule a joint steering committee and TAT meeting to elect a chairperson, other officers as needed, and discuss the water quality improvement process, next steps (goals and objectives) and funding opportunities, etc.

CREATE GOALS

- First or second steering committee/TAT joint meeting – develop a vision statement and set reasonable goals for improving water quality.
 - Develop objectives (e.g. remove from the impaired waters list, improve water clarity to 5 feet, create habitat to support healthy fish populations, increase local economic activity, improve quality of life, etc.).
- Determine frequency of future steering committee/TAT meetings (e.g. monthly, bi-monthly or quarterly). Frequency may depend on project status (e.g. waiting for results of watershed analysis or diagnostic/feasibility study).
- Develop a communication/outreach plan to keep other stakeholders and the community up to date and provide opportunities for input and involvement throughout the process. Key partners in communicating to a broader constituency include community development organizations and agencies, like Iowa State University Extension community development staff, RC&D, local community improvement/visioning groups, etc.).



INVENTORY

SECURE LOCAL SUPPORT, FUNDING FOR PROJECT DEVELOPMENT

- Seek local community leaders as project champions (e.g. lake association, mayor, county boards of supervisors, CCB, SWCD, etc.)
- Secure funding from local stakeholders and apply for grants to provide resources for the planning process (e.g. DNR Watershed Planning Grant; IDALS Watershed Development and Planning Assistance Grant (Appendix E).

GATHER DATA, ANALYZE PROBLEMS

- Contact a watershed assessment professional or consulting firm, as needed, to gather data, research and analyze existing data, and to help pinpoint problems (Appendix A)
- Review water quality improvement plan(s) (e.g. TMDL or Diagnostic Feasibility Study) if available.
- Identify causes and sources of pollution within the watershed and lake basin
 - Watershed analysis (NRCS, SWCD, DNR, and private consulting firms can help with these tasks).
 - Conduct a watershed assessment – identify land use, soils, land slope, etc.
 - Run the Sediment Delivery Calculator, SWAT, or other appropriate model.
 - Examine stream using RASCAL or other tools.
 - Evaluate topography using DEM or LiDAR data.
 - Determine overland, gully, and stream bank/bed erosion and sediment delivery potential.
 - Identify livestock operations, feedlots, and manure application methods, timing and locations.
 - Identify organized drainage district “watersheds” and outlets, if present.
 - Identify other potential point and nonpoint sources of pollution.

NOT SURE ABOUT THESE STEPS?

What do they mean? How do you do them? A consultant or local resource agency can help you gather the data you need. DNR Watershed Planning Grants can also help you put together the technical elements of your plan. www.iowadnr.gov/water/watershed/planning.html



INVENTORY

- Assess any potential urban contributions, such as impervious cover, storm drain outlets, construction sites, unsewered communities, etc.
- Identify potential wildlife influences.
- Lake basin analysis; physical, chemical and biological (Iowa DNR, and private consulting firms can help with these tasks)
 - Physical – Inventory
 - Gather and evaluate all historical and current physical assessment information (e.g. lake maps, bathymetry maps, volume, surface area, mean depth, basin slope, shoreline length).
 - Determine water level history (e.g. ordinary high water mark, sovereign authority, gauging station information, water level history).
 - Determine outlet and inlets (e.g. stormwater outfalls, drainage tiles, outlet history and capacity).
 - Gather current and historic water transparency and total suspended sediment data.
 - Physical – Analyze
 - Determine wind mixing potential (e.g. GIS modeling using current bathymetry).
 - Determine stratification potential, history and implications (e.g. oxygen depletion, temperature profiles).
 - Determine sedimentation rate (e.g. comparison of bathymetric measurements over time, sediment coring and analysis, shoreline recession/erosion).
 - Analyze water level history (e.g. sustained high and low water levels are detrimental to aquatic vegetation and can exasperate shoreline/bank erosion).
 - Determine water budget (i.e. water coming into and out of the system).



