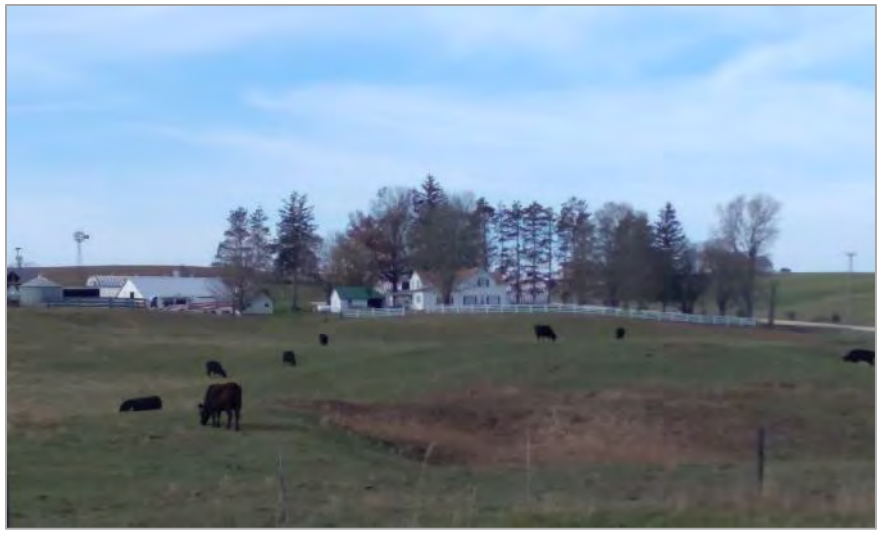
Chapter 9. Agriculture and Natural Resources



Farm in Jackson County *Photo Credit: ECIA*

Grassed waterway n in Jackson County *Photo Credit: ECIA*

Buzzard Ridge Wildlife Area (left), Blackhawk Wildlife Area (center), and Pine Valley Nature Area (right)
Photo Credits (all): Jackson County Conservation Department

OVERVIEW

Jackson County is located in a unique region of the country. "The Driftless Area covers 24,000 square miles in the heart of the Upper Mississippi River Basin spanning four states and forming the largest contiguous area of fish and wildlife habitat remaining in the Central United States."[1] The name "Driftless Area" refers to the lack of glacial drift, the silt, clay, sand, gravel, and boulders left behind by continental glaciers. The lack of glacial drift followed by thousands of years of weathering and erosion have resulted in a region of diverse soils, topography, and ecosystems. Figure 9.1 is a map of the Driftless Area with Jackson County circled in red.

According to the U.S. Census Bureau, the county has a total area of 650 square miles, of which 636 square miles are land and 14 square miles are water. Its eastern border is formed by the Mississippi River. The Maquoketa River and North Fork of the Maquoketa River are the county's next largest rivers.

Agriculture is the primary land use and a key part of the economy. The majority of the county's agricultural land is planted in corn and soybeans. In areas with steeper slopes, especially along rivers and streams, land cover consists of a mixture of forests and grasslands. Grasslands are primarily used for livestock grazing or are in the conservation reserve program.

The prairies and forests that once covered Jackson County have changed with the spread of agriculture and the development of communities. This chapter will review the quality of land, soil, air, water, and other natural resources in Jackson County.

Figure 9.1 Map of the Driftless Area
Source: Driftless Area Landscape Conservation Initiative at https://elpc.org/resources/driftless-area-landscape-conservation-initiative/ accessed Jan. 2024

Information about county, state, and federal public lands managed for their natural resources is provided in Chapter 10. Parks, Recreation, and Cultural Resources of this comprehensive plan.

[1] https://elpc.org/resources/driftless-area-landscape-conservation-initiative/

AGRICULTURE

Jackson County likely has been farmed by Native Americans since the late 1700s and by European settlers since the 1830s.

Century and Heritage Farms

In Jackson County, there are 232 Century Farms recognizing consecutive ownership of at least 40 acres of farmland for 100 years or more, and 51 Heritage Farms recognizing consecutive ownership of at least 40 acres of farmland for 150 years or more. For more information, visit https://iowaagriculture.gov/century-and-heritage-farm-program

Census of Agriculture

The U.S. Department of Agriculture (USDA) divides Iowa into nine agricultural statistics districts for convenience in compiling and presenting statistical information on crops and livestock. Jackson County is in USDA District 6, the East Central District, as shown on the map in Figure 9.2.

The USDA provides data at the national state, and county levels through the Census of Agriculture. "The Census of Agriculture is a complete count of U.S. farms and ranches and the people who operate them. Even small plots of land -- whether rural or urban -- growing fruit, vegetables or some food animals count if $1,000 or more of such products were raised and sold, or normally would have been sold, during the Census year. The Census of Agriculture, taken only once every five years, looks at land use and ownership, operator characteristics, production practices, income and expenditures. For America's farmers and ranchers, the Census of Agriculture is their voice, their future, and their opportunity."[2] The 2022 Census of Agriculture for Jackson County, Iowa, is shown in Figure 9.3.

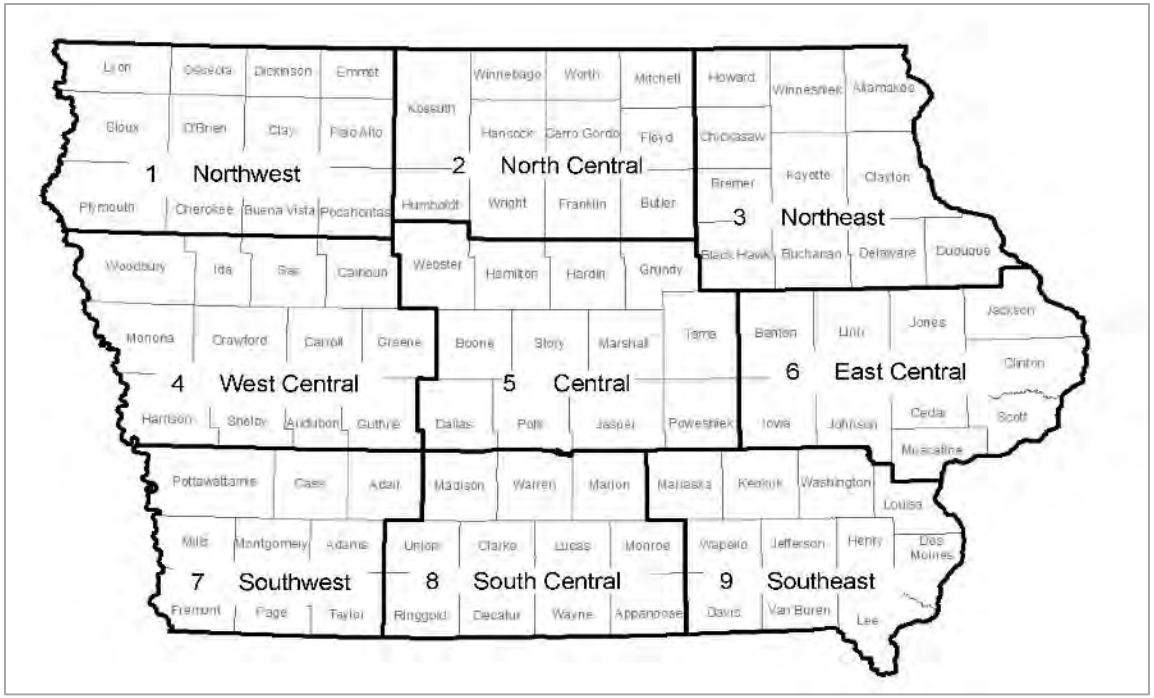
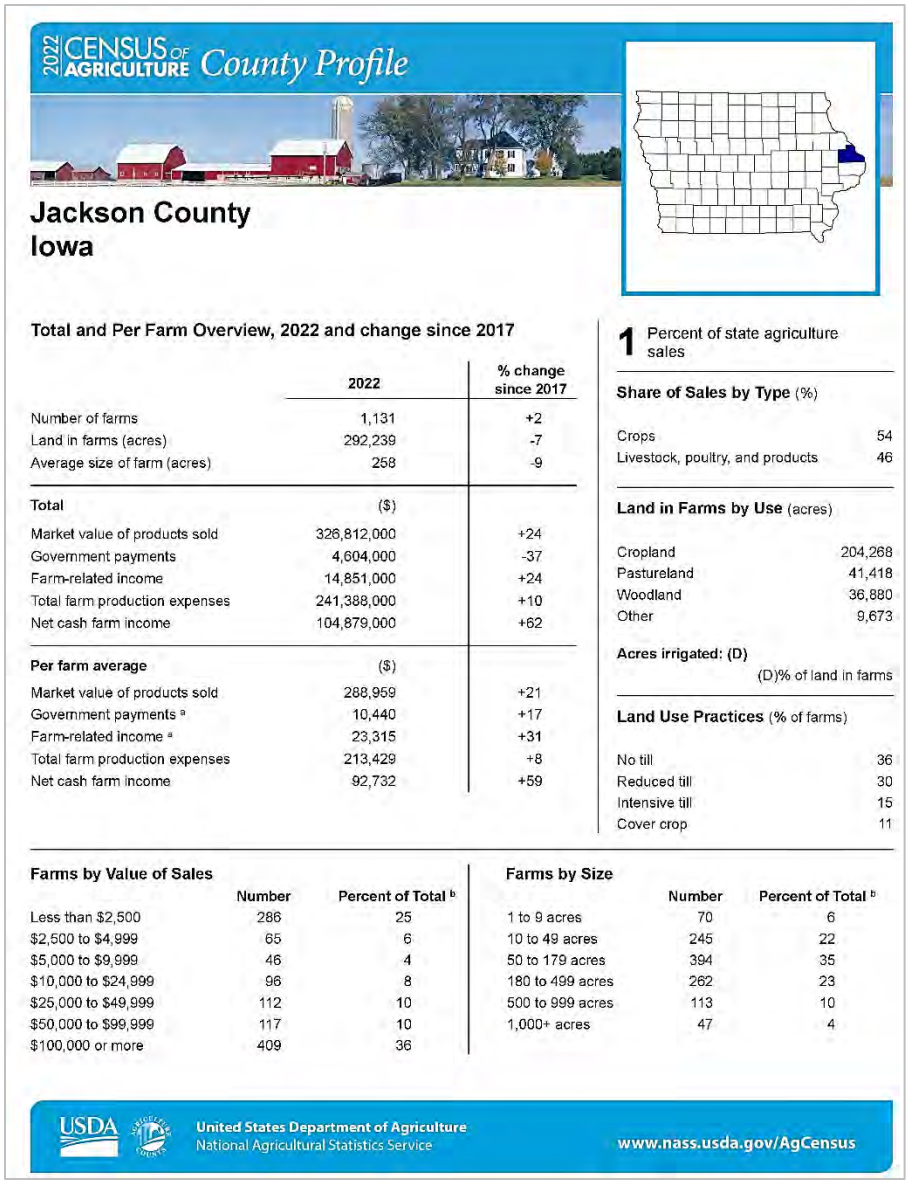


Figure 9.2 Map of USDA Agricultural Statistics Districts in Iowa
Source: USDA 2023 Iowa Agricultural Statistics

[2] https://www.nass.usda.gov/AgCensus/



2022 CENSUS OF AGRICULTURE *County Profile*

Jackson County
Iowa

Total and Per Farm Overview, 2022 and change since 2017

	2022	% change since 2017
Number of farms	1,131	+2
Land in farms (acres)	292,239	-7
Average size of farm (acres)	258	-9
Total	($)	
Market value of products sold	326,812,000	+24
Government payments	4,604,000	-37
Farm-related income	14,851,000	+24
Total farm production expenses	241,388,000	+10
Net cash farm income	104,879,000	+62
Per farm average	($)	
Market value of products sold	288,959	+21
Government payments [a]	10,440	+17
Farm-related income [a]	23,315	+31
Total farm production expenses	213,429	+8
Net cash farm income	92,732	+59

1 Percent of state agriculture sales

Share of Sales by Type (%)

Crops	54
Livestock, poultry, and products	46

Land in Farms by Use (acres)

Cropland	204,268
Pastureland	41,418
Woodland	36,880
Other	9,673

Acres irrigated: (D)
(D)% of land in farms

Land Use Practices (% of farms)

No till	36
Reduced till	30
Intensive till	15
Cover crop	11

Farms by Value of Sales

	Number	Percent of Total [b]
Less than $2,500	286	25
$2,500 to $4,999	65	6
$5,000 to $9,999	46	4
$10,000 to $24,999	96	8
$25,000 to $49,999	112	10
$50,000 to $99,999	117	10
$100,000 or more	409	36

Farms by Size

	Number	Percent of Total [b]
1 to 9 acres	70	6
10 to 49 acres	245	22
50 to 179 acres	394	35
180 to 499 acres	262	23
500 to 999 acres	113	10
1,000+ acres	47	4

USDA United States Department of Agriculture
National Agricultural Statistics Service
www.nass.usda.gov/AgCensus

Jackson County
Iowa, 2022
Page 2

2022 CENSUS OF AGRICULTURE *County Profile*

Market Value of Agricultural Products Sold

	Sales ($1,000)	Rank in State [c]	Counties Producing Item	Rank in U.S. [c]	Counties Producing Item
Total	326,812	53	99	440	3,078
Crops	176,285	69	99	453	3,074
Grains, oilseeds, dry beans, dry peas	169,447	70	99	338	2,917
Tobacco	-	-	-	-	257
Cotton and cottonseed	-	-	-	-	647
Vegetables, melons, potatoes, sweet potatoes	131	40	98	1,641	2,831
Fruits, tree nuts, berries	(D)	6	96	(D)	2,711
Nursery, greenhouse, floriculture, sod	(D)	63	90	(D)	2,660
Cultivated Christmas trees, short rotation woody crops	(D)	40	51	(D)	1,274
Other crops and hay	5,573	5	99	617	3,035
Livestock, poultry, and products	150,527	45	99	455	3,076
Poultry and eggs	8,663	44	99	625	3,027
Cattle and calves	108,171	11	99	130	3,047
Milk from cows	7,002	30	68	525	1,770
Hogs and pigs	27,924	79	99	269	2,814
Sheep, goats, wool, mohair, milk	161	65	99	1,125	2,957
Horses, ponies, mules, burros, donkeys	290	24	96	875	2,907
Aquaculture	-	-	20	-	1,190
Other animals and animal products	317	16	99	549	2,909

Producers [d] 2,022

Sex	
Male	1,372
Female	650
Age	
<35	198
35 – 64	1,074
65 and older	750
Race	
American Indian/Alaska Native	1
Asian	1
Black or African American	1
Native Hawaiian/Pacific Islander	-
White	2,015
More than one race	4
Other characteristics	
Hispanic, Latino, Spanish origin	10
With military service	214
New and beginning farmers	563

Percent of farms that:

Have internet access	78
Farm organically	1
Sell directly to consumers	2
Hire farm labor	23
Are family farms	95

Top Crops in Acres [e]

Corn for grain	96,313
Soybeans for beans	46,101
Forage (hay/haylage), all	29,425
Corn for silage/greenchop	2,400
Oats for grain	938

Livestock Inventory (Dec 31, 2022)

Broilers and other meat-type chickens	(D)
Cattle and calves	85,562
Goats	295
Hogs and pigs	82,925
Horses and ponies	1,002
Layers	122,240
Pullets	41,856
Sheep and lambs	745
Turkeys	168

[a] Average per farm receiving. [b] May not add to 100% due to rounding. [c] Among counties whose rank can be displayed. [d] Data collected for a maximum of four producers per farm. [e] Crop commodity names may be shortened; see full names at www.nass.usda.gov/go/cropnames.pdf. " Position below the line does not indicate rank. (D) Withheld to avoid disclosing data for individual operations. (NA) Not available. (Z) Less than half of the unit shown. (-) Represents zero.

USDA is an equal opportunity provider, employer, and lender.

Figure 9.3 2022 Census of Agriculture for Jackson County, Iowa

Source: U.S. Department of Agriculture (USDA) at https://www.nass.usda.gov/Publications/AgCensus/2022/Online_Resources/County_Profiles/Iowa/cp19097.pdf

Iowa's Corn Suitability Rating Index

Iowa's Corn Suitability Rating Index (CSR2) provides important information about a parcel's potential productivity. It was created to equalize tax assessments on agricultural land based on soil types and their inherent properties. A CSR2 rating is one factor used in setting cash rental rates and calculating a farm's value in addition to long-term yield and historical management practices.[3]

The CSR2 rating is calculated using six parameters. The "perfect corn producing" soil gets a rating of 100. A soil having nearly no potential to grow corn receives a rating of 5. Learn more at https://www.agron.iastate.edu/glsi/2022/12/03/csr2-equation-and-component-values/

A weighted mean (average) of CRS2 ratings for counties in Iowa calculated by Iowa State University in May 2017 is still referenced in 2024. Values ranged from 91.4 to 40.4. The State CSR2 weighted mean was 68.4. Jackson County's CSR2 weighted mean was 44.

