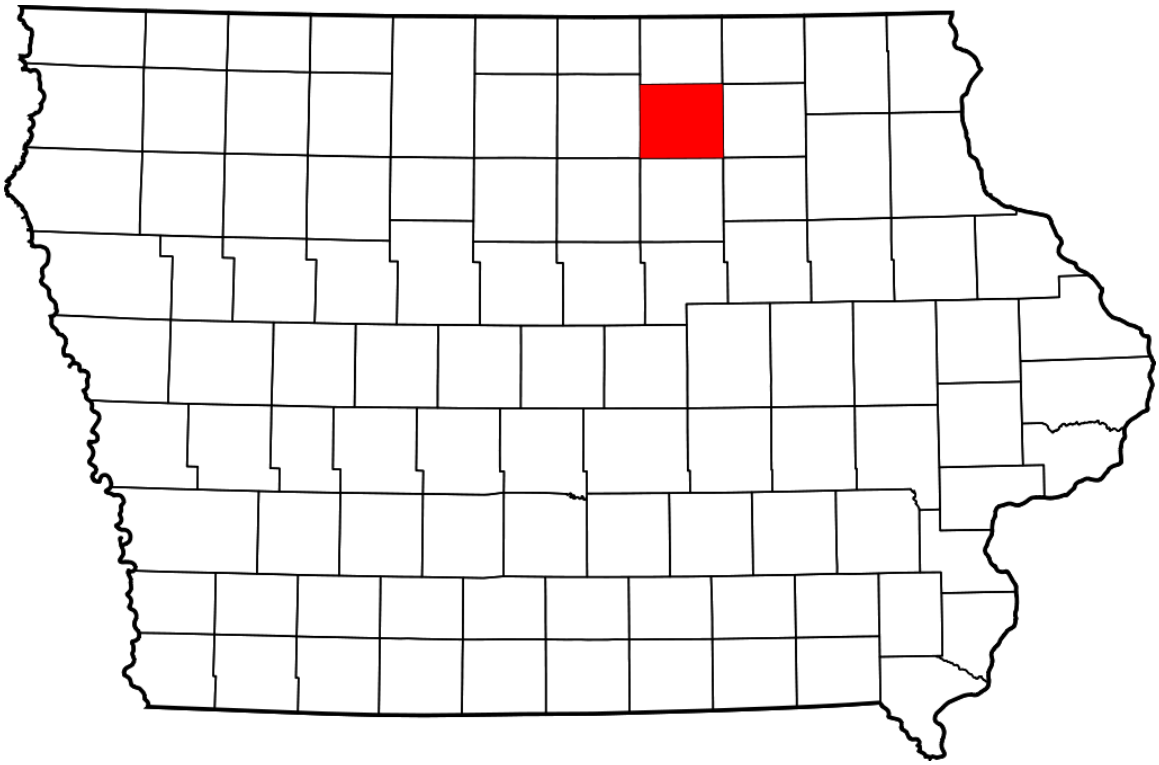
Floyd County Restoration



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Geology of Iowa

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Abstract

Humans are finally realizing that natural is better, so why aren't we converting land back to its' natural ecosystem? Large areas of row crops are not natural. Iowa was once a glorious sea of tall grasses and prairie forbs. Only 0.01% of the natural prairie is still present today. This document shows the specific geology of Iowa's Floyd County and why we should restore the natural ecology within it.

Introduction

Less than 99.9% of Iowa's native prairies still exist today. Prairies are one of the most productive ecosystems on Earth; why aren't we utilizing this fantastic vegetation? Much of Iowa's soils are used for farming, however, prairie can be planted in almost any type of soil and moisture levels so it would benefit everyone to establish prairie surrounding areas. Within this document, I will give you background about the soil content of Floyd County as well as reason as to why we need to plant more prairie state-wide to better the state in which we live.

Floyd County is located in the northern part of Iowa, slightly east of the midline. The cities within the limits of Floyd county include the following: Charles City, Colwell, Floyd, Marble Rock, Nora Springs, Rockford, and Rudd. Floyd county is divided into twelve townships, which include: Cedar, Floyd, Niles, Pleasant Grove, Riverton, Rock Grove, Rockford, and Rudd townships. The county has a total area of 501 square miles, according to the U.S. Census Bureau in 2010. The populations of the towns within Floyd County according to the 2010 census are as follows: Charles City, 7,652; Colwell, 73;

Floyd, 335; Marble Rock, 307; Nashua, 1,663; Nora Springs, 1,431; Rockford, 860; Rudd, 369.

