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Geology of Iowa

Southeast Linn County Geology; Palisades-Kepler State Park

Figure 1. The gazebo at the top of the hiking trail overlooking the rock face on the opposite side of the river.

A. Introduction:

Site Identification:

Palisades-Kepler State Park:

41°911271°N, 91.502665°W

Population Density:

717.47 people/square mile

Watershed Location:

Linn County crosses several different watersheds, the main being the Middle and Lower Cedar River water sheds. Defined by the EPA as address: 07080206 and 07080208, respectively.

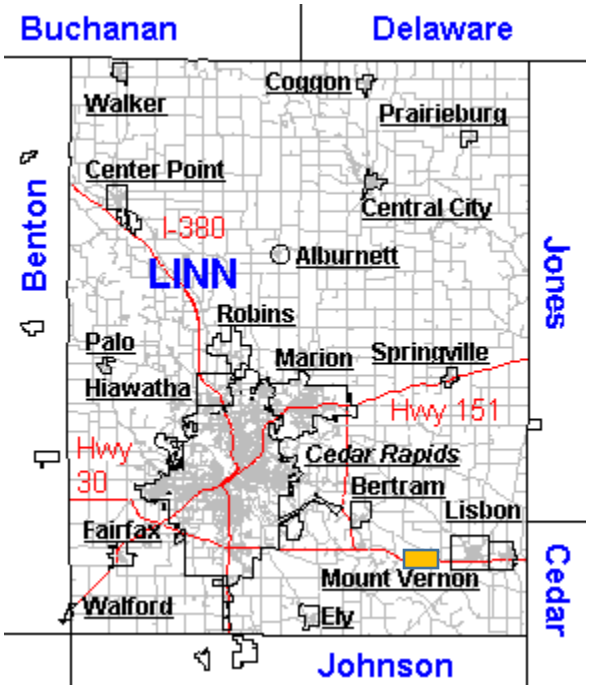


*Figure 2. Represents the county in which the park is located *The yellow box represents the approximate location of the Palisades-Kepler Park on this map*

The idea behind this project is to take a closer look at the geology within the Linn county area, focusing on a place that many of my students are familiar with. Working in an alternative school gives a lot of perspective to how kids think. They are willing to say what other students are most of the time scared or unwilling to share.

I have heard the cries of my students of these lessons being not applicable and not worth the time of day. It is important that students understand where much of our everyday products come from. This trip will put into perspective just how close to home some of this limestone and aggregate business is. We will take a specially close look at soil types and be doing a project in class on how soil type and quality can affect the growth of a plant.

B. Historical Record:

Cedar Rapids is the second largest city in Iowa. The city lies on both banks of the Cedar River. When Cedar Rapids was first established in 1838, William Stone named the town Columbus. In 1841 it was renamed Cedar Rapids for the rapids found at the Cedar River at the site. The river itself was named for the large number of red cedar trees that grew along its banks.[2]

Palisades-Kepler State Park was established in 1922. It lies between Bertram and Mount Vernon and is located approximately 12 miles east of Cedar Rapids on the Cedar River. The park attracts thousands of visitors each year because of its natural history, which includes a variety of geological features, diverse plant and animal populations, and archeological artifacts.[2]

Figure 4. The sign at the entrance to the park, the original stone tower laid the year after the park was founded.

When Palisades-Kepler State Park was established, much of the original land had been acquired and the State Board of Conservation had taken special notice of the unique bold cliffs. In September of 1928, the Board of Conservation accepted the gift of property from the estate of Louis H. Kepler, essentially doubling the size of the park. The Board added his name to the park name.[5]

In July 1934, a Civilian Conservation Corps company was established at Palisades-Kepler. Three barracks and a mess hall were built; then, work started on the building of many park facilities. Many of the roads, hiking trails, entry portals, lodge and other timber and stone structures built during this time period remain, giving the park much of its rustic character.[5]

