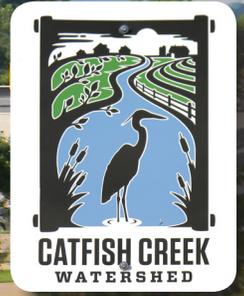


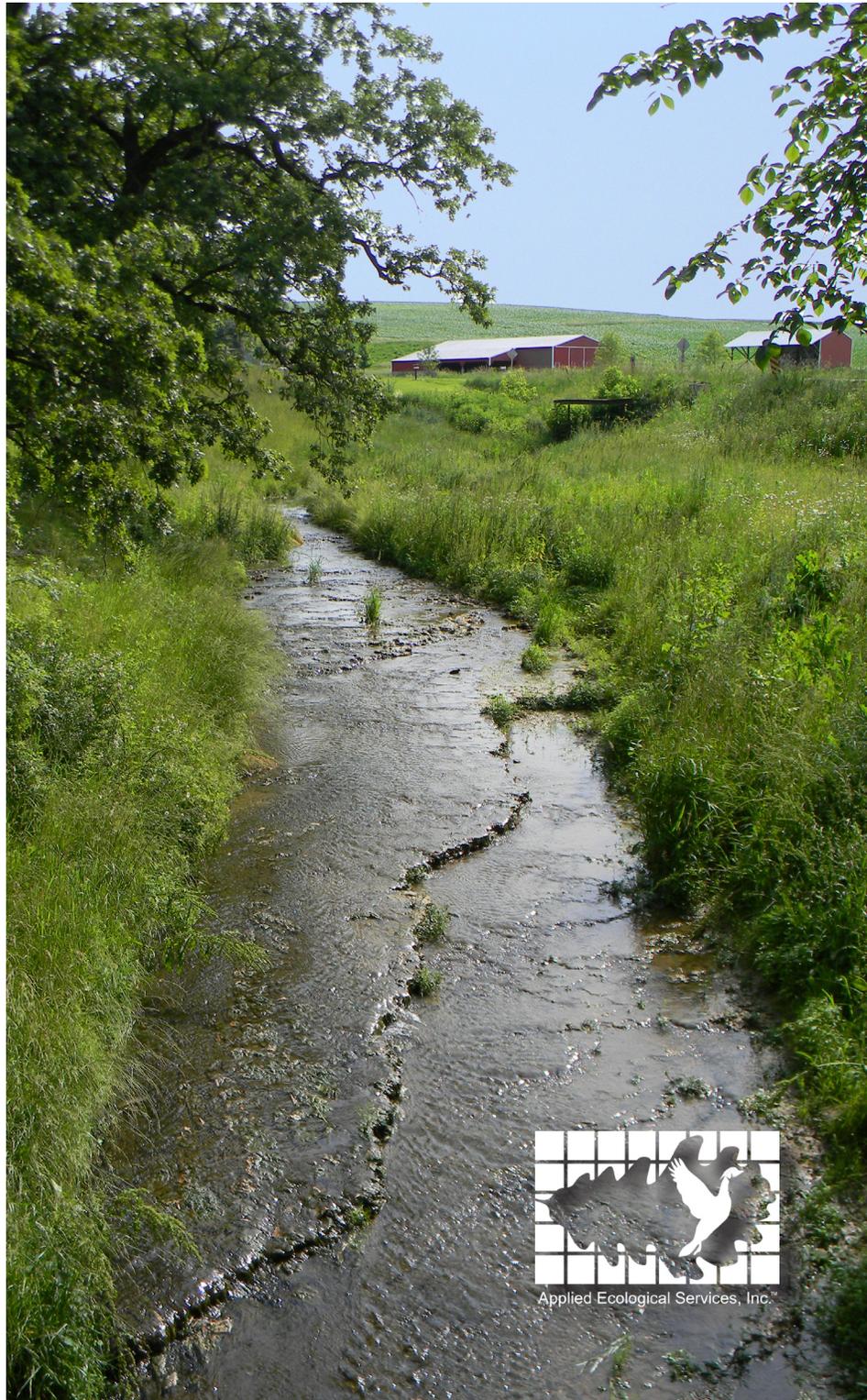
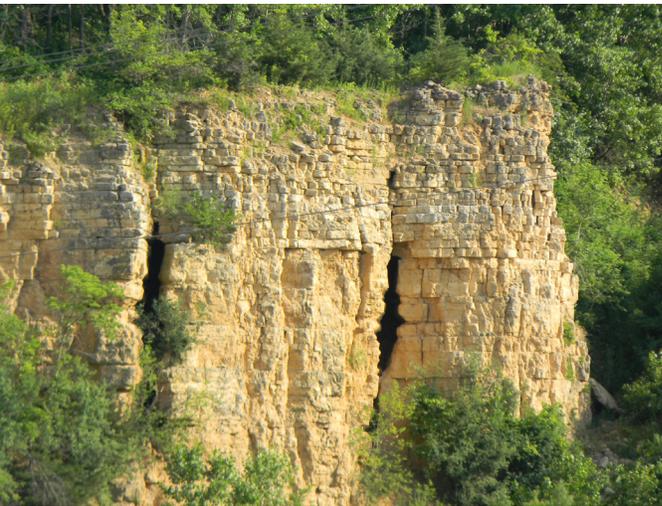
# Catfish Creek Watershed Management Plan

A Guide to Protecting and Restoring Watershed Health

Prepared for  
City of Dubuque  
By Applied Ecological Services, Inc.  
December 2014



EXECUTIVE SUMMARY

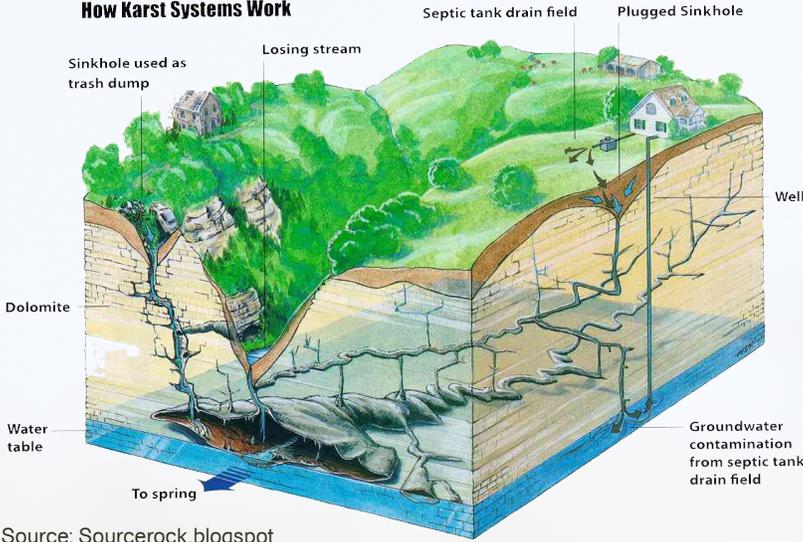


Applied Ecological Services, Inc.

