



Mapping Inland Lakes at Isle Royale and Pictured Rocks

A bathymetric map is the submerged equivalent of a topographical map, designed to provide a representation of the underwater terrain. For many of the lakes whose water quality is monitored by the Great Lakes Inventory and Monitoring Network, bathymetric maps do not exist or are outdated.

In 2007 Network staff began bathymetric mapping of nine inland lakes at Isle Royale National Park, using a Garmin GPSMap 430S (single-beam sonar) deployed from a small boat or canoe (*see photo at right*). Similar mapping began at Pictured Rocks National Lakeshore in 2011. As of 2014, mapping has been completed at all nine inland lakes we monitor at Isle Royale and three out of the six lakes we monitor at Pictured Rocks.

Why do we need bathymetric maps?

- To identify or confirm the deepest areas of lakes, which is where, according to our sampling protocol, water quality monitoring should take place.
- For a few lakes, to identify or confirm locations to deploy year-round surface-to-lake-bottom water temperature sensors.
- To calculate basic physical properties of lakes such as volume and proportion of the lake suitable for growth of submerged aquatic vegetation.
- Where possible, to compare newly-generated electronic maps with older paper maps to detect changes in lake depth.
- To provide to park managers and partners for research purposes, and to the public for recreational use.



Mapping the bottom of a lake at Pictured Rocks National Lakeshore.

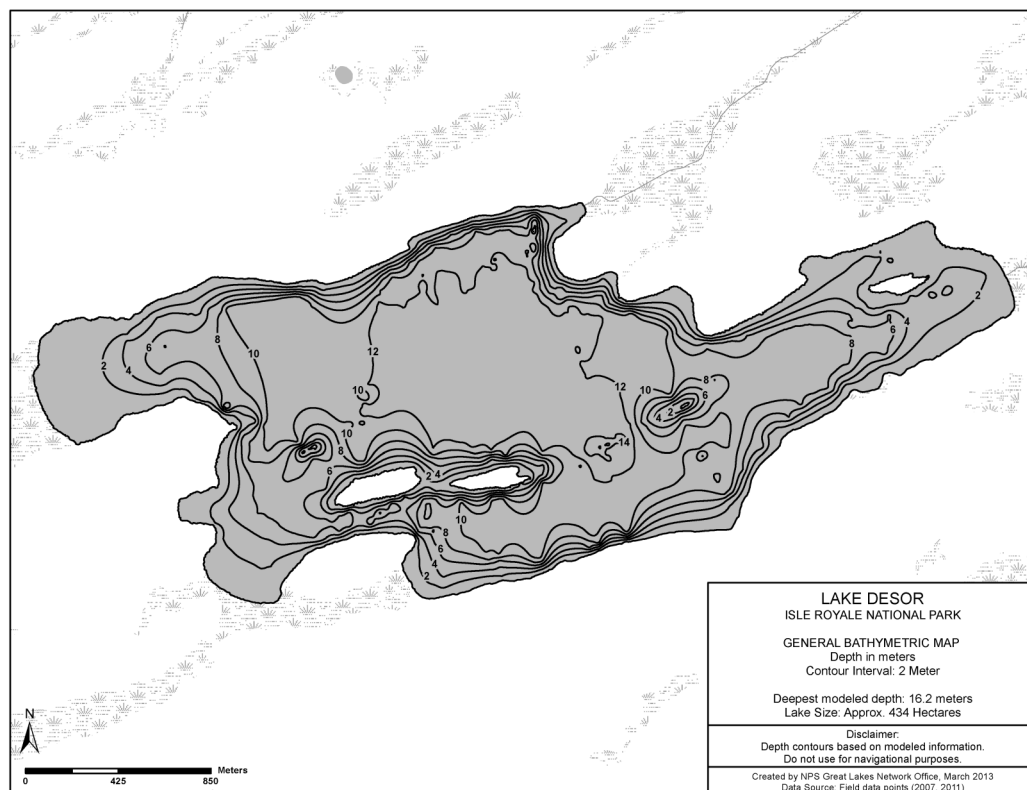


Figure 1. Bathymetric map for Lake Desor, Isle Royale National Park, in grayscale on a shaded background with mapped wetlands and hydrology.

What We're Finding

After some initial trial and error for both field data collection and in-house data processing and analysis, we now have standard operating procedures for bathymetric mapping that will be incorporated into our Inland Lakes Water Quality Monitoring Protocol. Having an electronic bathymetric record allows for nearly unlimited ways to display the data against a variety of backgrounds and base layers (*Figures 1 and 2*).

