Pine Creek Water Quality Project

The people of this community pulled together in the1920's to make the lakes a reality and have been working in this watershed since then. We must continue to be aware of changes we can make to protect the watershed and lakes in the best way we know how. These lakes are vital to our community.

Pine Lake in autumn illustrates the beauty and wisdom that has drawn visitors to Pine Lake State Park near Eldora for the last 75 years.

Local residents had a vision and carried it through to reality. Through land and financial donations, this beautiful nature and recreation area was created.

Lower Pine Lake was created in 1922 when a dam was constructed across the outlet of Pine Creek to the Iowa River. It was Iowa's first state-owned artificial lake.

In 1934, a Civilian Conservation Corps camp was established in the area and created much of what exists around Pine Lake today, including the original Upper Pine Lake dam. They are credited with building the beautiful rock lodge on Upper Pine Lake as well as cabins, foot bridges and trails. They also created the multiple stairstep rock chutes that control water runoff and prevent cropland runoff from forming gullies in several areas adjacent to the park and lake.

These were the first soil erosion control structures built to protect Pine Lake.

What is a watershed?

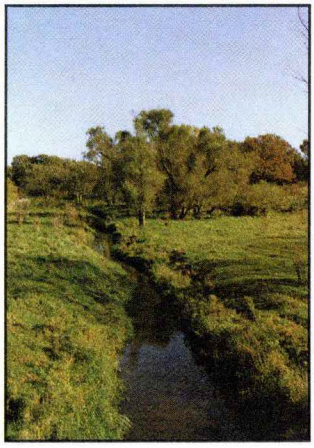
All of the land on earth is divided into watersheds. We all live in one.

A watershed is an area of land that water drains through on its way to the lowest point — a lake, river or stream.

Watersheds come in all shapes and sizes. The Mississippi River is one of the largest watersheds in the world with water draining from approximately 1.2 million square miles of land flowing into its banks. This watershed is made up of many smaller watersheds across several states.

The quality of water in a lake, river or stream is dependent upon the conditions within the watershed.

As rain falls, the water either travels over the surface or seeps down into the ground. Water that travels over the surface may pick up contaminants like sediment, chemicals and waste and deliver them to a water body.



Pine Creek

Practices like those described in this publication protect the water from sources in the watershed like erosive cropland, unstabilized streambanks and runoff from agricultural chemicals and fertilizers.

This is the pollution prevention approach to water quality — reducing pollution throughout the watershed instead of cleaning up water after pollution has occurred.

Pine Creek Water Quality Project

In the first years after its creation, Lower Pine Lake near Eldora received a large amount of sediment from the agricultural-based watershed. Only eleven years after Upper Pine Lake was constructed, more than 30 percent of its original capacity had been lost to sediment. Poor water clarity, summer algal blooms and fish kills also threatened the lakes.

Upper Pine Lake

Local land and water officials predicted if soil conservation practices were adopted in strategic locations in the 9,680-acre watershed, the lakes could be protected. If the water quality problems were not corrected, they determined, the lakes would deteriorate and no longer support their desirable uses such as fishing and swimming.

They were in need of help from the watershed's farmers and landowners.

The watershed has gently rolling topography and erosive soils. Approximately 78 percent of the watershed is cropland. Almost a third of that land is considered highly erodible land.

The first efforts to protect the lakes began in the 1930's. The most recent effort, the Pine Creek Water Quality Project, began in 1993.

The five-year project used the watershed approach to water quality improvement. This approach integrates education and management techniques with technical and financial assistance for producers and landowners.

Approximately 80 percent of producers in the watershed participated in the project. Currently, 60 percent of cropland acres in the Pine Creek watershed are effectively treated.

Of these acres, the most critical for the watershed are determined by the amount of sediment they deliver to Pine Creek and Pine Lakes.

Sediment delivery is determined by the potential of soil to reach Pine Lakes, depending on distance from Pine Creek, surrounding conservation practices, topography and other factors.

What is the impact downstream?

Although erosion is a natural process, growing corn and soybeans accelerates the rate of erosion.

Yet not all eroding soil will make its way into the lakes. Some areas are more critical because they deliver more sediment than others. One area in the watershed targeted by the Pine Creek Water Quality Project was a 240-acre subwatershed in the upper region of the watershed.

