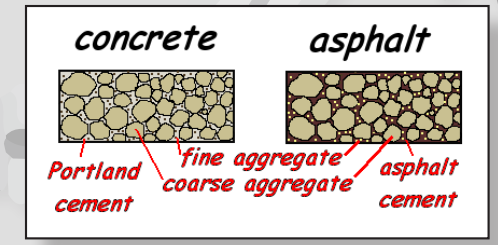
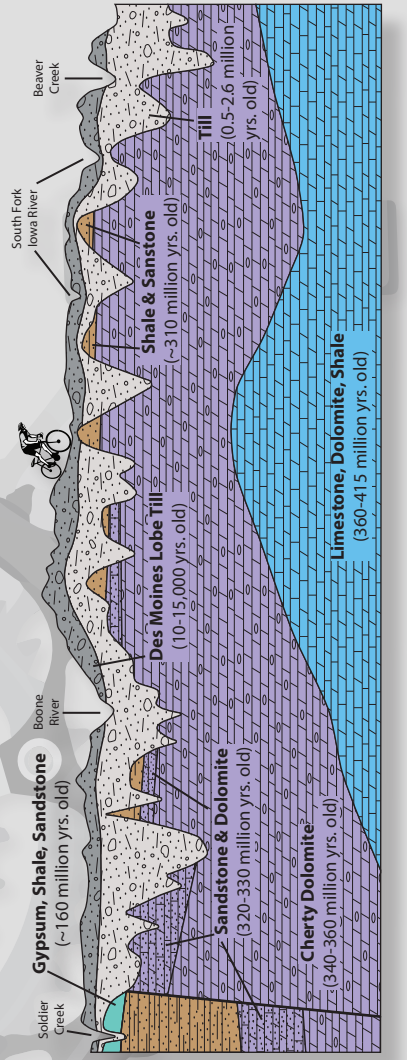
The Science of Roads

As you bike across the state of Iowa you will primarily be riding on paved roads, but what are they paved with? Some are paved with concrete and some with asphalt. What is the difference? Well both are composed mostly of aggregate, fragments of crushed limestone or dolomite and sand. It is the material that glues these fragments together that is the primary difference. Concrete (the white or light gray road surface) uses Portland cement to glue the aggregate together. Portland cement is made by firing a finely crushed mixture of limestone, sand clay, and other materials to 2,600° F in a kiln to produce a clinker that is mixed with gypsum and crushed to a fine powder to make the cement. The cement is mixed with water and the aggregate and applied to the road base to create a concrete roadway. Asphalt is a viscous petroleum product that is heated, mixed with aggregate and applied to the road base to create an asphalt roadway. 94% of asphalt and 80% of concrete is made up from aggregate.





Daily Geology: One of the most unique geologic settings in Iowa is represented by the gypsum deposits in Fort Dodge. These deposits are the only Jurassic-age rocks in the state. They are preserved here partly due to faults that dropped the bedrock sequence more than 100 feet, allowing these rocks to escape the erosive power of the glaciers that likely removed adjacent deposits of similar rocks. Pennsylvanian- and Mississippian-age bedrock return to their normal position just east of downtown Fort Dodge.

RAGBRAI

Day 3

2015

Tuesday, July 21

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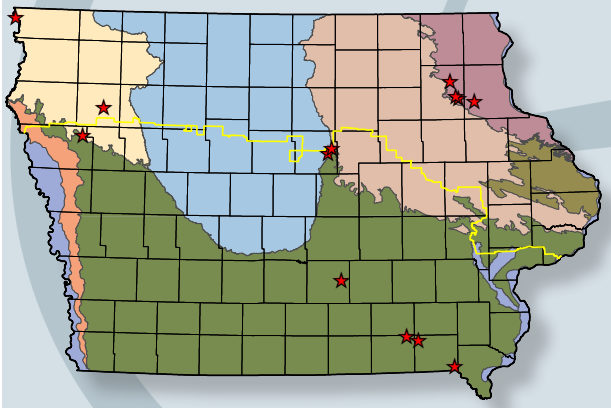
Iowa Gold Rush?