# INTRODUCTION

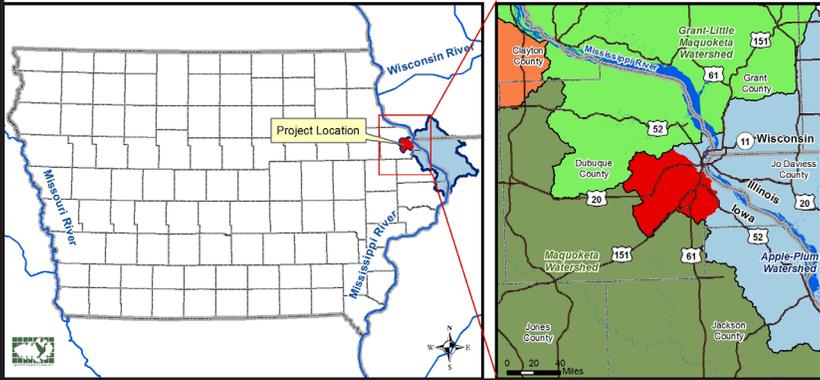
Each of us lives, works, and plays in a watershed. A watershed is best described as an area of land where surface water drains to a common location such as a stream, river, or lake. The source of groundwater recharge to aquifers, streams, and lakes is also considered part of a watershed. Watersheds are complex systems because there is interaction between natural elements such as climate, surface water, groundwater, vegetation, wildlife, and human elements. Human influences generally produce polluted stormwater runoff, increase impervious surfaces, alter stormwater flows, and degrade or fragment natural areas.

## How Karst Systems Work

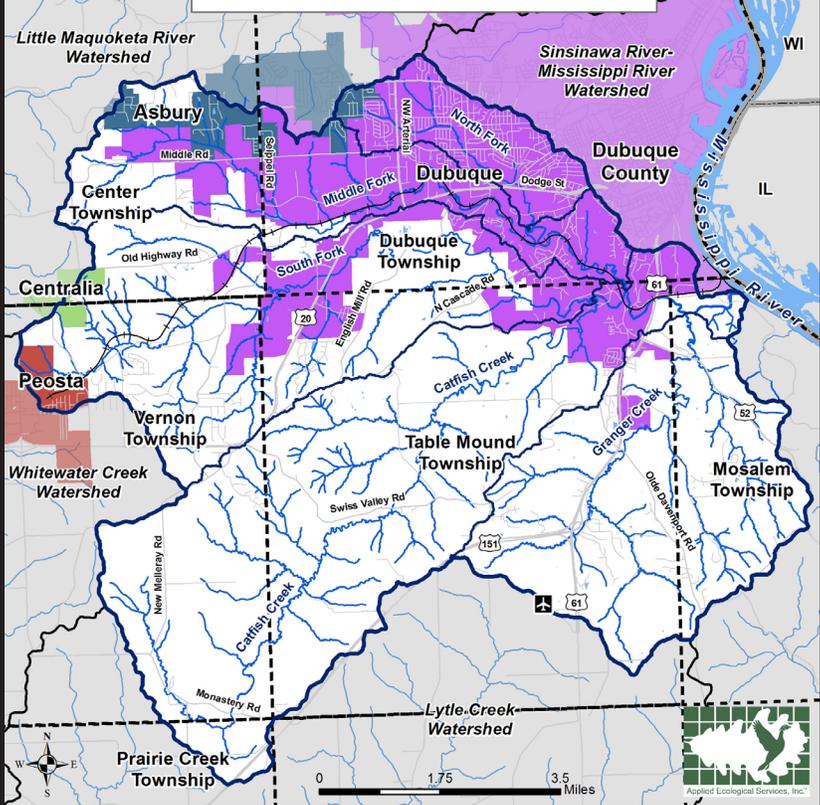


Source: Sourcerock.blogspot

## Catfish Creek Watershed Locator Maps

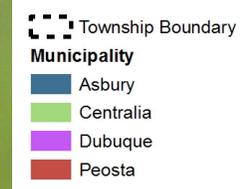


## Catfish Creek Watershed



Catfish Creek watershed (HUC 10 - #0706000501) is located along the southwestern half of the City of Dubuque, as well as parts of Asbury, Peosta, and Centralia in Dubuque County, Iowa. Catfish Creek flows generally northeast, beginning near the City of Peosta, and enters the Mississippi River on Dubuque's south side in the Mines of Spain State Recreation Area. There are five smaller watersheds within the Catfish Creek Watershed. These include: North Fork, Middle Fork, South Fork, Granger Creek, and Catfish Creek (main stem). Catfish Creek and its many smaller tributaries account for approximately 196 stream/tributary miles that drain approximately 72 square miles (46,100 acres) of land surface. Much of the watershed remains rural. The five forks of Catfish Creek support a diverse set of plants and animals and are a draw for hunters, anglers and those seeking to enjoy some of Dubuque County's most scenic areas, but they remain threatened by large amounts of soil and nutrients entering the water from both urban and agricultural runoff.

Catfish Creek watershed is located in Dubuque County within portions of seven townships, and four municipalities (see map, left). The entire watershed is located within Dubuque County. Of the four municipalities in the watershed, the City of Dubuque has the largest share of the watershed followed by the City of Asbury, City of Peosta and the City of Centralia.