- **Chemical – Inventory**
 - Gather and assess all information on phosphorous, nitrogen, total dissolved solids, dissolved oxygen levels, pH and other water chemistry parameters.
- **Chemical – Analyze**
 - Analyze water chemistry data for trends and relationships to other physical or biological parameters.
- **Biological – Inventory**
 - Gather and assess all existing information regarding chlorophyll a, phytoplankton, zooplankton and bacteria (E. coli).
 - Identify studies or information regarding aquatic vegetation (e.g. assessments, historic aerial photos, studies).
 - Assess the lake fishery and macro invertebrate populations (e.g. species present, population characteristics and historic changes).
 - Identify critical habitat areas (e.g. carp reproduction areas, game fish spawning areas, important aquatic vegetation beds, etc.).
- **Biological – Analyze**
 - Analyze and document trends in biological characteristics of the lake. Trends may be associated or correlated with physical, chemical or other biological parameters (e.g. zooplankton size structure; intensities and duration of blue-green algae blooms; relationships between algal biomass and water clarity, etc.).
 - Determine critical densities and population health characteristics of key macro invertebrate and fish species (e.g. carp densities, carp population size structure, panfish population health indices, predator population health indices, overall species diversity, prey densities, and presence of aquatic nuisance species).
 - Natural lake systems may benefit from historic productivity and ecosystem shift analysis (e.g. sediment coring and analysis).



INVENTORY

- Explore causes affecting changes in aquatic vegetation beds – both emergent and submergent vegetation densities, current and historic extents (e.g. grass carp introductions, historic droughts, water level changes or fluctuations, major watershed perturbations, aquatic pesticide application).
- Social/cultural context analysis
 - As part of your overall outreach plan, determine target audiences: Who has an interest or stake in improving water quality? Who do you depend on to make changes (in policy, on the land, in the water, in the home)? Who do you rely on to keep your effort afloat? Who do you need to spread your message to these people?
 - Research these audiences to gauge their knowledge of and opinions on local water quality, their barriers to participating in or supporting the effort, what would motivate them to participate, media use or how they prefer to receive information on the water quality effort, etc.
- Other considerations
 - Socioeconomic – document changes in lake use (e.g. creel surveys, park visitor surveys, and historical aerial photographs) and talk with local residents and leaders about the lake and their connection to it).
 - Historical lake management activities (e.g. lake drawdown, fish renovation, habitat work, lake aeration, dredging, vegetation management).
- Create a central database of information (GIS maps, water quality and watershed information, audience research findings, etc.).
- Identify and fill any critical gaps in data.
 - Use modeling methods to analyze watershed and water quality data and diagnose water quality problems and evaluate restoration alternatives.
 - Collect additional water quality monitoring data, if needed.
 - Track land use changes over time, as appropriate.



INVESTIGATE

EXPLORE POTENTIAL SOLUTIONS

- Use the help of technical staff, such as DNR, IDALS or NRCS staff, and/or a private consultant. It is important to involve these professionals early on in the process of technically evaluating potential solutions to avoid unintended consequences of any proposed solutions.
- Identify critical areas for improvement – target strategies towards the most significant causes and sources of pollution.
- Watershed - discuss restoration activities and ways to better manage the land to decrease pollutant runoff and improve water quality (Appendix A). For more information on specific conservation practices, please visit the NRCS website at: www.ia.nrcs.usda.gov/technical/ia_standards.html.

Potential watershed conservation practices

Rural

- Grass waterways
- Sediment basins
- Ponds
- Terraces
- Streambank stabilization
- Perennial cover

- Stream buffers
- Stream meanders
- Lakeshore stabilization and/or re-vegetation
- No-till
- Manure storage and runoff control structures

Urban

- Rain gardens
- Pervious surfaces
- Wet detention basins
- Storm water inlet stenciling
- Storm water treatment/filtration

- For examples of current and former watershed improvement efforts, please visit the DNR website at www.iowadnr.gov/water/watershed/project_list.html and www.iowadnr.gov/water/watershed/success.html.
- Lake basin – discuss restoration activities and ways to better manage the water body to improve water quality. Use conservation practices from technical guidance documents to address causes and sources of pollution. In-lake practices should not be scheduled before watershed improvements have been completed.



INVESTIGATE

- Physical conservation practices
 - Shoreline protection measures (e.g. rock armoring, re-shaping, vegetating, break water structures, water craft restrictions, etc.).
 - Sedimentation control (e.g. dredging, shoreline deepening, sediment dikes, sediment basins, wetlands, etc.).
 - Reduce lake stratification (e.g. lake aeration and circulation).
 - Water level management (e.g. structural changes to outflow, basin sealant, supplemental water source, drawdowns, etc.).
- Chemical conservation practices
 - Reduced internal loading of excessive nutrients (e.g. alum application, mechanical mixing of the water column, herbicide vegetation control, stormwater treatment, etc.).
- Biological conservation practices
 - Vegetation management (e.g. establishment of desirable aquatic vegetation, controlling nuisance algae).
 - Fishery management (e.g. fish renovation to remove/reduce rough fish species, stocking programs, aquatic nuisance species management, improve fish habitat, regulation changes, winterkill prevention, etc.)
 - Wildlife management (goose and duck management/access to lake, etc.).
- Other practices
 - Socioeconomic - improve access (e.g. fishing jetties, walkways, water trails, riparian recreational corridors, boat ramps, parking, etc.) .
 - Develop amenities (e.g. concessionaire, boat rental, bike trails, signage, etc.)
- Develop a cost benefit analysis of potential solutions (including the social context – what will stakeholders support?). Continue working on your public outreach plan, using results from audience research to develop strategies.



