

Restoring our pride in Badger Creek Lake



Inside:
What *you*
can do to
help your lake



What's wrong with Badger Creek Lake?

What's wrong with the water?

For years, Badger Creek Lake has been a source of pride for people living and farming nearby. Today, as the quality of water in the lake declines and new residents move to the area, the people of Badger Creek Lake need to maintain and renew that pride by improving their lake.



Badger Creek Lake in northeast Madison County.

Badger Creek Lake, a popular fishing and recreation spot, landed on Iowa's impaired waters list in 1998 because its water fell below standards set by the state for supporting aquatic life and primary contact recreation.

The problems come from excessive amounts of soil and nutrients in the lake. Those pollutants reach the lake from an eroding shoreline and from the watershed, or the area of land that drains into the lake.

In some parts of the lake, you can only see two feet down because the water is so cloudy. This can hurt the growth of fish and aquatic plants. The excess soil has also started to fill in shallow areas of the lake. Excessive sediment and nutrients have caused large algae blooms and occasional fish kills at Badger Creek Lake.

One problem is the large amount of land that drains into the lake. For every acre of lake, there are 43 acres of land in the watershed. If there are more than 20 acres of land for every acre of lake, sediment can become a large problem, much like it has at Badger Creek Lake.

The lake opened in 1980 and included a number of retention ponds in the watershed. While work has been done in the watershed, it hasn't been enough. Now, landowners need to target the areas with the worst erosion and apply the right solutions.

"The lake isn't in horrible shape yet, but it's time to do something. If we don't help the lake now, there will be tough consequences down the road," said Mike Erwin, Badger Creek Lake watershed coordinator.

To remove the lake from the impaired waters list, the lake must meet state standards. One step in achieving that goal is reducing sediment and phosphorus reaching the lake by 70 percent.

What can I do to help?

Clean water starts with you. Both farmers and owners of small acreages can use conservation practices, like the ones on pages 6 and 7. These practices control the amount of sediment, nutrients and other pollutants reaching Badger Creek Lake.

Financial assistance is available, and the benefits extend beyond cleaner water. Often, conservation practices can improve a farming operation, create recreational opportunities and provide wildlife habitat. Landowners in the watershed have already discovered this for themselves – like brothers Neil and Tim Armstrong, who tell their story on page 8.

You have a chance to make a difference for a cleaner Badger Creek Lake. Not only for yourself, but for future generations of Iowans. Now is the time to act.

Get Involved in the Badger Creek Lake Watershed Project

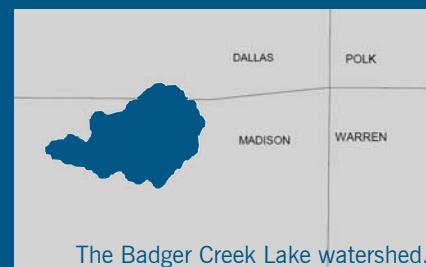
As a landowner in the Badger Creek Lake watershed, you have a unique opportunity to help improve your lake. By partnering with the Badger Creek Lake Watershed Project, you gain access to a number of resources.

Mike Erwin coordinates the watershed project and can work with you to evaluate your land and identify practices that can help both the lake and your property.

The coordinator can also help find financial assistance to install those practices. Landowners participating in the watershed project can generally get improved financial assistance opportunities.

Now is the time to get involved. The project is a limited year project, and the lake needs your help now. For more information on how you can help, contact project coordinator Mike Erwin

in Winterset at (515) 462-2961 or Michael.Erwin@ia.nacdnet.net.



Clean water a big draw for fishing

Every summer, boats line Badger Creek Lake, filled with anglers vying for the biggest bass. The lake hosts numerous individual anglers, fishing clubs and about a dozen fishing tournaments each year. In addition, the Badger Creek Recreation Area welcomes people for about 65,000 visits every year.

The lake is a popular spot to fish because of its location near the Des Moines area and the success anglers have there.