C. Geologic Record:

Bedrock in the park is mostly limestone and dolomite of Silurian age (~ 420-440 Ma). These strata contain abundant crinoids and brachiopods, and somewhat less abundant trilobites. In this region erosion and drainage development have created a landscape of steeply rolling topography that is associated with the Southern Iowa Drift Plain landform region.[3]

Figure 5. The rock face opposite the main beach area within Palisades-Kepler Park

Silurian Strata are exposed at many sites within this region. Much of this is dominated by dolomite and cherty dolomite, with patches of limestone remaining. The cliffs can reach up to 65 ft making it harder to see some of the formations. This park is very near the Plum River Fault Zone and nearby places can be found where formations have slipped 250 ft past the plunging syncline.[4]

Until recently, most of the exposed strata had been placed with the LeClaire facies of the Gower formation. Crinoid mounds set these apart from the Gower Formation and is now known as the Scotch Grove Formation. It is in this region that many large crinoid fossils can be found, some with stems reaching 2 cm in diameter. Other fossils common in this area are tabulate corals and stromatoporoids.[4]

These carbonate mounds measure 1.2 miles in diameter. With a trip to the park many fossils can easily be found even to the untrained eye. Though much of the hill side consists of echinoderm debris, a large portion is also made of a carbonate mud. Most of the bedding within this mud and even further downstream is horizontal.

D. Soil History and Surface Structure

Figures 6 and 7. Demonstrating what the soil types in the area would look like.

Our current soils in Iowa are relegated to Mollisols and Alfisols in designation. These soils are associated with certain climate-vegetarian zones. Mollisols are found within temperate grassland areas. They have a thicker A horizon, have a dark colored surface horizon and are base rich. This soil was laid down where slopes are not too steep

and today most all of these soils are used for agriculture purposes. Some are used as pasture or rangeland. Alfisols are found within temperate deciduous forest/savanna areas of the State. Commonly found in prior oak savannahs and forested regions in the area. These soils are being developed in and have supported forest vegetation at some time during their development.[6]

Pleistocene features have sculpted the landforms in the area, including the development of the Iowan Surface by erosion of loess-capped Pre-Illinoian glacial deposits. East-central Iowa is composed of Wisconsin Episode loess deposits, the Peoria and Pisgah formations. The Peoria Formation includes wind-blown materials that typically are well-sorted, and may be interbedded and range in texture from silt to medium sand.[1]

Bibliography

1) Anderson, Raymond R, and Chad L. Fields. *Geologic Features in Southeastern Linn County, Iowa*. Iowa City, Iowa?: Geological Society of Iowa, 2008. Print.

2) *Cedar Rapids: Our People, Our Story, Vol. 1*. Cedar Rapids, Iowa: The Gazette, 2004. Print.

3) Anderson, Raymond R, and B J. Bunker. *The Natural History of Palisades-Kepler State Park and Preserve, Linn County, Iowa*. Iowa City: Geological Society of Iowa, 1999. Print.

4) Witzke, Brian J, Michael J. Bounk, G A. Ludvigson, and Luis A. Gonzalez. *Silurian Stratigraphy and Carbonate Mound Facies of Eastern Iowa: Field Trip Guidebook to Silurian Exposures in Jones and Linn Counties*. Iowa City, Iowa: Iowa Dept. of Natural Resources, Energy and Geological Resources Division, Geological Survey Bureau, 1992. Print.

5) *Palisades Nature Leaflets*. Ames: State Conservation Commission, 1939. Print.

6) Domimant Soil Orders. USDA Natural Resources Conservation Services, Soils. N.p., n.d. Web. 15 July 2015. <http://www.nrcs.usda.gov/Internet/FSE_MEDIA/stelprdb1237749.pdf

Project Plan:

Objective: Students will be able to apply a few different principles which would have been covered before a field trip to this park. Students will be able to look at a topographic map and determine what the hill sides and elevation in the park will look like before they arrive. Students will also be able to apply the soil types and rock types to analyze soil samples at the park.

