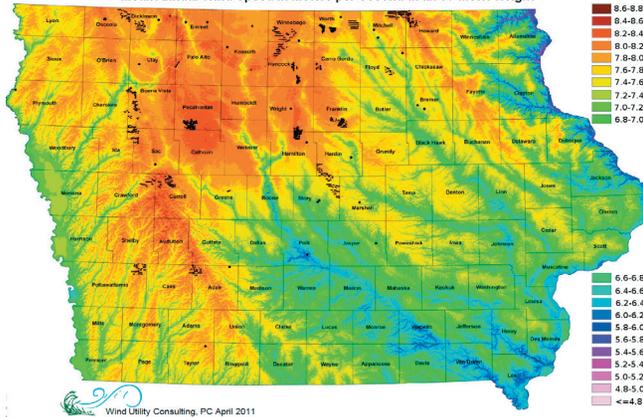


## RAGBRAI Geo-pedia

2,500 Large Wind Turbines in Iowa

Mean Annual Wind Speed in Meters per Second at an 80-Meter Height



### The 'Winderful' Power of Iowa!

With its flat, open landscape and high average winds, northern and western Iowa is an ideal region for harnessing the renewable power of wind. Large **wind turbines**, often constructed in clusters called **wind farms**, are strategically placed atop high ridges to maximize the full potential of the wind. You will see these in action on the RAGBRAI route between Aurelia and Schaller, which is surrounded by a wind farm. Iowa has become one of the nation's leaders in wind energy generation, with about 20% of the state's electricity coming from wind! Over 6,000 Iowans are employed by the wind energy industry. Iowa's wind farms generate enough electricity to power about 1,000,000 average-sized homes; which ranks second in the US to Texas, and leads California.

'Winderful' stats:

- Turbine Height – up to **400** feet
- Rotor Diameter – up to **300** feet
- Total in Operation Statewide – **2,890** utility-scale turbines
- Total Capacity Statewide – **4,495** megawatts

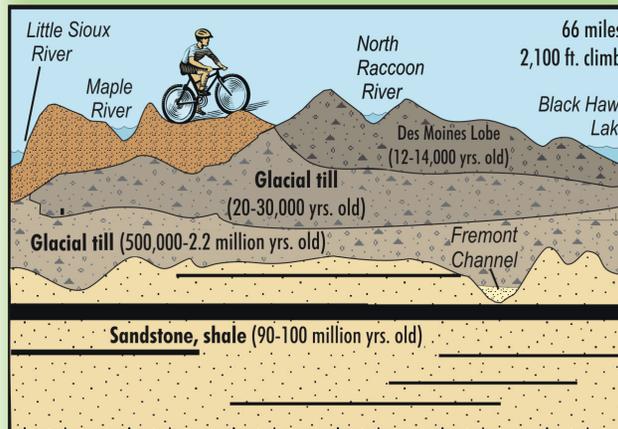
Above map is provided by:

[www.iawind.org/images/iowa-wind-locations.pdf](http://www.iawind.org/images/iowa-wind-locations.pdf)

\*Map produced by Wind Utility Consulting, PC using 200-meter resolution mean annual wind speed data developed by AWS TruePower for the Iowa Energy Center in 2010.

COVER PHOTO: Windfarm near Breda, Iowa in July 2011.

## Day 2 Milestones



**Start:** Cherokee

**Fremont Channel:** 37 - 44 miles

**Missouri-Mississippi Drainage Divide:** 40 miles

**Des Moines Lobe:** 40 miles

**North Raccoon River:** 45 miles

**Blackhawk Lake:** 63 miles

**Finish:** Lake View – 66 miles



**For More Information...**

Depositional Environments of Glacial Sediments and Landforms on the Des Moines Lobe

[ftp://ftp.igsb.uiowa.edu/igspubs/pdf/GB-06.pdf](http://ftp.igsb.uiowa.edu/igspubs/pdf/GB-06.pdf)

Nutrients in Iowa Lakes

[ftp://ftp.igsb.uiowa.edu/igspubs/pdf/WFS-2003-06.pdf](http://ftp.igsb.uiowa.edu/igspubs/pdf/WFS-2003-06.pdf)