“There’s pretty decent shoreline access and the species that bite on worms and bobbers – like bluegill, crappie and catfish – are abundant here,” said DNR fisheries biologist Gary Sobotka.

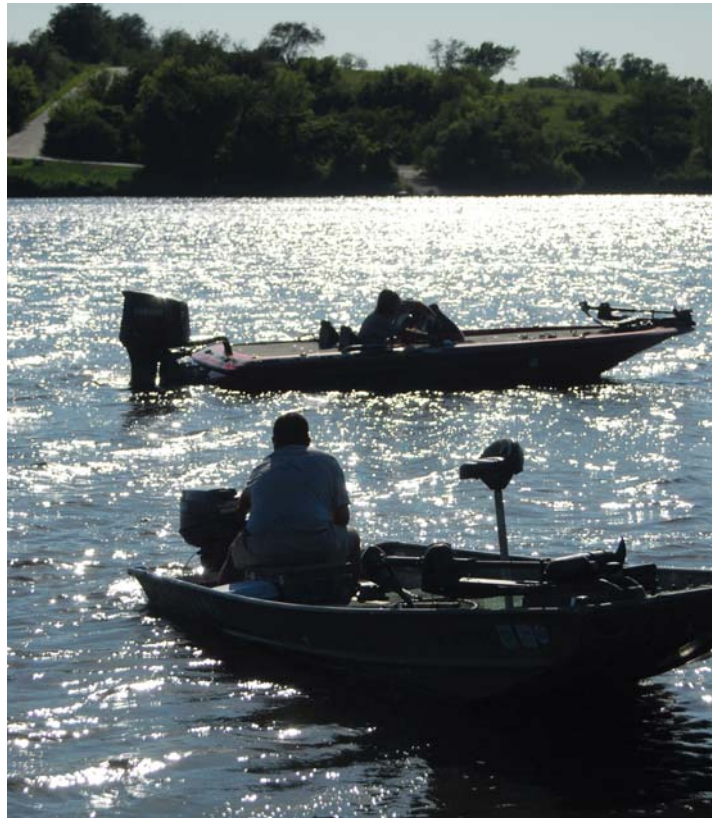
But what would happen to the fishing and park visitors if the quality of the lake continued to decline?

The cloudy water and algae blooms would make it harder for fish that use their sight to feed and would slow down the growth of fish. It would also make the lake less visually appealing.

Sobotka notes that the fishing could be better with improvements in the water and the watershed.

“Not making any changes would drag this lake down,” he said. “If we make changes in the watershed, both on farms and acreages, the lake will be less affected by a rainfall. Less sediment and nutrients will wash in, and we’ll see clearer water and better fish growth.”

If the quality of water in the lake would continue to decline, it would also affect other park visitors. When Iowans choose a lake to visit, water quality is the factor they consider the most, according to a recent Iowa State University study. The study also found

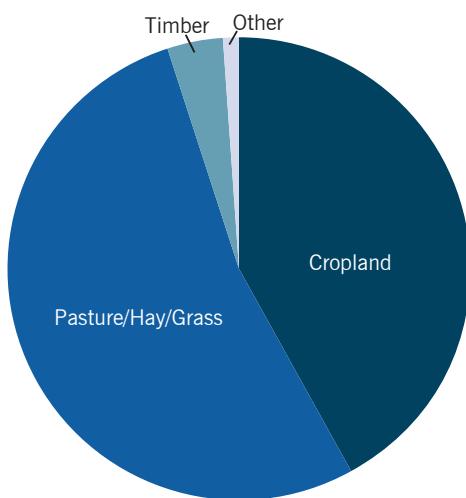


A fishing club meets at Badger Creek Lake.

that Iowans prefer lakes with clear water and without bacteria problems or water odor.

Clean water leads to improved fishing and recreation, which leads to an improved quality of life for nearby residents.