EVALUATE SOLUTIONS

- Create a summary report of problems and solutions, including a cost benefit analysis, which will help you draft a watershed management plan in the next step.
- Hold a public meeting to gather feedback on proposed alternatives and solutions.
 - Public meeting # 3 – Present draft summary report focusing on selected alternatives.
 - This could be in the form of formal presentations or an open house with specific stations depicting alternatives.
 - Gather and document feedback from participants and other stakeholders following the meeting (e.g. in writing, e-mail, verbal, etc).

CREATE A WATERSHED MANAGEMENT PLAN

- Use the research and findings gathered in the previous steps, along with community input from the public meeting and through ongoing local dialogue (i.e., presentations to stakeholder groups, updates and invitations to comment in local media), to develop a watershed management plan. Select preferred alternatives and solutions to protect and restore your lake.
- Develop a phased plan with goals, schedule, budget, monitoring and milestones, with assigned responsibilities and/or authorities to carry out elements of the plan clearly identified.
- Apply for and secure funding to carry out the plan (Appendix D).
- Develop jurisdictional authority (e.g. 28E cooperative agreement), if needed.
- Use the DNR's Watershed Management Plan guidebook to draft your plan, so that the plan will meet U.S. Environmental Protection Agency requirements if you decide to seek a DNR Watershed Implementation Grant to put the plan into action. The guidebook is located on the DNR website at www.iowadnr.gov/water/watershed/wmp.html.



IMPLEMENT

PUT THE WATERSHED MANAGEMENT PLAN IN ACTION

- Consider applying for grants to provide funding, guidance and technical assistance in rolling out your plan, including DNR Watershed Implementation Grants, Watershed Improvement Review Board grants and funding from IDALS-DSC's Water Protection Funds (WPF) and Watershed Protection Funds (WSPF).
- Choose or hire a project coordinator to work with the community on making changes on the land and in the water.
- Hold a public meeting to discuss strategies to put the watershed plan into practice
 - Public meeting #4 - Present schedule, budget, monitoring and milestones, and assigned responsibilities.
 - Roll out the outreach plan portion of watershed management plan to promote the project, encourage participation and behavior change (using conservation practices), and to raise support for your effort.
- Develop an ongoing communications plan, as part of your outreach plan, to report work, successes, opportunities, funding needs, etc. to your community.
- Use regular, long-term water monitoring to track progress.



EVALUATE PROJECT, SHARE SUCCESSES

- Monitor the progress of the project; make necessary adjustments to options, schedule and budget.
- Evaluate and report progress with the help of the technical advisory team and local steering committee.
- Evaluate water monitoring data to measure success; if possible, track additional benefits to local communities – increased recreation, tourism, creation of related amenities, etc.
- Share results and successes via press releases, events, celebrations or other public functions as identified in your outreach plan.



APPENDIX A:

WATERSHED IMPROVEMENT ONLINE RESOURCES

COMMUNITY-BASED PLANNING

North Carolina Cooperative Extension Service. (2004). Local watershed planning: getting citizens involved. (88pp.) Retrieved January 14, 2010, from <http://www.ces.ncsu.edu/depts/agecon/WECO/publication/LWPguidebook.pdf>

The Guidebook is written for natural resource managers, planners and others who need to convene citizens to develop local watershed plans. It focuses on the participatory, collaborative watershed planning process – a method of actively involving watershed stakeholders in identifying problems and designing acceptable solutions through education and negotiation. The first section helps determine how involved the public needs to be in the planning process, based on the individual project. Remaining sections look at setting up a collaborative process to develop an effective planning committee. This is an easy to follow guide/resource that walks through a planning process that can be used in a variety of situations.