Additional Uses and Future Work

To date our bathymetric maps have been:

- Incorporated into natural resource inventories at both Isle Royale and Pictured Rocks,
- Used by NPS partners and researchers for modeling the effects of climate change on inland lakes,
- Added to a database of bathymetric surveys in natural lakes for use as a reference in lake sedimentation and coring studies, and
- Used to help inform lake fisheries work at Isle Royale.

All Isle Royale lakes for which bathymetric maps were created by the Network are publically available online at the National Park Service's Integrated Resource Management Applications portal (IRMA; see URL below). Maps for lakes at Pictured Rocks will also be available to the public after work at the park is complete (expected in 2015). At that time, we will shift our efforts to lakes at Sleeping Bear Dunes National Lakeshore.

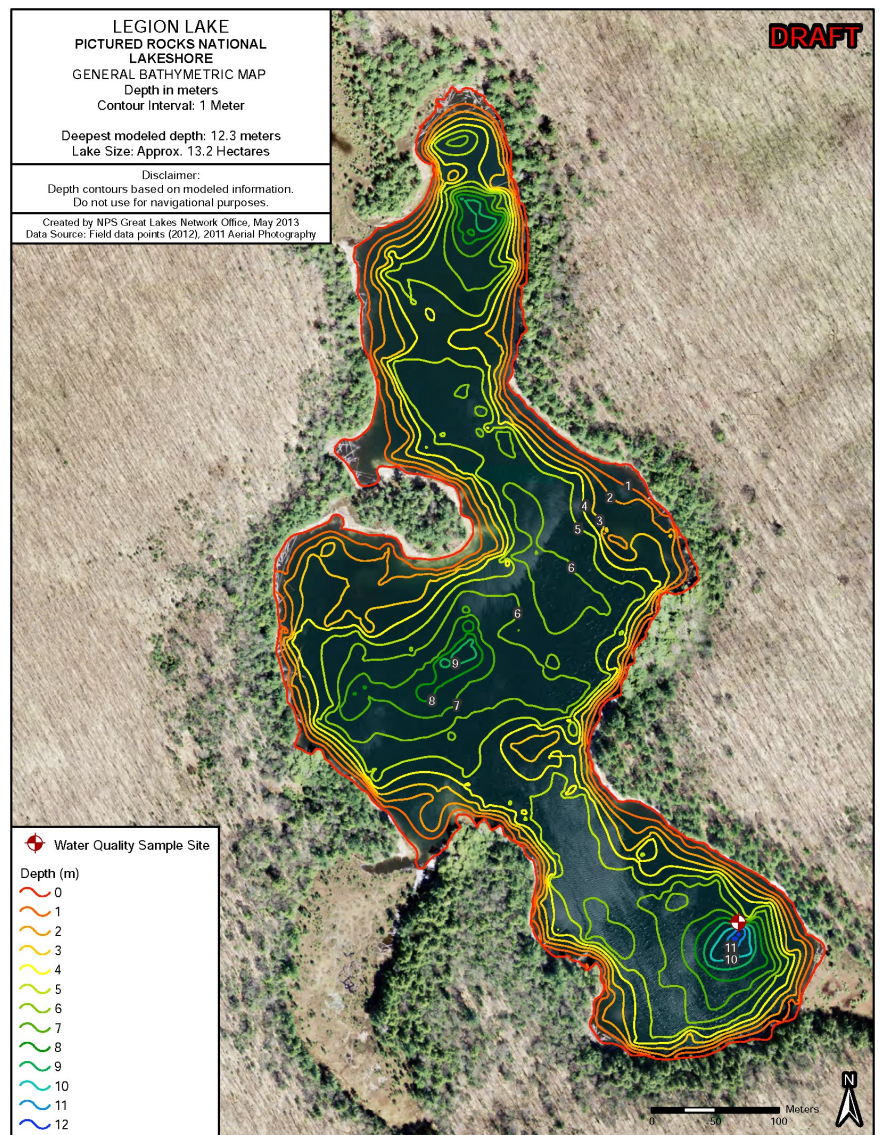


Figure 2. Bathymetric map for Legion Lake, Pictured Rocks National Lakeshore. The map is superimposed on a color aerial photograph showing conifers around the lake's shoreline, while the surrounding area is composed of hardwoods (photo was taken in the spring before leaves had opened).

Explore full-size images of these and other lake maps online at

<https://irma.nps.gov/App/Reference/Profile/2193087>