## PURPOSE

The overall water quality condition in Catfish Creek watershed is poor. According to IDNR's 2012 Integrated Report, Catfish Creek from the mouth to the confluence with South Fork, Granger Creek, and South Fork are all impaired for either primary or secondary contact due to the presence of indicator bacteria. An unnamed tributary to Catfish Creek (CCT16) is impaired for aquatic life due to organic enrichment/low dissolved oxygen. Catfish Creek upstream of the confluence with South Fork, Middle Fork, and North Fork all have an impairment of a presumptive use (primary contact) due to the presence of indicator bacteria. Additionally, Catfish Creek from Swiss Valley Campground south for about 3 miles is classified as a Class B (CW-1) coldwater aquatic life use stream because it holds an introduced reproducing trout population. This reach is considered partially supported based on biological monitoring conducted in 2001 and 2007.

In 2012, the City of Dubuque and the Catfish Creek Watershed Management Authority (CCWMA) applied for and received Iowa Economic Development Authority (IEDA) funding to undergo a watershed planning effort and produce a comprehensive "Watershed Management Plan" for the Catfish Creek watershed that meets requirements as defined by the United States Environmental Protection Agency (USEPA). Ultimately, the intent of the planning effort is to develop and implement a Watershed Management Plan designed to achieve water quality standards. The City of Dubuque hired Applied Ecological Services, Inc. (AES) in May 2012 to develop the plan.

## MISSION

The Catfish Creek Watershed Management Authority (CCWMA) is governed by a Board divided among the political subdivisions comprising the watershed. The Board is dedicated to the preservation, protection, and improvement of Catfish Creek watershed. The CCWMA's mission is to:

*"To reduce the risks of flooding and its effects, improve water quality and promote a healthier existence for all living things that call the Catfish Creek Watershed home.*

*The Catfish Creek Watershed Management Authority is an organization assembled to tackle concerns with water quality and flooding on a watershed level. This means crossing jurisdictional boundaries and working together to solve problems within the entire watershed."*

## GOALS

- Goal 1:** *Implement watershed educational and stewardship programs and increase communication and coordination among stakeholders.*
- Goal 2:** *Manage and mitigate for existing and future structural flood problems.*
- Goal 3:** *Protect groundwater quality and quantity and educate stakeholders on the influence of karst topography on groundwater resources.*
- Goal 4:** *Protect and manage fish and wildlife habitat.*
- Goal 5:** *Improve surface water quality to meet applicable standards.*
- Goal 6:** *Manage natural and cultural components of the Green Infrastructure Network.*
- Goal 7:** *Encourage agricultural techniques and soil conservation practices that will protect and conserve topsoil and bolster our water resources.*

# THE PAST

The terrain of the Midwestern United States was created over thousands of years as glaciers advanced and retreated during the Pleistocene Era. Some of these glaciers were a mile thick or more, but the area that is now Catfish Creek watershed lies in a region that was mostly unaffected by the glaciers which covered the rest of Iowa's landscape. Here the carbonate bedrock has been weathered and exposed for longer than the surrounding areas, creating unusual features such as limestone-walled valleys, high bluffs, caves, crevices, and sinkholes, as well as rock formations. This unique geology is known as karst topography. It leaves the region more vulnerable to both surface and groundwater contamination because the system is more permeable than elsewhere. The crevices and sinkholes common in the area allow for less infiltration and pollutant removal than would be found in an area without karst topography and expedited routes for pollutants to contaminate surface and groundwater resources.

The unique geology of the area has also influenced the stream characteristics of Catfish Creek. In some areas, exposed bedrock makes up the bottom of the stream channel. The coldwater portion of the main branch of Catfish Creek (also known as Upper Catfish Creek) is made possible by naturally occurring seeps that keep temperatures cool enough for trout during summer months and provide a warmer environment over winter. This high-quality, cold-water reach is one of only 30 streams in Iowa with a population of naturally reproducing brown trout.

The U.S. public land surveys of Iowa described the majority of Catfish Creek watershed as "timber," "scattering trees," or "part prairie/part timber" with some pockets of "prairie." This mixture of "timber" and "prairie" across the landscape that ecologists now refer to as savanna. A savanna typically consists of scattered trees that have canopies that range from nearly closed to fully open, with a diversified ground cover of mostly grasses and prairie species below.

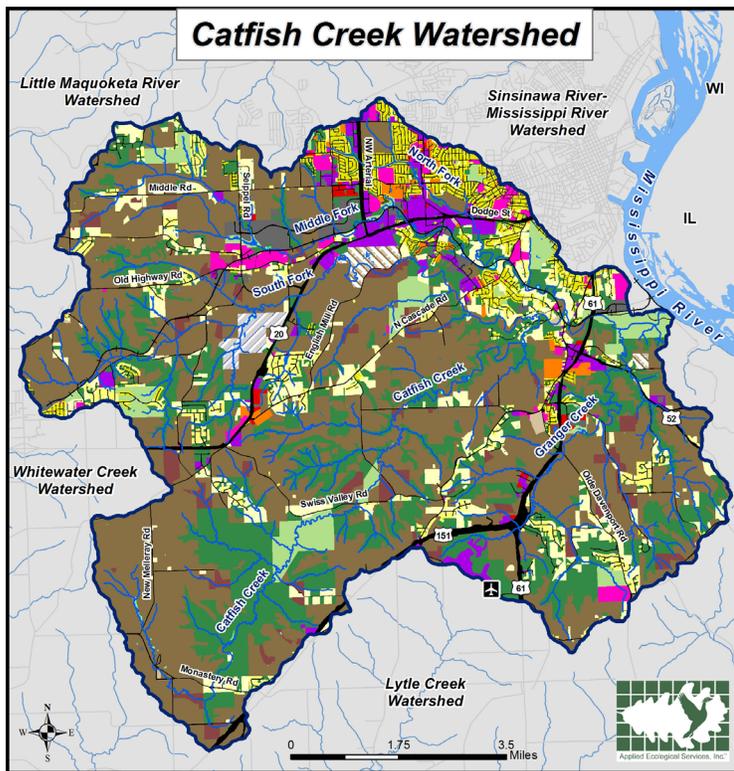
The prairie-savanna landscape was historically maintained and renewed by frequent lightning strike fires, fires ignited by Native Americans, and grazing by bison and elk. Fires ultimately removed dead plant material, exposing the soils to early spring sun, returning nutrients to the soil, and keeping woodlands confined to wetter ravines. Running through the prairie-savanna landscape were the deep valleys surrounding Catfish Creek which were carved by the run-off of melting glaciers long ago, high bluffs, caves, crevices, and sinkholes. During pre-European settlement times most of the water that fell as precipitation was absorbed in upland savanna and prairie communities and within few wetlands that existed along stream corridors.