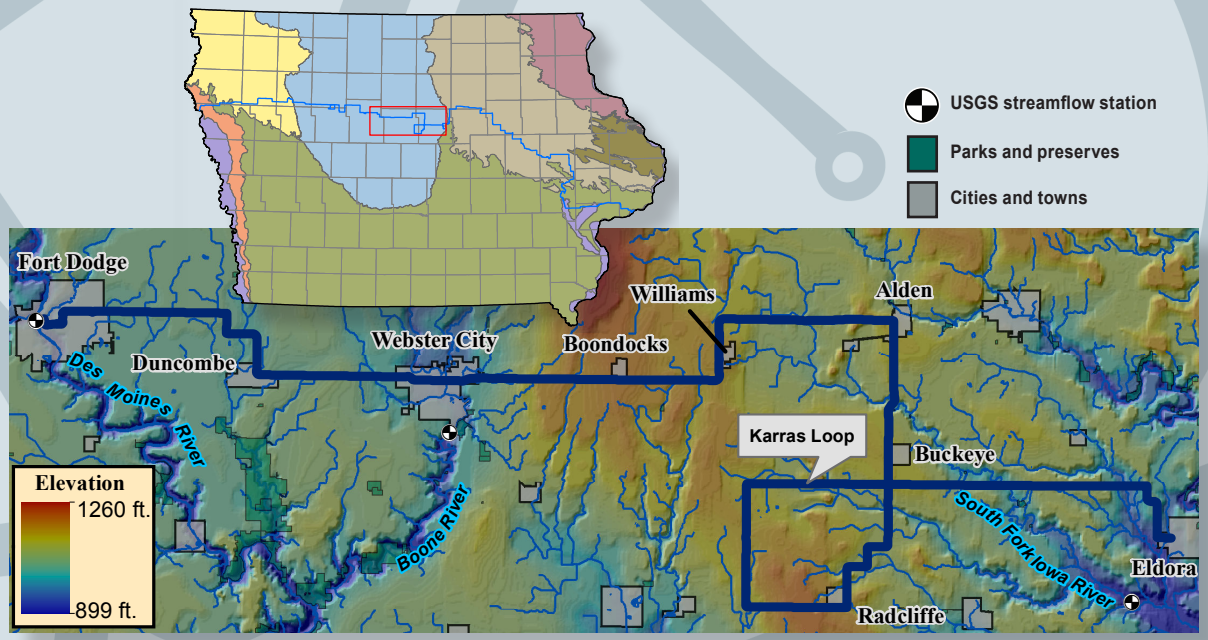
In the spring of 1853 a farmer named John Ellsworth reported finding gold on a portion of his property that lay along the Iowa River, a short distance south of the Hardin County town of Eldora. Gold fever swept through the land like a brush fire enticing, by some estimates, more than 3,000 hopeful souls. Wielding picks and shovels, patient prospectors sifted through every sand and gravel bar along the river only to come up empty handed. In 1857, O.M. Holcomb, the first publisher of the Hardin County Sentinel, spent the entire summer prospecting up and down the Iowa River and reported that, he too found gold. Although his boasts were met with far less excitement than previous claims. Nearly a quarter century after the first discovery, on Thursday, April 5th, 1877, a bed of black sand was noticed about seven miles north of Eldora that reportedly yielded fifty cents worth of gold from each pan. The map below shows the locations of historical gold sightings. To be sure there is gold residing in the glacial sediments covering the landscape, just not in economical concentrations.



* Cover photo: Jurassic-age gypsum deposits in a mine near Fort Dodge. That's Des Moines Lobe till lying on top of the irregular surface of the gypsum.

Fort Dodge Gypsum

The rocks of the Fort Dodge Formation (Upper Jurassic) are the most intensely quarried bedrock units in Iowa. The thick and exceptionally high quality gypsum unit that dominates the formation has been mined for a variety of economic products since the mid-1800's. The formation includes a locally-occurring basal conglomerate (Shady Oak Member) and an overlying dark gray claystone, followed by a thick gypsum unit (Gypsum Creek Gypsum Member), and an upper suite of sandstones and mudstones informally called the "Soldier Creek Member". The formation has an extremely restricted areal extent, with its only known occurrences in central Webster County, Iowa. Deposition probably occurred in a large evaporite basin, but there is no evidence available to confirm the geometry of the gypsum basin or the lateral extent of evaporite deposition. The lack of fossils and large "time gaps" below and above the deposits have left the geologic history of the Fort Dodge Formation as one of the great mysteries of Iowa geology.



Valley Train Rivers

The Des Moines River is unique as it drains the central axis of the Des Moines Lobe and is the youngest of Iowa's valley train rivers. Becoming deeply entrenched into Pennsylvanian-age sandstone bedrock in several locations, such as Dolliver State Park and Ledges State Park, where the valley is as much as 220 feet deep. This entrenchment is the result of the Des Moines River valley forming at the margin of the Algona Moraine then catastrophically draining several times, thus releasing large volumes of sediment laden meltwater down the valley. Today's ride ends in Eldora on the eastern edge of the Des Moines Lobe. In this area another valley train river, the Iowa River, cut through the Beamis Moraine about 13,500 to 12,000 years ago.