

Pleistocene geology of the Steinke Basin area of Devils Lake State Park

Location. Steinke Basin is located in the north-central part of Devils Lake State Park in Sauk County, about 5.6 km south-southeast of Baraboo, Wisconsin, along Highway DL. The west-central part of the Baraboo Quadrangle reproduced as figure 1 has been annotated with the recently approved geographic names Steinke Basin and Johnson Ponds. The area is located in the south half of sec. 18 and the north half of sec. 19, T11N, R7E (Baraboo, Wisconsin, Quadrangle, 7.5-minute series, topographic, U.S. Geological Survey, 1975) (fig. 1). A parking lot south of Highway DL provides access and an area to view the geologic features discussed below. The parking lot is a trail head for hiking and cross-country ski trails in the area. A map of hiking trails in Devils Lake State Park is posted at the parking lot.

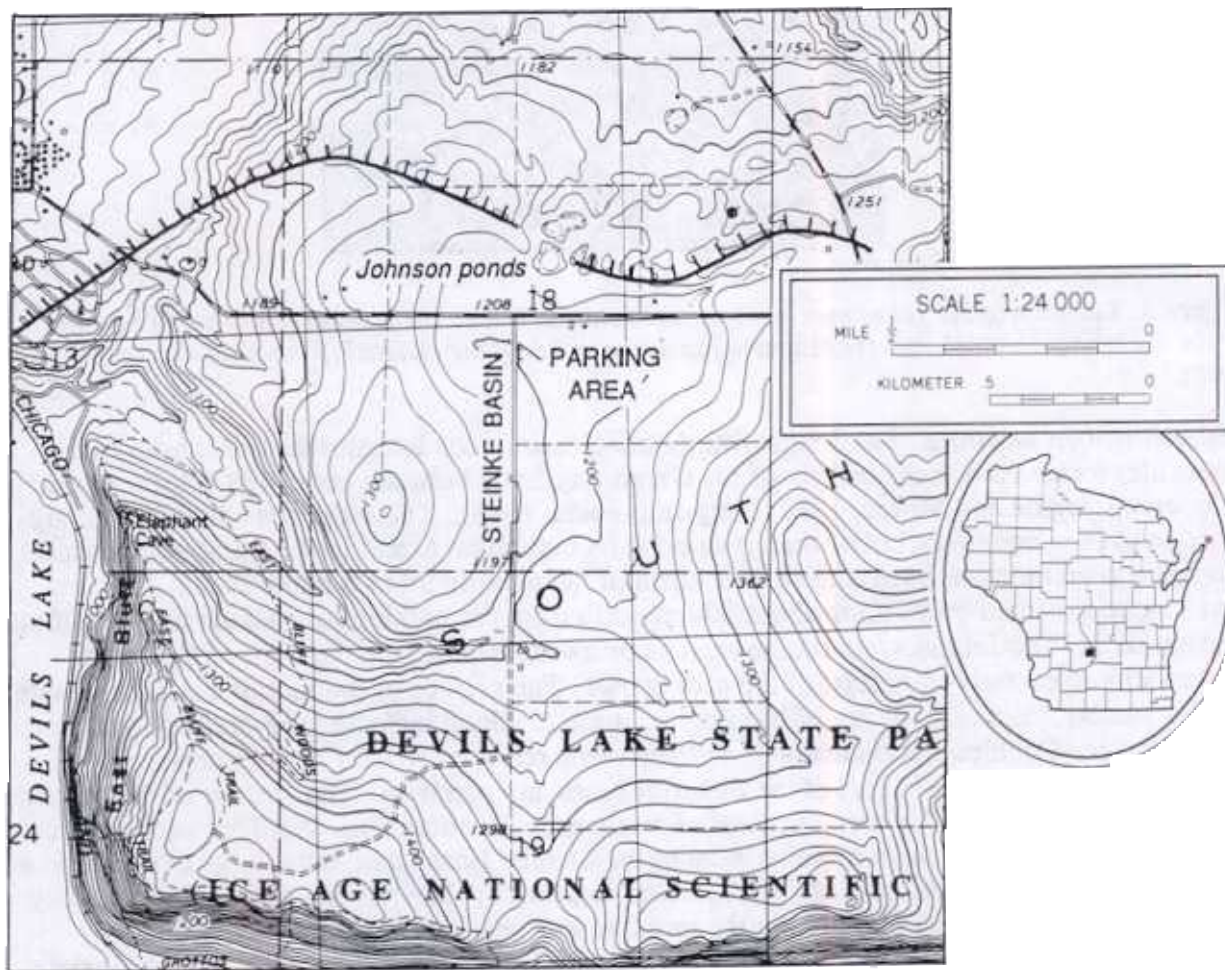


Figure 1. Location of Steinke Basin and the Johnson Ponds. The maximum position of the late Wisconsin ice margin is shown with a hachured line.

Authors. John W. Attig and Lee Clayton, 1990

Significance. The Steinke Basin area provides the opportunity to view the Johnstown moraine (the outermost moraine of the Green Bay Lobe of the Laurentide Ice Sheet), a probable tunnel channel, kettle lakes, an ice-marginal-lake basin, and a sediment fan deposited by a river flowing

from beneath the glacier into the lake (Attig and others, 1990; Clayton and Attig, 1990). It is also an excellent location to discuss the interaction of the ice margin with the preglacial topography. The locations of the features discussed here are shown in figure 2.