Materials:

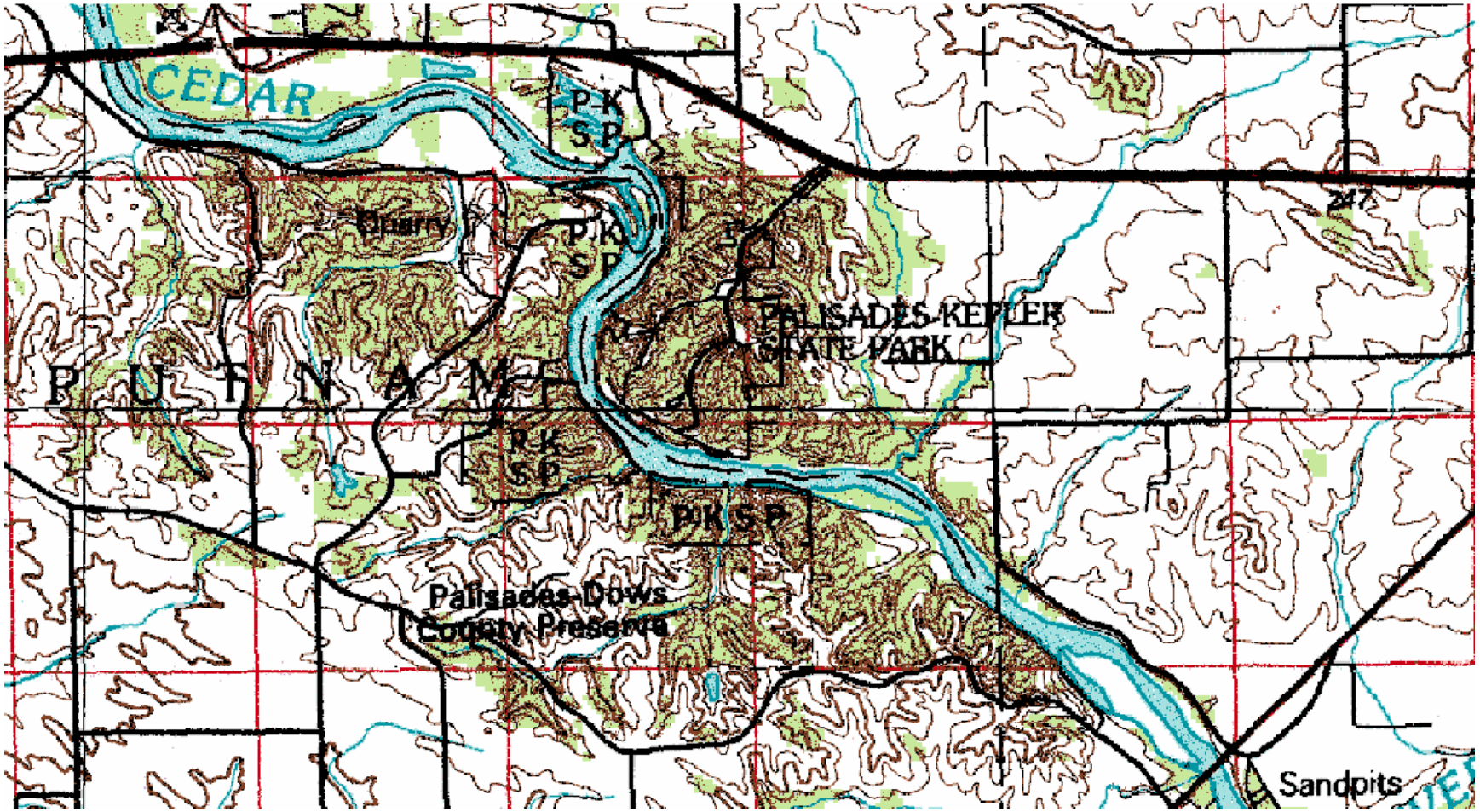
- Soil Sampling tubes
- Texture key and kit
- Notebook
- Rock testing kit, glass, penny, nail, streak plate, etc.

Procedure:

Each group will start with a map and a piece of graph paper, the first objective will be to turn the contours into a graph representing the horizontal elevation of the land. Students will use this to determine what would be the best route to the river, without already having seen the paths.