# THE PRESENT

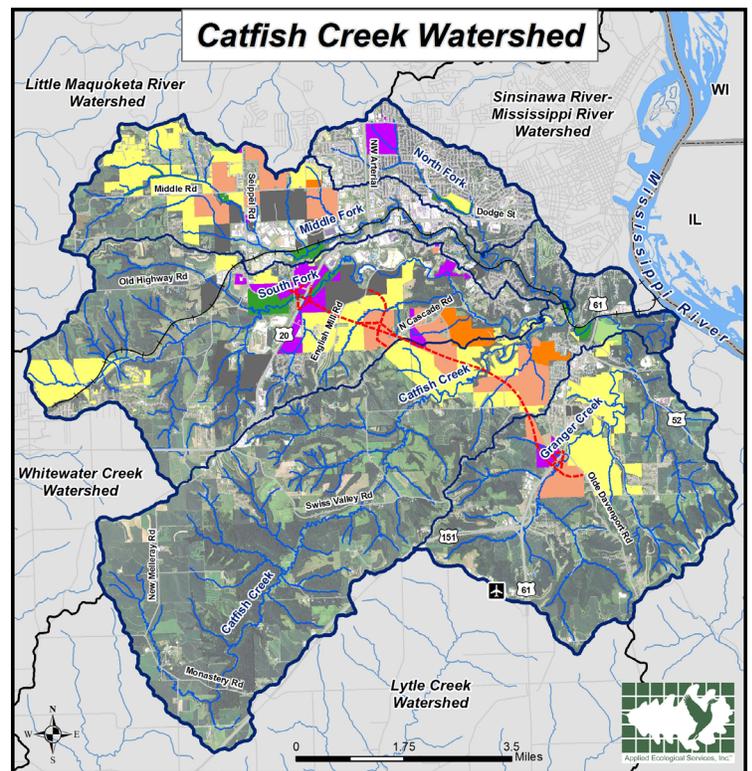


European settlement resulted in drastic changes to the fragile ecological communities. Fires no longer occurred and prairie and floodplains were tilled under or drained for farmland or developed. Row crop farming covered the vast majority of the landscape in the early 1900s, with the outskirts of Dubuque's outward urbanization appearing in the northeastern-most portion of the watershed, but before residential and commercial development seen today. Some of the woodland communities described by early settlers were still present in the late 1930s along the stream channels but farmland replaced most of the savanna and prairie communities. With the advent of farming came significant changes in stormwater runoff.

Today residential and commercial development has replaced some of the farmland in the watershed. Stands of remnant woodlands persist but are fragmented by residential development and farming.



EXISTING 2012 LAND USE/LAND COVER



FUTURE LAND USE/LAND COVER

## THE FUTURE

Predicted future land use changes show that the largest loss of current land use/land cover is expected to occur on agricultural land where approximately 6,919.1 acres of the existing 21,590.6 acres (15% decrease) is expected to be converted to mostly residential and industrial land uses. The majority of these changes are expected to occur in the northern half of the watershed within the City of Dubuque and the areas surrounding the Southwest Arterial extension. In addition, existing open space is also expected to decrease from 10,060.4 acres to 9,107.6 acres in the future, a 952.8-acre decrease. However, it is important to note that 111.4 acres of public parks/golf courses are expected to be created.

### Land Use

Ag - Livestock	Residential - Multi-Family
Ag - Row Crop	Residential - Mixed
Cemetery	Residential - High Density (< 1/2 acre)
Commercial	Residential - Medium Density (1/2 - 1 acre)
Industrial	Residential - Low Density (> 1 acre)
Institutional	Transportation
Land fill	Water
Office Space	Wetland
Open Space	
Park/Golf Course	
Quarry	

## CHALLENGES & THREATS

### Surface Water

- All five branches of Catfish Creek watershed exceed recommended water quality criteria for nitrogen, phosphorus, and sediment.
- Additionally, South Fork, Catfish Creek, and Granger Creek exceed recommended *E. coli* guidelines.

### Agricultural Land

- Agricultural land use in the watershed is the single largest contributor of nitrogen (58%), phosphorus (64%), and sediment (57%) to streams, followed by streambank erosion and urban land use.
- 71% of stream reaches in the watershed are at least moderately eroded.
- Where livestock is kept, they are often allowed free access to streambanks, contributing to sediment and phosphorus loading.
- While some farms in the watershed utilize conservation practices, much more prevalent use of these practices needs to be implemented throughout the watershed in order to achieve water quality targets.

### Land Use

- The region's karst topography makes the watershed more vulnerable to both surface and groundwater contamination.
- Overall development policy among the watershed communities does not adequately protect green infrastructure.
- Two mulch processing facilities within the watershed drain directly to adjacent streams without additional filtration.

# IMPORTANT NATURAL AREAS



## SWISS VALLEY NATURE PRESERVE

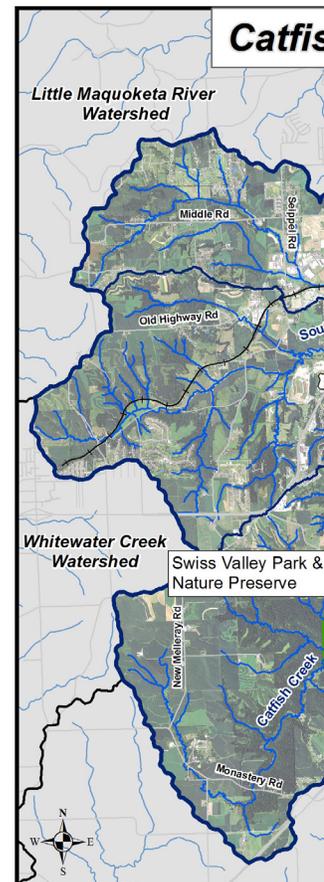
Swiss Valley Nature Preserve is a 476-acre site owned by the Dubuque County Conservation Board and located in the southwestern portion of the watershed. The park is home to a large portion of Catfish Creek, as well as remnant woodlands, a restored prairie and the administrative headquarters of the Dubuque County Conservation Board.