Floyd County was named after Sergeant Charles Floyd in 1854. Charles City was founded in 1851. It is place of the lynching of James Cullen in 1907, which was the last lynching in the state of Iowa. Charles City was also home to Carrie Lane Chapman Catt, who was president of NAWSA. Charles City is the most populated out of the towns within Floyd County and is the county seat. Colwell had a population of 73 people in 2010. Marble Rock acquired its' name because of the white limestone within the area. Nashua is famous for the Little Brown Church, which was mentions in the song "The Church in the Wildwood", by Dr. William Pitts. The Floyd County Fossil and Prairie Park Center is near Rockford. This center has numerous fossils from the Devonian bedrock. Nora Springs was the birthplace of Arthur Gratias.

Summary of Geology

As stated in *Iowa's Geological Past: Three Billion Years of Change* by Wayne I. Anderson that "the present is the key to the past", which clearly illustrates that with looking at specific features within rocks we can determine what Earth was like at the beginning. It all starts with the Precambrian, approximately 4.6 billion years ago to 541 million years ago. Iowa's oldest exposed rock is Sioux quartzite. North America and Iowa were nearly ripped apart by the Mid-Continent Rift System; we can see this anomaly within the rock record in Iowa. The only Precambrian rocks exposed within Iowa are in Lyon County, which is approximately a three and a half hour drive from Floyd County.

The next rocks are part of the Cambrian, which was approximately 541 million years ago to 485 million years ago. Unfortunately, there is no evidence of Early Cambrian rocks within Iowa. However, it was determined that the Cambrian period had six transgressive-regressive (T-R) cycles, which was determined by the deposits left by the shallow seas; sandstone is the main makeup of the rock record. The Cambrian is known as the age of the trilobites, which helped to determine the depth of the seas; other fossils found in the Cambrian are: brachiopods, arthropods, gastropods, worms, and cyanobacteria. Like the Precambrian, Iowa doesn't consist of a lot of Cambrian rocks. The rocks are found in the northeast corner of the state, bordering the Mississippi river. A majority is in Allamakee County with a sliver in Clayton County. It is a minimum of a two-hour drive to the Cambrian rocks from Floyd County.

The Ordovician comes next on the timeline from past to present at 485 million years ago to 443 million years ago. The Cambrian rocks are composed of shales and carbonates. The sea slowly receded from the Prairie du Chien group, which explains an unconformity within the Ordovician. The Transcontinental Arch, which was a thousand-mile long ridge, separated the Ordovician sea in half. The Cambrian was composed of limestones, which changed into dolomite through the process of dolomitization that includes waters rich in magnesium. Fossils present within the Ordovician include trilobites, brachiopods, cephalopods, gastropods, scaphopods, and bivalves. This rock record is found primarily in the northeast within Allamakee, Winneshiek, and Clayton counties. Counties like Winnebago, Clay, Bremer, and Dubuque have some Ordovician rocks within them as well. To travel to the main allotment of the Ordovician from Floyd

County, you would need to drive around two hours. However, if you can suffice with a small portion you may drive around a half an hour to Bremer County.

The Silurian was from 443 million years ago to 419 million years ago. This period is composed of dolomite and limestone. There were five T-R cycles within the Silurian bedrock. The deposits from the cycles and the fossils present in the rocks show that the depth of the sea varied greatly. Some of the fossils include crinoids, corals, gastropods, nautiloids, and numerous others. 440 million years ago there was a glacial ice age that caused a mass extinction of over half of the marine fauna. Sadly, the rock record is not continuous and there is an unconformity at the end of the Silurian. This bedrock is present in the eastern part of the state. Counties within this region are: Delaware, Dubuque, Jones, Jackson, Cedar, Clinton, and Scott. To be able to see the Silurian bedrock from Floyd County, you would need to drive approximately two hours.

