ATTACHMENT F: NATURAL RESOURCES

(Updated excerpt from Jo Daviess Comprehensive Plan Baseline Data)

The natural resources in Jo Daviess County are unique relative to the rest of the state and much of the mid-west because the county is part of the Wisconsin Driftless Region bypassed by continental glaciers of the Ice Age. This region covers parts of southern Minnesota and Wisconsin, Northwestern Illinois and Northeastern Iowa. Glaciated areas were leveled, strewn with glacial debris or "drift" and dotted with lakes and ponds. The driftless areas, on the other hand, have bedrock close to the surface into which deep valleys have been carved by millions of years of weather and erosion. In Jo Daviess County, streams are numerous and the only two lakes are man-made. The relief from the higher ridges to the valley floors is typically 300 feet or more creating a rugged and scenic landscape. Ecosystems can be found in this landscape that are older than those found in glaciated areas.

Geology

The topography of Jo Daviess County is characterized by rugged relief unique to most of Illinois. Our county, located in the far northwestern corner of the state, is in an area spared by the major glaciations of the last two million years. It is, accordingly, called the "Driftless Area" by geologists, the term "drift" referring to material deposited by glacial activity.

The visible landscape that we see today began during the Paleozoic Era (570 to 245 million years ago) when shallow seas repeatedly inundated the interior of the continent. Shells of marine animals, along with muds, silts and sands from eroding highlands, were periodically deposited in those sea bottoms. Gradually, these beds were buried and lithified into rock layers of limestone, dolomite, shale and sandstone. The result over millions of years was hundreds of feet of sedimentary rocks.

Today, geologists classify layers of rock by their chemical and physical properties. Also critical to their classification are fossilized remains of plants and animals, which give clues to the relative ages of the layers. A geological formation is a set of rock layers that are distinctive enough to be identified in the field. They can be anywhere from a few inches to several hundred feet in thickness.

The oldest formations in Jo Daviess are of Ordovician age, or roughly 450 million years old. These are the rock layers seen along the Apple River, the Galena River, or in the large quarry west of Elizabeth. They are made up largely of beds of dolomite (commonly referred to as "limestone"), a rock composed of calcium and magnesium carbonates. Other common rocks are limestone, a chemical precipitate of calcium carbonate; shale, which comes from layers of mud; and sandstone, from layers of sand.

The youngest rocks we see today are of Silurian age, or just over 400 million years old. These layers are those seen on the tops of high ridges and mounds. They are mostly dolomite, a very hard rock that resists the effects of erosion. They underlie Terrapin Ridge and U.S. 20 from the Observation Tower to the Galena Territory. The highest points in the state are capped by these rocks, including Charles, Horseshoe and Benton Mounds.

Our part of Illinois has been relatively stable during the last 250 million years. During this long period, many hundreds of feet of rock layers have eroded away. Because of this the area was reduced to a relatively flat erosional plain with sluggish streams flowing southward in broad valleys. This plain was at the level of the highest mounds and ridges that one sees today.

But then the land was uplifted through tectonic activity (movement of crustal plates) and this caused streams to begin cutting downward with increased activity. This increased erosional activity caused a more rugged topography to develop. Stability ensued and a new plain of low relief began to form, this time at the level of the Galena dolomite, or roughly at the elevation of Warren, Woodbine and Eagle Ridge Inn. But then came the glaciers.

Geologists refer to the period of continental glaciations as the Pleistocene Epoch, a period lasting from about 1.6 million years ago to 10,000 years ago. Major periods of ice advance from northern Canada significantly affected Illinois during this period. These were huge sheets of ice, often more than a mile thick, that originated because of climatic change. These glaciers affected Illinois greatly. They destroyed the drainage patterns of streams while leveling hills and filling in valleys. In the process some plants and animals became extinct while others were forced to "migrate" farther south.

The glacial movement was neither regular nor uniform. Lobes of ice advanced and receded; some areas were more heavily affected than others. During the last 1.6 million years, as many as 14 glaciations may have invaded Illinois, caused each time by global fluctuations in temperature. In between glaciations, erosion continued, new soils began to redevelop, and new flora and fauna moved in. It is a complex period in our earth's history.

