Geology Hiking Guide for the Ice Age Trail

Straight Lake State Park Area
Polk County, Wisconsin (Abridged)

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Stop 1. Boulder Valley

A boulder-strewn valley is located ~1 mile north of 280th Ave. along the Ice Age Trail in Straight Lake State Park. The valley is filled with boulders. Most boulders are made of **basalt** (dark, massive volcanic rock) and are up to 5 feet in diameter. Small reddish granite and rhyolite boulders are also present. Underneath the boulders, a shallow stream flows between two perched wetlands. Glacial meltwater eroded the valley and removed finer sediments, leaving a lag of large boulders.

Stop 2. Basalt Outcrop

A basalt outcrop is located along the trail 0.2 miles north of 280th Ave. The vegetation-covered, dark grey basalt outcrop juts toward the trail. The basalt contains small holes (former air pockets in lava) filled with younger minerals. The volcanic basalt oozed from the **Midcontinent Rift** 1.1 billion years ago, as North America started to split apart (Fig. 1).

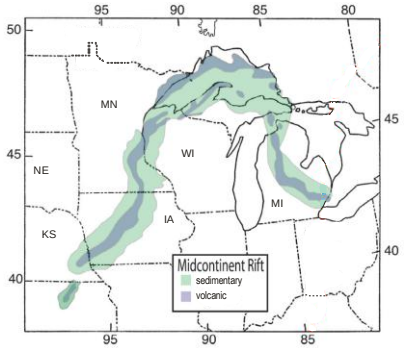


Figure 1. Midcontinent Rift System
Location and extent of the Midcontinent Rift System. The blue area is dominated by basalt. Modified from Stein et al. (2011).

Stop 3. Glacial Erratic

A large glacial erratic looms over the trail 0.2 miles south of 280th Ave. An **erratic** is a rock that does not match the bedrock found in an area. These erratics were transported here by glaciers and range in size from pebbles to large boulders. This erratic, 6.5 feet in diameter, is made of the rock diorite and comes from north of the Lake Superior area.

Stop 4. Tunnel Channel & Till

A tunnel channel is best seen at the east end of Straight Lake along the trail. The tunnel channel extends 7.5 miles from 280th Ave. southeast to Big Round Lake. This tunnel channel is an elongate valley which contains Straight Lake, Rainbow Lake, and the Straight River. **Tunnel channels** form as meltwater erodes sediment and/or bedrock beneath the glacier (Fig. 2).

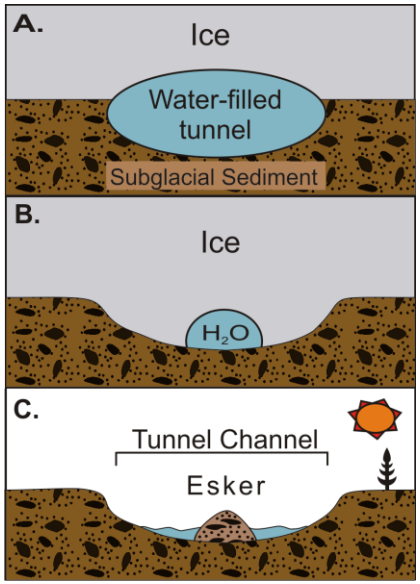


Figure 2. Tunnel Channel & Esker
A) Water beneath the glacier flows rapidly toward the ice margin and erodes a tunnel channel. B) Ice flows into the tunnel channel as water discharge/velocity decreases. Sediment is deposited in small conduit to form an esker. C) After ice melts, the tunnel channel containing an esker and wetlands remains.

Here the pressurized water raced toward the ice margin and eroded a tunnel channel at least 89 feet deep and 0.15 to 0.45 miles wide beneath the ice. A large outcrop of reddish glacial sediment (**till**) covers the hill side 15 feet southwest of the trail.