From 419 million years ago to 358 million years ago was called the Devonian. Floyd County is part of the Devonian. There are thirteen formations within the time, which show the T-R events. The Devonian varies greatly with rock types from dolostone and limestone to fossiliferous limestone and shale. Life was booming within the period because of such vast environments. This bedrock is superb for aggregates used in gravel. The Devonian stretches from Worth County diagonally southeast to Muscatine and Louisa Counties. Floyd and Cerro Gordo Counties are highly fossiliferous.

The Carboniferous is made up of the Mississippian and Pennsylvanian bedrocks. The Mississippian was from 358 million years ago to 323 million years ago. It has ten T-R cycles and has an abundance of oolites within very pure limestone. The south was very high in saline, so gypsum is present in these areas. The Pennsylvanian was from 298

million years ago to 232 million years ago. There were many differentiating times between having seas and not having seas within the Pennsylvanian. This factor helped create peat, which can become coal. There is a great abundance of coal in Iowa however, it is unusable due to its' high level of sulfur. The Pennsylvanian can create aggregates for roads as well as many other commercial uses. The Carboniferous makes up almost all of the southern region of Iowa. To travel to the nearest Carboniferous bedrock from Floyd County is a two hour drive but it you were to drive to the heart of it in Warren County it is around three hours.

The Cretaceous is made up of Mesozoic and Cenozoic. Iowa doesn't have a Permian or Triassic record, and the Jurassic is a minuscule area within the Fort Dodge Formation. The Mesozoic rocks differ between sandstones and mudstones. Within the Cretaceous period, the Manson Impact Structure was formed from a large meteorite colliding into Iowa's crust. The Mesozoic dominates the western side of Iowa. Unfortunately, there is an unconformity between the Mesozoic and Cenozoic within Iowa's record.

Floyd County

Floyd County is primarily within the Devonian, which was between 419 and 358 million years ago. The Devonian varies greatly with rock types from dolostone and limestone to fossiliferous limestone and shale. Floyd County is highly fossiliferous. The county is present within the Iowan Surface. The Iowan Surface has eroded Illinoisan till with loess formations. Nashua, a town within Floyd County, has a Paha ridge. The limestone and shale present within Floyd County are prime natural resources.

The county has a gentle relief and decent drainage from the numerous rivers and creeks flowing within it. Pollution can be a concern due to the drainage ditches from the wide range of agricultural production. Leaching from fertilizers on row crops has greatly affected our rivers.

Natural Resources

Iowa, being part of the Midwest, is a prime producer of crops. Corn and soybeans are the major crops of the county but the fields may also be used for oats, hay, or as pasture for numerous types of animals. Pigs are a major source of income for many households within the county. Cattle and sheep are also raised for livestock. Limestone, shale, sand, gravel, trees and water are some of Floyd County's natural resources (Soil Survey of Floyd County). Sand is commonly found within floodplains and is used in road surfacing and as an aggregate. Gravel is found near rivers and cultivated within quarries and is produced to similar things such as the sand is. There is a Fossil and Prairie Center in Rockford, where kids and the rest of the public can go to collect fossils and learn about prairie ecosystems. Much of the water throughout the county is supplied through underground aquifers. The Cedar River, which runs through the county used to be extensively used for energy.

Geology and Restoration

Only 0.01% of the state's native prairies exist today. Prairies are the natural vegetation of Iowa and most of the Midwest and it is specifically adapted to our climate (Figure 2). Many of the species within Iowa are naturally accustomed to the prairie

ecosystem for survival. Bison and elk used to roam freely throughout our lovely state but have since disappeared due to overhunting and destruction of habitat. Prairies are natural to this state so we should reestablish what we have destroyed.

Vegetation depends on soil for water and nutrients that are essential to functioning; this is why geology is crucial to the environment. Prairie is specifically reliant on soil composition since 65% of its' biomass is in the soil. Prairies can help pump nutrients back into the soil that were once lost from agriculture.

Restoration ecologists fine a specific site suitable for a prairie and research it extensively. Soil types, drainage, topography, and other criteria are needed to understand the soil before we can even begin to plan. History of previous land use is critical for the plan implementation starting point. Based on the soil types, professionals come up with a seed mix that will vary depending on the intended results of the prairie such as: roadside fillers, erosion control, pollinator habit, wetland restoration, or oak savanna restoration. From this point, restorationists will create a seeding plan and a budget for that plan. The size, amount of seed per square foot, present vegetation, and equipment all need to be considered. After planting has been done, the vegetation needs to be closely monitored for invasive species and weeds. After the first year, prescribed burns need to help control weeds and invasive species from taking over the site. Prescribed burns are also essential to prairie health. Frequent monitoring is very important to prairie success. When milkweed is present, we can increase the population of Monarch butterflies during the migration due to their endangerment. There are incentive programs out there for farmers to take part of their land out of production and convert it to prairie. We have a good start with roadside management plans and increased awareness for establishment on public

land; however, it’s not enough; we need to plant private land into prairie if we want to make an impact.