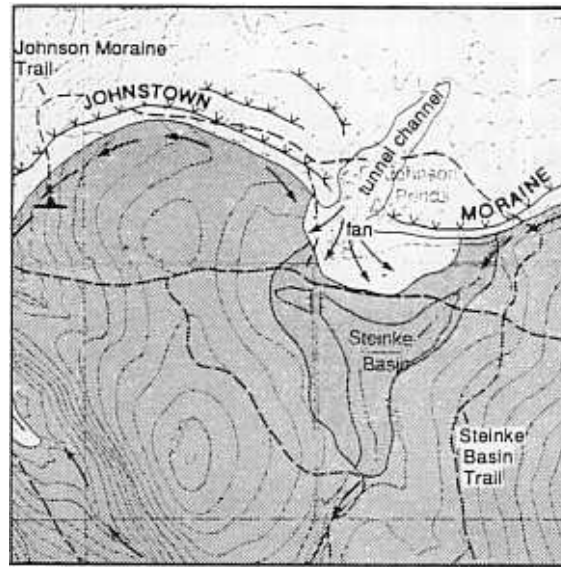


Figure 2. Location of the Johnstown moraine, the Johnson Ponds, the ice-marginal lake in Steinke Basin, the tunnel channel, and the sediment fan at the mouth of the channel (from Attig and others, 1990).

The Johnstown moraine. The Johnstown moraine (named for Johnstown, Wisconsin, east of Janesville) formed along the margin of the Green Bay Lobe between about 18,000 and 15,000 years ago (Clayton and Moran, 1982; Attig and others, 1985). This ridge was deposited along the edge of the Green Bay Lobe when it stood at its maximum extent in the Baraboo Hills area. The Johnstown moraine forms the skyline north of the parking lot in Steinke Basin. The moraine can be explored by walking about 300 m north from the parking lot past the remains of the Johnson farm. The Johnstown moraine trends northwest/southeast to the west of the access trail and has a more easterly trend east of the access trail. The surface of the moraine is littered with cobbles and boulders of a variety of lithologies, some of which indicate long-distance transport by the glacier. Cobbles and boulders of a distinct pale red porphyritic rhyolite, presumably transported from the eastern part of the Superior basin, are common. The surface of the moraine is slightly hummocky in this area; local relief rarely exceeds about 3 m. No deep exposures in the sediment of the Johnstown moraine exist in the Steinke Basin area, but a large exposure in a gravel pit about 4 km to the east has been studied in detail by Clayton and others (1985). They concluded that much of the sediment in the moraine was deposited by meltwater streams — probably streams in tunnels at the base of the glacier. The stream sediment, in turn, is overlain by stratified melt-out till and lodgement till. In addition, it is likely that some debris flowed and fell off the ice front. In the Steinke Basin area, as in other high areas in the Baraboo Hills, the Johnstown moraine is a relatively narrow feature, typically less than 100 m wide. It is typically much broader in adjacent lowland areas.

Tunnel channel and kettle lakes. North of the parking lot is a conspicuous cut through the Johnstown moraine just to the east of the remains of the Johnson farm. The low point in the moraine is a channel eroded into the bed of the glacier and through the moraine by a stream that

drained meltwater from the glacier. The floor of the channel slopes upward, to the south, toward the ice margin, indicating that the stream was flowing in a tunnel under the ice. Similar channels were cut beneath the margin of the glacier across much of Wisconsin. Attig and others (1989) interpreted the channels to have formed when meltwater from the thawed bed beneath the glacier burst through a zone along the margin where the glacier was frozen to its bed. A string of small ponds, the Johnson Ponds, marks the bed of the channel. These small kettle lakes probably formed when flow through the tunnel diminished and ice in the roof of the tunnel collapsed. The remaining meltwater drainage through the tunnel filled the area around the ice blocks with sand and gravelly sand. The ice blocks eventually melted, leaving the depressions that now are ponds or small wetlands.

Glacial lake in Steinke Basin. Before the advance of the Green Bay Lobe onto the north side of the Baraboo Hills, Steinke Basin was drained by a stream that flowed to the north. The advancing ice blocked the north-facing valley and dammed a lake in Steinke Basin. The water level in the lake rose until it was high enough to spill out of the south end of the basin and flow westward to the northeast end of Devils Lake. The Johnstown moraine now forms the drainage divide at the north end of the basin. Samples from a drillhole about 300 m south-southeast of the parking lot showed about 10 m of lake sediment overlying quartzite.

Ice-marginal fan. A sediment fan was deposited where the meltwater stream flowed from beneath the glacier into the lake in Steinke Basin. The fan can best be viewed from Highway DL about 200 m west of the entrance to the parking lot in Steinke Basin. From that point the mouth of the tunnel channel can be seen to be the apex of a fan of sediment that was deposited between the margin of the ice and the lake. The surface of the fan slopes to the southwest, south, and southeast, away from the apex. Much of the surface of the fan is now cropland that, when freshly plowed, reveals the nature of the sediment in the fan. At the mouth of the tunnel channel, cobbles are present near the apex of the fan. A short distance from the mouth of the tunnel channel, cobbles are absent and the fan is composed entirely of sand. This change in grain size is the result of decreased gradient downstream from the apex of the fan.

References

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