Bonnell, Joe. (n.d.). Community-based watershed management. Ohio State University College of Natural Resources. Retrieved January 14, 2010, from <http://ohioline.osu.edu/ws-fact/0001.html>

This web-based fact sheet provides an overview of the characteristics of community-based watershed management, challenges associated with community-based management, and keys to success. It also includes a list of additional resources on the topic

University of Nebraska-Lincoln. (2003). Watershed Management Planning Guidebook for Communities. (90 pp.) Retrieved January 14, 2010, from <http://www.deq.state.ne.us/>

This guidebook demonstrates the Community Based Approach to the Watershed Management Planning process. It guides local stakeholders through the step-by-step planning process from the point of organizing themselves through the implementation of their plan. It describes how to develop a watershed plan with community involvement. It offers technical information and hints throughout plan development and implementation of management practices.

Note: Guidebook link located in the "Nonpoint source management" section of the webpage.

WATERSHED PLANNING

Iowa Department of Natural Resources. (2009). Watershed Management Plan Guidebook. (67 pp). Retrieved Feb. 12, 2010 from <http://www.iowadnr.gov/water/watershed/wmp.html>.

This guidebook takes you step-by-step through the process of creating a Watershed Management Plan in Iowa. Additional assistance in creating a plan is also available through DNR Watershed Planning Grants.

EPA. (2008). Handbook for developing watershed plans to restore and protect our waters. Retrieved January 14, 2009, from http://www.epa.gov/owow/nps/watershed_handbook/

This handbook is intended to help communities, watershed organizations, and state, local, tribal and federal environmental agencies develop and implement watershed plans to meet water quality standards and protect water resources. It was designed to help any organization undertaking a watershed planning effort, and it should be particularly useful to persons working with impaired or threatened waters. The handbook is generally more specific than other guides with respect to guidance on quantifying existing pollutant loads, developing estimates of the load reductions required to meet water quality standards, developing effective management measures and tracking progress once the plan is implemented. Webpage includes a link to an online fact sheet and downloadable PDF of the handbook (400 pp).

Indiana Department of Environmental Management. (2003). Indiana watershed planning guide. (110pp). Retrieved January 14, 2010 from <http://www.in.gov/idem/catalog/documents/water/iwpg.pdf>

This is a comprehensive manual designed to steer watershed groups through the development of a watershed plan. It includes step-by-step instructions for planning as well as a list of additional resources. It does not include technical instructions for watershed assessment or implementation measures.

Michigan Department of Environmental Quality. (2000). Developing a watershed management plan for water quality: an introductory guide. (56 pp.) Retrieved January 14, 2010, from http://www.michigan.gov/documents/deq/ess-nps-watershed-planning_210637_7.pdf

This guide was written to help local units of government, nonprofit organizations, and citizens develop watershed management plans. It outlines a process for gathering people, information and resources together to protect and improve water resources. It includes sections on development of partnerships, identification of issues and conservation practices needed to resolve, identification of related efforts/issues, development of objectives and assessment of progress/success, as well as public information/involvement and plan assembly.

WATERSHED PRACTICES

National Water Program. (2009). Watershed scale planning and implementation. Retrieved January 15, 2010 from <http://www.usawaterquality.org/themes/watershed/research/planning.html>

Web site includes information in the areas of "Identifying Critical Areas to Best Locate BMPs" and "Factoring Economics into Watershed Management Decisions." Includes general information with more in-depth PDFs and links to other sites.

Iowa NRCS. (2010). Iowa Natural Resources Conservation Service home page. Retrieved January 15, 2010 from <http://www.ia.nrcs.usda.gov/>

Home page for the Iowa NRCS. Includes information about programs, technical assistance and contacts for Iowa.

IDALS. (n.d.) Water resource bureau: watershed protection. Retrieved January 15, 2010, from <http://www.iowaagriculture.gov/waterResources/watershedProtection.asp>

Home page of the Watershed Protection Program, which provides technical and financial assistance for the development and implementation of local watershed initiatives. The site includes information about technical assistance as well as development/planning and funding/implementation assistance.

Metropolitan Council. (2009). Urban small sites best management practice manual. Retrieved January 15, 2010, from <http://www.metrocouncil.org/environment/Water/BMP/manual.htm>

The Urban Small Sites Best Management Practice (BMP) Manual provides information on tools and techniques to assist Twin Cities municipalities and WMOs in guiding development and redevelopment. It includes detailed information on 40 BMPs that are aimed at managing storm water pollution for small urban sites in a cold-climate setting. The goal of the manual is to support the principles of accommodating growth while preserving the environment. The BMP Manual is available online as PDFs. A CD version is also available.