References

Anderson, W. I. (1998). *Iowa's Geological Past: Three Billion Years of Change*. Iowa City, IA: University of Iowa Press.

Iowa Geographic Map Server. 2016. Iowa State University Geographic Information Systems Support and Research Facility. http://ortho.gis.iastate.edu/. March 2016.

Koch, D. L. (1984). *Groundwater Quality and Hydrogeology of Devonian-Carbonate Aquifers in Floyd and Mitchell Counties, Iowa*. Iowa City, IA: Iowa Geological Survey.

Koch, D. L. (1999). *Iowa Geology*. Iowa City, IA: Geological Survey Bureau.

Soil Survey of Floyd County, Iowa.

USDA-NRCS. *Web Soil Survey*. United States Department of Agriculture- Natural Resource Conservation Service, n.d. Web. 25 Apr. 2016. <http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>.

Figure 1. Topographic map of Floyd County (IGMS, 2016).

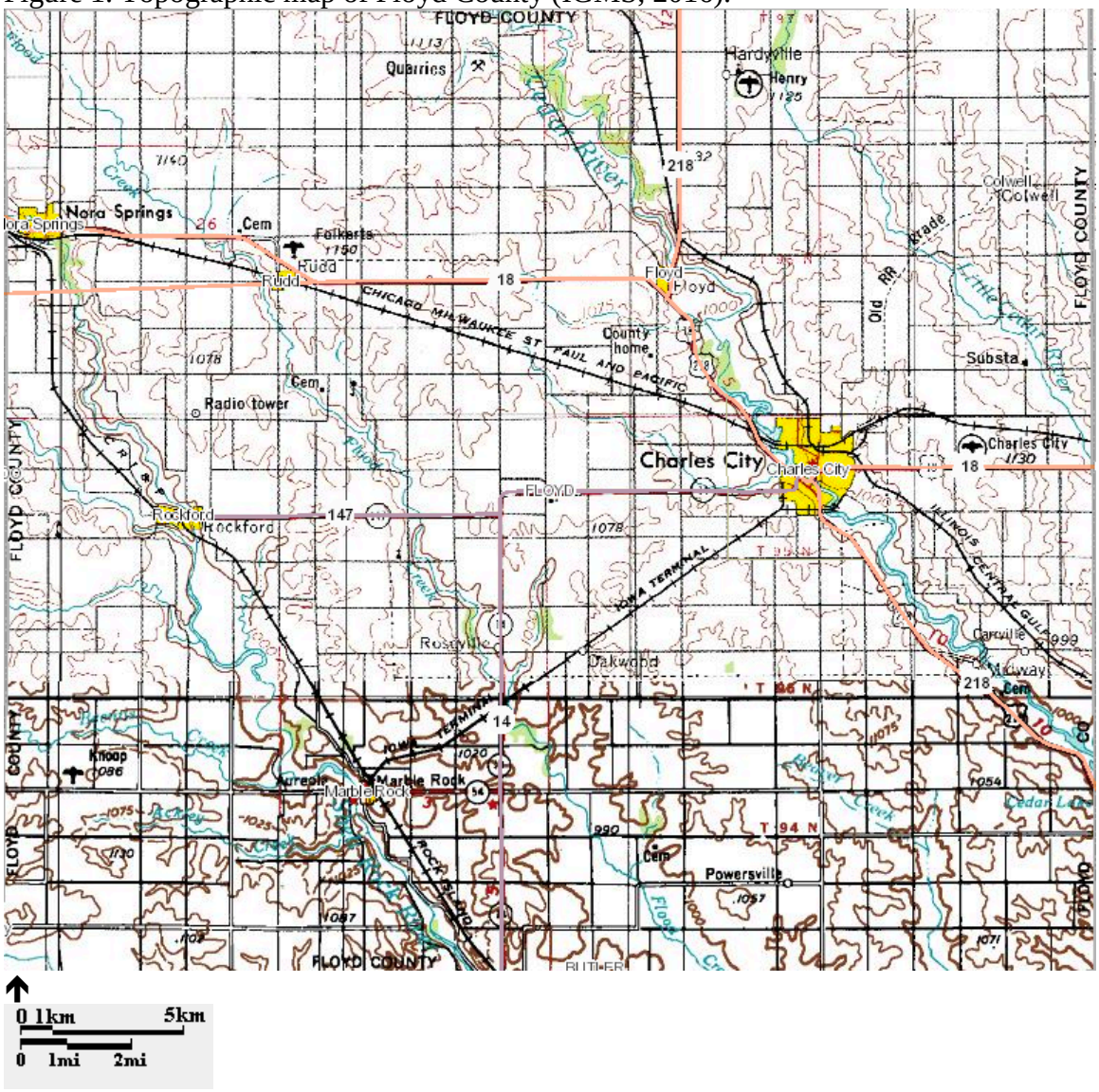

Figure 2. 1800s aerial view of historic vegetation (IGMS 2016).