We will then find our way to the rock face near the river and discuss the layers present in the exposure. Students will try to determine what type of environment this could have formed in.

Last, we will sample soil close to the riverside, then find our way near the top of the exposure and test again. This should give students a good insight on different environments creating different soils.


CEDAR
P-K
S.P.
Quarry
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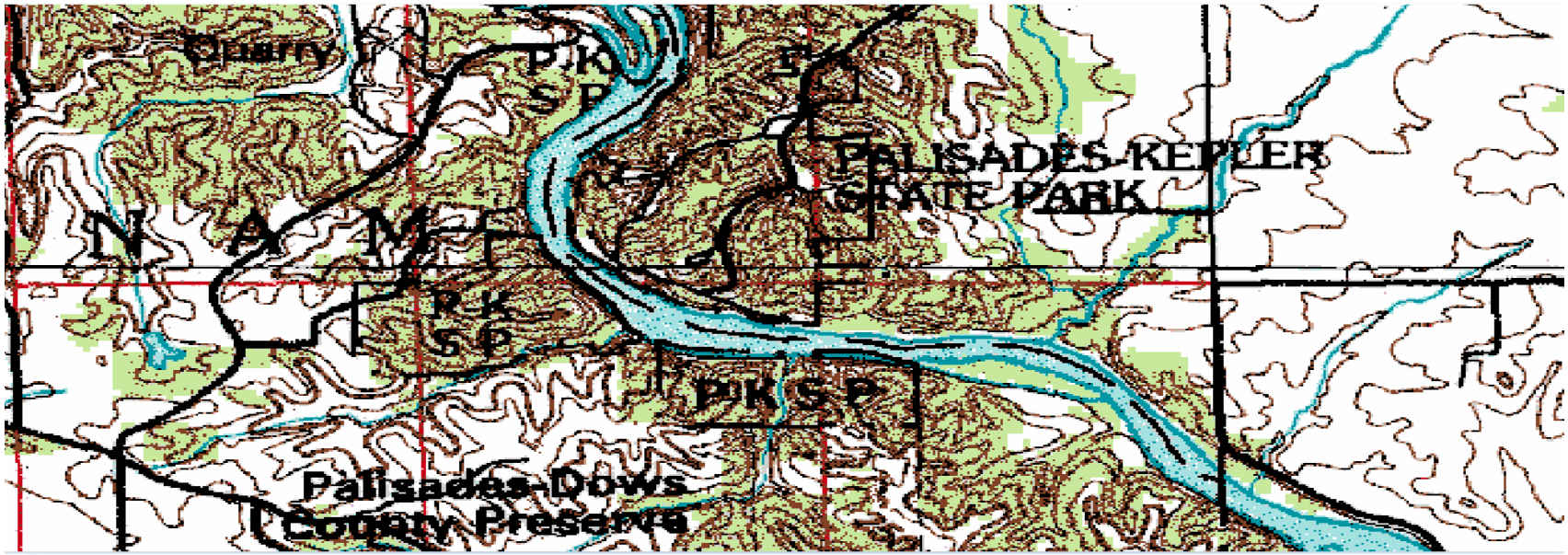
247
PALISADES-KEPLER
STATE PARK
PUTNAM
P-K
S.P.
P-K S.P.
Palisades-Dows
County Preserve
Sandpits



Produced by the United States Geological Survey

Compiled from USGS 1:24 000-scale topographic maps dated 1953-1983. Planimetry revised from aerial photographs taken 1983 and other source data. Revised information not field checked. Map edited 1984

Projection and 10 000-meter grid, zone 15,
Universal Transverse Mercator
25 000-foot grid ticks based on Iowa coordinate system, south and north zones
1927 North American Datum
To place on the predicted North American Datum 1983, move the projection lines 3 meters north and 13 meters east

There may be private inholdings within the boundaries of the National or State reservations shown on this map

CONTOUR INTERVAL 10 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929
ELEVATIONS SHOWN TO THE NEAREST METER

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS

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