Land Use in the Badger Creek Lake Watershed



What's a watershed?

A watershed is an area of land that drains water into the lowest point – a body of water, such as a stream, lake or marsh.

The Badger Creek Lake watershed covers 11,700 acres, mostly in Madison County, with a small portion in Dallas County.

During a rainfall, water either travels over the surface or seeps into the ground. Water traveling over the surface may pick up contaminants like sediment, chemicals and waste and deposit them in a body of water.

Quick Facts: Badger Creek Lake

- Built in 1980
- 269-acre lake
- Average depth of 10 feet
- Maximum depth of 25 feet
- Listed on impaired waters list
- Located in Badger Creek State Recreation Area, southwest of Des Moines
- Watershed covers 11,700 acres
- Watershed to lake ratio of 43 to 1
- Popular for bass, crappie, bluegill, channel catfish
- More than 250,000 Iowans within a 30-minute drive

Problem pollutants

Sediment

When rain falls in the watershed, it erodes valuable topsoil and washes it into streams and the lake. In one year, an estimated 5,774 tons of sediment can reach Badger Creek Lake. That's like dumping almost eight dump truck loads of soil into the lake every week, or about 385 dump truck loads every year.



Excess sediment can:

- Reduce water clarity
- Damage the habitat of aquatic life, like fish
- Fill in streambeds and the lake
- Clog drainageways
- Deliver phosphorus to streams and the lake

Sediment reaches Badger Creek Lake through these types of erosion:

- **Sheet erosion** occurs when rainfall and runoff remove a thin layer of soil from the surface of the land.
- **Rill erosion** forms small channels with a concentrated flow of water on sloping fields.
- **Gully erosion** happens after heavy rains or snowmelts and the concentrated runoff creates channels or ditches in the soil.
- **Streambank erosion** occurs when water in streams removes soil from the streambank. Some streambank erosion happens naturally, but livestock using the streams can trample the banks, which can result in a higher rate of erosion.
- **Shoreline erosion** happens when water in the lake removes soil from the shoreline. Severe shoreline erosion is a problem along approximately 1.5 miles of shoreline in Badger Creek Lake.

Once sediment reaches Badger Creek Lake, the constant mixing of the lake can stir up sediment and nutrients from the lake bottom. This constant mixing can cause algae blooms and brown, cloudy water.

Nutrients

The most common nutrients in Iowa are nitrogen and phosphorus, which are needed for healthy soils and waters. However, there can be too much of a good thing with nutrients.



High nutrient levels can lead to poor water quality and:

- Cloud the water
- Create low oxygen and high ammonia levels, which is harmful to fish and other aquatic life
- Lead to poor diversity of aquatic life
- Lead to nuisance levels of algae and aquatic plants that interfere with recreation
- Lead to potentially toxic algae blooms

Due to Iowa's naturally rich soils and intensive agriculture, the state has very high levels of nitrogen and phosphorus in its water.

- About 90 percent of nitrogen and 80 percent of phosphorus in Iowa's water come from "nonpoint" sources like agriculture.
- "Point" sources, like municipal and industrial wastewater treatment plants, account for the rest.

However, there are no point sources in the Badger Creek Lake watershed. While watershed work must also reduce nitrate levels, phosphorus is the greater problem in the watershed. To reduce phosphorus in the lake, landowners will need to make changes on the land to reduce nonpoint sources.

Problem pollutants from rural living

Excess sediment and nutrients are not just a problem on farmland. A rural home, whether a small acreage or part of a housing subdivision, can impact water by sending its own sediment, nutrients and bacteria into streams and Badger Creek Lake. Listed below are a few issues that can lead to problems from sediment and nutrients.



Septic systems

Failing and outdated septic systems can send human wastewater – along with bacteria and nutrients – into streams, groundwater and the lake.