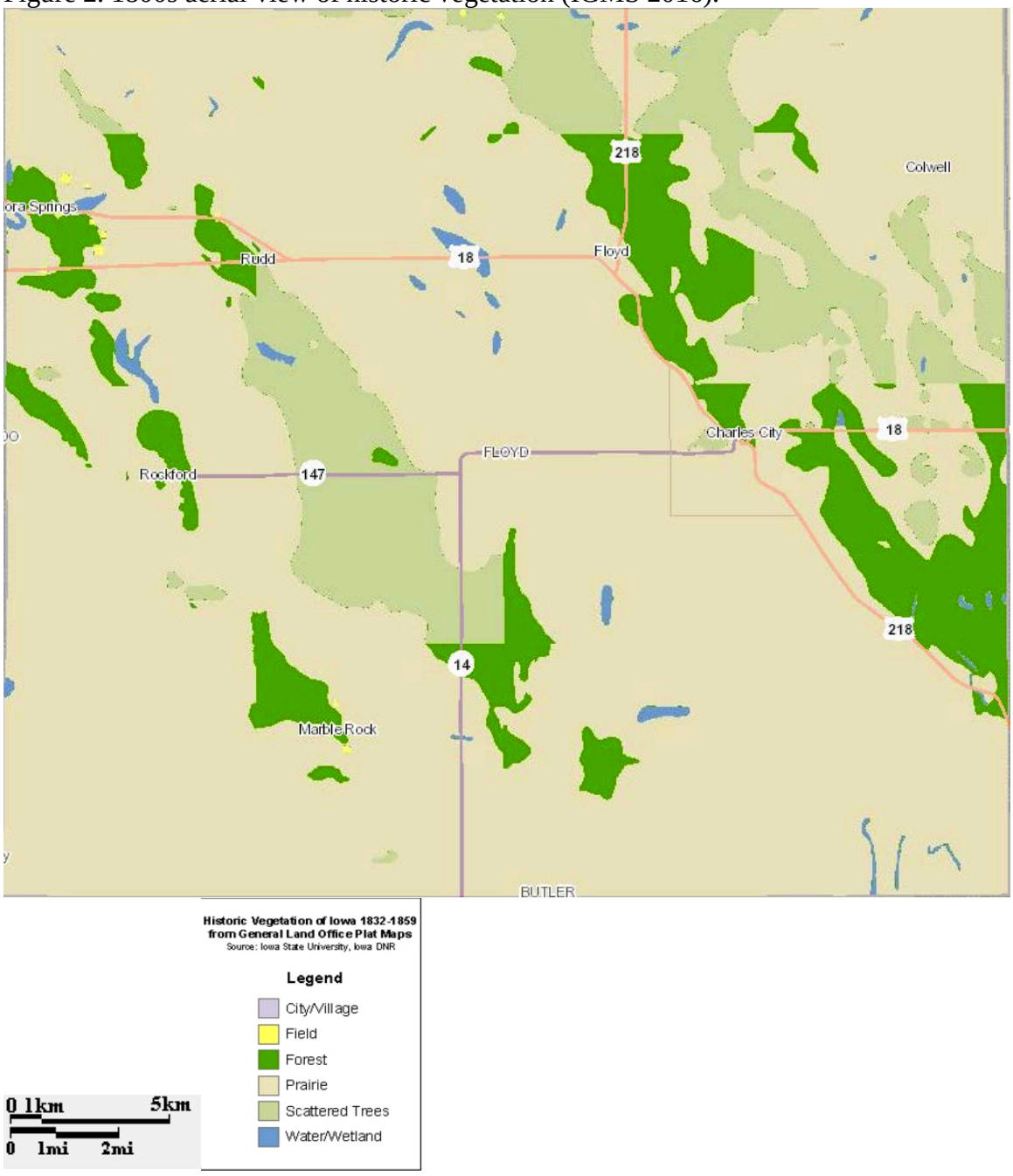

Figure 3. Iowa Landforms. Floyd County is within the Iowan Surface (GIS).