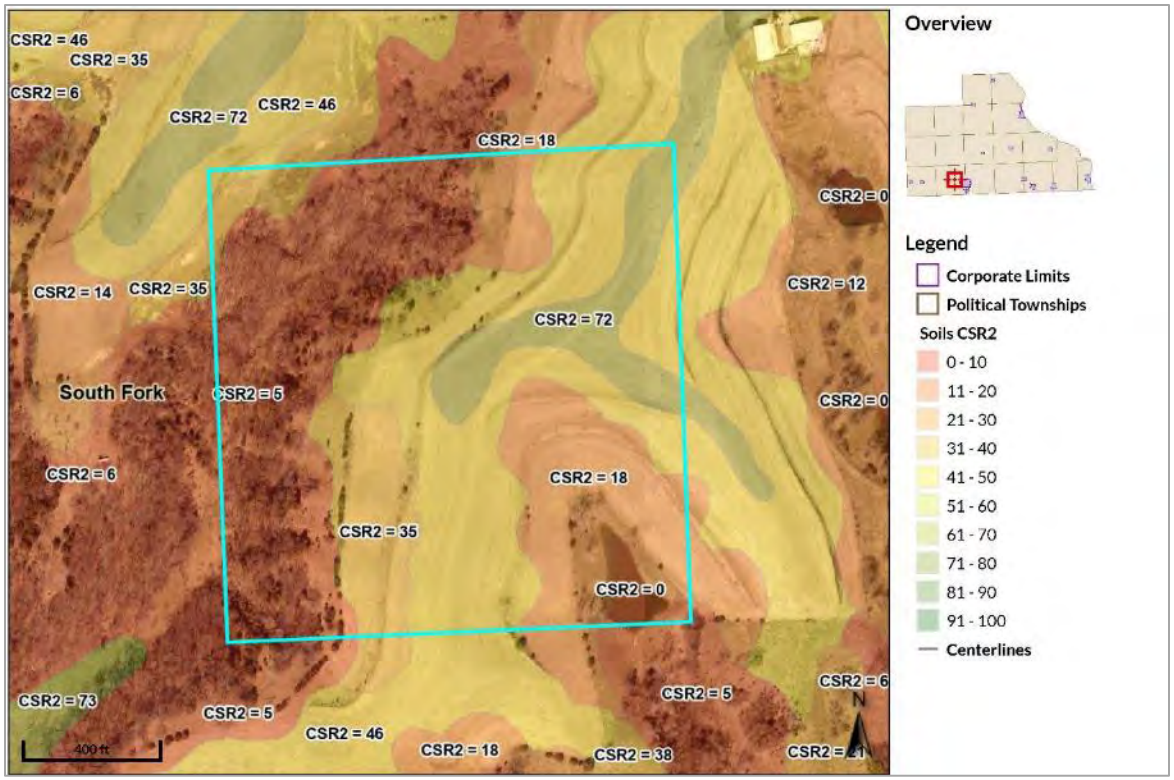


Figure 9.4 Sample CSR2 Soil Map - Jackson County Source: Jackson County GIS, Jan. 2024

"The estimated average CSR2 values statewide for high-, medium-, and low-quality land are 83, 70, and 56 points, respectively. The estimated percent of land area for high-, medium-, and low-quality land is 35%, 40%, and 25%, respectively."[4]

The Jackson County Geographic Information System (GIS) can provide a soil report soil types and CSR2 points for each agricultural parcel as well as a soil map (see Figure 9.4). Access via the Beacon GIS link on the GIS webpage at https://jacksoncounty.iowa.gov/gis/

[3] https://www.extension.iastate.edu/agdm/wholefarm/html/c2-87.html

[4] *2023 Farmland Value Survey*, Iowa State University

Iowa Agricultural Statistics

The USDA's National Agricultural Statistics Service, Upper Midwest Regional Office in Des Moines, Iowa collaborated with the Iowa Department of Agriculture and Land Stewardship and the Iowa Farm Bureau to produce the 2023 Iowa Agricultural Statistics in October 2023. It provides a statistical profile of Iowa agriculture at the state and county levels. Learn more at https://www.nass.usda.gov/Statistics_by_State/index.php

This 2023 USDA report provides recent updates to some data in the 2017 Census of Agriculture for Jackson County.

Table 9.1 shows the 2022 crops acreage, yield, and production of corn, soybeans, and oats in Jackson County. Also shown are the rankings for Jackson County and Iowa.

Table 9.2 shows the number of head of cattle in Jackson County as of Jan. 1, 2023. Also shown are the rankings for Jackson County and Iowa.

Table 9.3 shows cash rents per rented acre for non-irrigated cropland and pasture in 2022 and 2023 in Jackson County and Iowa.

Iowa Farmland Values

Table 9.4 shows average dollar value per acre for farmland in Iowa and Jackson County based on U.S. Census of Agriculture estimates and 2022 and 2023 Iowa Land Value Surveys conducted by the Center for Agriculture and Rural Development, Iowa State University (ISU), and ISU Extension and Outreach.

Table 9.2 Cattle – Jan. 1, 2023 for Jackson County

	Number of head	County Rank in Iowa	Iowa's Rank in USA
All cattle and calves	90,000	6	7
Beef cows	22,000	2	12
Milk cows	4,900	11	12

Source: USDA 2023 Iowa Agricultural Statistics

Table 9.3 Cash Rents: 2022 and 2023

	Non-irrigated cropland		Pasture	
	2022	2023	2022	2023
Jackson County	242.00	256.00	-	45.50
Iowa	256.00	269.00	59.50	60.50

Source: USDA 2023 Iowa Agricultural Statistics

Table 9.4 Average Farmland Values: 2022 and 2023

	2022	2023	% Change
Jackson County	$11,100	$11,158	0.5%
Iowa	$11,411	$11,835	3.7%

Source: 2023 Iowa State Land Value Survey https://www.card.iastate.edu/farmland/isu-survey/2023/

Table 9.1 Crops – 2022 Acreage, Yield, and Production in Jackson County

	Area planted (acres)	Area harvested (acres)	Yield per acre (bushels/acre)	Production (bushels)	County Rank in Iowa	Iowa's Rank in USA
Corn for grain	114,500	111,300	219.2	24,397,000	56	1
Soybeans	59,000	58,600	66.3	3,887,000	81	2
Oats	2,700	460	64.8	29,800	17	7

Source: USDA 2023 Iowa Agricultural Statistics

Cropland Data

The USDA's National Agricultural Statistics Service and Agricultural Research Service provide the Cropland Data Layer (CDL) online annually with CropScape. Table 9.5 lists the top ten CDLs by acreage in 2023 for Jackson County according to CropScape.

Table 9.5 Top 10 CDLs by Acreage in Jackson County (2023)

Land Cover Category	Percent
Grass/Pasture	27%
Corn	25%
Deciduous Forest	18%
Soybeans	12%
Mixed Forest	4%
Open Water	2%
Alfalfa	2%
Developed/Open Space	2%
Developed/Low Intensity	2%
Woody Wetlands	2%

Per 2022 USDA Agriculture Handbook:

Developed, Open Space is large lot single-family homes, parks, golf courses, and landscaped areas with less than 20% impervious surfaces.

Developed, Low Intensity is single-family homes with 20-49% impervious surfaces.

Figure 9.5 is a map of the 2023 Cropland Data Layer for Jackson County. Agriculture and Non-Agriculture categories are listed in the legend by decreasing acreage. Only the top six Non-Agriculture categories are listed. Additional data and maps can be downloaded from CropScape at https://nassgeodata.gmu.edu/CropScape/

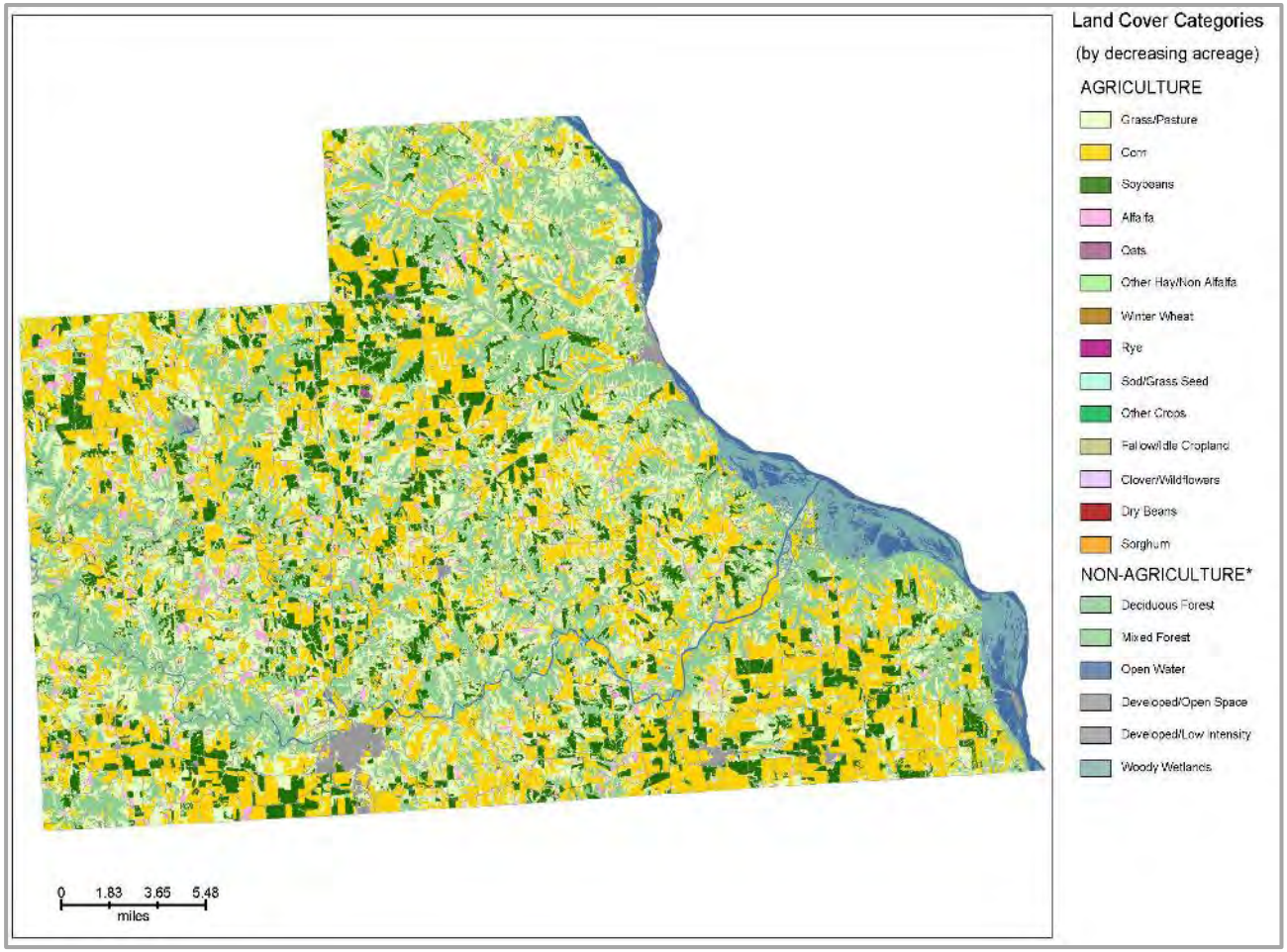


Figure 9.5 Map of 2023 Cropland Data Layer for Jackson County
Source: https://nassgeodata.gmu.edu/CropScape/ accessed Jan. 2024

AGRICULTURAL ECONOMY

According to the US Census Bureau, the North American Industry Classification System (NAICS, pronounced Nakes) is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy.

Figure 9.6 shows the estimated number of businesses by NAICS type in Jackson County in 2023. Of the 879 businesses, the top three by number were: 1. Other Services, 2. Retail Trade, and 3. Public Administration. Together, these 320 businesses made up 36.4% of the total.

Agricultural Businesses

The 36 business establishments identified as Agriculture, Forestry, Fishing and Hunting in Figure 9.5 are classified under NACIS Sector 11. This sector is for establishments primarily engaged in growing crops, raising animals, harvesting timber, and harvesting fish and other animals from a farm, ranch, dairy, greenhouse, nursery, orchard, hatchery, or their natural habitats.

Figure 9.6 Number of Business Establishments in Jackson County by NAICS Type (2023)
Source: Jackson County Economic Alliance using source data from Esri 10-17-2023

This sector has two basic activities:

1. Agricultural production includes the complete farm or ranch operation, such as farm owner-operators and tenant farm operators.
2. Agricultural support includes activities associated with farm operation, such as soil preparation, planting, harvesting, and management, on a contract or fee basis.

For more information, visit https://www.naics.com/six-digit-naics/?code=11

Where are other ag-related businesses?

In the NACIS system, agriculture-related businesses are found in sectors other than agriculture, such as wholesale trade; retail trade; transportation and warehousing; and professional, scientific, and technical services.

Table 9.6 shows the potential for agriculture-related businesses in Jackson County in 2023 by NAICS type, number of businesses, and total employees.

Sector 42 Wholesale Trade businesses buy goods for resale, but usually not to the general public. They purchase, sell, and deliver merchandise in larger quantities. Ag-related examples are: dealers of farm and garden machinery, equipment, and supplies; wholesalers of grocery and related food products; and farm product raw material merchants.

Sector 44 - 45 Retail Trade is the buying of goods for resale to the general public. Ag-related examples are: nursery, garden center, and farm supply retailers; and grocery, convenience, and specialty food retailers.

For more information about NAICS, visit https://www.census.gov/naics/

Table 9.6 Potential for Agriculture-Related Businesses in Jackson County (2023)

NACIS Type of Business	Number of Businesses	Total Employees
Agriculture, Forestry, Fishing and Hunting	36	69
Wholesale Trade	40	489
Retail Trade	109	1,041
Transportation and Warehousing	27	138
Professional, Scientific, and Technical Services	51	164
TOTALS	263	1,901

Source: Jackson County Economic Alliance using source data from Esri 10-17-2023

Fall harvest in Jackson County *Photo Credit: ECIA*

ANIMAL FEEDING OPERATIONS

"Iowa has two types of DNR-regulated animal feeding operations (AFOs): confinements and open feedlots. Both types are confined (kept and fed for 45 days or more per year) in a lot, yard, corral, building, or other area. Both types include manure storage structures, but do not include livestock markets.

Definitions

A **confinement feeding operation** confines animals to areas that are totally roofed. Confinement feeding operations in Iowa must retain all manure.

An **open feedlot** is unroofed or partially roofed with no vegetation or residue ground cover while the animals are confined. Large open feedlots with a National Pollutant Discharge Elimination System (NPDES) permit are allowed to discharge to a water of the state under certain conditions listed in the permit, such as during a storm event larger than the 25-year, 24-hour storm.

A **combined operation** has some animals in a confinement and some in an open feedlot.

Unlike livestock on pasture, animals in AFOs are kept in small areas where feed and manure become more concentrated. Animal manure and urine contain nitrogen (nitrate and ammonia), phosphorus, organic matter, sediments, pathogens, and heavy metals — all of which are potential pollutants if they are concentrated in a small area. Some of these substances can pose threats to human health or impair drinking water. When excess nutrients reach our waters, they can cause low levels of dissolved oxygen, algal blooms and, in extreme cases, fish kills.

Regulations

Iowa regulates AFOs to protect surface and groundwater resources. All AFOs must follow some regulations when land applying manure or when building a new structure or expanding an existing operation. Generally, regulations differentiate between the type and size of operation, and the type of manure storage that is used. When constructing a confinement, the operations must also meet separation distances from neighboring businesses, residences, churches, schools, and public use areas. These distances help protect neighbors from potentially offensive odors and air emissions. Environmentally sensitive areas such as wells, sinkholes and water sources are also protected by setbacks from construction and manure application."[5]

Master Matrix

The Master Matrix is an Iowa DNR scoring system that can be used to evaluate the siting of permitted confinement feeding operations by counties that have adopted a construction evaluation resolution annually between January 1 to 31.[6]

In January 2024, Jackson County had 45 AFOs in the DNR's AFO database; visit https://www.iowadnr.gov/Environmental-Protection/Animal-Feeding-Operations/AFO-Online-Services

[5] *AFO – General Overview,* Iowa DNR: Jan. 2021; visit https://www.iowadnr.gov/Environmental-Protection/Animal-Feeding-Operations/

[6] https://www.iowadnr.gov/Environmental-Protection/Animal-Feeding-Operations/AFO-Construction-Permits#Master-Matrix-364

LAND QUALITY

Land quality refers to the extent that land is free from contamination and therefore suitable for a particular use.

Measuring Land Quality

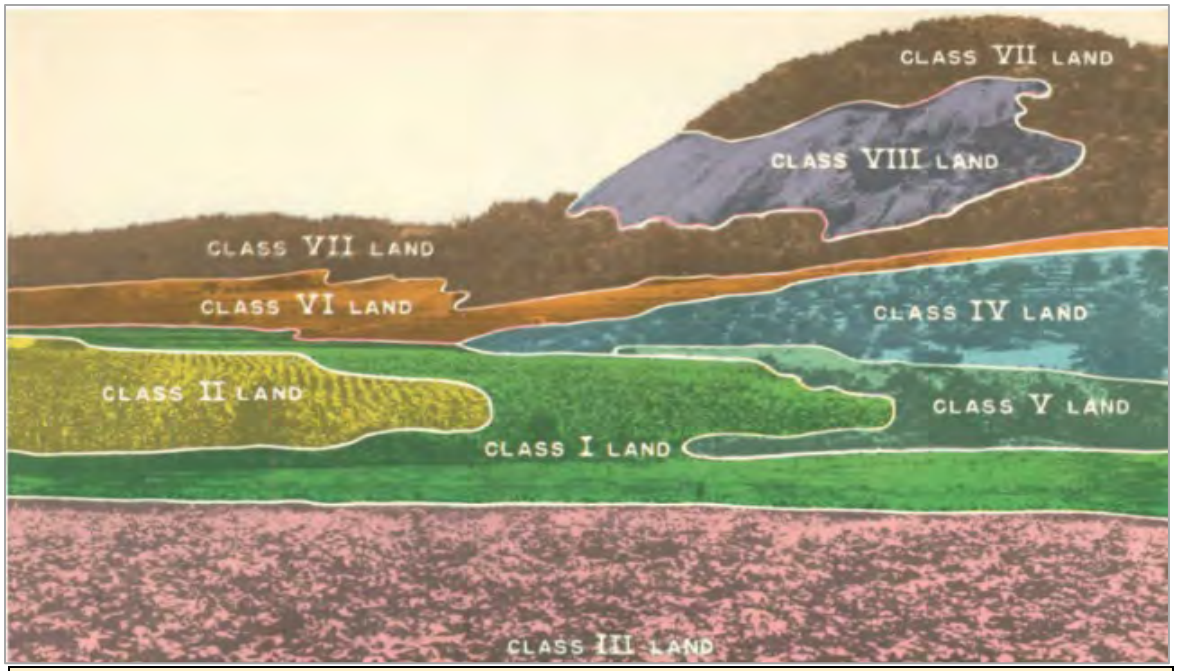
Existing measures of land quality are often used to monitor the use of land or the capability or suitability of land for an agricultural purpose such as growing crops or grazing animals, or for nonagricultural land development.