The portion of Catfish Creek that winds through the park (also known as Upper Catfish Creek) is made possible by naturally occurring seeps that keep temperatures cool enough for trout during summer months and provide a warmer environment over winter. The Iowa Department of Natural Resources (IDNR) has labeled the Upper Catfish Creek as a cold-water-Class "B" stream from Swiss Valley Park Campgrounds south approximately 3 miles. This high-quality, cold-water reach is one of only 30 streams in Iowa with a population of naturally reproducing brown trout. It is also stocked with trout annually by the Iowa Department of Natural Resources. Work to stabilize 3,000 feet of streambank within the preserve, plant native grasses, and install 35 fish hides to improve habitat along this reach was completed by Dubuque County Conservation Board.



Elsewhere in the preserve, 10 miles of hiking trails, many of which are groomed for cross-country skiing in the winter, work their way through the prairie, savanna, and woodland landscapes. The preserve houses many of the distinct features associated with the Paleozoic Plateau, including an abundance of naturally occurring sinkholes which provide excellent habitat for both common and uncommon species. A remnant woodland remains untouched from pre-settlement times, containing red and white oaks, shagbark hickory, walnut, white ash, elm, and quaking aspen, as well as a mature maple-basswood forest.

Many of the trees in this area are more than 200 years old.





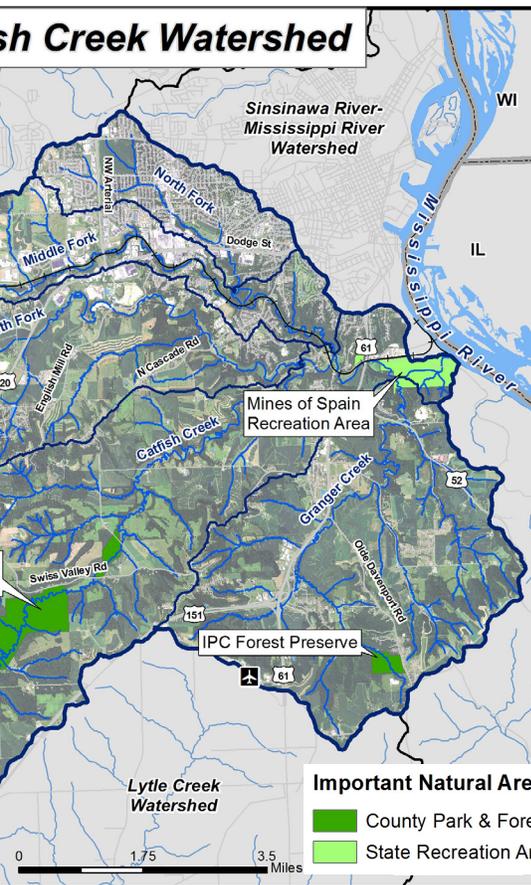
Source: Dubuque Area Convention & Visitors Bureau



### MINES OF SPAIN RECREATION AREA

**M**ines of Spain Recreation Area consists of 1,300 acres south of the City of Dubuque including the mouth of Catfish Creek and south along the Mississippi River and it is owned by Iowa Department of Natural Resources. Approximately the northern half of this area is designated by IDNR as the Catfish Creek Preserve. Only a 275- acre portion of Mines of Spain Recreation Area/Catfish Creek Preserve falls within the Catfish Creek watershed, but it includes many important natural features.

**T**he preserve is predominantly an oak forest, with paper birch, quaking aspen, maple-basswood forest, juniper groves, and hill prairies also represented. A wide variety of plants can be found within the preserve over the course of the year. Spring flora within the woodlands include jack-in-the-pulpit, spring beauty, hepatica, blood root, wild ginger, false Solomon's seal, pasqueflower, plantain-leaved pussytoes, hoary puccoon, violet wood sorrel, and alumroot. The woodland understory also harbors Indian pipe as well as a number of ferns including such varieties as rattlesnake, maidenhair, ebony spleenwort, lady, silvery glade, fragile, crested wood, spinulose wood, walking, bulblet, and cliffbrake. In summer prairie coreopsis, pale-spiked lobelia, round-headed bush clover, and pale purple coneflower can be found blooming in prairie areas, followed by sky-blue aster, rough blazing star, sideoats grama, big and little bluestem, and Indian grass in the fall.