NRCS. (n.d.) Water related best management practices in the landscape. Retrieved January 15, 2010, from <http://www.wsi.nrcs.usda.gov/products/UrbanBMPs/>

This website includes detailed instructions for a variety of conservation practices related to water runoff management, stream system protection, restoration, and re-establishment, and tree protection and restoration. Information is downloadable as PDFs.

APPENDICES B - E

B

POTENTIAL TECHNICAL ADVISORY TEAM (TAT) MEMBERS

The following are suggestions of groups and individuals that you may want to serve on your technical advisory team, but they are not required:

- Iowa Department of Natural Resources programs: Fisheries, Wildlife, Parks, Law Enforcement, Forestry, Lake Restoration, Watershed Improvement (including Basin Coordinators and TMDL staff), Water Quality and Watershed Monitoring and Assessment
- Natural Resources Conservation Service – local District Conservationist
- Iowa Department of Agriculture and Land Stewardship – watershed project coordinator; Basin Coordinator
- Local Soil and Water Conservation Districts
- Regional Resource Conservation and Development staff
- United States Geological Survey
- Local County Conservation Board staff
- Iowa Department of Public Health
- Iowa State University Extension

C

POTENTIAL STAKEHOLDERS/COMMITTEE MEMBERS

The following are suggestions of groups and individuals that you may want to serve on your local steering committee, but they are not required:

- Respected individuals in the community
- Chamber of Commerce
- City/County Government (mayor, City Planner, Parks and Recreation, Board of Supervisors, Storm Water Manager, County Sanitarian; County Engineer)
- Community Development
- Councils of Government
- Appointed Boards - Chairman
- Leaders of service groups
- Outdoor recreational organizations/user groups
- Neighborhood associations
- Friends groups
- Landowners
- Lake associations
- Local colleges or universities

E

PLANNING AND IMPLEMENTATION FUNDING SOURCES

PLANNING

- Iowa Department of Natural Resources
 - DNR Lake Restoration Program
www.iowadnr.gov/water/lakerestoration/index.html
 - DNR Watershed Improvement Program
 - Watershed Planning Grants
www.iowadnr.gov/water/watershed/planning.html
- Iowa Department of Agriculture and Land Stewardship
www.iowaagriculture.gov
 - Watershed Development and Planning Assistance Grants
www.agriculture.state.ia.us/waterResources/watershedProtection.asp

IMPLEMENTATION

- Iowa Department of Natural Resources
 - DNR Watershed Improvement Program
 - Watershed Implementation Grants - www.iowadnr.gov/water/nonpoint/app.html
 - DNR Lake Restoration Program - www.iowadnr.gov/water/lakerestoration/index.html
 - State Revolving Fund - www.iowasrf.com
- Iowa Department of Agriculture and Land Stewardship - www.iowaagriculture.gov
 - Public Owned Lakes Program
 - Water Protection Fund, Watershed Protection Fund
 - Watershed Improvement Review Board Fund
- Check with your local Soil and Water Conservation District for available funding programs



IOWA DEPARTMENT OF NATURAL RESOURCES
Leading Iowans in caring for our natural resources
www.iowadnr.gov

Lake Ahquabi



A Restoration Success Story

Ahquabi: An Impressive Pedigree

Lake Ahquabi borrows its name from Iowa's original residents and it's inspiration from one of the nation's greatest conservationists.

The name Ahquabi comes from the Sauk and Fox tribe and literally means "resting place." Perhaps it was the tranquility of the landscape that inspired Pulitzer Prize winning cartoonist and noted conservationist J.N. "Ding" Darling to recommend the site of Lake Ahquabi as a park site.

This 125-acre lake located in a 770-acre park setting was built in 1935 by the Civilian Conservation Corps and has been a treasured place of quiet beauty since. Located in Warren County south of Indianola, Lake Ahquabi now has more than 200,000 visitor days per year.

But like so many of our lakes constructed during the 1930s, the unforeseen impact of agriculture and development was not anticipated. While significant effort has been made to design and construct the lake, there was little consideration made to long-term maintenance. By the 1980s, water quality had suffered and the lake itself was in danger of eventually disappearing.

The 125-acre lake had been reduced to 114 acres by sedimentation alone. Excessive nutrients from the 3,321 acre watershed also resulted in murky water and the proliferation of less desirable fish species.