The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) uses two measures.

The Land Capability Class (LCC) shows, in a general way, the suitability of soils for most kinds of field crops.

The Prime Farmland designation denotes farmland that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses.

For nonagricultural development, the Land Suitability Analysis uses a Geographic Information System (GIS) overlay analysis to identify appropriate areas for new development. For more information, see Chapter 12. Land Use in this comprehensive plan.



LAND CAPABILITY CLASSES			
Suitable for Cultivation		**No Cultivation Practice, Hay, Woodland, and Wildlife**	
I	Requires good soil management practices only	**V**	No restrictions in use
II	Moderate conservation practices necessary	**VI**	Moderate restrictions in use
III	Intensive conservation practices necessary	**VII**	Severe restrictions in use
IV	Perennial vegetation, infrequent cultivation	**VIII**	Best suited for wildlife and recreation

Figure 9.7 Land Capability Class, adapted from NRCS by Iowa State University
Source: https://iastate.pressbooks.pub/soiljudgingiowa/chapter/land-capability-class/ accessed Jan. 2024

Figure 9.7 depicts the Land Capability Class graphically as a landscape. Classes I through IV are suitable for cultivation. Classes V through VIII are not suitable for cultivation; however, they are suitable for pasture, hay, woodland, and wildlife.

Classes II through VII are assigned subclasses on the basis of the type of hazard or limitation restricting their use. Four LLC subclass symbols are used to designate the problem as erosion (E), wetness (W), soil (S), or climate (C).[7] Figure 9.8 is a 2016 map of the LLC distribution across Iowa and Jackson County.

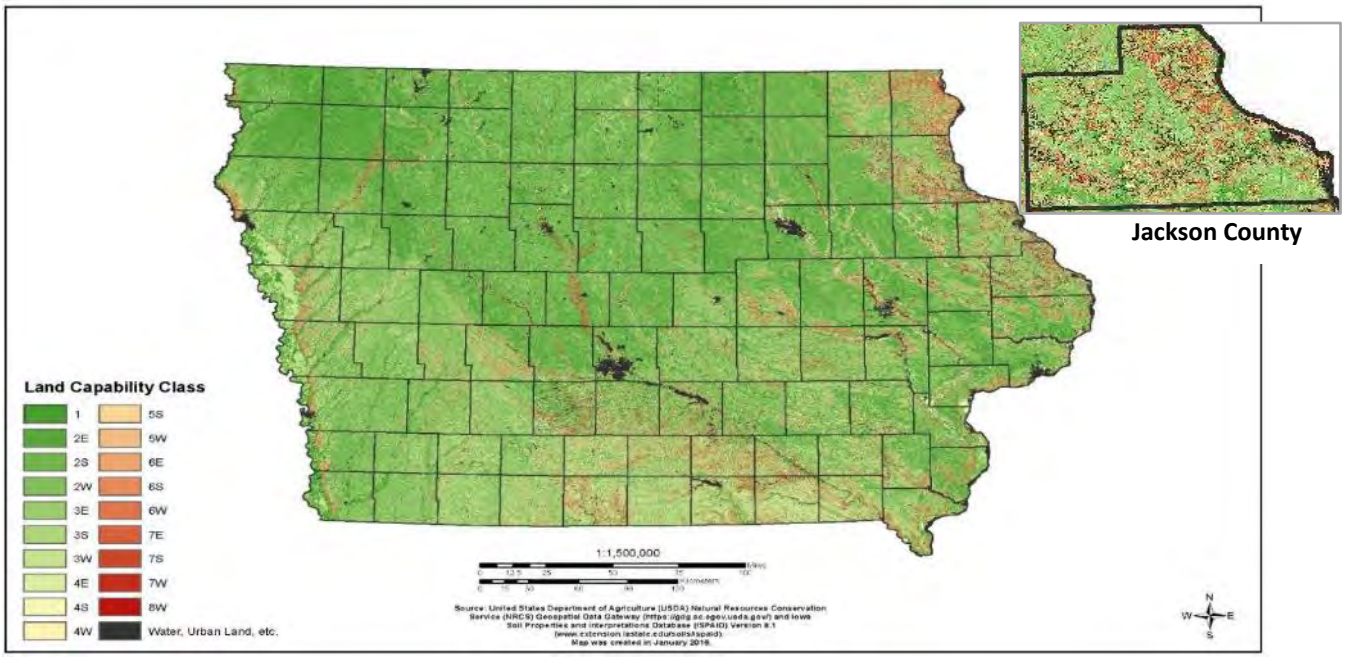


Figure 9.8 USDA-NRCS Land Capability Class (LLC) Distribution across Iowa
Source: Iowa State University Department of Agronomy: Jan. 2016, accessed Jan. 2024

NRCS Iowa Land Uses

Iowa NRCS provides technical assistance to agricultural producers and non-industrial forest managers to help address natural resource concerns while strengthening their operations for four types of Iowa land uses. All four are found in Jackson County.

Cropland includes areas used for the production of adapted crops for harvest. There are two subcategories:

- *Cultivated cropland* includes row crops or close-grown crops, and hay or pasture land that is in a rotation with row or close-grown crops.
- *Non-cultivated* cropland includes permanent hay land and horticultural cropland.

Pasture lands are diverse types of land where the primary vegetation produced is herbaceous plants and shrubs.

Agroforestry combines trees and shrubs with crops and/or livestock.

Prairie, Pollinators and Wildlife Habitat is a partner-driven approach to conservation that funds solutions to natural resource challenges on agricultural land.

For more information, visit https://www.nrcs.usda.gov/conservation-basics/conservation-by-state/iowa/iowa-land-uses

[7] https://iastate.pressbooks.pub/soiljudgingiowa/chapter/land-capability-class/, copyright 2023

Topography

Jackson County's topography is comprised of steeply rolling hills with rock outcrops and karst features in some areas. Karst is a type of landscape where the dissolving of the bedrock has created sinkholes, sinking streams, caves, and springs associated with bedrock. The county generally slopes from northwest to southeast, as shown in Figure 9.9, a topographic map of Jackson County.

Land Cover

According to the U.S. Geological Service (USGS), the National Land Cover Database (NLCD) provides nationwide data on land cover for characteristics of the land surface such as thematic class (e.g., urban, agriculture, and forest).

Most categories are self-explanatory; for example, Cultivated Crops and Pasture/Hay. Some categories are not; for example, *Shrub/scrub* contains some woodlands with trees over six feet. Other categories that are not self-explanatory include: *Developed, Open Space* – large lot single-family homes, parks, golf courses, and landscaped areas with impervious surfaces covering less than 20%; *Developed, Low Intensity* – single-family homes with impervious surfaces of 20 - 49%; *Developed, Medium Intensity* -- single-family homes with impervious surfaces of 50 - 79%; and *Developed High Intensity* – usually includes apartment complexes, row houses, and commercial or industrial areas with impervious surfaces covering 80 - 100%.[8]

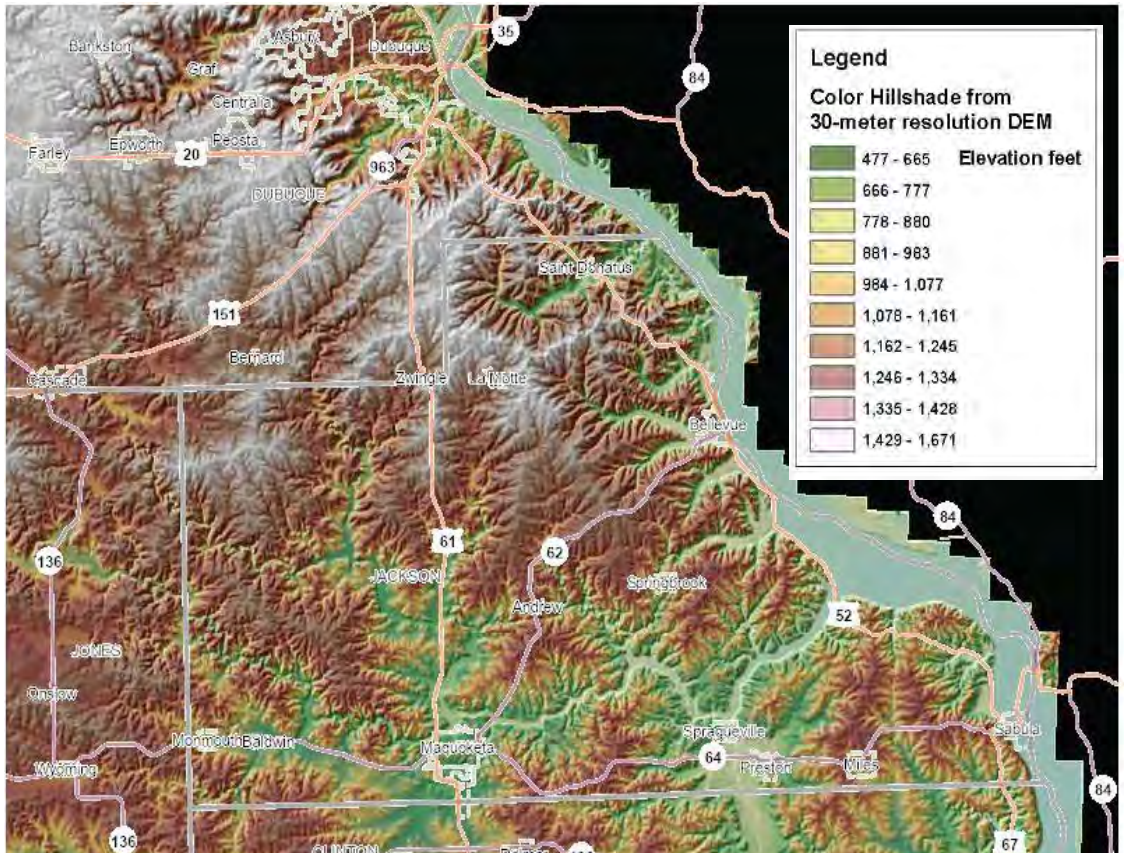


Figure 9.9 Topographic Map of Jackson County Source: Iowa Geographic Map Server, 2024

[8] Source: USDA Agriculture Handbook 296: May 2022, p. 362

Figure 9.10 is a map of the land cover distribution for Jackson County using the 2021 National Land Cover Database. The predominant land cover categories are agricultural uses of 82-Cultivated Crops and 81-Pasture/Hay, followed by 41-Deciduous Forests. Concentrations of Developed land covers in categories 21-Open Space, 22-Low intensity, 23-Medium Intensity, and 24-High Intensity identify the locations of the cities in Jackson County.

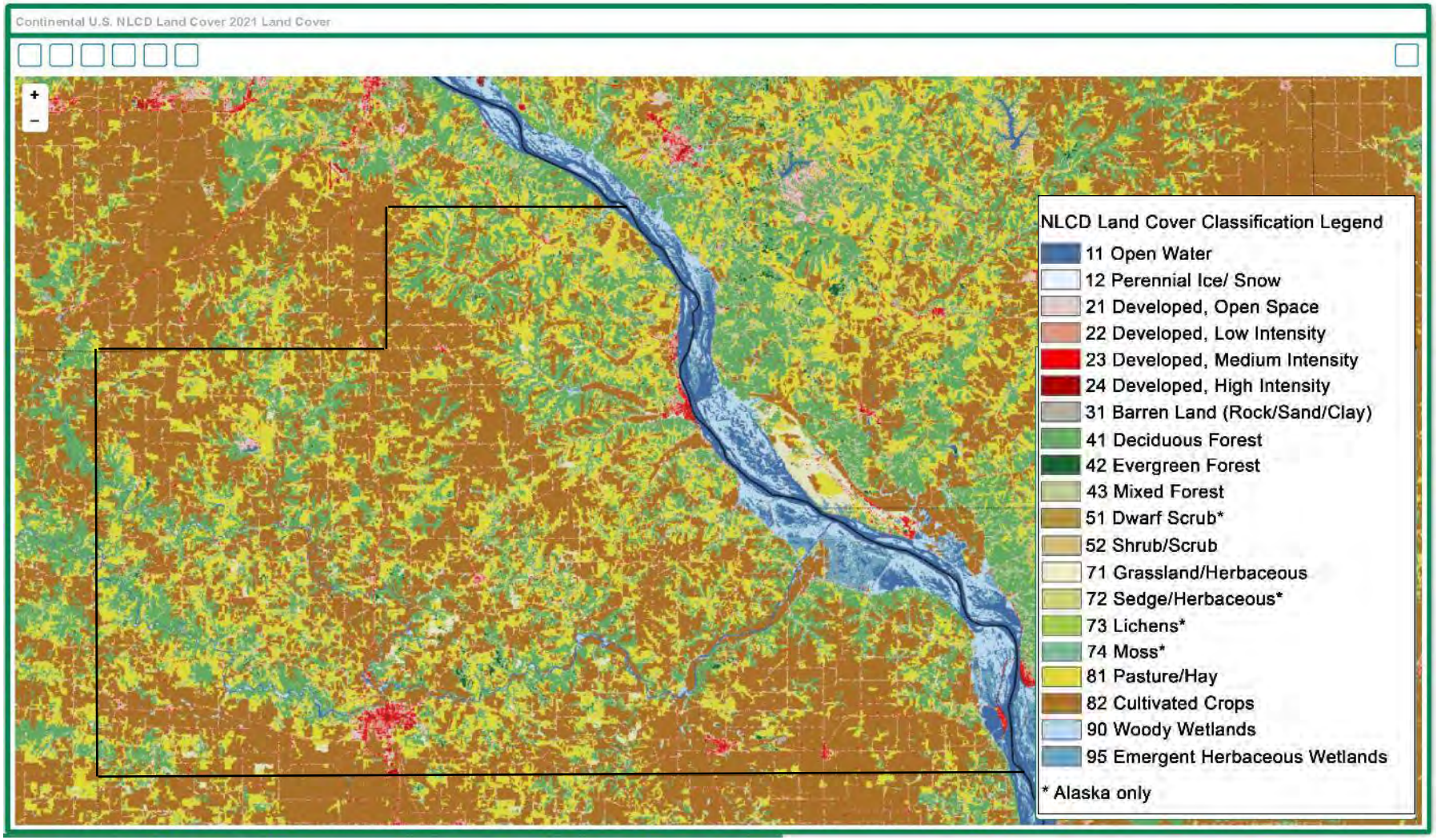


Figure 9.10 Land Cover Map for Jackson County (2021) Source: Multi-Resolution Land Characteristics Consortium, https://www.mrlc.gov/viewer// Dec. 2023

SOIL QUALITY

Most of Jackson County's soils developed from deposits of glacial till – a mix of clay, silt, sand, gravel, and boulder; wind-deposited silt called loess; and sediment deposited by flood waters, called alluvium. The soil region is FDN with soil names of Fayette-Downs-Nordness.

Jackson County is in the landform subregion called the East-Central Drift Plain. It is characterized by shallow dolomite bedrock with sinkholes, wind-blown sand and loess deposits, and gently sloping to rolling farmland with steep wooded valleys (see diagram in Figure 9.11).

Decline in Soil Quality

Prior to the mid-1800s, Jackson County (like the rest of Iowa) was covered with three major natural ecosystems: tallgrass prairie, savanna, and deciduous forest. "Humans have caused significant changes to soil since then with the rise of intensive cultivation. The primary change is a decline in organic matter, which is vital for healthy, rich, life-supporting soil.

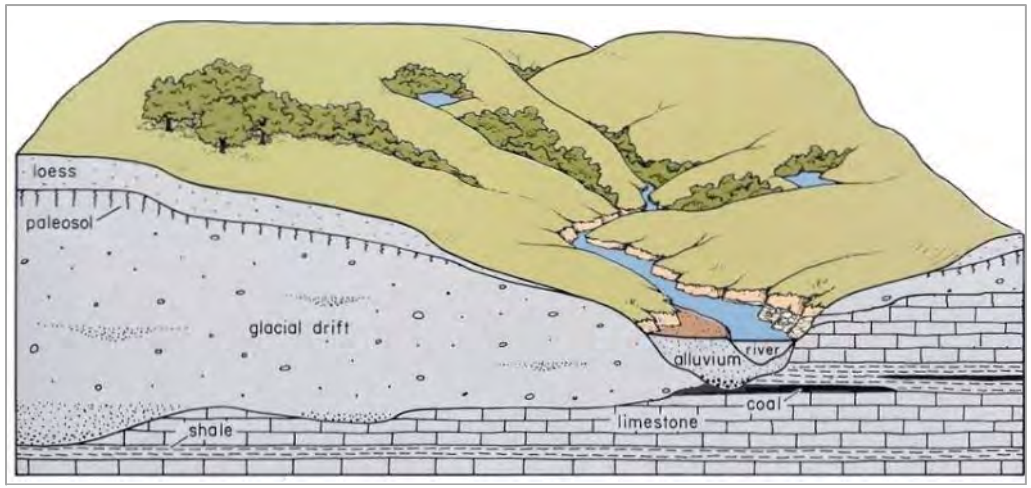


Figure 9.11 Diagram of East-Central Drift Plain Landform Sub-Region
Source: https://iowageologicalsurvey.uiowa.edu/iowa-geology/landforms-iowa, accessed Jan. 2024

Decline in soil organic matter to approximately 50% of the original concentration present under native ecosystems is due to three major factors:

1. Erosion of topsoil due to repeated tillage and soil being left bare in the winter.
2. Lack of plant inputs to the soil and accelerated loss of soil organic matter.
3. Extensive sub-terranean drainage."[9]

Soil Erosion

Erosion occurs where the natural ecosystem is altered significantly and soil is left bare of plant material. Erosion also occurs where the landscape has been altered through reshaping or removing the topsoil, or compacting soil with equipment such as at construction sites.