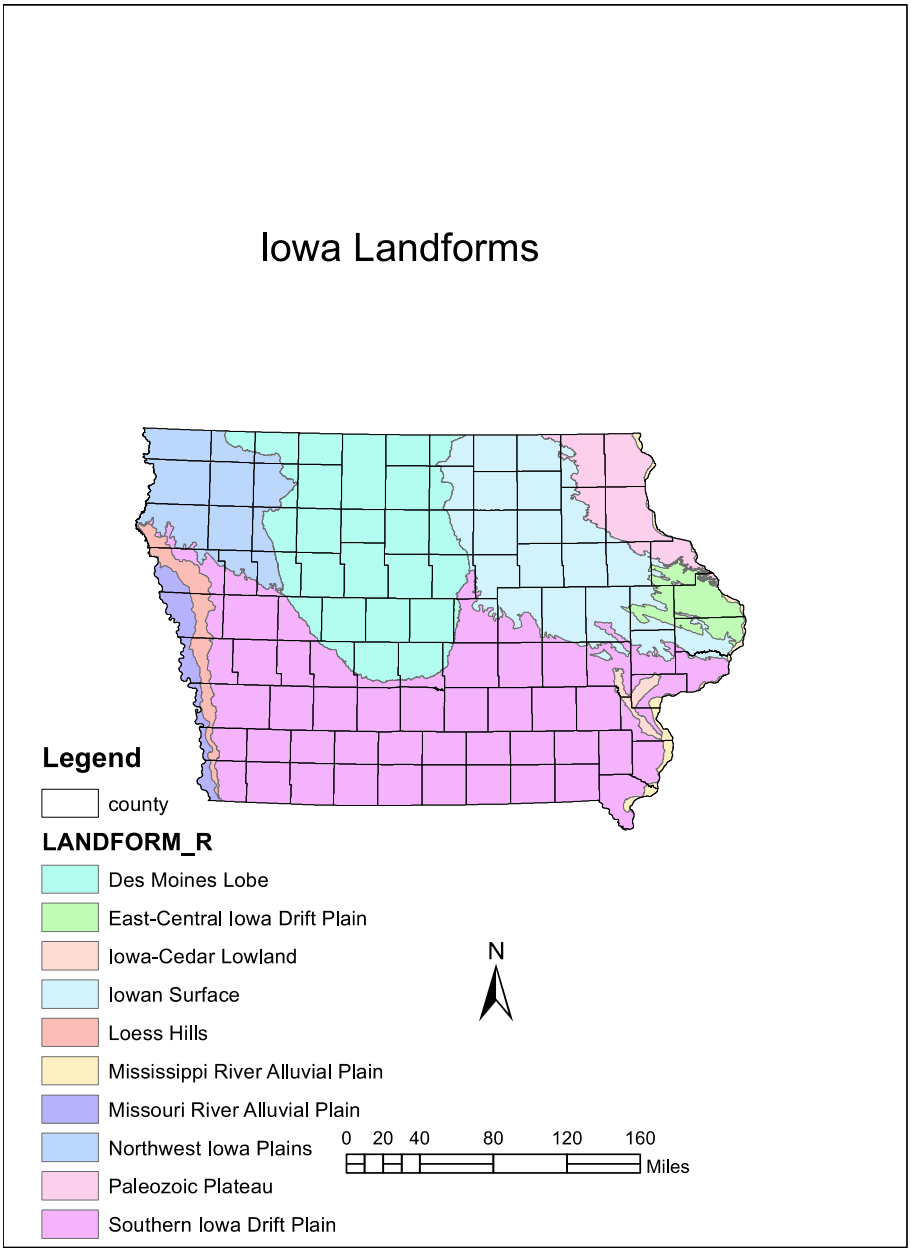

Figure 4. Geologic Systems within Iowa. Floyd County is primarily made up within the Devonian (GIS).