Lake Ahquabi, however, is a success story. It's a story about how a concentrated effort to improve a watershed combined with restoration of a lake can produce dramatic and lasting results. For Lake Ahquabi visitors that means cleaner water for swimming and fishing.



Lake Ahquabi's original beach house

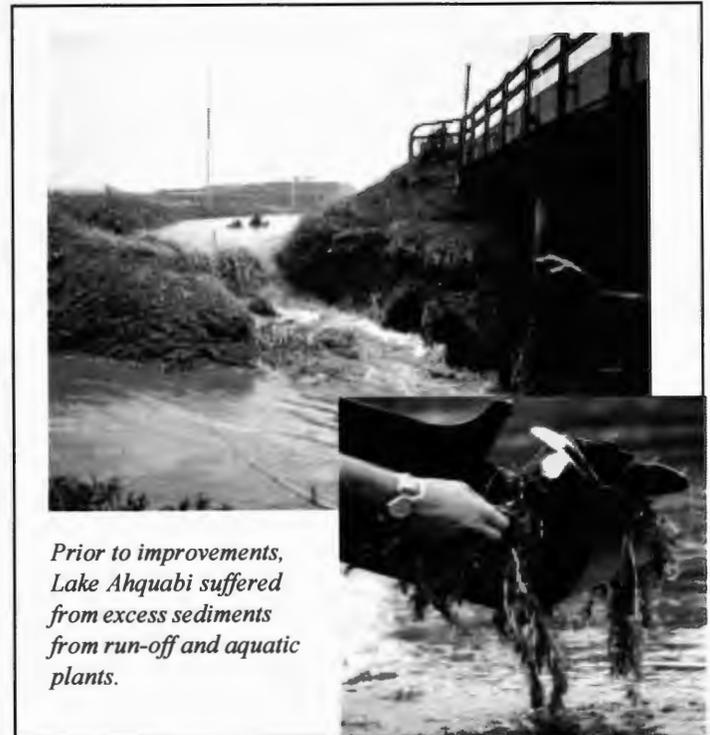
Measuring Success

The results of restoration work at Lake Ahquabi can be measured in terms of tons of soil from sediment delivery and micrograms per liter of various nutrients.

Success, however, is most effectively measured in terms of people. Improving the water quality, fish population and park amenities has resulted in Lake Ahquabi being re-established as a popular recreational destination.

Lake Ahquabi is a classic example of customers recognizing quality; when water quality and fishing was poor, attendance dropped off. Improvements to water quality and angling opportunity have resulted in noticeable increases in the number of people using the lake.

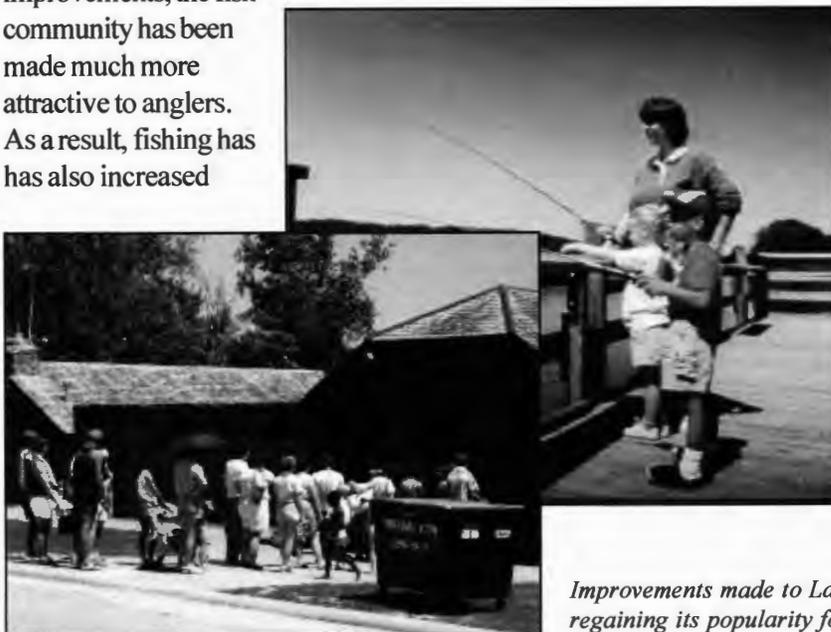
Prior to restoration of the lake, park use was estimated at approximately 60,000 visitor days per year. By 1999, park use had increased three-fold to 206,000 visitor days per year. Over the years, aquatic life in the lake had deteriorated to carp, gizzard shad and slow growing panfish. Since improvements, the fish community has been made much more attractive to anglers. As a result, fishing has also increased



Prior to improvements, Lake Ahquabi suffered from excess sediments from run-off and aquatic plants.

over three-fold to more than 17,000 trips annually. Anglers haven't been disappointed with a catch rate of 2.7 fish per hour, more than double that of most other Iowa lakes.