Topsoil usually has the most nutrients and organic matter. When topsoil is lost, the remaining soil is less able to maintain a healthy ecosystem. This can negatively impact the quality of drinking water sources and wildlife habitat.[10]

[9] *Soils*, ISU Extension and Outreach: March 2021, p.9

[10] Ibid

Soil Health

According to the USDA Natural Resources Conservation Service (NRCS), "Soil health is defined as the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans. Soil performs five essential functions: regulating water, sustaining plant and animal life, filtering and buffering potential pollutants, cycling nutrients, and providing physical stability and support."[11] Figure 9.12 shows the four principles of soil health.

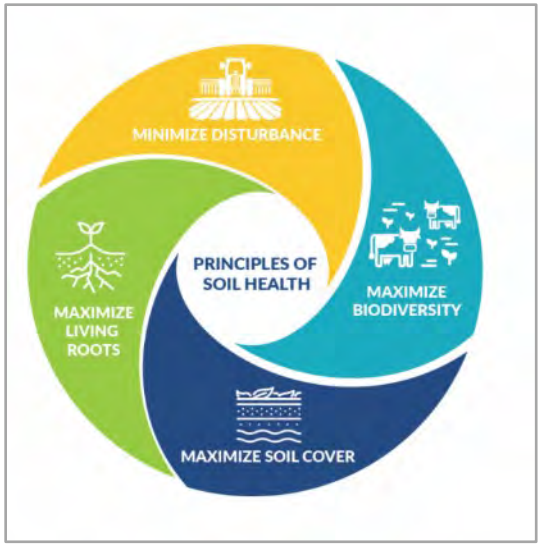


Figure 9.12 Principles of Soil Health
Source: Natural Resources Conservation Service

Improving Soil Quality

"By farming using soil health principles and systems that include no-till, cover cropping, and diverse rotations, more and more farmers are increasing their soil's organic matter and improving microbial activity. As a result, farmers are sequestering more carbon, increasing water infiltration, improving wildlife and pollinator habitat — all while harvesting better profits and often better yields."[12]

"Maximizing soil health is essential to maximizing profitability. By enhancing soil organic matter, a series of soil changes and environmental benefits follow,"[13] as shown in Figure 9.13. "Managing soil organic matter is the key to healthy soil and air and water quality. Erosion control is not enough."[14]

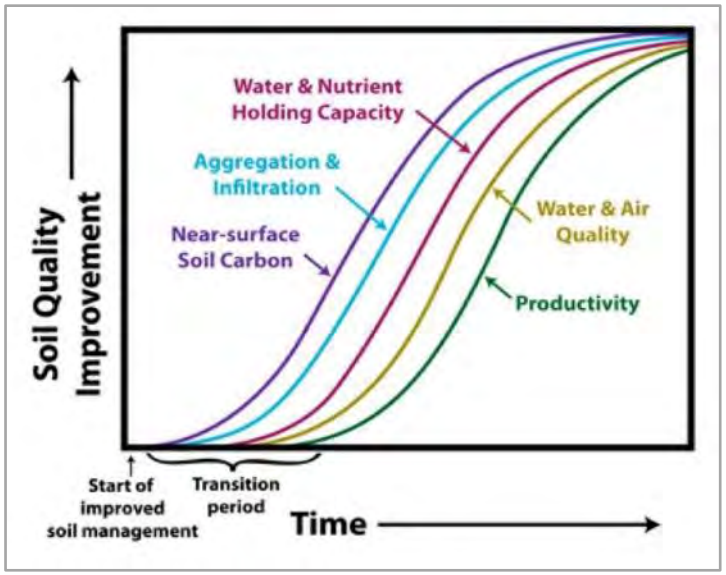


Figure 9.13 Role of Soil Organic Matter
Source: Natural Resources Conservation Service

Mining & Mineral Resources

According to the *Five-Year Soil & Water Resource Conservation Plan for 2021-2025* of the Jackson County Soil and Water Conservation District (SWCD), there are 53 registered mineral sites in the county. Resources mined in Jackson County are primarily crushed stone, sand, and gravel. Other minerals include: lead, zinc, phosphorous, and flagstone.

[11] https://www.nrcs.usda.gov/conservation-basics/natural-resource-concerns/soils/soil-health
[12] Ibid
[13] https://www.nrcs.usda.gov/conservation-basics/natural-resource-concerns/soils/soil-health/role-of-organic-matter
[14] https://www.nrcs.usda.gov/conservation-basics/natural-resource-concerns/soils/soil-health/manage-for-soil-carbon

Soil and Water Conservation Districts

In Iowa, there are 100 soil and water conservation districts (SWCDs); one in each county, and two in Pottawattamie County. Each district is governed by five commissioners who are elected at the general elections on a non-partisan basis for four-year terms. Iowa law grants authority to SWCDs to carry out activities that promote conservation. SWCDs form a Conservation Partnership with local, state, and federal agencies, as well as local groups and organizations.

The Iowa Department of Agriculture and Land Stewardship (IDALS) Division of Soil Conservation provides staff support to the SWCDs. Each SWCD is unique in the resource conservation problems it addresses and the way it chooses to package and deliver programs to landowners, farm operators, and local communities. Learn more at https://iowaagriculture.gov/field-services-bureau/additional-resources

Soil Conservation Practices

"By investing in soil conservation, landowners improve the productivity of their farm and keep sediment out of the water. State cost share funds can be used for temporary or permanent practices.

Temporary practices include: no-till, strip till, contouring, field borders, cover crops, ridge till, critical area planting, contour strip cropping, and filter strips.

Permanent practices include: diversion, grade stabilization structures, grass strips, pasture and hay land planting, terraces, windbreaks, grassed waterways, tree planting, and conservation cover."[15]

Figure 9.14 shows acres of conservation tillage and no-till practices with greater than 30% residue in Jackson County by watersheds, based on the county's 2017 USDA Census of Agriculture.

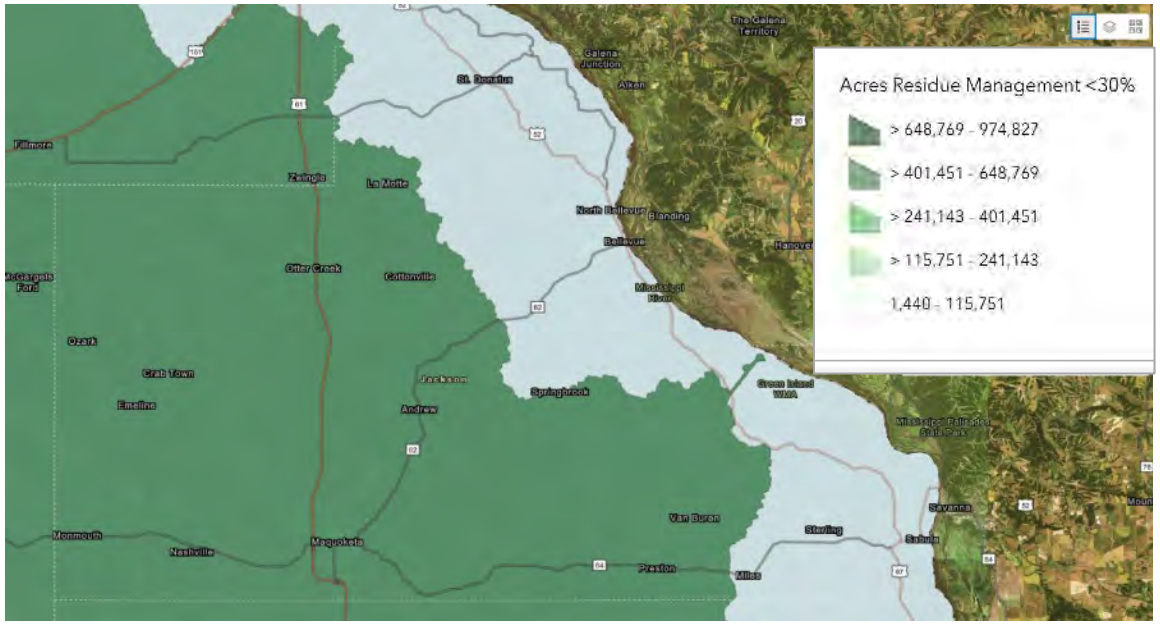


Figure 9.14 Conservation and No-Till Practices >30% Residue in Jackson County (2017)
Source: https://nrstracking.cals.iastate.edu/tracking-iowa-nutrient-reduction-strategy

[15] https://iowaagriculture.gov/field-services-bureau/financial-assistance-conservation-practices

Soil & Water Resource Conservation

The following information is from the Jackson County SWCD's *Five Year Soil & Water Resource Conservation Plan for 2021-2025*.

It is the mission of the Jackson County SWCD to: Help landowners and producers to do the best job possible of protecting and enhancing our soil and water resources. We administer local, state, and federal conservation programs that provide financial and technical assistance to implement structures and practices to preserve our soil and water.

The Soil and Water Resource Conservation Plan (SWRCP) represents the state of soil and water resources of the Jackson County SWCD. The plan includes five-year priority goals set by the Jackson County SWCD Board to protect and promote natural resources. The Board also uses the five-year SWRCP to formulate their annual plans.

The Jackson County SWCD Board determines their priority goals from an inventory of the District's natural resources, and in collaboration with input from a Local Working Group (consisting of farmers, local business owners, and other residents of the community), Natural Resources Conservation Service staff, and the public.

The priority goals for 2021-2025 are:

- Encourage the wise use and protection of the soil resources within the SWCD in order to sustain crop productivity for generations to come.
- Encourage the wise use and protection of the surface water and groundwater resources within the SWCD, to prevent their contamination and to ensure their sustained use.
- Improve perennial cover by promoting profitable and sustainable use of forest and pasturelands within the SWCD.
- Connect with the greater community and other stakeholders in support of conservation, sustainability and regenerative agriculture.

See the Watershed Management section of this chapter for Jackson County SWCD success stories.

Native grasses
Photo Credit: Jackson County SWRCP

Buffer strips *Photo Credit: Jackson County SWRCP*

AIR QUALITY

Everyone needs clean air. Poor air quality is unhealthy for everyone, but especially for children, senior citizens, and people with respiratory conditions like asthma. People who work or exercise outdoors also can be affected. Clean air also helps Iowa's livestock, wildlife, crops, and other plant life.

Cleaner, healthier air requires local and regional efforts, so the Iowa Department of Natural Resources (DNR) partners with communities, business and industry, organizations, and individuals to address air quality issues.

Air Pollutants

The Federal Clean Air Act requires the U.S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for six commonly found pollutants known as "criteria" air pollutants: carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide. Jackson County meets these standards.

Iowa DNR provides a map of current air quality conditions. Iowa DNR also provides maps and metrics of active construction permit and Title V operating permit applications, asbestos notifications, as well as emissions and monitoring data on the Air Quality Dashboard. Access these resources at https://www.iowadnr.gov/Environmental-Protection/Air-Quality

Construction Permits

"When a business wants to build or expand, they must apply for a construction permit to show how they will meet state and federal air quality standards. DNR issues permits for projects from paint booths at an auto body shop to coal-fired boilers at a power plant. Even facilities exempt from applying for a permit must meet air quality regulations. Residential heaters, cook stoves and fireplaces along with certain agricultural equipment related to raising crops and livestock are some of the items that are exempt."[16] Table 9.7 shows the 132 construction permits in Jackson County from 2001 - 2023.

Table 9.7 Construction Permits in Jackson County: 2001 - 2023

Active Applications	Number
Construction Standard Application	1
Final Permits by Type	**Number**
Group 1 Grain Elevator	5
Paint Booth Permit	12
Construction Standard Application	113
Recission	1

Source: Iowa DNR Air Quality Dashboard, Iowa Easy Air Applications page

Operating Permits

Iowa DNR issues five-year operating permits to ensure certain major facilities and equipment continue to perform as designed, to protect ambient air quality under Title V of the Federal Clean Air Act.[17] In Jackson County, Iowa DNR issued one Title V operating permit for the Maquoketa Municipal Electric Utility for 2020 - 2025.[18]

[16] *Construction Permitting Summary* at https://www.iowadnr.gov/Environmental-Protection/Air-Quality/Construction-Permits

[17] https://www.iowadnr.gov/Environmental-Protection/Air-Quality/Operating-Permits

[18] Iowa DNR Air Quality Dashboard, Iowa Easy Air Applications page

Emissions Inventory

Iowa DNR is responsible for reviewing and estimating air pollution data from a variety of sources throughout the state. Examples of emissions inventory data include:

Point Sources: Stationary sources, such as smoke stacks from industrial facilities and fermentation processes.

Mobile Sources: Both on-road sources (cars and trucks) and nonroad sources (agricultural equipment, construction equipment, trains, airplanes, etc.)

Biogenic Sources: Trees and vegetation, oil and gas seeps, and microbial activity.

Nonpoint Sources: Sources such as residential fuel use and landfills.[19]

Greenhouse Gases

By Iowa Code, Iowa DNR includes estimates of emissions of some greenhouse gases (GHG) in its construction permitting and emissions inventory programs. The DNR also has a voluntary GHG registry to track and credit companies in Iowa that reduce their GHG emissions or provide increased energy efficiency. Figure 9.15 is an Iowa DNR infographic of the 2022 Iowa GHG emissions and the 2022 Iowa total GHG emissions by economic sector.[20]

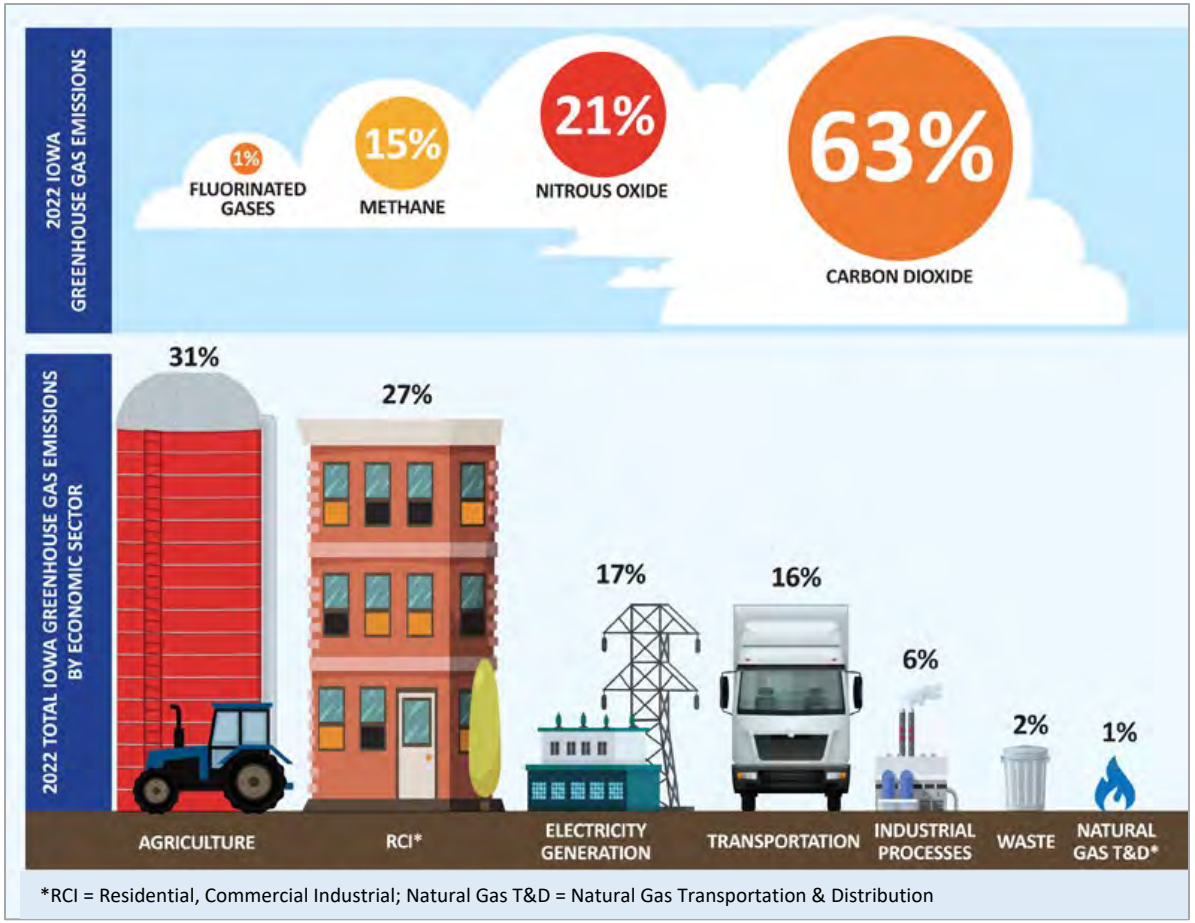


Figure 9.15 Iowa Infographic for 2022 Greenhouse Gas Inventory Source: Iowa DNR

[19] https://www.iowadnr.gov/Environmental-Protection/Air-Quality/Emissions-Inventory

[20] https://www.iowadnr.gov/Environmental-Protection/Air-Quality/Greenhouse-Gas-Emissions

WATER QUALITY

From drinking water to wastewater, and from wetlands to lakes, ensuring clean water is an important priority for Iowa. Drinking water and wastewater are discussed in Chapter 5. Infrastructure and Utilities in this comprehensive plan. This chapter discusses enhancement and protection of water quality for agriculture, outdoor recreation, and habitats for fish and wildlife.

Water Resources

The information in the following tables is from the Jackson County SWCD's *Five Year Soil & Water Resource Conservation Plan (SWRCP) for 2021-2025*.

Table 9.8 is an inventory of the water bodies in Jackson County.