Before the project, this subwatershed delivered 272 tons of sediment to the lake every year. That would cover one acre with a one and a half-inch layer of soil.

Producers implemented grassed waterways, a grade stabilization structure and residue management systems to reduce the amount of sediment delivered to Pine Lakes by approximately 200 tons per year, a 73 percent reduction. Now, only 74 tons travel the route to the lakes.

Changing the watershed landscape

We think we have reduced erosion by 75 percent on our farm due to several changes like contour farming, no-till and the addition of grassed waterways and terraces." This is the feeling of landowner Wayne Paige and operator Chuck Smoldt about their farm adjacent to Pine Lakes.

"Many farmers in the watershed were active participants in the Pine Creek Water Quality Project," said Jennifer Welch, project coordinator. "Practices such as no-till, contour farming, buffer strips, and nutrient and pest management programs were voluntarily implemented by farmers and landowners."

Nutrient and pest management minimizes water contamination by applying pesticides only when economic thresholds are reached or fertilizers based on what crops are predicted to use. More than 50 percent of the watershed acres were enrolled in nutrient and pest management.

"By recognizing the benefits we are receiving from our manure application, we have reduced our use of phosphorous and potassium dramatically," said Bill and Billie Janssen.

Like the Janssen's, other producers in the watershed are now more conscientious of nitrogen use and monitor actual crop requirements through late spring soil and fall stalk tests.

Producers hired crop consultants to intensively manage their farming operation. Specific plans were created on a field-by-field basis to tailor fertilizer and pesticide programs to individual fields.

Two watershed producers have become proficient at building grassed waterways. "We have designed and built machines to install fabric checks in newly constructed grassed waterways to prevent gully erosion before grass is established," said producers Rollin and Claus Primus.

So more grassed waterways are protected from erosion with fabric checks, the Primus' are now building and selling these machines with the assistance from a local welding shop.

Another watershed producer has been pleased with the results of strip tillage in his no-till management system. "I planted corn in bands where nitrogen had been applied in late fall. The nitrogen application created a darker residue-free strip that was warmer in early spring and gave my corn an earlier start," said producer Mark Balvanz. The undisturbed residue between the strips protected the soil from erosion and slowed weed growth.

Many of these management practices take a high degree of commitment from the producer. It is a commitment not only to their farm and the environment, but also to the community and everyone that benefits from the lakes.

"The results of this project could not have been achieved without the hard work and efforts of the farmers and landowners in this watershed," said Welch. "They have done the real work."

Through the help of local, state and federal partners, the producers in the Pine Creek Water Quality Project have changed the landscape of this watershed.

Dredging is a "last ditch" effort for water bodies that have accumulated large amounts of sediment. In conjunction with watershed protection practices implemented through the Pine Creek Water Quality project, Upper and Lower Pine Lake is being dredged in 1997.

This process uses a floating barge to collect silt like a giant vacuum from the lake bottom. The dredged material is pumped in a slurry with lake water into a large basin. Once the sediment has settled to the bottom, the sediment-free water is returned to the lake.

This very expensive process fixes only the symptoms of sediment. The practices implemented on the land in the watershed do the real work of protecting Pine Lakes.

After the area was treated.

Gully erosion treated by a grade stabilization structure reduced sediment going into Pine Lakes by 65 tons per year.

Improving
one practi

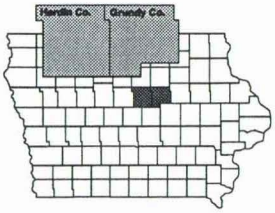
Grade Stabilization Structures

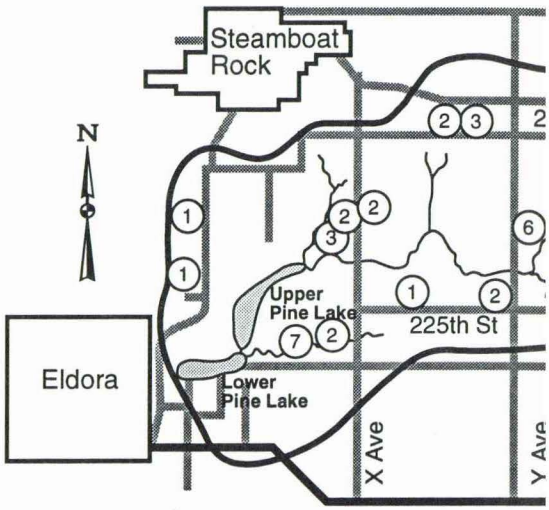
These structures are used to control gully erosion. Some structures are built to store water much like a pond. They are built across gullies to guide runoff waters from one stabilized level to another. They can be constructed of wood, aluminum, concrete, or rock baskets called gabions.