While the overall cost of the restoration project at Lake Ahquabi was just under \$4 million, it is estimated that the "payback" in terms of recreational benefits took only two years. This is based on established studies showing that the average visitor to a state park spends \$20 a day and park usage has increased by nearly 150,000 visitors a year since the work was completed.



Improvements made to Lake Ahquabi have resulted in the lake regaining its popularity for recreation in central Iowa.

Lake Ahquabi Fixing a c

*History can deal some harsh lessons
Through the years, it became evident
Lakes must also be maini*



Best management practices on cropland such as no-till (above) along with the installation of sedimentation basins and wetlands (right) in the watershed has reduced sediment and nutrients reaching the lake by 50 percent.



Extensive in-lake renovation work (above left), installing fish habitat above shows the wetland

Lake Ahquabi is a shining example of how to manage a lake through effective watershed planning. The work made in and around the lake to improve

Lake Inside and Out

as was the case at Lake Ahquabi.
' that building lakes isn't enough.
tained and protected.



Major infrastructure work was done both at the dam (above) and with park amenities such as the enclosed, handicap accessible fishing pier (left).



is done including dredging
itat (above right). The map
ork completed.

ow a lake can be restored, and protected
hese are just a few of the improvements
rove and maintain water quality.

Lake Ahquabi:

A Reflection of its Watershed



The restoration of Lake Ahquabi represents a decade of work by a number of governmental agencies and, more importantly, people within the watershed.

The reduction of lake sedimentation and removal of fine sediments from the shallow reaches of the lake was recognized from the onset as being the first and most important component to improving water quality. Any effort to restore Lake Ahquabi without making improvements to the watershed would have been a short-term solution at best.

From the very beginning, the public was openly invited to participate in the restoration effort at Lake Ahquabi. Public meetings were held to seek the input of the lake's neighbors to determine the most effective methods to restore and protect water quality.

Through public

participation, it was determined that soil and nutrient delivery to the lake could be reduced through best management practices on pasture and cropland in the watershed and through the renovation of two existing sediment basins and development of five new wetlands above the lake. Overall, 95 percent of the cropland in the watershed is now farmed under Natural Resource and Conservation Service (NRCS) approved soil conservation practices.

Although monitoring activity will continue through 2002, it has already been estimated that sediment delivery to the lake has been reduced by at least 50 percent and additional efforts are underway to further reduce sediment and nutrient delivery to the lake.

Partners

- Iowa Department of Natural Resources
- U.S. EPA - Clean Lakes and 319 programs
- Warren County Conservation Board
- REAP
- Marine Fuel Tax
- Iowa Department of Agriculture and Land Stewardship
- Institutional Road Funds (DOT)
- Landowners
- Lions Club, Izaak Walton League
- Warren County Soil and Water Conservation District
- U.S. Fish and Wildlife Service - Sport Fish Restoration Fund

A Recipe for Restoration

Once steps were underway to protect the watershed, the massive effort of restoring the actual lake could begin at Ahquabi.

A new lake draw-down structure and valve was installed in the dam. The new structure will allow intensive management of the lake by allowing greater ability to control water level. Construction and repair of the spill-way included a 10-foot vertical drop to reduce the likelihood of undesirable fish entering the lake from waters below the dam. A massive fish habitat improvement effort in the lake basin included the addition of structures such as rock reefs, brush piles and stake beds.

Construction of a two-lane boat ramp and a fishing jetty along with expansion of the parking lot and renovation of eight existing fishing jetties was accomplished in 1994-95. A 20-by-40-foot enclosed handicap accessible fishing pier was also added during this time.

Extensive stocking of largemouth bass, bluegill, sunfish, redear sunfish, channel catfish and crappie was accomplished in 1995.

Lake aeration was installed in the deepest part of the lake in 1994 to reduce the likelihood of future water quality problems and assist in the fish management program. Approximately 6,000 tons of rock was placed on 1,000 feet of shoreline to protect it against erosion.

Hydraulic dredging was used to remove 422,339 cubic yards of sediment from the shallow, upper reaches of the east and south arms of the lake in 1996-97. The material was pumped into three sediment basins constructed in the watershed above the lake.