Beach Monitoring

[www.igsb.uiowa.edu/wqm/activities/beach/beach.htm](http://www.igsb.uiowa.edu/wqm/activities/beach/beach.htm)



**"If It Can't Be Grown It Has To Be Mined!"**



# 40th 2012 RAGBRAI

## Learn about the Land

# Monday, July 23 Day 2



### Iowa DNR – Geological and Water Survey

109 Trowbridge Hall  
Iowa City, IA 52242  
[www.igsb.uiowa.edu](http://www.igsb.uiowa.edu)

### US Geological Survey - IA Water Science Center

400 S. Clinton St.  
Iowa City, IA 52240  
<http://ia.water.usgs.gov>

### Iowa Limestone Producers Association

5907 Meredith Dr., Suite A  
Des Moines, IA 50322  
[www.limestone.org](http://www.limestone.org)

## Keep on Rockin' in the Fremont Channel

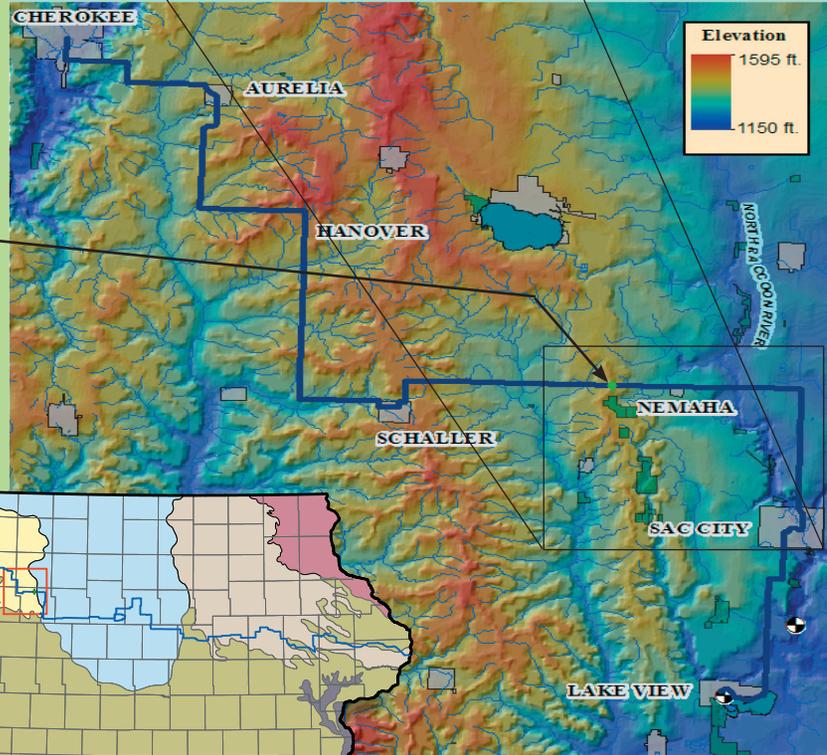
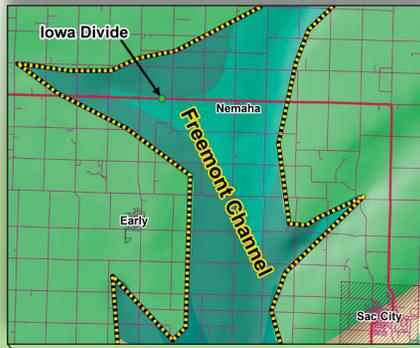
Topography refers to the relative change in elevation over a given area. Although the topography of Northwestern Iowa may not be as impressive as other parts of the state, the same is not necessarily true of the *bedrock topography*. Just as rivers carve large valleys on the surface today, evidence of ancient river systems can be seen in valleys cut into the bedrock surface beneath the glacial deposits. Such is the case with the **Fremont Channel**, which cuts from north to south entirely across western Iowa. The Fremont Channel was the earliest ancestor of the Missouri River, having been cut by meltwater from the earliest glacial advances into Iowa around 2.2 million years ago. Before it was abandoned and filled over a million years ago, the Fremont Channel carved a gorge over 200 feet deep into bedrock, deeper than the current Missouri River. As you ride east through Nemaha, you will cross the upper reaches of this amazing feature.