For reasons that are not yet fully understood, a small area of land in northwest Illinois, southwest Wisconsin, and northeast Iowa was missed by most, if not all of these glacial advances. As a result, geologists refer to this area as the "Driftless Area." Drift is anything that was glacially deposited and no drift has been found in this region. Jo Daviess County is at the southern end of this area. Stephenson County was glaciated, but long enough ago to have still developed a landscape similar to Jo Daviess but with a more subtle and gently rolling topography. Prior to glaciation, the streams and drainage patterns that we see today did not exist. The Mississippi River did not exist in its present form. Rather, it originated as meltwater flowing along the margin of the ice sheet. Over several ice advances and thousands of years, the river developed the channel we know today.

Although our area was never covered by ice, it was nevertheless affected greatly. In fact, the rugged topography so characteristic of the Driftless Area is due in part to the nearby glacial activity. As the ice sheets with their pulsating lobes ebbed and flowed, meltwater would alternately erode and then fill in stream channels. The channel of the Mississippi River at Savanna, for example, was close to 200 feet deeper than at present.

As the streams in Jo Daviess County realigned themselves with the deepened Mississippi channel, they began to erode more rapidly. It was the same effect as if tectonic activity had uplifted the land, giving new life to sluggish old streams. As a result, our streams began to cut down with renewed vigor, forming narrow valleys with steep bluffs, as seen along the Apple River and its tributary valleys like Long Hollow and Irish Hollow.

The glaciers affected the land in another way, too. During the winters of glacial periods, westerly winds blew dust from the dry flood plains of the Mississippi Valley onto the uplands to the east. This fine material, called loess, developed a thickness of 25 feet in western Jo Daviess County, gradually thinning to 5-8 feet along the eastern border near Stockton. Our modern soils, developed on this mantle of loess, are richer agriculturally than would otherwise have been the case.

The last glacial advance receded from the surrounding area about 20,000 years ago. The farthest extent of ice was during the Illinoisan glaciation 250,000 years ago which extended near a line running from Stockton to Warren. Benton Mound (the second highest point of land in Illinois), the large mound immediately to the west and north of Stockton, is the boundary. It was to the east of this mound that glacial meltwater formed, backing up the South Branch of the Apple River, creating a large lake. The Apple River at that time flowed from the northwest to the southeast and emptied into the Pecatonica. As the water level rose, it breached a small divide where Apple River Canyon State Park is now located. This permitted the lake and meltwater to drain into a small stream flowing southwestward. This torrent of water created the "Apple River Canyon" that we know today, one of the most ecologically significant areas in the state. The rock cliffs and steep valley walls of this stream have provided shelter for a host of threatened and endangered plants and animals.

During the last 20,000 years, the Driftless Area has continued to develop. The streams are still cutting down, the hills and ridges are being eroded, soils are still developing, and the flora and fauna are still adjusting. During the last 200 years the greatest changes have been manmade. But despite vegetation being cut, fields plowed, and streams altered, the land still retains a uniqueness and attractiveness not to be found elsewhere in the state.

Present Day Topography

Because of its geologic history, Jo Daviess County has among its elevations most of the highest points in the state of Illinois. In the west are Horseshoe Mound (1065'), Dygerts Mound (1015') and Pilot Knob (1000'). A few miles to the north are Charles Mound (1235' and Illinois' highest point) and Scales Mound (1140'). To the east, Stockton's Benton Mound has an elevation of 1220', the second highest in Illinois. (Stockton is the highest town in Illinois.) U.S. 20 passes over the southern and lower end of this mound. Called "mounds" locally, these are geologic "outliers," or erosional remnants.

At one time, these mounds were part of a relatively flat plain whose rock layers dipped gently from northeast to southwest. These high areas exist because they are capped with Silurian dolomite, a very hard rock resistent to erosion. Immediately underneath, however, are to be found beds of Maquoketa shale, a relatively soft rock. These beds help form the gentle slopes to be found beneath the steep slopes of the Silurian dolomite (see diagramatic table of rock layers on following page). The old railroad tunnel near Rodden was built through the Maquoketa shale. While this formation may be over 150' thick, good outcrops are not visible because these rocks are soft and weather easily.