These basins will be operated as wetlands and used to reduce future delivery of nutrients and sediments.

The results from the effort at Ahquabi have been astounding. Today, the lake is home to a vibrant, thriving fish

community. Unacceptable species of fish such as common carp and gizzard shad were reduced from over 700 pounds per acre to zero.

Water clarity has been increased from under 20 inches to over four feet. Water quality monitoring indicates that nutrients such as nitrates and phosphates have been significantly reduced through the efforts to reduce erosion in the watershed.



Improved land practices and dredging (top two photos) improved both water quality and fishing. Fish in Ahquabi had become stunted (above), but the improvements have resulted in better quality fishing for anglers (right).

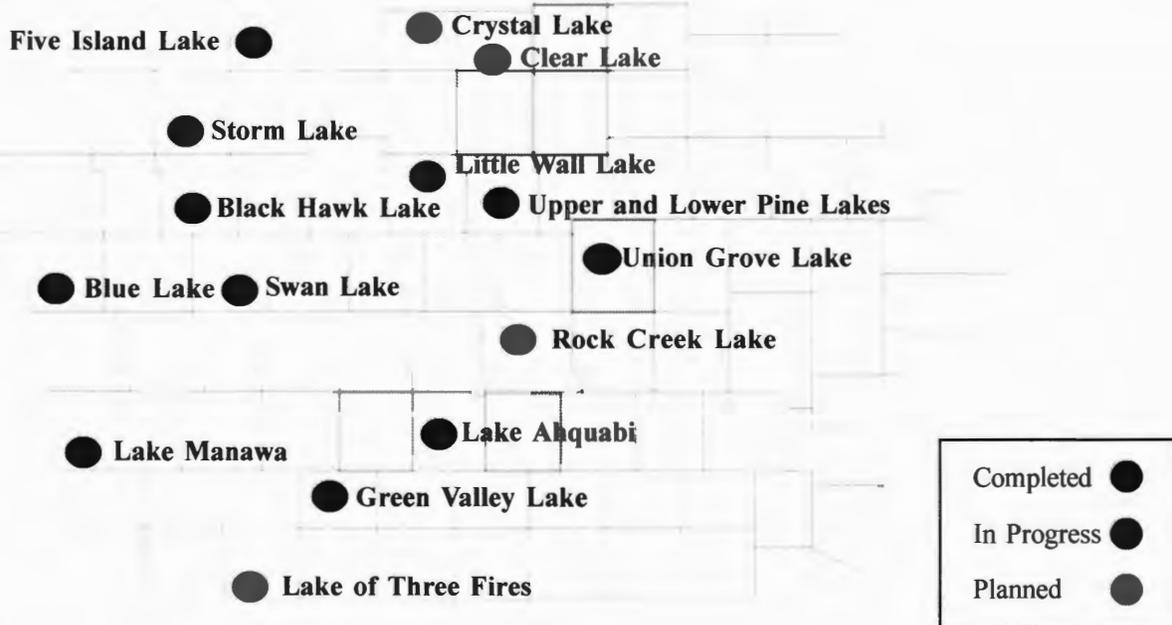
Using What We've Learned

Nine lake/watershed restoration projects have been accomplished within the past two decades.

Each of these have strived to improve water quality and recreational use of the lake. From these projects we have learned:

- The public is very supportive of efforts to maintain and improve the quality of our lakes.
- Land owners in the watershed of Iowa lakes have been active partners in our efforts to improve lake water quality.
- Restoration of carefully selected lakes and lake watersheds can be very cost effective.
- Selection of lakes and lake watersheds for restoration should be based on public benefit and cost effectiveness of restoration.
- Not all lakes can be restored in a cost effective manner.

Iowa currently has 65 lakes listed on its "impaired waters" list and most of those are impacted by siltation and excess nutrients. Much of what has been learned through projects like Lake Ahquabi will be useful in improving water quality at those lakes as well.



This publication has been funded by the Iowa Department of Natural Resources through a grant from the U.S. Environmental Protection Agency under the Federal Nonpoint Source Management Program (Section 319 of the Clean Water Act) and from the DNR's Fish & Wildlife Trust Fund. Federal regulations prohibit discrimination on the basis of race, color, national origin, sex or handicap. If you believe you have been discriminated against in any program, activity or facility as described above, or if you desire further information, please write to: Director, Iowa Department of Natural Resources, Wallace State Office Building, 900 East Grand, Des Moines, Iowa 50319-0034.