## The Great Iowa Divide

All of Iowa's rivers and streams ultimately flow into either the Missouri or Mississippi Rivers. Along this year's RAGBRAI route, the point at which the state's rivers switch from flowing westward to the Missouri River and eastward to the Mississippi River is located about 2 miles west of Nemaha.

## Why is Black Hawk Lake...Black?

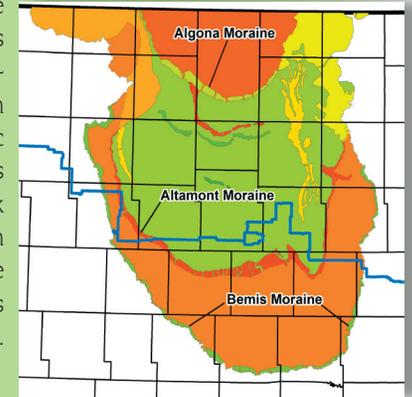
Black Hawk Lake is impaired due to high levels of **algae** and non-algal **turbidity**, which exceed Iowa's standards for water clarity. The lake is also prone to high levels of bacteria that could indicate potential human health issues for swimmers. To improve the water quality and overall health of Black Hawk Lake, a plan was created to reduce the amount of nutrients entering the lake. The plan calls for a combination of land and animal management practices to be implemented on public and private lands within the watershed. Reducing nutrient loss from row crops through better timing and methods of manure and fertilizer application, increasing use of conservation tillage methods, and implementing structural best management practices (BMPs) such as terraces, grass waterways, and constructed wetlands in strategic locations will significantly reduce pollutant loading to the lake. Elimination of direct stream access by grazing livestock, efforts to reduce runoff from streets and other urban areas, targeted in-lake dredging, and fishery management/restoration will also improve water quality in the lake. Preventing waterfowl from gathering at the beach and ensuring septic systems throughout the watershed are functioning properly will also benefit water clarity and reduce bacteria inputs to the lake.



## Introducing...The Des Moines Lobe

About two miles west of Nemaha you will ascend a roughly north-south trending feature called the **Bemis Moraine**. Moraines are piles of debris (clays, sand, gravel, and boulders) that represent the edge of an advancing glacial ice sheet. The Bemis Moraine is the terminal moraine for the **Des Moines Lobe**. Approximately 16,000 years ago a large glacial ice sheet advancing from the north split into several lobes that flowed into low-lying areas. One of these lobes rapidly advanced through the north-central part of the state and terminated near the City of Des Moines. The Des Moines Lobe ice sheet advanced into Iowa during a relatively warm period of time and was accelerated by a thin veneer of water at the base of the ice. As the glacier halted, rivers formed near the margins of the ice. These rivers are called **valley train**

**river systems** and carried massive amounts of sediment away from the glacier. At the 45 mile mark for Day 2, you will cross the North Raccoon River, a former valley train river. Almost immediately after you climb out of the North Raccoon River valley, you ascend the **Altamont Moraine**, which is slightly younger than the Bemis. Turning south on County Highway M54 you will ride the crest of the Altamont Moraine until you cross the North Raccoon River again and enter Sac City. Day 2 ends at Black Hawk Lake, which formed at the edge of the Des Moines Lobe.



## "Hooray for the RRWA!"

The **Raccoon River Watershed Association (RRWA)** is one of Iowa's most active citizen-led watershed groups. Dedicated to raising awareness about the intrinsic value and beauty of the Raccoon River, RRWA members conduct regular volunteer monitoring of the river water quality, sponsor paddling trips along the river, share information about birds and wildlife found along the river corridor, and hold regular community forums to highlight research projects on the river. The RRWA was instrumental in helping to shape the Raccoon River Watershed Management plan that provides a roadmap for protection and restoration activities on the river for the next decade.