Lawn and land management

While your lawn in town was all grass, that doesn't mean your rural lawn should be the same. With a larger property, you have new options beyond turf grass. Longer grasses, including prairie plants, have deeper roots which allow them to absorb more water and use more nutrients than a standard grass lawn. These taller plants, as well as trees, wetlands and rain gardens, help reduce the amount of runoff reaching streams.



Lawn fertilizers

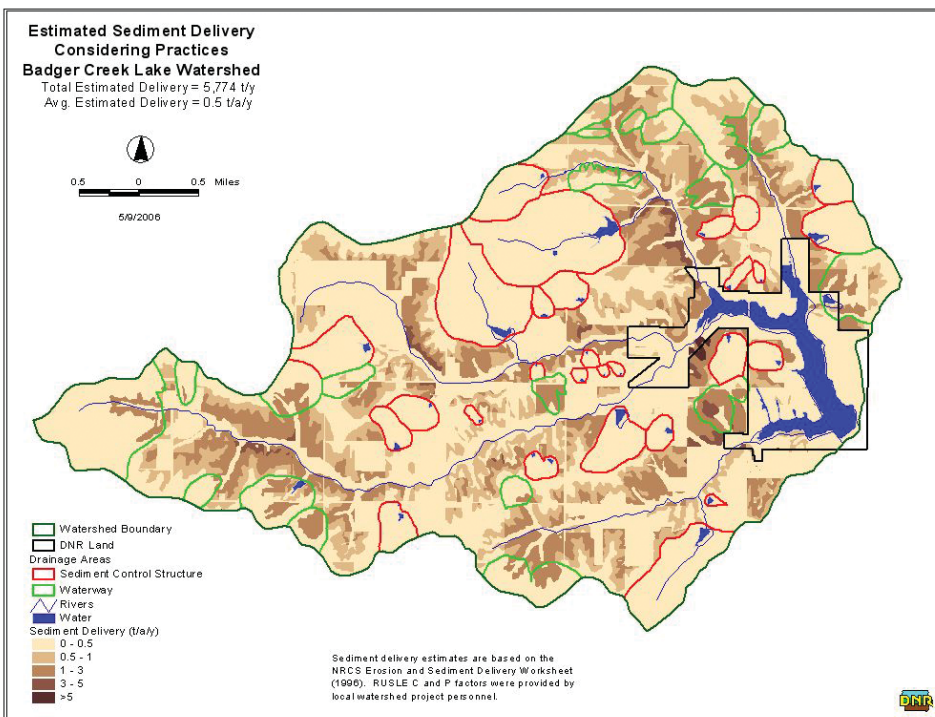
Using too much lawn fertilizer or fertilizing too often can allow rain to wash the excess nutrients into streams and the lake. Test your lawn's soil to determine the appropriate type and amount of fertilizer to apply. For information about soil tests, contact the Madison County Extension office at (515) 462-1001 or www.agron.iastate.edu/soiltesting/



Construction erosion

Developers should use proper erosion and sediment control methods at construction sites to prevent excess soil from washing into streams and the lake. The DNR requires sites that disturb more than one acre of soil to obtain a permit and implement a storm water pollution prevention plan.

Photo by NRCS



The GIS map to the left shows the amount of sediment currently reaching Badger Creek Lake, taking into account conservation practices already in place.

Solutions for Badger Creek Lake

By using conservation practices, like the ones below, you can help reduce the amount of sediment and other pollutants reaching Badger Creek Lake. Using these practices in areas with the highest rates of erosion will have the largest effect on the lake.

Assistance with choosing and installing the best practices for your land is available, as well as a number of cost-share, low-interest loan and other programs. For more information on these programs, contact the Madison County NRCS/SWCD office in Winterset at (515) 462-4884.

Practices for farms



Terraces

Terraces are embankments built around a hillside, usually on the contour. Terraces either slow runoff and guide it to the bottom of the hill, or collect runoff and store it until the runoff can be dewatered by field tile. Watershed project goal: install 15,000 feet of terraces on 107 acres.