Table 9.8 Inventory of Water Bodies in Jackson County

Acres of waterbodies	7,680
Miles of perennial streams	200
Acres of Wetlands	4,120

Source: 2021-2025 Jackson County SWRCP

Table 9.9 is a list of water bodies and their general location in Jackson County.

Table 9.9 List of Water Bodies in Jackson County

Name of Water Body	Area of County	Name of Water Body	Area of County
Bar Slough	Green Island	**Maquoketa River**	Green Island
Bear Creek	Baldwin	**Mill Creek**	Bellevue
Beaver Creek	Sabula	**Mineral Creek**	Leisure Lake
Beers Creek	Baldwin	**North Fork Maquoketa River**	Maquoketa
Bellevue Slough	Bellevue	**North Spring Branch**	Leisure Lake
Black Hawk Creek	Canton	**Otter Creek**	Zwingle
Brush Creek	Delmar North	**Pine Creek**	Leisure Lake
Buck Creek	Fulton	**Pleasant Creek**	Springbrook
Cedar Creek	Fulton	**Prairie Creek**	Maquoketa
Cline Branch	Leisure Lake	**Raccoon Creek**	Baldwin
Copper Creek	Preston	**Rock Creek**	Preston
Deep Creek	Preston	**Running Slough**	Blackhawk
Duck Creek	Springbrook	**Ryan Creek**	Preston
East Fork Sabula Slough	Sabula	**Sabula Slough**	Sabula
Eldridge Slough	Sabula	**Silver Creek**	Maquoketa
Esmay Slough	Sabula	**Smith Creek**	Green Island
Farmers Creek	Fulton	**Snag Slough**	Green Island
Hainer Creek	Delmar North	**South Copper Creek**	Preston
Hubbel Slough	Sabula	**South Spring Branch**	Leisure Lake
Hurstville Branch	Maquoketa	**Spring Branch**	Leisure Lake
Jess Branch	Andrew	**Spruce Creek**	Bellevue
L Esmay Slough	Sabula	**Tarecoat Creek**	Fulton
Little Mill Creek	Bellevue	**Union Creek**	Maquoketa
Lux Creek	La Motte	**Upper West Fork West Sabula Slough**	Sabula
Lytle Creek	Leisure Lake	**Yeager Creek**	Bellevue

Source: 2021-2025 Jackson County SWRCP

Impaired Waters

The Clean Water Act requires that the Iowa Department of Natural Resources (DNR) submit a list of waters which do not meet water quality standards. The failure to meet these standards might be due to an individual pollutant, multiple pollutants, "pollution," or an unknown cause of impairment. The list includes waters impaired by point sources and non-point sources of pollutants. The state also establishes a priority ranking for the listed waters, considering the severity of pollution and uses.

Iowa's most recent list of impaired waters was completed in 2022. The list includes lakes, wetlands, streams, rivers, and portions of rivers that do not meet all state water quality standards. These are considered "impaired waterbodies".[21] Figure 9.16 shows portions of the Maquoketa River and the North Fork in Jackson County as Category 5 impaired waters. Category 5 requires Iowa DNR to set a total maximum daily load (TDML) for pollutants.

While these rivers are listed as impaired, they are still safe for recreational use. According to the Iowa's State Water Trail Plan: For water trail users, "impaired" water quality can range from having no bearing whatsoever on our experience to conditions that make people ill through contact with or ingestion of the water.

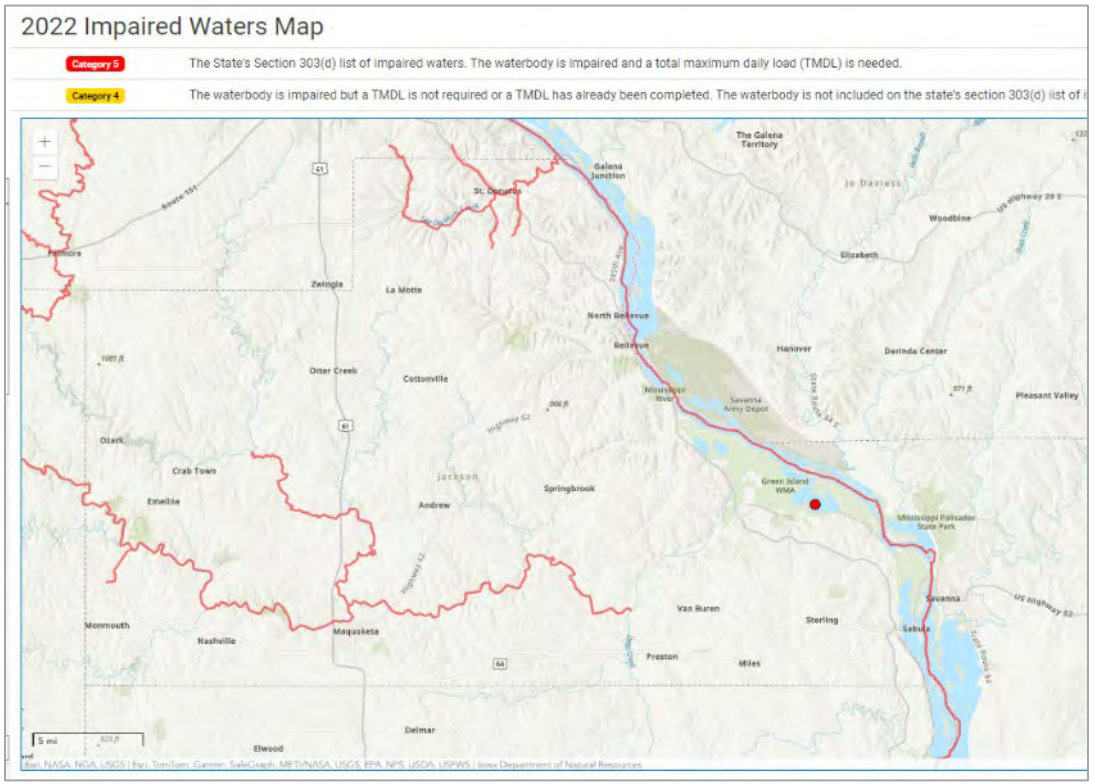


Figure 9.16 Map of Impaired Waters in Jackson County (2022)
https://www.iowadnr.gov/environmental-protection/water-quality/water-monitoring/impaired-waters
accessed Jan. 2024

[21] https://www.iowadnr.gov/environmental-protection/water-quality/water-monitoring/impaired-waters

Iowa Nutrient Reduction Strategy

The Iowa Nutrient Reduction Strategy is a science and technology-based approach to assess and reduce nutrients delivered to Iowa waterways and the Gulf of Mexico. It outlines voluntary efforts to reduce nutrients in surface water from both point sources, such as wastewater treatment plants and industrial facilities, and nonpoint sources, including farm fields and urban areas, in a scientific, reasonable and cost-effective manner.[22] View full strategy, including annual progress reports and strategy revisions, at www.nutrientstrategy.iastate.edu

Visit the Tracking the Iowa Nutrient Reduction Strategy site to access online dashboards and download data at https://nrstracking.cals.iastate.edu/tracking-iowa-nutrient-reduction-strategy

This dashboard presents nonpoint source — or agricultural — efforts to reduce nutrient loss using edge-of-field conservation practices and structural erosion control. Figure 9.17 displays the acres protected by structural erosion control practices installed in Jackson County from 2011 to 2021 under public conservation (i.e. cost-share) programs.

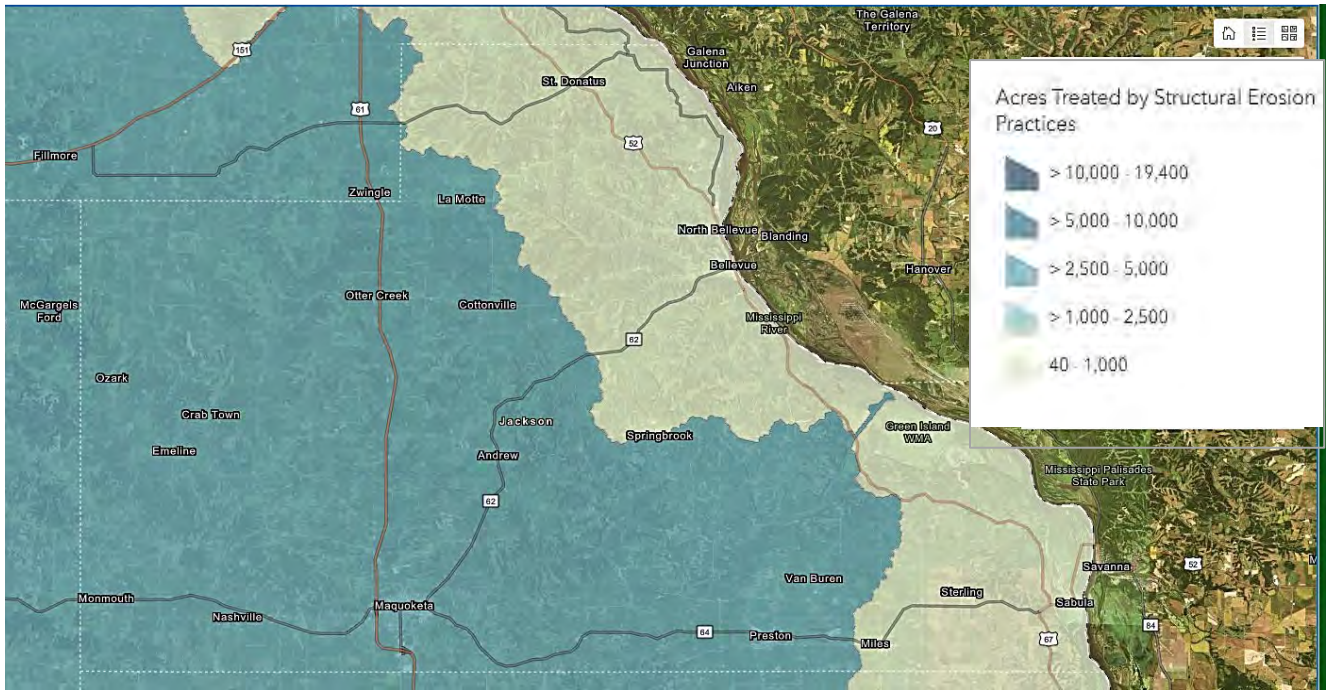


Figure 9.17 Acres Protected by Structural Erosion Practices Installed in Jackson County (2011-2021)
Source: https://nrstracking.cals.iastate.edu/tracking-iowa-nutrient-reduction-strategy, accessed Jan. 2024

[22] https://www.iowadnr.gov/Environmental-Protection/Water-Quality/Nutrient-Reduction-Strategy

WATERSHED MANAGEMENT

"A watershed is an area of land that is drained by the same body of water. Within the watershed all rain water eventually ends up in the same river, lake, or ocean. Rivers and streams are hierarchical systems that begin where surface runoff flows into a small stream. The small stream then flows into a river that eventually empties into a larger river. This continues until the water reaches its final destination like an ocean or lake.

Like rivers, watersheds are also hierarchical systems with smaller watersheds nested inside larger watersheds. The watersheds of small streams that flow into the same river combine to make up the river watershed. Then, the river watershed combines with watersheds from other rivers to makeup a larger watershed."[23]

Watershed boundaries show the extent of surface water drainage using a hierarchical system of nesting hydrologic units at various scales, each with an assigned hydrologic unit code (HUC).

The hydrologic unit hierarchy is indicated by the number of digits in groups of two (such as HUC 2, HUC 4, and HUC 6) within the HUC code. HUC 8 maps the subbasin level, analogous to medium-sized river basins (about 2,200 nationwide).[24]

Figure 9.18 is a map of the HUC 8 Watersheds in Iowa. There are two HUC 8 watersheds in Jackson County (circled in red). The Apple-Plum Watershed is located on the eastern side of the county along the Mississippi River. The Maquoketa River Watershed covers the rest of the county.

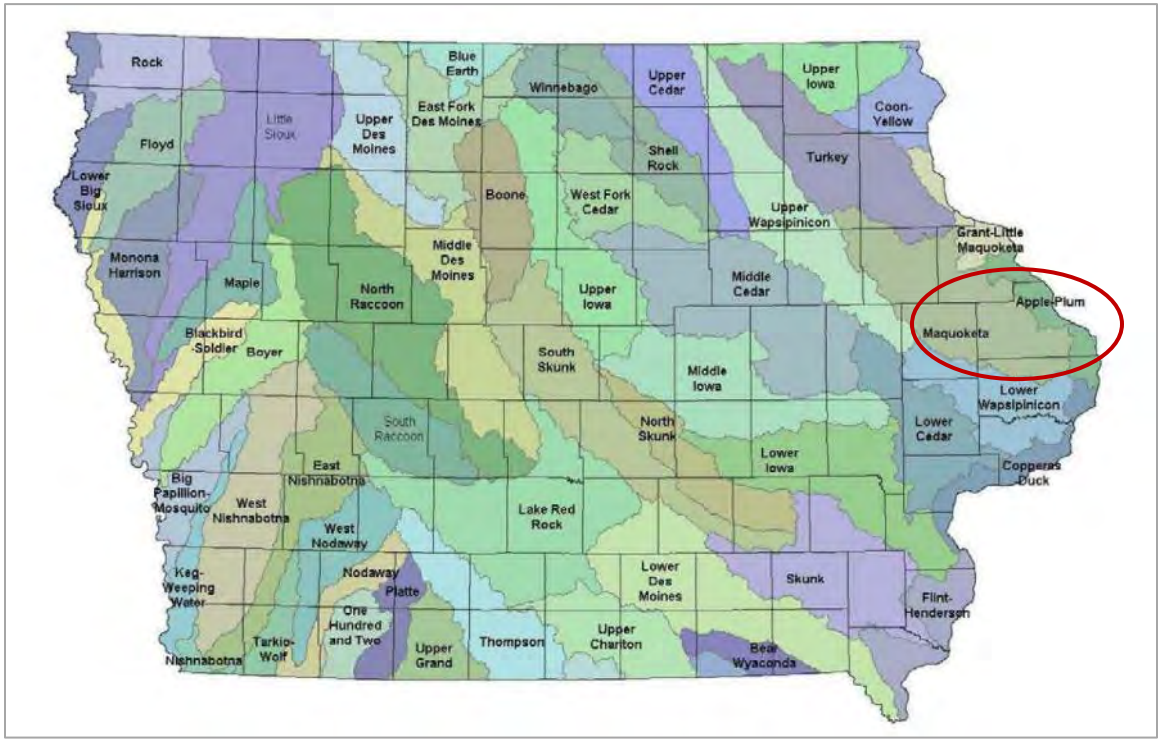


Figure 9.18 Map of HUC 8 Watersheds in Iowa Source: U.S. Environmental Protection Agency

[23] 2021 Jackson County Water Trail Plan, p. 11

[24] https://enviroatlas.epa.gov/enviroatlas/datafactsheets/pdf/Supplemental/HUC.pdf

Watershed Management Authorities

"A Watershed Management Authority (WMA) is a mechanism for cities, counties, Soil and Water Conservation Districts (SWCDs), and stakeholders to cooperatively engage in watershed planning and management.

The WMA is formed by a Chapter 28E intergovernmental agreement by two or more eligible political subdivisions within a specific HUC 8 watershed. A board of directors governs the WMA, which may undertake the following activities: assess and reduce flood risk; assess and improve water quality; monitor federal flood risk planning and activities; educate residents of the watershed regarding flood risks and water quality; and allocate moneys made available to the authority for purposes of water quality and flood mitigation.

A WMA does not have taxing authority and it may not acquire property through eminent domain."[25]

Figure 9.19 is a map of Iowa's WMAs.

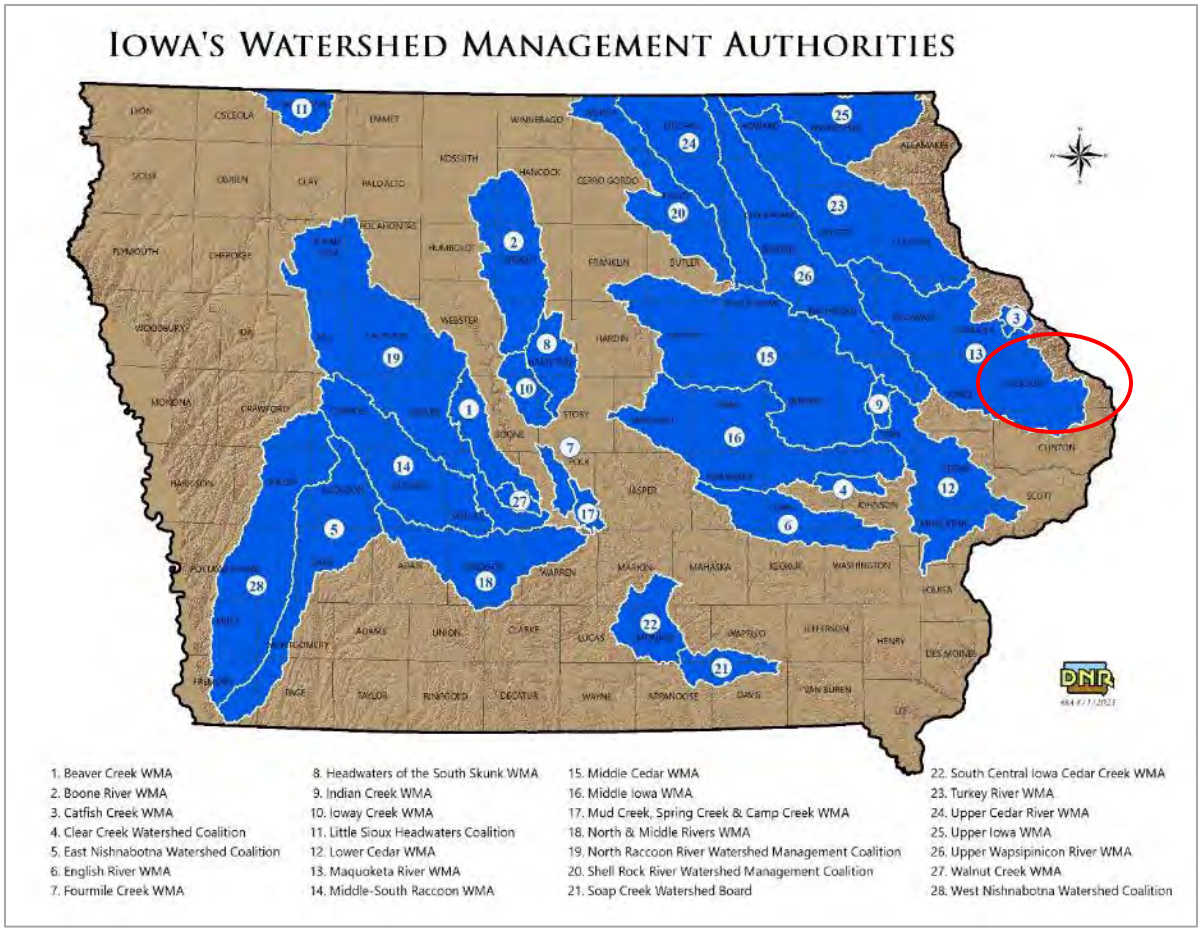


Figure 9.19 Map and List of Iowa's Watershed Management Authorities (2023)
Source: https://www.iowadnr.gov/Environmental-Protection/Water-Quality/Watershed-Management-Authorities, accessed Jan. 2024

[25] https://www.iowadnr.gov/Environmental-Protection/Water-Quality/Watershed-Management-Authorities

Maquoketa River Watershed WMA

The Maquoketa River Watershed is one of 11 tributaries to the Mississippi River, and drains water from 1,870 square miles within the Upper Mississippi River Basin. The watershed includes 80 townships and nine counties. Figure 9.20 is a map of the Maquoketa River Watershed.