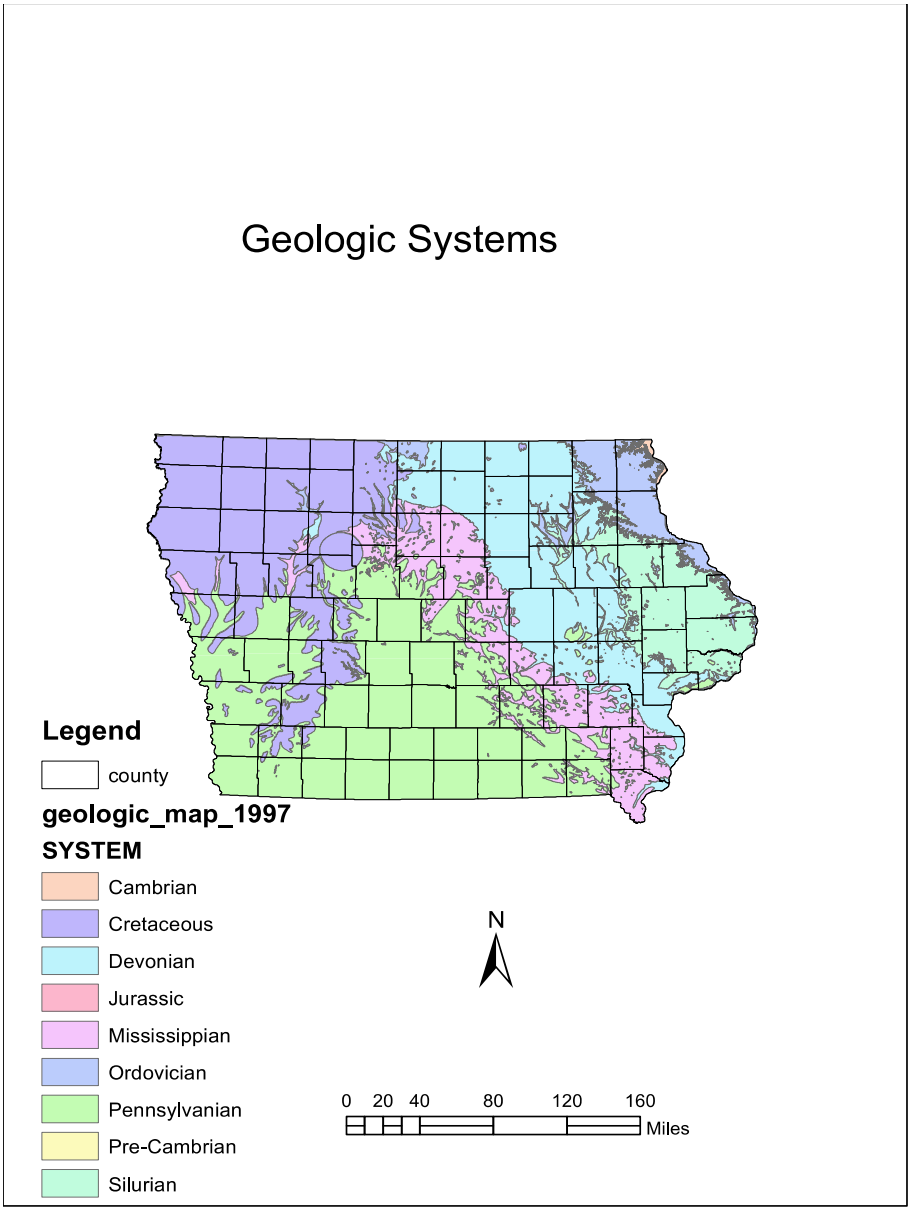

Figure 5. Aerial photo showing the area of interest and the soil type distribution. I created this map for my grandparent's farm in Floyd County (USDA-NRCS 2016).