Photo by NRCS

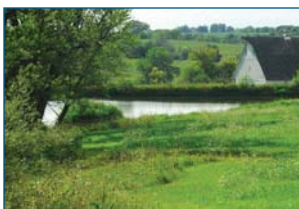
Prescribed grazing practices

These practices reduce pollutants that result from over-grazing and livestock access to streams. Rotational grazing limits the time cattle have access to a stream, giving the streambanks time to heal, and reduces erosion. At the same time, it increases a pasture's carrying capacity. Buffer areas along the stream filter runoff water and provide habitat for small animals and birds. Project goal: Treat 960 acres of pasture with these practices.



Waterways

Grassed waterways are shaped and placed in areas with concentrated water flow to slow water, guide it off the field and reduce gully erosion. Grassed waterways help disperse water, preventing small gullies from forming. They can also trap nutrients and sediment. Project goal: 18 acres of waterways to control drainage from about 54 acres of row crop land.



Wetlands

Wetlands were once widespread across Iowa, but many were drained for agricultural uses. Wetlands are being restored today to help filter out nutrients and sediment. Project goal: construct six wetlands to control drainage from about 3,000 acres of row crop land.



Photo by NRCS

Buffers and filters

Vegetative conservation buffers slow sediment and filter runoff water before it reaches a stream. In addition, buffers reduce erosion from wind, help stabilize streambanks and provide habitat for wildlife. Project goal: plant 40 acres of buffers and filters in the Badger Creek Lake watershed.

Other watershed project goals:

Sediment basins

Six planned to trap sediment and nutrients

Conservation Reserve Program

Planned on 20 acres to convert cropland to permanent vegetation

Grade stabilization structures

Six planned to reduce water flow and trap sediment

Nutrient management

Planned on 3,600 acres to reduce nutrients in the lake

Pasture and hayland planting

To reduce erosion on 240 acres of critical areas

Practices for country living

Conservation practices are not just for farmers. Living in the country is different from urban living, especially when it comes to caring for your land. The growing number of small acreages and country subdivisions in the Badger Creek Lake watershed also need to do their part in improving the lake. There are a number of ways to help.

Assistance is available for landowners who would like help learning to manage their land or help in installing conservation practices to benefit the lake. To learn more, please call the Madison County Natural Resources Conservation Service (NRCS) center in Winterset at (515) 462-4884.



Low-impact developments

Low-impact housing developments add housing to a rural landscape with minimum impact to surroundings. This strategic placing of housing reduces the disturbance to the land and soil leaving the property. It also leaves more open green space for the community to enjoy, as well as ponds and rain gardens. The goal is to infiltrate as much rainfall and snowmelt as possible onsite, reducing erosion and pollutant runoff.



Septic systems

Failing and outdated septic systems can send human wastewater – along with bacteria and nutrients – into streams, groundwater and the lake. Low-interest loans may be available for homeowners to replace outdated or failing septic systems through the DNR's Onsite Wastewater Systems Assistance Program. For more information, visit www.iowadnr.gov/water/septic/ or the Madison County Sanitarian. Madison County also requires time of sale septic system inspections.



Buffers

Vegetative buffers can also be used on small acreages to beautify the property, provide a windbreak and add wildlife habitat. Buffers filter and absorb rainfall before it can carry pollutants into a stream.



Photo by Julie Sparks

Pasture management

Pasture management prevents overgrazing by managing the stocking of animals, like horses, according to available forage plants. Preventing overgrazing and selecting the best feeding area can increase the number of plants per acre, improving animal health and performance. In addition, the plants slow runoff, reducing the amount of soil and nutrients leaving your land, also making your acreage more visually appealing.



Wetlands

Like buffers, wetlands are just as viable for small acreages as for farms. Wetlands are nature's water treatment plant for runoff, filtering it before it can reach a stream. Wetlands are great additions to your land, as they add beauty, capture water and provide a place for wildlife to gather.