The Maquoketa River Watershed Management Authority (MR WMA) was formed in 2017. Members of the Board of Directors represent 19 cities, seven counties, six Soil and Water Conservation Districts (SWCDs), and the Lake Delhi District.

In 2021, the MR WMA developed a Watershed Management Plan: Phase 1 that serves as a guidebook and vision to achieve these broad goals to improve watershed planning and management:

- Protecting local drinking water
- Supporting positive soil health practices
- Reducing flooding
- Promoting recreation
- Improving overall water quality

In 2022, the Watershed Management Plan Phase 2: Sub-watershed Implementation was developed. It takes planning efforts further by providing insight into where resources should be directed to meet the MR WMA's goals based on a technical analysis and continued engagement with local stakeholders.

In 2022, a Watershed Interactive Map was created using Geographic Information Systems (GIS) tools to provide location-specific information to the general public about important features and issues in the Maquoketa River Watershed.

For more information, visit https://www.limestonebluffsrcd.org/maquoketariverwma

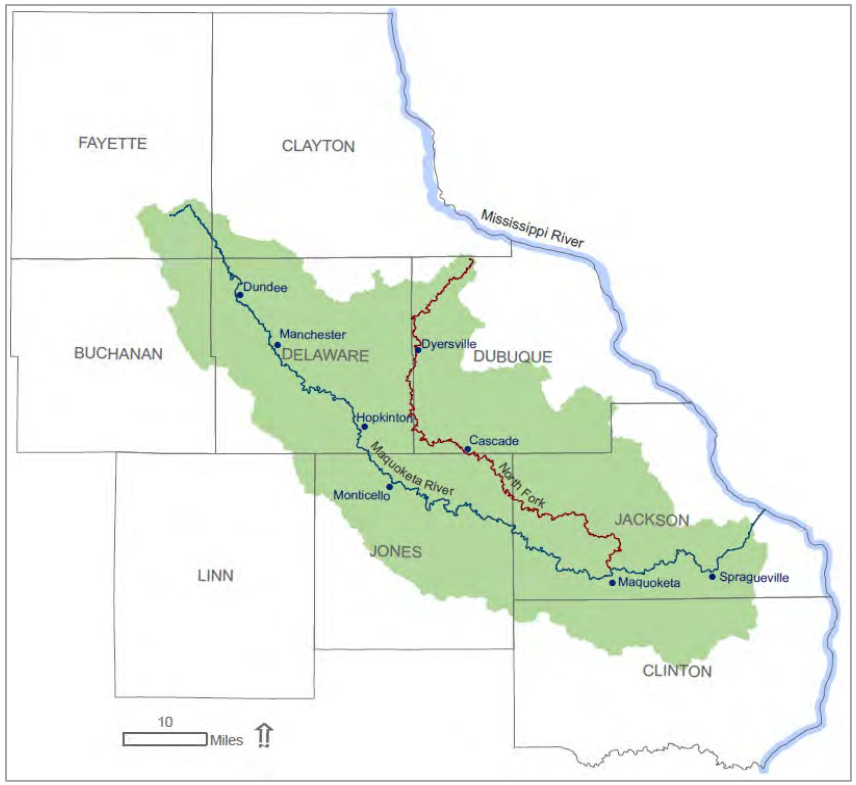


Figure 9.20 Map of Maquoketa River Watershed Source: ECIA

Find Phases 1 and 2 of the Maquoketa River Watershed Management Plan and the Watershed Interactive GIS Map at https://iisc.uiowa.edu/partners/maquoketa-river-watershed-management-authority

Watershed Success Stories

Hundreds of Iowa's rivers, lakes, and streams are listed as impaired under the federal Clean Water Act. While it is easy for a body of water to be added to this list, it is harder to get one removed. Farmers and landowners in two small watersheds in Jackson County accomplished this feat in 2022.

The following information is from the U. S. Environmental Protection Agency at https://www.epa.gov/nps/success-stories-about-restoring-water-bodies-impaired-nonpoint-source-pollution

Farmers Creek is a warm water stream in a watershed of 30,590 acres (47.8 square miles) with rolling farmland and bluffs (Figure 9.21). The formerly impaired creek section south of La Motte is outlined in pink.

Tete des Morts Creek is a tributary of the Mississippi River in Jackson and Dubuque counties. Its watershed includes a total of 30,433 acres (47.6 square miles) of rolling farmland and bluffs (Figure 9.22). The formerly impaired section of Tete des Morts Creek (outlined in pink) is downstream of the biosampling station at St. Donatus.

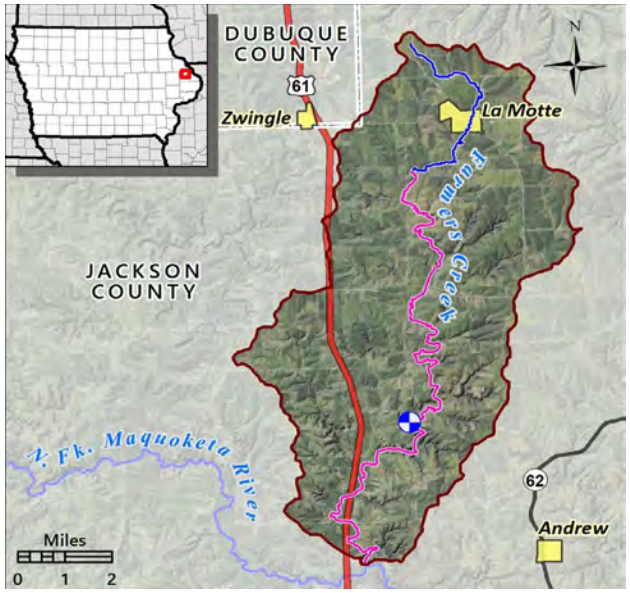


Figure 9.21 Farmers Creek Watershed
Source: USEPA and Iowa DNR

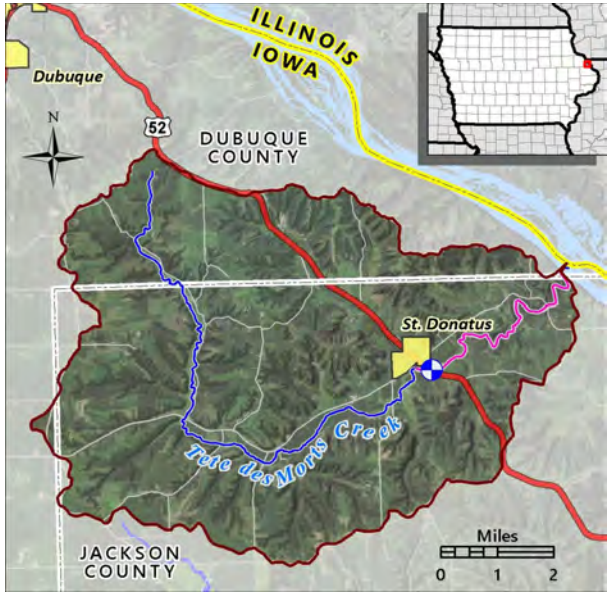


Figure 9.22 Tete des Morts Creek Watershed
Source: USEPA and Iowa DNR

Due to the steep topography and soil characteristics, over 85% of both watersheds are is considered highly erodible land. Land use in the watersheds is primarily agricultural and is managed for row crop and livestock production.

Nutrients and sediment delivery were identified as the primary nonpoint pollution concerns in both watersheds. Additionally, two fish kills in Farmers Creek were determined to be caused by livestock waste and runoff from land-applied dairy manure. Tete des Morts Creek had a series of fish kills of unknown origin. As a result, both creeks were added to Iowa's impaired waters list due to fish and biological impairments.

The Jackson County Soil and Water Conservation District launched a five-year watershed project in 2005 for Farmers Creek and a nine-year project in 2009 for Tete des Morts Creek. Participating farmers and landowners still continue to install a variety of conservation practices. As a result, the reduction in sediment delivery achieved has improved the water quality and habitat for fish and other aquatic life in both watersheds.

NATURAL RESOURCE CONSERVATION

The Iowa Department of Natural Resources (DNR) supports conservation of natural resources at the state level and by cities, counties, and individuals.

Iowa's Wildlife

The 2015 **Iowa Wildlife Action Plan** is designed to conserve all wildlife in Iowa before they become rare and more costly to protect. To protect *Species of Greatest Conservation Need*, the plan prioritizes protecting and enhancing existing habitats, developing new habitats, and increasing broadly-applied conservation efforts to improve aquatic habitats.

The **Iowa Wildlife Diversity Program** works to preserve and protect Iowa's nongame species, including shorebirds, raptors, songbirds, small mammals, bats, amphibians, reptiles, small fish, butterflies, dragonflies, and more. The program focuses on: landscape and ecosystem management, statewide inventory and monitoring of all wildlife species, training volunteer wildlife surveyors, public outreach, species reintroductions, and implementation of Iowa's Wildlife Action Plan.[26]

The **Iowa Natural Areas Inventory** interactive website provides data and maps for threatened, endangered, special concern, and selected rare species for professional natural resource managers and the public. The list of threatened, endangered, special concern, and rare species in Jackson County is at https://programs.iowadnr.gov/naturalareasinventory/pages/RepDistinctSpeciesByCounty.aspx?CountyID=49

Iowa's Forests

The 2020 **Iowa Forest Action Plan** contains strategic goals and strategies aimed at maximizing forest health and productivity, strategically growing Iowa's forests, and promoting the benefits of Iowa's forest resource.[27]

Iowa's Prairie Resources

Historically tallgrass prairie covered much of Iowa's landscape to prairie, the Iowa DNR Prairie Resource Center provides over 65 species of Iowa-origin prairie grasses and wildflowers to public land managers across the state.[28]

Wildlife Landowner Assistance

"In Iowa land in public ownership is very limited. Public areas can only serve as islands of wildlife habitat in a landscape dominated by row crops and urban sprawl. As a result, private lands efforts are reestablishing habitat. The Iowa DNR provides technical assistance for restoring wetlands, establishing grasslands, and forestry practices."[29]

Conservation Reserve Program

"You can't have wildlife without the right habitat. The Conservation Reserve Program (CRP) is one way to add habitat to cropland, while protecting soil and water quality. All CRP programs will pay a landowner an annual rental."[30] The CRP is administered by the U.S. Department of Agriculture's Farm Services Agency.

[26] https://www.iowadnr.gov/Conservation/Iowas-Wildlife
[27] https://www.iowadnr.gov/Conservation/Forestry
[28] https://www.iowadnr.gov/Conservation/Prairie-Resource-Center
[29] https://www.iowadnr.gov/Conservation/Wildlife-Landowner-Assistance
[30] https://www.iowadnr.gov/Conservation/Wildlife-Landowner-Assistance/Conservation-Reserve-Program

The Jackson County Conservation Department's *2023 Outdoor Recreation Plan* supports local conservation as well.

Native Ecosystems and Habitats

"At the time of Euro-American contact, the state of Iowa was a mosaic of native ecosystems and habitats. These habitats were both aquatic and terrestrial, water and land. Aquatic habitats included rivers, lakes, oxbows, ponds, marshes, fens, etc. Terrestrial habitats included forest types such as riparian lowland forests, upland forests such as maple basswood forests, and open oak hickory forests. While forest habitats were found along river corridors where water was more available, tallgrass prairie and savanna habitats dominated the state."[31]

Figure 9.23 shows historic vegetation in Jackson County from 1832 to 1859, derived from the General Land Office Plat Maps for Iowa. The three major types were Forest, Scattered Trees, and Prairie.

"The tallgrass prairie ecosystem is comprised of many prairie habitat types such as wet, mesic, and dry prairies. The prairie is an ecosystem made up of a great diversity of plant and animal species characteristic to the ecosystem. Where the forests and prairies of Iowa met, savannas occurred. Iowa's savannas were transitional habitats between open prairie and forest. Savannas were home to plant and animal species of the prairie, the forest, and the savanna ecosystem. One of the most notable characteristics of Iowa's savannas were open grown oak tree species, such as bur, white, black, and chinquapin oak, as well as occasional hickory species."[32] "Savannas, once common, are now one of the rarest and most threatened ecosystems in Iowa."[33]

Iowa's native prairies also provided invaluable ecosystem services. The thousands of years of the prairie plants

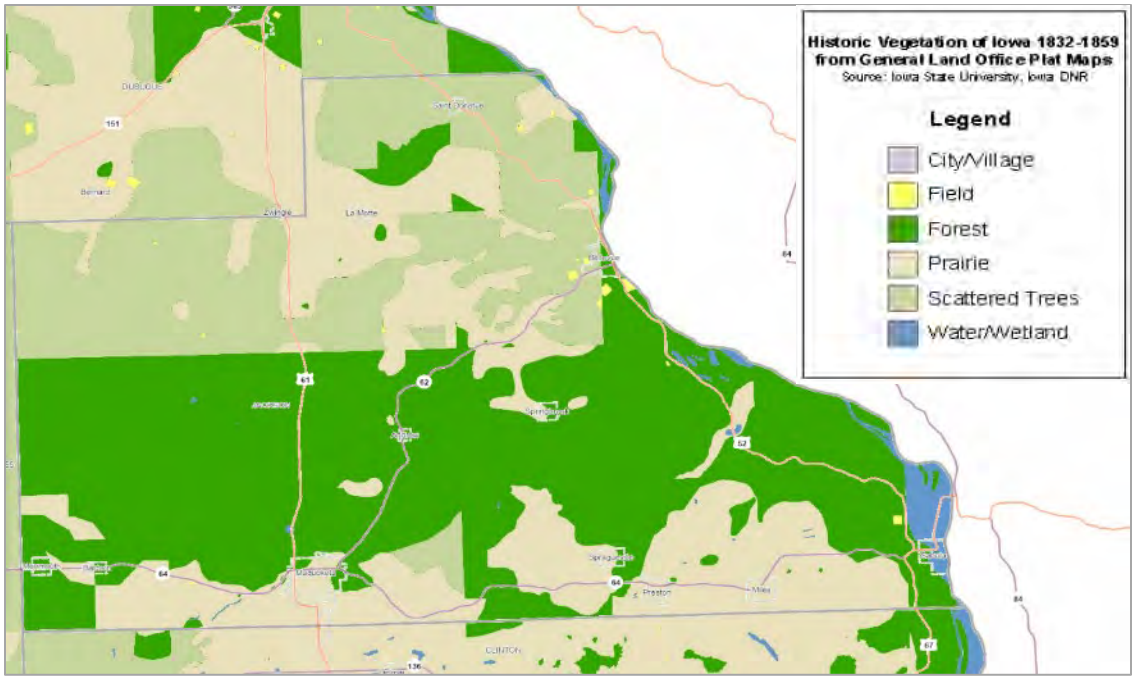


Figure 9.23 Historic Vegetation in Jackson County, 1832 - 1859
Source: Iowa Geographic Map Server, accessed Jan. 2024

[31] 2023 Outdoor Recreation Plan, Jackson County Conservation Department, p. 8

[32] Ibid

[33] *Prairies*, Iowa State University: March 2021

living, dying, and decomposing on Iowa's landscape gave the organic matter for Iowa's rich and deep topsoil. The deep, complex root systems of prairie plants also provide valuable ecosystem services: carbon sequestration, erosion control, rainwater infiltration/retention which help mitigate flood risk, and acting as a filter aiding in groundwater quality.[34]

Rare Aquatic Habitats

Of the 13 major streams in Jackson County, 10 are major cold-water streams. "At least two of these streams have naturally reproducing brown trout. Acquisition and protection of land along these streams should be strongly considered. Cold-water streams are only found in the Driftless region of Iowa, providing a rare opportunity for recreation and conservation."[35]

Terrestrial Habitat Disturbances

Iowa's terrestrial habitats were adapted to and dependent on disturbances from wildfire, storms, flooding, grazing, and insects. These disturbances helped cycle nutrients, transport seeds, and remove plant material, making available niche habitats for plant and animal species. These disturbances helped prevent shrub and tree species from establishing in the prairies. As a result, Iowa's forests were much more open grown and demonstrated savanna characteristics.[36]

Transition of Land Cover

"Between the 1830s and 1870s while the original land surveys were conducted in Iowa, 80 to 85% of the landscape was some version of prairie habitat. Once Euro-American settlement took hold it was not very long for humans find that the prairie soil was incredibly rich and made for productive farms. From the early 1830s to the early 1900s the majority of Iowa was converted into an agricultural system. The 28 million acres of prairie at the beginning of the 1800s was greatly reduced by the early 1900s. Currently less than 0.1% of Iowa's original prairie remains."[37] (See Figure 9.24)

Reduction in Native Ecosystem Diversity

Iowa's native prairies and savannas were very diverse ecosystems that were home to a wide variety of plants, animals, and fungi. In many cases these plant and animal species have declined drastically in population and range due to loss of habitat. In other cases, some of these species have become extirpated, absent from occurring naturally within Iowa's borders.[38]

Figure 9.24 Transition of Iowa Land Cover since circa 1830
Source: *Prairies*, Iowa State University: March 2021

[34] 2023 Outdoor Recreation Plan, Jackson County Conservation Department, p. 9
[35] Ibid, p. 2
[36] Ibid
[37] Ibid
[38] Ibid

Forest Management Plans

The Jackson County Conservation Board (JCCB) manages 2,280 acres of land for a variety of public use activities. Many of these managed acres are partially to mostly forest cover. These forested acres, if managed properly, provide needed wildlife habitat and public recreation opportunities.