Instead, what we see outcroppings at the tops of the ridges. These are the hard, resistent Silurian dolomites. A unique feature of these hills are the large blocks of rock which are found along some of the steep slopes. These blocks, pieces of the more resistant Silurian dolomite are undercut as the shale beneath erodes and weathers. The blocks, through the force of gravity, slide or "creep" down the hillside. This process can take thousands of years.

The major streams in the County have over thousands of years cut down through the Silurian dolomite of the ridges, the Maquoketa shales of the gentle slopes, and are now downcutting into the next major group, the resistant Galena dolomites. These are harder rocks, massively bedded, which erode with steep slopes along streams.

The most pronounced topography of the region lies along the western half of the county, where stream beds are between 700' and 800' above sea level; the Mississippi River is about 600', while surrounding ridges rise to 1000'.

Climate

Jo Daviess County enjoys all four distinct seasons. In winter the average temperature is 21 degrees F, and in summer the average temperature is 71 degrees F. The total annual precipitation is about 35 inches, and nearly 65% of this falls in April through September. The average seasonal snowfall is about 32 inches. The average relative humidity in the afternoon is about 63%. Humidity is higher at night, and the average at dawn is about 81%. The sun shines 69% of the time possible in summer and 46% in winter. The prevailing wind is from the northwest. Average windspeed is highest, 12 miles per hour, in April.

Soils

Though for the most part the county was itself unglaciated, the area was affected by fine sand and silt blown by the wind into the unglaciated areas. A Soil Survey of Jo Daviess County, Illinois, issued by the U.S. Department of Agriculture, Natural Resource Conservation Service in 1996, summarizes the quantities and characteristics of soils found in the county, and provides detailed maps locating the types of soils. The survey also includes tables which evaluate the suitability of soil types for various uses, including crops and pasture, woodland management and productivity, windbreaks and environmental plantings, recreation, wildlife habitat, engineering (including building site development and sanitary facilities), construction management, and water management.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land best suited for crops. It produces the highest yields with minimal expenditure, and with the least damage to the environment. About 84,000 acres (over 21% of the total acreage), located for the most part in the eastern portion of the county, meet the definition requirements of prime farmland.

While erosion continues to pose troubling questions about long-term sustainability, Illinois soils remain richly productive under proper management.

Hydrology

The Mississippi River is the largest river in the United States, draining about 41% of the entire country. The Mississippi River forms the entire western border of Jo Daviess County. Over the years, the Mississippi ("The father of the waters") has greatly affected the county through river transportation, wildlife, recreation, tourism, and flooding. Water levels in the Mississippi are controlled through lock and dam system operated by the U.S. Army Corps of Engineers (U.S.A.C.E.).

The Mississippi watershed is broken down into smaller areas defined by the waterways feeding into it. The majority of Jo Daviess county is located in the Apple-Plum hydrologic river basin, with small north eastern and north central portions of the county located in the Pecatonica hydrological river basin. The Apple-Plum unit includes property in nine counties in Illinois, Iowa and Wisconsin. The Jo Daviess County portion of this watershed area contains 2,282 river and stream miles of which 1,085 are perennial or continuously flowing. The unit encompasses an area of 1,476 square miles. It is further divided into eight watershed areas draining into the Menominee River, the Galena River, Smallpox Creek, Lower Apple River, Upper Apple River, Little Rush Creek, Plum River, East Fork of the Plum River. These watershed areas are further broken down into sub-watershed areas. Sub-watershed area maps are available in the offices of the Jo Daviess County Natural Resource Conservation Service.

Jo Daviess County has more than 15,000 acres of open water (the 10th highest county acreage in this category for the state). Over 11,000 acres of the open water is found in lakes and rivers (major stream courses) with the remainder in minor stream courses that contain water year round. There are only two lakes in Jo Daviess County and these are man-made lakes created in conjunction with the county's two large resort developments.

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