In-lake improvements:

Making improvements within the lake is also a step to cleaner water. In-lake improvements will address shoreline erosion and reducing phosphorus from sources within the lake. However, these in-lake improvements are just one part of improving Badger Creek Lake, and generally the last step in a lake restoration project.

"It's critical that we have the watershed work in place first," said Mike McGhee, DNR lakes and rivers project coordinator. "Restoration is expensive, and you only want to do it once. We want to make sure that work lasts. The work in the watershed is preventative maintenance, keeping the lake clean after restoration."

Brothers continue tradition

For brothers Tim and Neil Armstrong, saving soil and protecting water is both a family tradition and a responsibility.

Like many other farmers in the Badger Creek Lake watershed, their family built some conservation practices without cost-share funding.



Neil Armstrong and brother Tim stand in front of one of their family's ponds in the Badger Creek Lake watershed.

"It was just because they needed to be there," said Neil, who farms his grandfather's land. "It was the right thing to do."

Conservation has been the right thing to do in the Armstrong family for years. Grandfather John was chairman of the first Badger Creek watershed committee. He also served as a commissioner of the Madison County Soil and Water Conservation District, a position later held by his son, Gene, and grandson Tim, currently a commissioner.

"Being a commissioner gives me a better opportunity to work with landowners and protect the watershed," said

Tim, a contractor who builds terraces, ponds and other conservation practices. "If we don't take care of the land, who's going to? It's a family tradition, a family obligation. I owe it to my grandfather to protect that."

Neil looks after the family farm, which features a number of conservation practices, including terraces. In addition to providing wildlife habitat, the terraces also benefit the pocketbook.

"Terraces save a lot of soil, and this was land that couldn't be continually row cropped. It wasn't cost-effective to farm, and government help made it feasible. Plus, you help wildlife and the quality of water downstream," Neil said. He plans to add a wetland and pond.

The Armstrong brothers are quick to credit other landowners in the watershed as well. Many family farms were there before the lake was built, and they've made a difference.

"Water does not leave farms like it used to," said Tim.

"What does leave is a lot better quality," added Neil.

However, they note that there is still work to be done, noting stream-bank erosion and siltation problems, and educating new acreage owners and developers in the watershed.

"People in the watershed are doing a good job, we just need to fine tune it," said Mike Erwin, watershed coordinator.

Get Involved

- Attend **field days** for farmers and acreage owners that show how different conservation practices work.
- Attend **"Producers Roundtable"** discussions. This group is open to anyone who would like to learn about farming practices from neighbors and guest speakers.

- Sign up to be a **volunteer water monitor** through IOWATER. For more information, visit www.iowater.net.

To learn more on how you can get involved, contact project coordinator Mike Erwin at (515) 462-2961 or Michael.Erwin@ia.nacdnet.net.

A publication of the
Iowa Department of
Natural Resources
2006



Produced by:

Jessie Rolph Brown,
DNR Information Specialist

Photography:

Clay Smith, DNR

Contributors:

Michael Erwin,
Watershed Coordinator

Kate Bussanmas,
DNR GIS Specialist

For more information

Mike Erwin

Watershed Coordinator

(515) 462-2961

Michael.Erwin@ia.nacdnet.net

Steve Hopkins

Nonpoint Program Coordinator

Iowa DNR

(515) 281-6402

Stephen.Hopkins@dnr.iowa.gov

For additional copies of this
publication, please contact:

Iowa DNR

Wallace State Office Building

502 E. 9th St.

Des Moines, IA 50319-0034

(515) 281-5918

www.iowadnr.gov

Badger Creek Lake Watershed
Project Partners:

Landowners and residents,

Iowa DNR, U.S. EPA, Natural

Resources Conservation Service,

Watershed Protection Fund and

Water Protection Fund.



PRINTED ON
RECYCLED PAPER

The publication of this document 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). 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 the address above.