JCCB's forest management plans are a cooperative effort between JCCB, contract foresters, and the Iowa Department of Natural Resources (DNR), utilizing strategic and sound forest management practices.

Forest Threats: Oak species are very important in the region. Pre-settlement forests across Iowa were dominated by a mixture of oak species. Several factors threaten the longevity of the region's oaks: Bur oak blight, oak wilt, and rapid white oak decline.

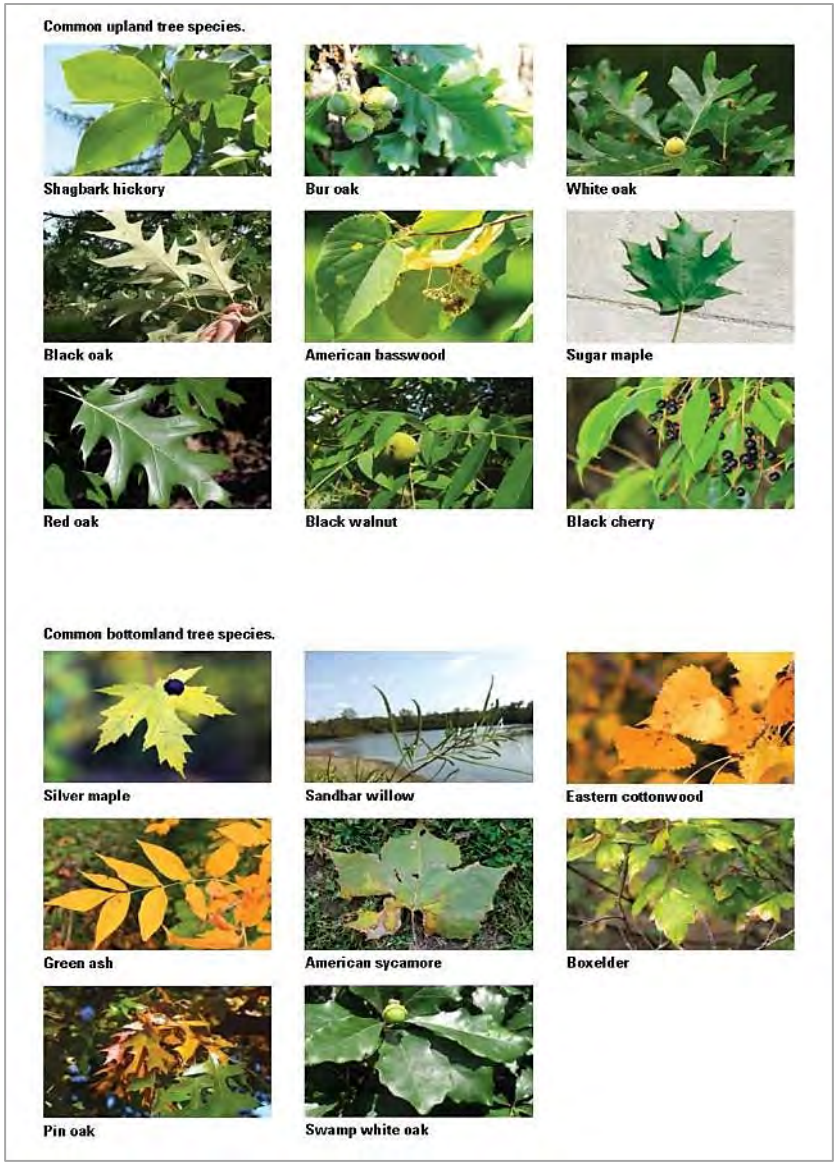
The Emerald Ash Borer has made its way across the area, killing off the native ash trees. As disease spread through local forests, it created opportunity for unwanted species to take hold. Invasive plants can outcompete native vegetation and prevent oak regeneration. Each forest area's plan provides a targeted approach to deal with these threats.[39] These plans also have goals for wildlife habitats, water quality, threatened and endangered species, and low-impact recreation.

Types of Forests in Iowa

"Upland forests are found above the floodplains on slopes and ridge tops.

Bottomland forests can be found in the moist bottom of ravines and along streams and rivers, areas that are often susceptible to temporary flooding."

Source: *Forests*, Iowa State University: May 2021.



Common tree species in upland and bottomland forests in Iowa.
Source: *Forests*, Iowa State University: May 2021.

[39] Ibid, p. 6

Prairie Management Plans

The JCCB manages several native prairie remnants and reconstructed prairie sites. While reconstructed prairies likely will never support the diversity of Iowa's prairie of the past, creating diversity and maintaining diverse plant and animal communities within JCCB managed areas is a priority.

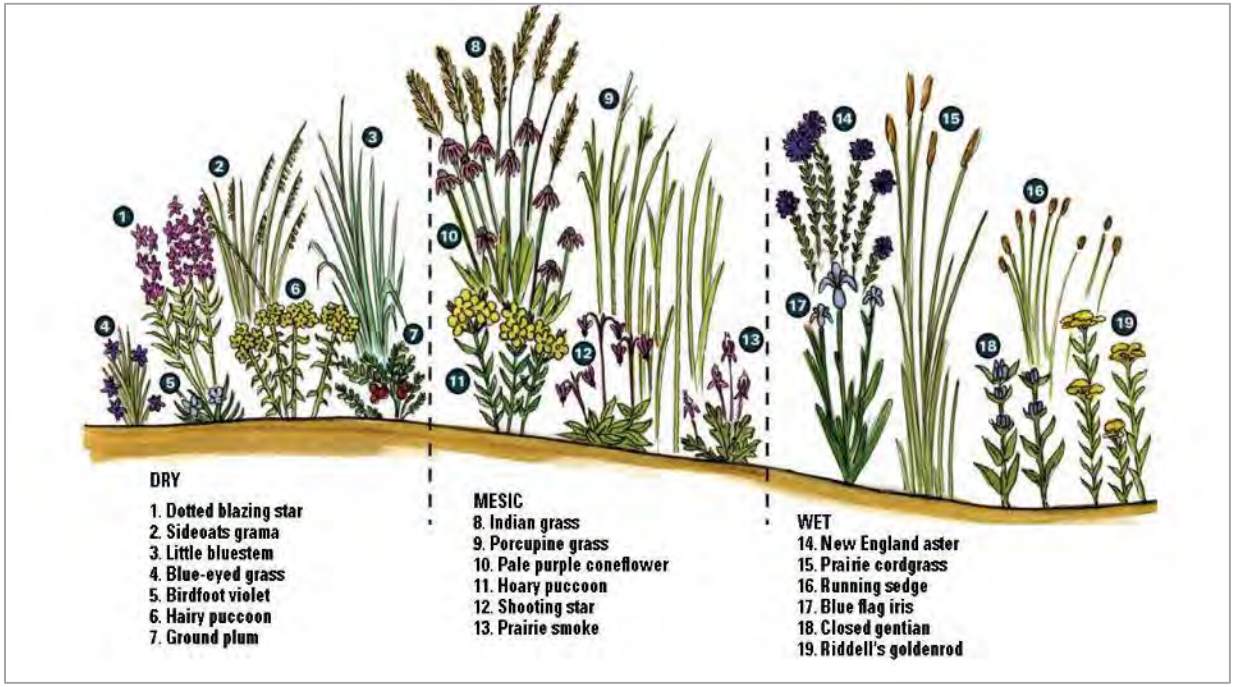
Planting: Conversion of cropland and non-native seedings to prairie on county managed areas will promote wildlife habitat and recreation. Before reestablishment, JCCB will determine site condition: is it Wet, Mesic or Dry. These conditions will advise seed selection and planting capabilities. Site conditions and seeding goals will decide seeding method. (See illustration.)

New Planting Maintenance: For the first few years, prairie plants are putting most of their energy into their root systems. It is common for newly seeded prairie sites to look sparse or slightly shabby. Assessment after the third and fourth growing season will provide evidence of seeding success. Maintaining the prairie seeding through mowing can control weeds and woody plants.

Prescribed Fire: Prairies are fire-dependent ecosystems. Burning is the best way to maintain a diverse prairie. Burning releases nutrients and helps to discourage weeds and woody plants.[40]

Education: JCCB's remnant prairie areas can be used to facilitate high quality environmental/conservation education. With the sensitivity and rugged character of these remnant prairies, higher level education, research, and study can be conducted on these sites. Remnant prairies can be utilized as education field sites for middle school, high school, and adult students.[41]

These plans also include goals for invasive plant species, wildlife habitats, and threatened and endangered species.



Common Plants in Dry, Mesic, and Wet Prairies in Iowa. Source: *Prairies*, Iowa State University: Mar. 2021

[40] Ibid, p. 8

[41] Ibid, p.10

Sustainable Conservation Funding

Iowa's sustainable funding for natural resources is also known as the **Natural Resources and Outdoor Recreation Trust Fund**. In November 2010, the people of Iowa chose to amend Iowa's Constitution and create the Fund and a dedicated funding source of 3/8 of 1% of the next sales tax increase.[42] No sales tax increase has been approved by the Iowa legislature, so the Fund has no funding.

The **Resource Enhancement and Protection (REAP) Program** invests in the enhancement and protection of the state's natural and cultural resources. The program is authorized to receive $20 million per year until 2026, but the state legislature sets the amount of REAP funding every year. In 2023, REAP was funded at $12 million. Each year, the first $350,000 each year goes to Conservation Education, and 1% of the balance is for Iowa DNR Administration. The remaining balance is divided as shown in Figure 9.25.[43]

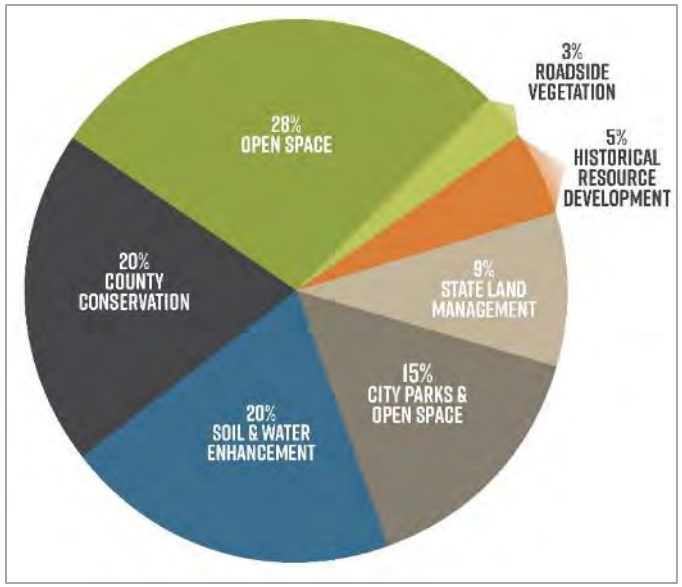


Figure 9.25 Annual REAP Fund Distribution of Remaining Balance Source: Iowa DNR

Since its establishment in 1989, the REAP program has been vital to the outdoor recreation planning process and a major funding source in completing recreation projects in Jackson County and around Iowa. Until the sales tax increase is approved by the state legislature, full funding for the REAP program will continue to be an annual struggle.[44]

The **REAP County Conservation Account** (20% of REAP funds) is available for land easements or acquisition, capital improvements, stabilization and protection of resources, repair and upgrading of facilities, environmental education, and equipment. Thirty percent (30%) of the account is allocated automatically and equally to all 99 counties on a quarterly basis. Another 30% of the account is allocated based on population. The remaining 40% of the account is available to counties through competitive grants. Grants are 100%, so local match money is not required. Visit https://www.iowadnr.gov/Conservation/REAP/REAP-Funding-at-Work/County-Conservation

The Jackson County Conservation Board (JCCB) sets aside **Sales of Forest Resources** to acquire and develop additional land for conservation and habitat protection/improvements. From 1986 to 2021, the JCCB has conducted 29 sales involving 141 acres, for a total revenue of just under $720,000.[45]

[42] https://www.iowadnr.gov/about-dnr/grants-other-funding/natural-resources-rec-trust
[43] https://www.iowadnr.gov/Conservation/REAP
[44] 2023 Outdoor Recreation Plan, Jackson County Conservation Department, p. 1
[45] Ibid, pp. 6-7

CLIMATE CHANGE

"Climate Change refers to any significant change in the measures of climate lasting for an extended period of time. This includes major changes in temperature, precipitation, wind patterns, or other effects that occur several decades or longer."[46]

Iowa State Climate Summary

The 2022 Iowa State Climate Summary produced by the National Oceanic and Atmospheric Administration (NOAA) has the following three key messages:

"Temperatures in Iowa have risen more than 1°F since the beginning of the 20th century. Warming has been concentrated in winter and fall, with a general lack of summer warming. Under a higher emissions pathway, historically unprecedented warming is projected during this century.

Spring precipitation has been above average since 1990, affecting agriculture both positively (adequate soil moisture) and negatively (delays in spring planting). Projected increases in winter and spring precipitation pose a continued risk of spring planting delays.

Severe flooding and drought have occurred periodically in recent years. Future increases in the frequency and intensity of extreme precipitation events may increase the frequency and intensity of floods, while increases in evaporation rates due to rising temperatures may increase the intensity of naturally occurring droughts."[47]

The 2022 Iowa State Climate Summary also notes: "Agriculture is an important sector of Iowa's economy and is particularly vulnerable to extreme weather conditions."[48] "Springtime flooding in particular could pose a threat to Iowa's economy by delaying planting and reducing yields. Periodic summer droughts, a natural part of Iowa's climate, are likely to be more intense in the future."[49]

Figure 9.26 is a NOAA chart of the average temperature for Jackson County from 1895 to 2023. The trendline marks a 2.47°F increase per century.

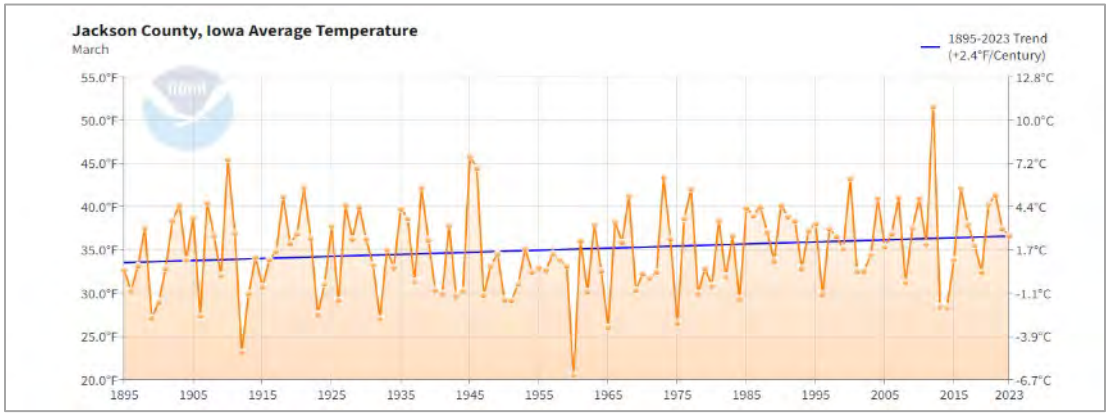


Figure 9.26 Average Temperature in Jackson County, 1895-2023
Source: https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/county/time-series, accessed Jan. 2024

[46] https://www.iowadnr.gov/conservation/climate-change

[47] https://statesummaries.ncics.org/chapter/ia/, p. 1

[48] Ibid, p. 3

[49] Ibid, p. 4

Figure 9.27 is a NOAA chart of the precipitation in Jackson County from 1895 to 2023. The trend line marks an increase of 0.22 inch per century.