Stop 5. Kettles and Hummocks

Hummocky topography is the most common terrain in the park and surrounding areas. The best example is seen along the trail between Straight Lake and Cty Hwy I. This stop is a classic example of a kettle surrounded by hummocks. The **kettle** south of the trail is an oval-shaped (and usually water-filled) depression. The hills surrounding the kettle are **hummocks**. To the north of the trail is the tunnel channel. Kettles and hummocks are formed through the process of topographic reversal (Fig. 3).

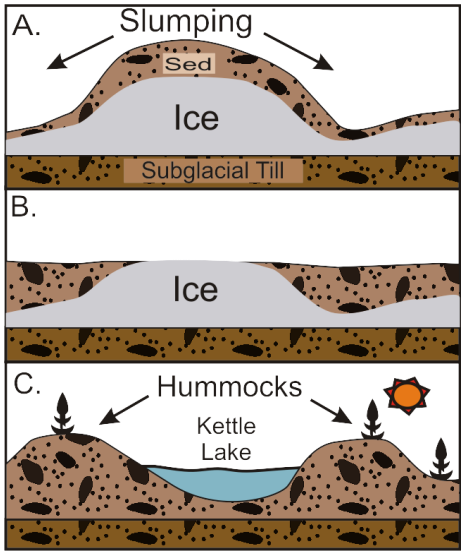


Figure 3. Topographic Reversal
A) Ice insulated by thick sediment melts more slowly than ice beneath thin sediment, forming a high area on the ice surface. Sediment slumps off high area into lowlands. B) Ice in center is now uncovered and melts. C) Original topographic high becomes a kettle that might fill with water, while the original topographic lows become hummocks (hills). Modified from Syverson et al. (1995).

Stop 6. Pitted Outwash Plain

South of 270th Ave. the trail runs through a pitted outwash plain, which consists of a gently sloping plain with scattered kettles (pits). A **pitted outwash plain** forms as meltwater flows away from the ice margin and deposits sand and gravel over ice blocks. When the buried ice melts, the sediment collapses to form the "pits" on the sloping surface.

Stop 7. Moulin Kame

A moulin kame is a distinctive landform located within the tunnel channel north of State Hwy 48. The moulin kame is a small conical hill that rises nearly 20 feet above the poorly drained tunnel channel floor. The **moulin kame** formed as meltwater and sediment flowed down a vertical shaft (moulin) in the ice and deposited sediment to form a hill (Fig. 4).