Before

Grade stabilization structure - gabion baskets

After





Water & Sediment Control Basins

Basins function similarly to a small dam or terrace to prevent gully erosion. They are embankments built across drainageways or depressional areas where water concentrates to run off a field. Basins store water temporarily and deliver it to underground tile.

Ponds

Ponds reduce the erosive energy of runoff by ponding water over actively eroding areas. This earthen structure also can be used as a water supply source for livestock with a gravity flow system to a stock tank.

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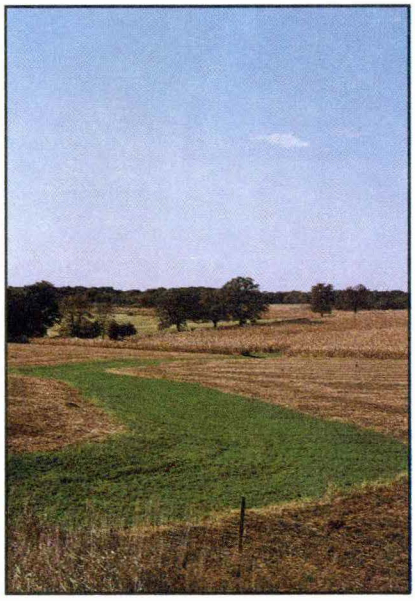
Grassed waterway



Grassed Waterways

Rainfall that runs off fields often concentrates into small streams of runoff and erodes gullies if the soil is bare. Waterways are shaped and seeded with grass in areas of concentrated flow. The grass slows the water and guides it off the field, significantly reducing gully erosion.

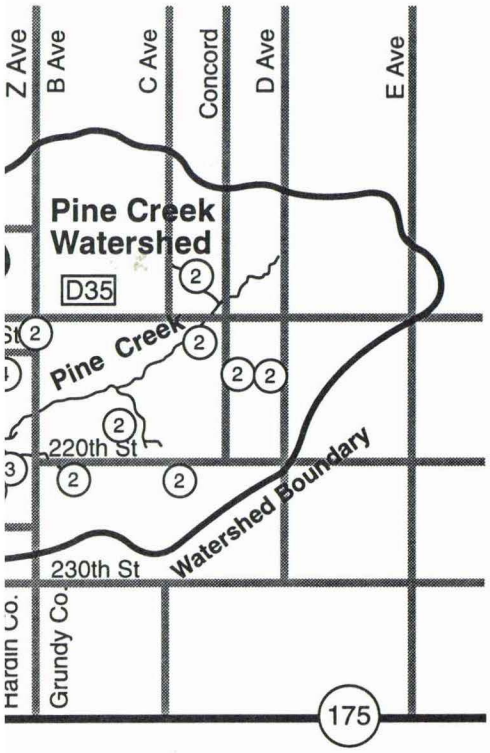
Terraces

Terraces are grass-covered earthen ridges built on a hillside slope to catch runoff water and deliver it to an underground tile outlet at the bottom of the hill. The tile carries the runoff water to a non-eroding outlet.

Pine Lakes:
e at a time

The watershed map illustrates where many of the recently constructed erosion control practices are located, as well as terraces and other practices from previous efforts in the watershed. Take a drive through the watershed and view all the practices that reduce the erosion potential of the cropland. All these practices could be implemented in fields outside the Pine Creek watershed.

Since everyone lives in a watershed, all places will benefit from measures to protect the productivity of the soil for future years to come.



Map legend

❶ Terraces	17,000 ft
❷ Grassed waterways	60,000 ft
❸ Grade stabilization structures	11
❹ Shallow water impoundments	2
❺ Ponds	3
❻ Streambank stabilization	3,500 ft
❼ Water and sediment control basins	5

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Construction of the streambank stabilization.