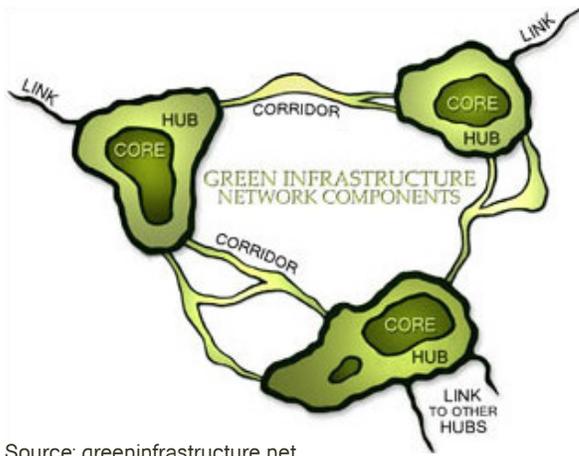
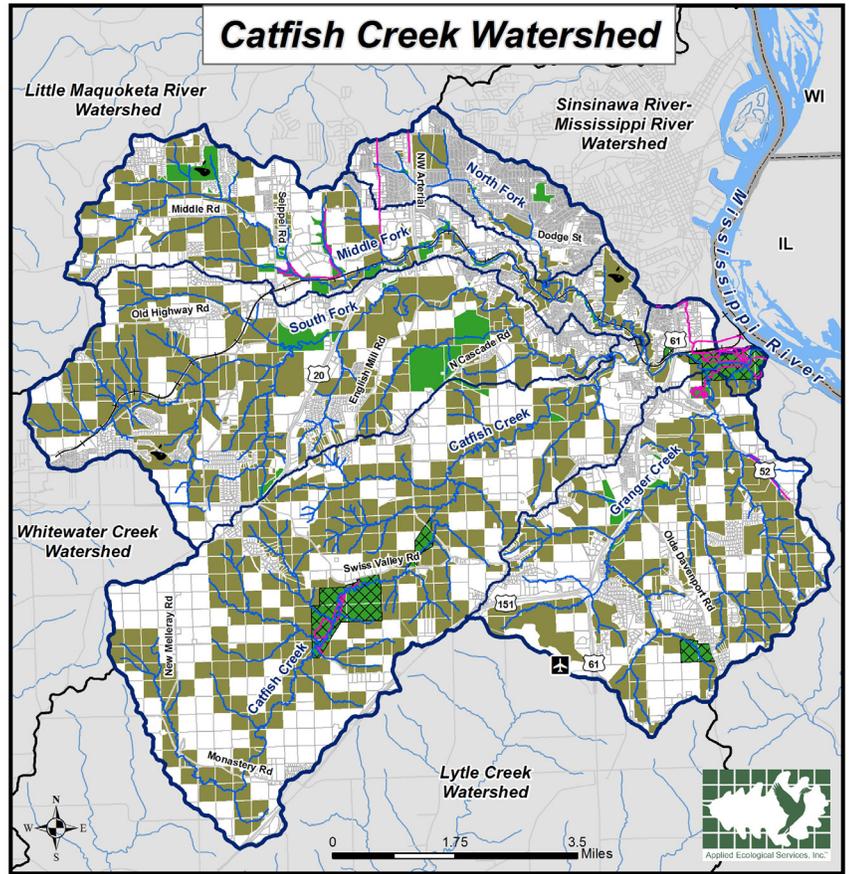
### INTERSTATE POWER COMPANY FOREST PRESERVE

**I**n 1988, Interstate Power Company (IPC) donated 82 acres to the Dubuque County Conservation Board, hence the name Interstate Power Company Forest Preserve. The preserve is located on Olde Davenport Rd. just north of Schueller Heights Rd. IPC still maintains a substation on the site, but the preserve is predominantly a oak woodland with ravines and spring-fed streams that eventually make their way to Granger Creek. Some rolling grassland, an 8-acre restored prairie, and a 1.5-mile trail can also be found on the site.



# GREEN INFRASTRUCTURE & YOUR LAND

A Green Infrastructure Network is a connected system of natural areas and other open space that conserves natural ecosystem values and functions, sustains clean air and water, and provides a wide array of benefits to wildlife and people. The network (see map, below) is made up of hubs and linking corridors. Hubs generally consist of the largest and least fragmented areas such as Swiss Valley Nature Preserve, Mines of Spain Recreation Area, Interstate Power Company Preserve, large agricultural areas, and golf courses. Corridors are generally formed by the wooded stretches along many of the developed reaches of Catfish Creek and tributaries. Corridors are extremely important because they provide biological conduits between hubs. However, most parcels forming corridors are not ideal green infrastructure until residents and land owners embrace the idea of managing stream corridors or creating backyard habitats.



Source: greeninfrastructure.net

## GREEN INFRASTRUCTURE NETWORK

-  Existing Recreational Trails
-  Important Natural Areas
-  Protected Green Infrastructure
-  Unprotected Green Infrastructure
-  Golf courses

## RAIN BARREL



## RAIN GARDEN



If a portion of a stream runs through your land, here are some tips to help properly manage your piece of the green infrastructure network:

### 1. MANAGE FERTILIZER USE

Avoid over fertilizing agricultural fields and lawns adjacent to streams and only use nutrients when soil testing shows that it is necessary.

### 2. MANAGE LIVESTOCK ACCESS

Where possible, fence streams, create crossings, and/or utilize pasture rotation to manage livestock access to streams and streambanks.

### 3. REMOVE NON-NATIVE SPECIES

Identify and remove plants that are out of place (see photo guide, right).

### 4. PLANT NATIVE VEGETATION

Plants adapted to the Midwest climate can help control erosion by stabilizing banks.

### 5. A NATURAL, MEANDERING STREAM IS A HAPPY STREAM

Work with experts to restore degraded stream reaches.

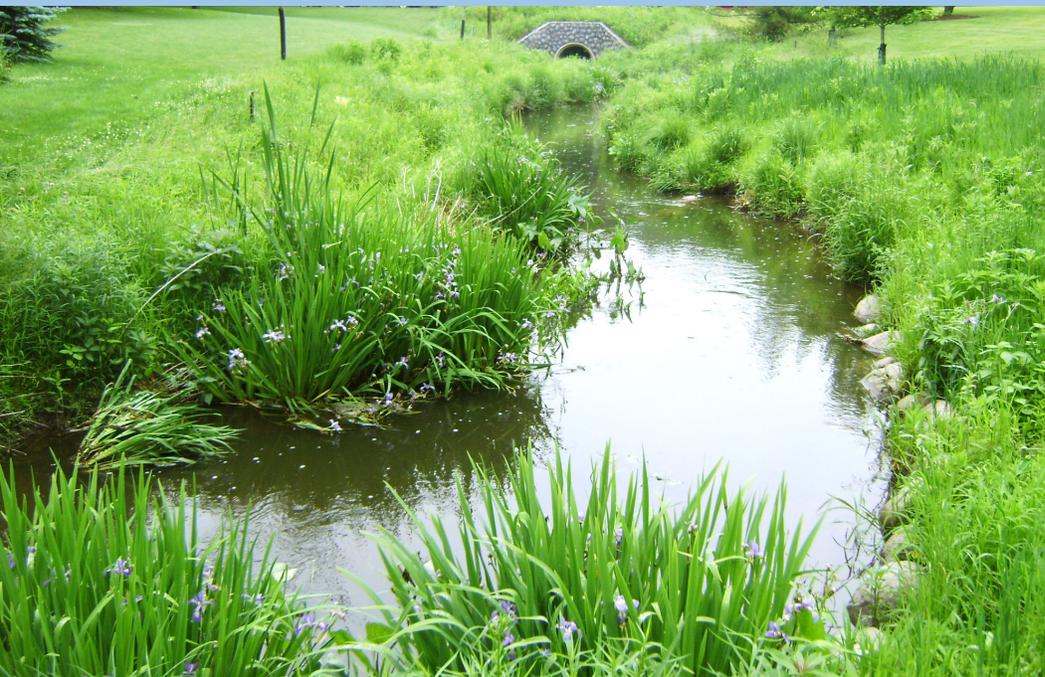
Any property owner can improve green infrastructure. Create a safe place for wildlife by providing a few simple things such as food, water, cover, and a place for wildlife to raise their young. The National Wildlife Federation's Certified Wildlife Habitat® program can help you get started. Golf courses can become certified through the Audubon Cooperative Sanctuary Program.