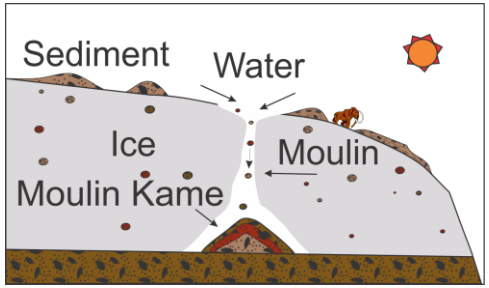
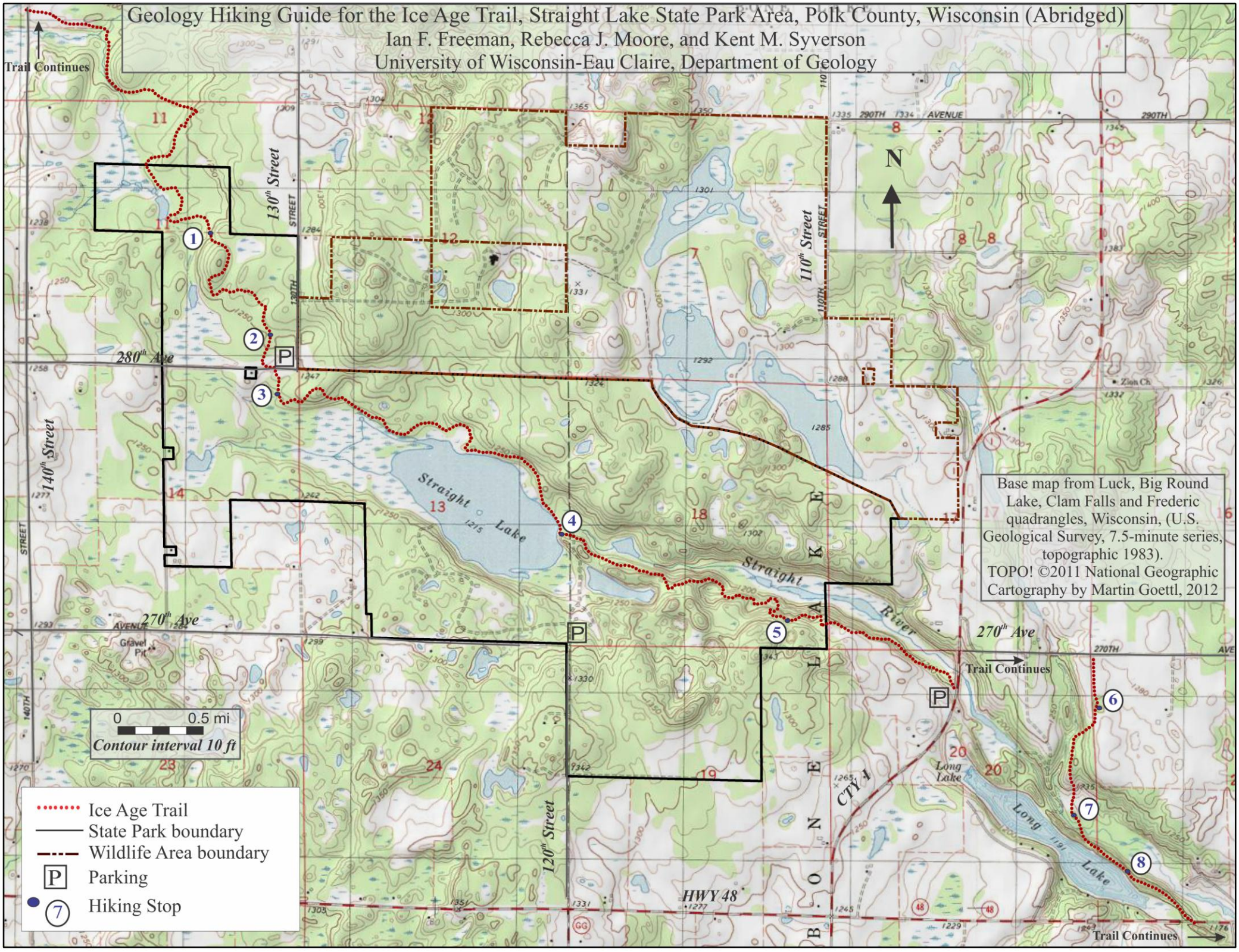


Figure 4. Moulin Kame
Water and sediment on the ice surface fall down a vertical shaft (moulin) in the ice. Sediment is deposited to form a cone-shaped moulin kame on the glacier bed.

Stop 8. Esker

At this stop the trail follows a classic sharp-crested esker segment north of State Hwy 48. This 50-ft-high esker segment is part of a 5-mile-long esker located between Straight Lake and Big Round Lake. Sometime after meltwater eroded the Straight Lake tunnel channel (Fig. 2), water flow decreased, and sediment was deposited inside a smaller conduit (Fig. 2B, C). The lake and wetlands on either side of the esker at this stop mark the base of the tunnel channel.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Trail Continues
130th Street
110th Street
140th Street
120th Street
280th Ave
270th Ave
Straight Lake
Straight River
Long Lake
HWY 48
CTY I
N
Base map from Luck, Big Round Lake, Clam Falls and Frederic quadrangles, Wisconsin, (U.S. Geological Survey, 7.5-minute series, topographic 1983).
TOPO! ©2011 National Geographic
Cartography by Martin Goettl, 2012
0 0.5 mi
Contour interval 10 ft
Ice Age Trail
State Park boundary
Wildlife Area boundary
Parking
Hiking Stop
Trail Continues