Shallow Water Impoundments

The erosive energy of water is reduced by ponding water over actively eroding areas. The water depth is usually less than six feet and pool size is dependent on the landscape.

These structures temporarily store and release runoff at a controlled rate after heavy rains, similar to the natural function of wetlands. Other wildlife benefits include waterfowl habitat and cover, wetland vegetation and food source.

Filter Strips

A filter strip or riparian buffer planting consists of a strip of grass, trees and shrubs or a combination along a stream that filters runoff water from farm fields. The vegetation slows runoff, allowing contaminants such as sediment and herbicides to collect in the vegetation. The strips also reduce the erosion on the streambank.

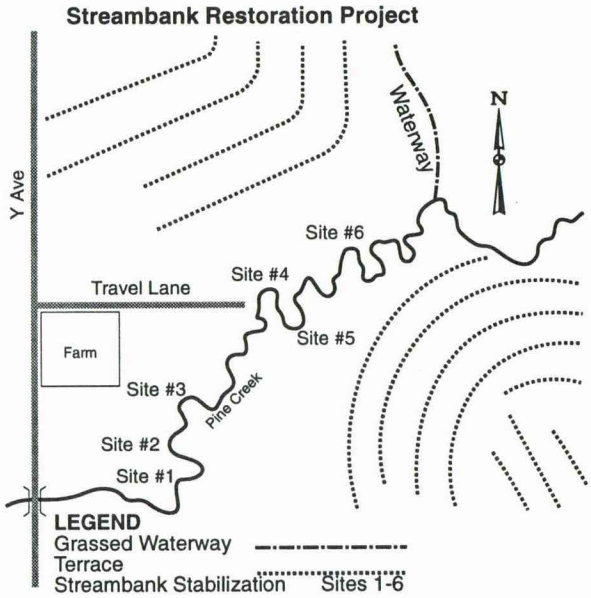
What a difference we can make...

Streambank Restoration Project

Before streambank stabilization

After streambank stabilization

A 3,000-foot section along Pine Creek was losing ground - literally. Pine Creek was cutting into the crop fields at this location and 80-100 percent of the sediment directly transported into Pine Lakes. Unlike soil erosion from upland crop fields, streambank erosion directly moves into the water flow downstream from Pine Creek into Pine Lakes.



At This Site

- Streambank stabilized: 3,000 ft
- Before: approx 456 tons/year of soil delivered to Pine Creek
- After: approx 25 tons/year

"The cropland and travel lane disappearing into Pine Creek were especially apparent in years with significant rainfall events," said producer Mark Balvanz. "I knew that something needed to be done to stop it."

The streambank erosion from this area was approximately 456 tons per year. Approximately 90 percent of the sediment from streambank erosion was reaching Pine Lakes. That is until six sites along Pine Creek's streambank were stabilized with strips of trees, shrubs, grasses, and rock rip-rap. Now the erosion is less than 25 tons per year.

The project is a demonstration site to promote the use of streambank restoration practices. Buffer strips of trees and grass along the streambank trap sediment and chemicals from cultivated fields before they reach Pine Creek. They transformed the site into a thriving wildlife eco-system similar to native conditions. These changes will slow the encroachment of Pine Creek into cropland and improve water quality by reducing streambank erosion and sediment and chemicals in cropland runoff water.

Riparian buffers are most effective when used in conjunction with sound management systems including terraces, grassed waterways, no-till and integrated crop management.

Willow post planted on streambank

Restoration Steps

- Streambanks were shaped to reduce cutting and remove overhang to create stable slopes.
- Severe cuts on bends were stabilized with rock rip-rap.
- Willow posts and bundles were planted into the creek banks (willows will grow into a mat of vegetation to shelter the banks from flood waters).
- Shrubs were planted on the upper portion of the bank.
- Strips of trees, shrubs, and a switchgrass buffer were planted to restore the area.

Shallow water impoundment structure

Before

After

Several years ago, shallow water impoundment structures like this one built on the Schwarck farm were virtually nonexistent. Today, they are considered an innovative and effective conservation practice.

The erosive energy of water is reduced by ponding water over actively eroding areas. Runoff from heavy rains is temporarily stored and the velocity of the runoff is reduced by this structure, similar to the natural function of wetlands in the landscape. The pond also acts as a natural purification process where nitrogen is removed by wetland vegetation and pesticides can be immobilized and degraded.

