

IDENTIFYING WATER SOURCES ON THE NORTH SLOPE, ALASKA FOR GEOLOGIC EXPLORATION

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EXPANDED ABSTRACT

The National Mapping Division and Water Resources Division of the U.S. Geological Survey have produced a digital inventory of lakes on the North Slope of Alaska. The lake inventory represents an innovative utilization of Landsat multi-spectral scanner (MSS)-derived land cover classifications that were previously developed to meet other resource inventory objectives. The inventoried region consists of the area above the 69th parallel and comprises sixteen 1:250,000-scale quadrangles. Approximately 23,000 North Slope lakes can be accessed within the digital data base (lakes with areas less than 5 acres were not included in the inventory).

Land cover classified MSS data were processed to locate water bodies and to classify them as deep, shallow or turbid, or ice. Digital procedures to create the lake inventory were developed at the EROS Alaska Field Office and the EROS Data Center in Sioux Falls and incorporated algorithms contributed by the Bureau of Reclamation. Digital processing was done at the Alaska Field Office.

The primary purpose of the lake inventory was to identify deep lakes on the North Slope and to estimate their size. Water is needed for petroleum exploration and production activities. Because of the permafrost, ground water is usually unavailable. Also, shallow lakes freeze to the bottom, prohibiting their use as a water source during the

winter months. Therefore, information on the location and size of deep lakes is needed to identify year-round water sources.

The digital lake inventory provides users a digital data base with capabilities to update and to produce tabular or map outputs. The digital data base includes locations of lake centers in latitude and longitude, a unique number for each lake within a 1:250,000-scale quadrangle, the acreage of each lake, and the acreage for each water class (deep, shallow or turbid, or ice) within a lake. In addition, the data bases were designed to accommodate field attribute data such as lake depth, water quality, volume of water, and ice thickness. As additional attributes are collected or changes in attributes are noted, users can update the data base to include new data.

Using Boolean expressions, the user can interactively retrieve any of the lake attributes stored in the data base and produce a tabular report. Also maps of lake center locations, with lake numbers and maps showing the inventoried water classes, can be produced at scales to match the scales of standard U.S. Geological Survey maps. The output products then can be used as overlays on the topographic maps to provide simple correlation between information on the topographic maps and data from the digital lake inventory.

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Northern part of map of gold and coal fields of Alaska with principal steamer routes and trails (U.S. Geological Survey, 1898, scale 1:2,500,000).