Creating a rain garden, or a small vegetated depression, to capture water is another way of promoting infiltration while beautifying your yard and providing additional habitat. Disconnecting your roof downspouts and capturing that runoff in rain barrels not only reduces the amount of runoff entering streams, but also serves as a great source of water for irrigating your yard.



Source: Appalachian Traveller.

## STREAM RESTORATION



# REMOVE THESE NON-NATIVE AND INVASIVE SPECIES

COMMON REED



BUCKTHORN



Source: Loras.edu

REED CANARY GRASS



PURPLE LOOSESTRIFE



GARLIC MUSTARD



TEASEL



# ACTION RECOMMENDATIONS

The Catfish Creek Watershed-Based Plan includes an “Action Plan” developed to provide stakeholders with recommendations to specifically address plan goals. The Action Plan includes two subsections: programmatic recommendations and site specific recommendations. Programmatic recommendations are general remedial, preventative, and regulatory watershed-wide actions. Site specific recommendations include actual locations where projects can be implemented to improve surface and groundwater quality, green infrastructure, and habitat. Programmatic recommendations and site specific High Priority-Critical Areas are discussed in this section.

## POLICY TYPE PROGRAMMATIC RECOMMENDATIONS

### ***Plan Adoption and/or Support & Implementation Policy Recommendations***

- Watershed Partners adopt the Catfish Creek Watershed Management Plan and incorporate plan goals, objectives, and recommended actions into comprehensive plans and ordinances.

### ***Green Infrastructure Network Policy Recommendations***

- Each municipality incorporates the identified Green Infrastructure Network into comprehensive plans and development review maps.
- Amend municipal comprehensive plans and zoning ordinances to include a Catfish Creek Watershed Protection Overlay that requires Conservation Design or Low Impact standards for all development and redevelopment located on identified Green Infrastructure Network parcels.
- Require Watershed Protection Fees in all municipalities in the form of Development Impact Fees and/or Special Service Area (SSA) taxes for all new and redevelopment to help fund management of green infrastructure components within developments.
- Require developers to protect sensitive natural areas, restore degraded natural areas and streams, then donate all natural areas and naturalized stormwater management systems to a public agency or conservation organization for long term management with dedicated funding.
- Establish incentives for developers who propose sustainable or innovative approaches to preserving green infrastructure and using naturalized stormwater treatment trains.
- Require mitigation for wetlands lost to development to occur within the watershed.

### ***Road Salt Policy Recommendations***

- Each municipality/township supplement existing programs with deicing best management practices such as utilizing alternative deicing chemicals, anti-icing or pretreatment, controlling the amount and rate of spreading, controlling the timing of application, utilizing proper application equipment, and educating/training deicing employees.

### ***Lawn Fertilizer Policy Recommendations***

- Municipalities/townships create regulations banning phosphorus unless soil testing pre-application proves necessary.

### ***Stormwater Management Facility Policy Recommendations***

- Require new development and redevelopment to use stormwater management facilities that serve multiple functions including storage, water quality benefits, infiltration, and wildlife habitat.
- Require reduced runoff volume from new and retrofitted detention basins.

### ***Native Landscaping/Natural Area Restoration***

- Allow native landscaping within local ordinances and ensure local “weed control” ordinances do not discourage or prohibit native landscaping.



## OTHER PROGRAMMATIC RECOMMENDATIONS FOUND IN THE PLAN

- Dry & Wet Bottom Detention Basin Design/Retrofits, Establishment, & Maintenance
- Stream & Riparian Area Restoration & Maintenance
- Natural Area Restoration & Native Landscaping
- Conservation & Low Impact Development
- Agricultural Management Practices
- Rainwater Harvesting & Re-use
- Green Infrastructure Planning
- Vegetated Swales (bioswales)
- Septic System Maintenance
- Vegetated Filter Strips
- Wetland Restoration
- Pervious Pavement
- Street Sweeping
- Rain Gardens

# HIGH PRIORITY-CRITICAL AREA SITE SPECIFIC PROJECT RECOMMENDATIONS

## Detention Basin Retrofits & Maintenance

A number of detention basins can be retrofitted by naturalizing with native vegetation. Naturalized basins improve water quality from developed areas, improve habitat, and require less maintenance. Seven detention basins were identified as High Priority-Critical Areas in the watershed.

## Wetland Restoration

Wetland restoration sites are generally associated with large areas that were historically wetland prior to European settlement in the 1830s but were drained for agricultural purposes. Fourteen High Priority-Critical Area wetland restoration sites were identified, many of which can be restored by breaking existing drain tiles and planting with native vegetation.

## Streambank, Channel, & Riparian Restoration

Fifty-nine stream reaches have been identified as High Priority-Critical Areas because they exhibit highly eroded banks or degraded channel conditions that are a major source of both nutrients and total suspended solids (sediment). Streambank stabilization and channel restoration using bioengineering, as well as adjacent riparian area restoration, will reduce pollutants and improve habitat.