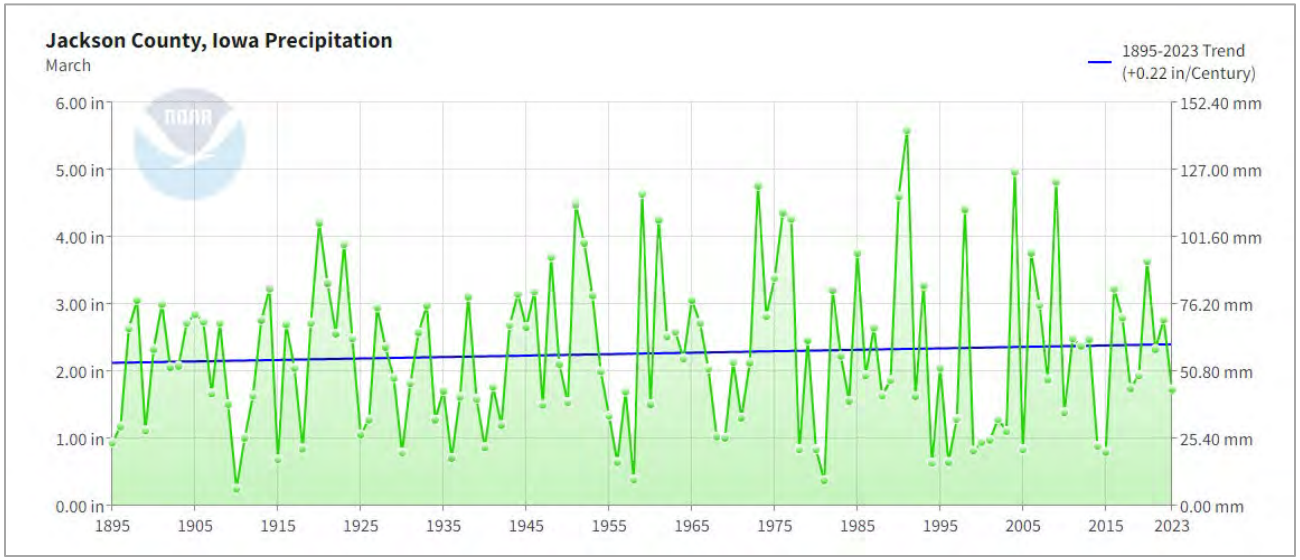


Figure 9.27 Average Precipitation in Jackson County, 1895-2023
Source: https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/county/time-series, accessed Jan. 2024

Climate Change Indicators

Climate change also impacts human society and natural ecosystems in a variety of ways. For example, climate change can affect human health, cause changes to forests and other habitats, and impact energy supplies. Climate-related impacts are occurring in many economic sectors.[50]

The U.S. Environmental Protection Agency (EPA) has developed over 50 climate change indicators that show changes over time and include more than 100 figures as graphs and maps in six topic areas: Greenhouse Gases, Weather and Climate, Oceans, Snow and Ice, Health and Society, and Ecosystems. Visit https://www.epa.gov/climate-indicators/view-indicators

Climate-Resilient Land Mapping Tool

"The Resilient and Connected Network is a proposed conservation network of representative climate-resilient sites designed to sustain biodiversity and ecological functions into the future under a changing climate. The network was identified and mapped over a 10-year period by Nature Conservancy scientists using public data available at the state and national scale, and an inclusive process that involved 289 scientists from agencies, academia, and organizations across the US. The network is a starting point for conversations with local communities, indigenous tribes, land trusts, agencies, corporations, and funders on how to coordinate conservation efforts to increase our collective impact and sustain nature. Resilient lands and waters may be conserved by a wide range of measures."[51] Figure 9.28 is a map of climate-resilient sites in Jackson County. Pine Valley Nature Area and Big Mill Wildlife Management Area (circled in red) are identified as high resilience sites.

[50] https://www.epa.gov/climateimpacts

[51] https://www.maps.tnc.org/resilientland/

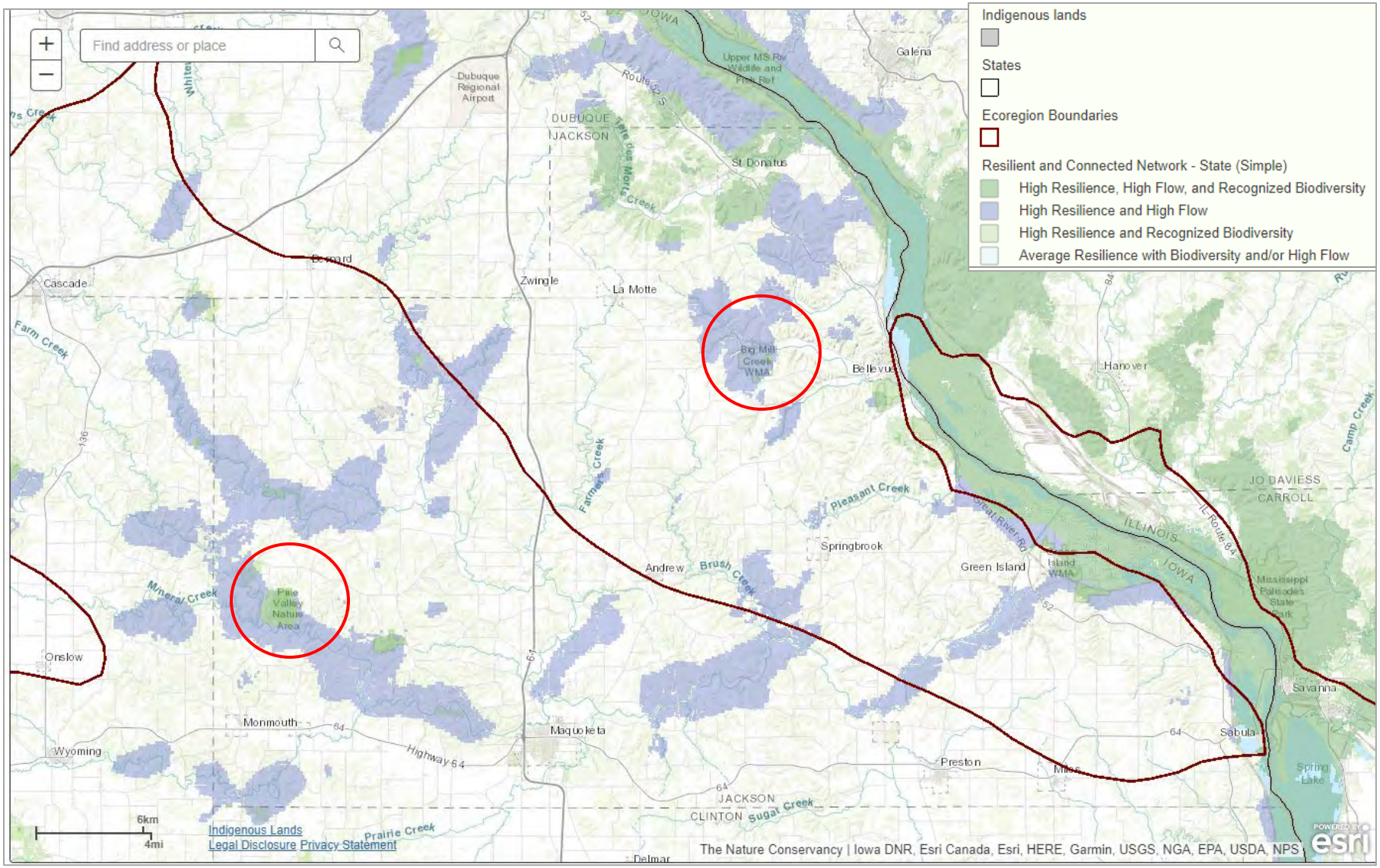


Figure 9.28 Map of Climate-Resilient Sites in Jackson County

Source: Nature Conservancy, https://www.maps.tnc.org/resilientland/, accessed Jan. 2024

LOCAL, STATE, AND FEDERAL AGENCIES

Resources are listed by categories.

Agriculture

The Iowa Department of Agriculture and land Stewardship (IDALS) lists agriculture resources and regulations at https://iowaagriculture.gov/

Iowa State University Extension and Outreach provides educational information about Iowa agriculture at https://www.extension.iastate.edu/ag/

The U.S. Department of Agriculture (USDA) Farm Services Agency (FSA) lists agriculture programs and services at https://www.fsa.usda.gov/

Agricultural Economy

Iowa State University Extension and Outreach provides information about Iowa's agricultural economy online at https://www.extension.iastate.edu/ag/

The U.S. Department of Agriculture (USDA) Economic Research Service (ERS) provides farm economy information at https://www.ers.usda.gov/topics/farm-economy/

Animal Feeding Operations

Iowa Department of Natural Resources (DNR) resources and regulations for animal feeding operations are at https://www.iowadnr.gov/Environmental-Protection/Animal-Feeding-Operations/AFO-Resources-and-Regulations

Iowa State University Extension and Outreach developed the **Air Management Practices Assessment Tool** (AMPAT) to give livestock and poultry producers an objective overview of mitigation practices best suited to address odor, emissions, and dust at an animal feeding operation. Visit https://www.extension.iastate.edu/ampat/

Land Quality

The Iowa Department of Natural Resources (DNR) lists land quality resources and regulations at https://www.iowadnr.gov/Environmental-Protection/Land-Quality

Soil Quality

The Iowa Department of Agriculture and land Stewardship (IDALS) lists soil quality resources and regulations at https://iowaagriculture.gov/field-services-bureau

The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) lists programs, initiatives, and resources for soil conservation at https://www.nrcs.usda.gov/

Air Quality

The Iowa Department of Natural Resources (DNR) lists air quality resources and regulations at https://www.iowadnr.gov/Environmental-Protection/Air-Quality

The U.S. Environmental Protection Agency (EPA) has educational information about air quality at https://www.epa.gov/environmental-topics/air-topics

Water Quality

The Iowa Department of Agriculture and Land Stewardship (IDALS) lists water quality resources and regulations at https://iowaagriculture.gov/water-resources-bureau and also at https://iowaagriculture.gov/field-services-bureau

The Iowa Department of Natural Resources (DNR) lists water quality resources and regulations at https://www.iowadnr.gov/Environmental-Protection/Water-Quality

The U.S. Environmental Protection Agency (EPA) has educational information about water quality at https://www.epa.gov/environmental-topics/water-topics

Watershed Management

The Iowa Department of Agriculture and Land Stewardship (IDALS) lists watershed resources and regulations at https://iowaagriculture.gov/water-resources-bureau

Iowa Department of Natural Resources (DNR) resources and regulations for watershed management are available at https://www.iowadnr.gov/Environmental-Protection/Water-Quality

The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) lists information on watershed programs at https://www.nrcs.usda.gov/

Natural Resource Conservation

The Iowa Department of Natural Resources (DNR) lists conservation resources and regulations at https://www.iowadnr.gov/Conservation

Iowa State University Extension and Outreach provides educational information about conservation at https://www.extension.iastate.edu/ag/natural-resources-stewardship

The U.S. Department of Agriculture (USDA) lists programs, initiatives, and resources for conservation at https://www.usda.gov/topics/conservation and through the USDA Natural Resources Conservation Service (NRCS) at https://www.nrcs.usda.gov/

Climate Change

The U.S. Department of Agriculture (USDA) **Regional Conservation Partnership Program (RCPP)** has funds to support the adoption of climate-smart agriculture practices, which have direct climate mitigation benefits, advance a host of other environmental co-benefits, and offer farmers, ranchers, and foresters new revenue streams. Visit https://www.nrcs.usda.gov/programs-initiatives/rcpp-regional-conservation-partnership-program

The U.S. Environmental Protection Agency (EPA) has information about climate change online at https://www.epa.gov/climate-change

The Iowa Department of Natural Resources (DNR) lists climate change resources for individuals, local governments, and health providers at https://www.iowadnr.gov/conservation/climate-change

ISSUES AND OPPORTUNTIIES

Soil Health and Water Quality

Issue: The Jackson County Soil and Water Conservation District (SWCD) Five-Year Soil and Water Resources Conservation Plan (SWRCP) for 2021-2025 states that: "Soil health and water quality not only determine the quality of human life, but whether human life is possible. Conservation and restoration of our soil and water resources benefits everyone and requires community-wide involvement."

Opportunities: The Jackson County SWCD Five-Year SWRCP for 2021-2025 notes that: **"**The lands and water we enjoy in the Jackson County Soil & Water Conservation District are resources borrowed from future generations. We are responsible for their care. This Five-Year Soil and Water Resources Conservation Plan (SWRCP) recognizes that obligation. We have created it with the belief that we can enjoy the benefits of land and water stewardship today, while ensuring environmental security for tomorrow. Your involvement in the plan's success is your gift to the future."

Watershed Management

Issue: The 2021 Maquoketa River Watershed Management Plan notes: "An effective path toward cleaner water and flood management in Iowa includes a strong emphasis on a watershed approach, which considers the entire area of land that drains into a body of water, such as river or lake. A watershed approach incorporates both technical data and robust stakeholder participation, so that policies and actions are realistic and data-driven.

Watersheds are not confined to traditional jurisdictional boundaries, and to accomplish local watershed-based planning, many cities, counties, and Soil and Water Conservation Districts have formed Watershed Management Authorities (WMAs) through voluntary, intergovernmental agreements."

Opportunities: The Maquoketa River Watershed Management Authority spans seven counties. With 35 jurisdictions having joined the agreement, the Maquoketa River WMA exists to reduce flood risks and improve water quality.

The 2021 Maquoketa River Watershed Management Plan – Phase 1 is "a regional community-driven plan with the goal to identify, prioritize, and address water-related issues such as water quality and flood mitigation. The plan serves as a guidebook and vision for the future for the member cities, counties, and Soil and Water Conservation Districts, offering a long-range perspective and ways to improve water quality and mitigate flooding throughout the watershed.

The topics that the plan addresses include but are not limited to agricultural practices, water quality, present and future flooding, improved recreation, protection of the river ecosystem, and conservation practices. A significant portion of the planning process focused on public outreach to learn about existing attitudes, behaviors, and practices related to watershed issues in order to develop goals, objectives, and strategies."

The 2022 Maquoketa River Watershed Management Plan – Phase 2 focuses on subwatershed analysis, prioritization, and plans. Phase 2 prioritizes subwatersheds for site-specific interventions based on the strength of improvement, negative impacts, and project cost.

Environmental Education

Issue: The county's 2023 Environmental Education Plan states that: "The desired outcome of environmental education is environmental literacy. The environment sustains all life on earth. We all need to know how ecological systems work and function. We need to understand how natural systems are intertwined. Environmental education gives us the tools and knowledge we need to make informed decisions about environmental issues and problems in our communities. Whether it be understanding water quality and pollution in a local stream, strategic planning for sustainable development, combating invasive species, the landscape, or addressing climate change."

Opportunities For Children: The county's 2023 Environmental Education Plan notes that environmental education can:

- Improve academic achievement and test scores in all subject areas.
- Capture students' attention and engaged students who are the hardest to reach.
- Get children outdoors and more active, improving health, addressing obesity, attention deficit disorder, and depression.
- Incorporate STEM (science, technology, engineering, and math) to helps meet 21st century needs, such as questioning, critical thinking, investigating, interpreting, and problem solving.

Opportunities For Adults: The county's 2023 Environmental Education Plan notes that environmental education can:

- Promote outdoor lifestyles, and ensure healthier individuals and communities.
- Ensure people are informed about sound science and equipped to make decisions that help protect our natural resources on which our lives depend.
- Create a higher degree of pro-environment and conservation behavior. The more people know, the more likely they are to recycle, be energy efficient, conserve water, etc.

Natural Resource Conservation

Issue: Outside funding sources are vital to future development of conservation enhancements. The Jackson County Conservation Department will continue to seek outside funding sources to leverage local dollars for these efforts.

Opportunities: The county's 2023 Outdoor Recreation Plan provides:

- A guideline for future development and acquisition projects;
- Management plans for forest and prairie ecosystems; and
- A 5-year development plan for: wildlife areas, restoration and enhancement of habitat, and other capital development projects that will enhance conservation.

Regional Collaboration

The Grant Wood Loop Master Plan updated in 2022 is a roadmap and living document for collaboration toward a shared vision within the three-county region of Dubuque, Jackson, and Jones Counties over the next 20 years. This collaboration is working together to erase the boundaries and "enhance,

promote, sustain, and connect" the region's cultural, natural, and park assets.

Issue: In the Grant Wood Loop region, communities were able to complete the region's top priority park and recreation projects through the Grant Wood Loop Master Plan. With the initial set of projects completed, additional priorities and projects that will continue to move the region closer to its vision for the future have been identified.

Opportunities: The updated Grant Wood Loop Master Plan is meant to highlight the region's assets, identify our opportunities as a community, and advocate for and support the effort of all groups in the region who are working on connecting people to each other and to great spaces and great experiences. The Master Plan is a collection of projects and initiatives. The region must work together across jurisdictions to implement the shared vision and bring new and expanded opportunities to our communities.

White Water Canyon Wildlife Area bridges the lines between Dubuque, Jackson, and Jones counties
Source: Grant Wood Loop Master Plan – 2022 Update, p.15

GOALS AND OBJECTIVES

Soil Health and Water Quality

9.1 Implement the Five-Year Soil and Water Resources Conservation Plan's priority goals for 2021-2025:

- Encourage the wise use and protection of the soil resources within the SWCD in order to sustain crop productivity for generations to come.
- Encourage the wise use and protection of the surface water and groundwater resources within the SWCD, to prevent their contamination and to ensure their sustained use.
- Improve perennial cover by promoting profitable and sustainable use of forest and pasturelands within the SWCD.
- Connect with the greater community and other stakeholders in support of conservation, sustainability and regenerative agriculture.

Watershed Management

9.2 Implement the Maquoketa River Watershed Management Plan – Phase 1:

- Improve water quality through techniques for nutrient management, erosion reduction, and increased infiltration.
- Improve watershed flood management.
- Increase watershed awareness and involvement among stakeholders.
- Preserve, protect, and improve ecologically sensitive habitats and ecosystems in the watershed.
- Establish the WMA as a trusted community resource.

9.3 Implement the Maquoketa River Watershed Management Plan – Phase 2 as a subwatershed action plan to guide local authorities and residents in putting Phase I of the plan into practice:

- Use technical analysis and continued engagement with local stakeholders to identify projects where resources could be directed to meet the goals determined by the community.
- Prioritize projects that will have the biggest impact with the most efficient resource use.
- Focus on finding priority locations and explicit solutions to mitigate future flooding events, enhance water quality, and promote recreational opportunities within the watershed.

Natural Resource Conservation

9.4 Implement the Conservation components of the 2023 Outdoor Recreation Plan for:

- Future development and acquisition projects;
- Management plans for forest and prairie ecosystems; and
- A 5-year development plan for: wildlife areas, restoration and enhancement of habitat, and other capital development projects that will enhance conservation activities.