This structure was finished in October of 1996 and completely filled with water within three months. It is located at the base of an 85-acre subwatershed, approximately 1,000 feet from Pine Creek.

Almost immediately after construction, several groups of migrating waterfowl were spotted using the pond.

"The kids and I saw 14 migrating Canada geese on the island before it was even full," said Garry Schwarck. "I was really excited to see wildlife using the pond so quickly."

Water depth is usually less than six feet and pool size varies according to the landscape. A special outlet structure allows the landowner to change the depth of the water during the year to mimic the wet/dry cycles of wetlands.

"We calculated that the amount of sediment being delivered into Pine Lakes has been reduced by 60 tons of soil per year through the use of this structure," said Jennifer Welch, project coordinator.

Approximately 90 percent of the sediment that was going into the lake is now being trapped and held by the structure.

"It is one of the most cost effective practices for reducing the amount of sediment delivered to Pine Lakes," said Welch.

In addition, the impoundment structure offers many wildlife benefits including waterfowl habitat and cover for offspring, food and water source, and wetland vegetation.

Canada geese are attracted to the pond's small size, shallow depth and island for nesting.

What is nonpoint source pollution?

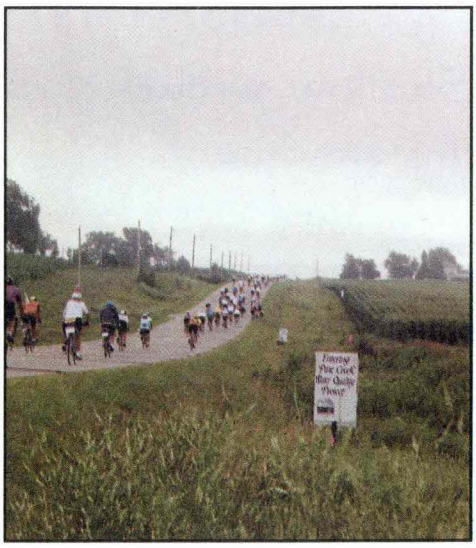
Non-point source pollutants are those contaminants swept into water bodies by heavy rains or carried into groundwater. Non-point source pollutants cannot be traced to a specific source.

A variety of land uses may contribute to this elusive contamination - chemical application to cropland, residential lawns or golf courses, soils disturbed by new construction, manure runoff from a livestock operation, and soil eroding from cropland are just a few.

Sediment is Iowa's biggest environmental threat to water quality. Sediment not only fills in thousands of cubic feet in Iowa's lakes, rivers and streams annually, but also destroys fish habitat and decreases recreational use.

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).

Reaching landowners with a conservation message



Riders on RAGBRAI in 1995 followed signs across the watershed.

Informing landowners and producers in the Pine Creek Water Quality Project area about conservation practices that reduce environmental impact and save money enabled them to make a difference in their watershed.

Workshops, tours and informational meetings held in the watershed were key components of the Pine Creek Water Quality Project's information and education program.

When RAGBRAI (Des Moines Register's Annual Great Bike Ride Across Iowa) rode through the watershed in 1995, signs were painted to describe conservation practices and their function. More than 10,000 bicycle riders from across the country witnessed the conservation efforts of the producers.

Local youth are a key element in the continued protection of the lake. Volunteers from Eldora/New Providence chapter of Future Farmers of America and Quakerdale youth home assisted with a streambank restoration project involving planting willow trees on the slopes of a streambank. Students raked, dug, planted grass and willow trees, and secured erosion control fabric on the slopes.

"High water had weakened the banks and sediment was falling off into the creek and carried downstream," said one student. "Our class wanted to help to prevent this any way we could."

You may notice several outdoor signs throughout the project area. The signs highlight conservation practices and acknowledge watershed producers for their conservation efforts.

Displays, newsletters, letters and other devices were used to communicate with landowners and other key audiences.

Students help with the streambank restoration.

PINE CREEK
WATER QUALITY PROJECT

The four objectives of the project communicated to landowners and other audiences included:

- Reduce sediment and nutrients entering Pine Creek and Pine Lakes
- Increase awareness of water quality problems and practical solutions
- Promote comprehensive conservation plans to improve and protect local water resources
- Target problem areas when implementing conservation and water quality practices

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