## Green Infrastructure Protection Areas

Thirty-five green infrastructure protection areas have been selected in the watershed after careful review of their location within the green infrastructure network and predicted land use changes. Most parcels are undeveloped agricultural land, about half of which are planned for future development. The recommendation is that these parcels be preserved or developed using conservation or low impact development designs.

## Agricultural Management Practices

Agricultural measures would greatly reduce pollutant loading in the watershed. Recommendations in the plan include conservation tillage (no till) and vegetated swales for cropland and fencing to manage stream access and waste management on livestock operations. Forty-three agricultural areas were identified as High Priority-Critical Areas for potential pollutant reduction based on the results of the watershed inventory.

## Other Management Measures

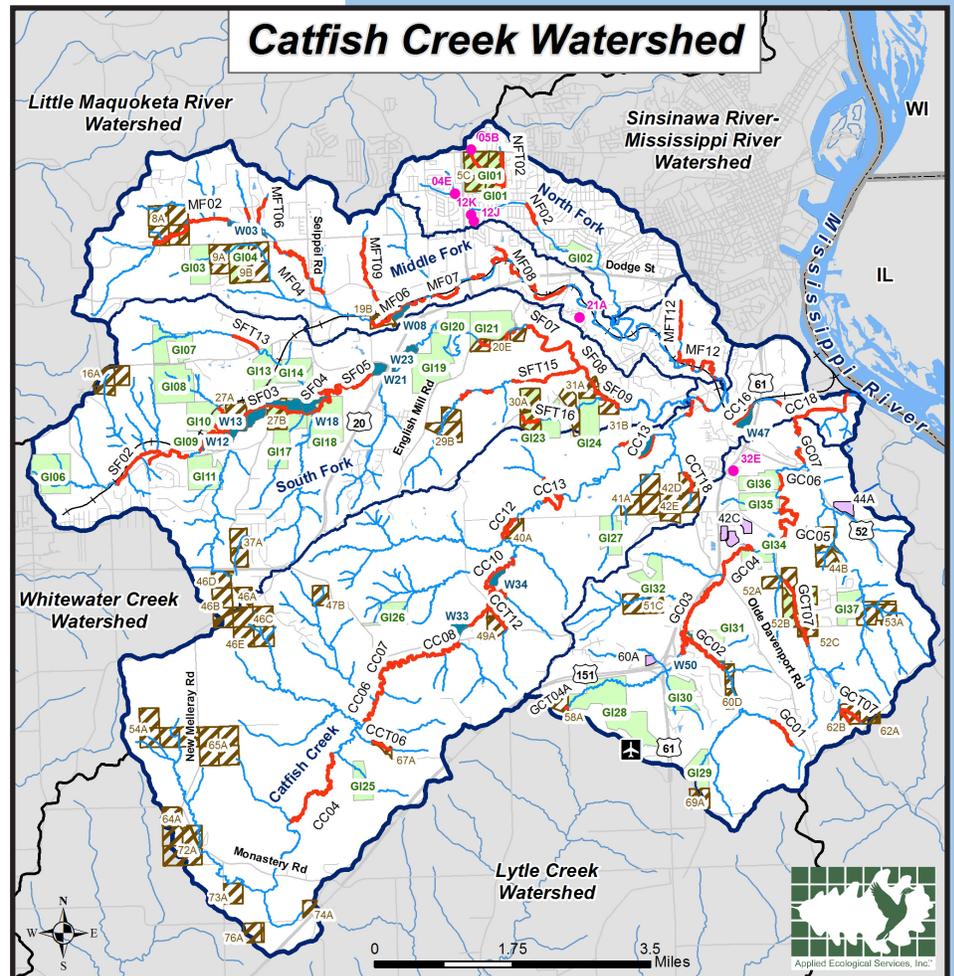
As a result of the watershed inventory, three critical areas that fall under the category of "other" management measures were found. They include an area where parking lot BMPs are needed, as well as two mulch processing facilities that drain directly to adjacent streams.



Stabilize and restore degraded streambanks and riparian areas



Fence streams to restrict cattle access and reduce sediment and pollutant loading



- Critical Area Types**
- Detention Basins
  - Wetland Restoration
  - Streambank, Channel, & Riparian
  - Agricultural Land
  - Green Infrastructure Protection Areas
  - Other Management Measures



For more information, go to [www.catfishcreekwatershed.org](http://www.catfishcreekwatershed.org)

## How can you help Catfish Creek?

### Agricultural Community

- Consult your local Natural Resources Conservation Service (NRCS) office regarding enrollment in conservation programs to help reduce soil erosion, enhance water supplies, improve water quality, increase habitat, and reduce flood damages.

### Residents, Land Owners, & Businesses

- Reduce fertilizer use - only use fertilizer when testing shows it is needed.
- Use less salt on driveways, parking lots, and sidewalks during winter months.
- Use native landscaping to decrease watering needs and maintenance.
- Install rain gardens and use rain barrels to reduce stormwater runoff.
- Manage your land as part of the green infrastructure network.
- Attend meetings with decision makers to express concerns about the watershed.
- Attend watershed education and participation events.
- Build a sense of community in your neighborhood around Catfish Creek and the watershed.

### Municipalities & Townships

- Adopt the Catfish Creek Watershed Management Plan & inform the public that a plan has been developed.
- Incorporate watershed plan goals and recommended actions into local comprehensive plans, zoning overlays, codes, and ordinances.
- Build "demonstration projects," or large-scale water quality & public education projects, near public facilities.
- Distribute materials to help residents manage streams and green infrastructure in their backyards.

### Catfish Creek Watershed Management Authority

- Identify "champions" to participate at future Catfish Creek watershed meetings, pursue projects, and to evaluate watershed plan implementation progress.
- Hire a Watershed Implementation Coordinator to lead plan implementation.



Watershed Coordinators &  
CCWMA Administrators:

**Dean Mattoon**  
City of Dubuque

**Eric Schmechel**  
Dubuque Soil & Water  
Conservation District

*Executive Summary  
Produced by:*

**Applied Ecological  
Services, Inc.**

*All photos by AES unless  
otherwise noted.*

