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LAKE-LEVEL FLUCTUATIONS IN THE
KENAI-SOLDOTNA AREA, ALASKA
1967-71

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FLUCTUATIONS - KENAI

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LAKE-LEVEL FLUCTUATIONS IN THE KENAI-SOLDOTNA
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The numerous lakes in the Kenai-Soldotna area form an important part of the total water resource. They are natural reservoirs in which water is temporarily stored; their net effect is to reduce peak runoff and to increase low flows. The lakes are also valuable in terms of scenic and recreational attractions.

Lake basins of the Kenai-Soldotna area are glacial in origin and are distributed throughout the areas mapped as glacial moraine and drift (fig. 1). The water level in many lakes in the drift deposits reflect the general shallow or unconfined water table. Such lakes occupy depressions that extend below the ground-water level, and the fluctuation of the lake level is similar to the fluctuation of adjacent ground-water levels. The lakes in glacial moraine are perched, that is, their water levels are generally above the regional ground-water table. Thus, adjacent lakes may have widely different water levels.

From 1967 to 1970, a period of below-normal precipitation, water levels in lakes dropped from a few inches to as much as 6 feet (fig. 1). The magnitude of these declines was documented in 1970 from discussions with local residents, comparisons of aerial photographs, and field surveys. The field surveys included measurement of elevation difference between the present water surface and the highest established beachline. For example, the highest established beachline is illustrated in Figure 2, a photograph taken during the survey of Lake Suneva.

The magnitude of net change from 1970 to 1971 was determined by resurveying (fig. 3) the water surface relative to reference marks established during the 1970 survey.

Results of the 1970 lake survey did not indicate a definite pattern to lake-level declines. The greatest declines were observed in closed basins in drift deposits (fig. 1), and the maximum decline of 6 feet was measured in three lakes near the industrial plants. Minimum declines were observed in perched lakes in the morainal deposits and lakes interconnected by streams in the drift deposits. Lakes in the morainal deposits may have been lower during 1969, but they would be expected to recover faster during the near-normal precipitation of 1970 because little of their inflow would be lost to ground-water recharge. Lakes interconnected by streams generally maintained a constant water level during the drought period; presumably the lake levels were maintained by surface-water inflow. The range of lake-level decline is comparable to the decline of shallow ground-water levels. As with decline of the ground-water levels, the drought conditions of 1968 and 1969 may have been the principal cause of lake-level declines. Results of the 1971 lake survey indicated a pattern of continued water-level decline near the industrial plants but a slight recovery of the water levels in lakes located more distant from the industrial plants (fig. 3). However, in most places, the net change between the 1970 and 1971 levels were less than 1 foot, and many lake levels remained far below normal. The exception was Lake Suneva that recovered 4 feet between 1970 and 1971 and in 1971 appeared to be at a level near its highest variable beachline. During the 1970 survey, a tributary inflow stream to this lake was observed with no flow; and during the 1971 survey, the tributary was observed to be flowing.

The lake-level declines coincided with the drought conditions that extended from 1967 to 1970. During this period, many lakes throughout the Kenai lowlands and south-central Alaska declined to record low levels. Even though precipitation since 1970 has been near normal and some lakes showed recovery, many still have below-normal water levels. The greatest measured decline has been near the industrial plants.

Explanation

1/2 0 1 2 3 4 MILES

△-6 Lake level the indicated number of feet below highest established beach line.

▨ Areas of industrial ground-water withdrawal.

— Geologic contacts

Qgm Morainal deposits.

Qdu Drift deposits

Qop Outwash-plain deposits.

Qac Abandoned-channel deposits.

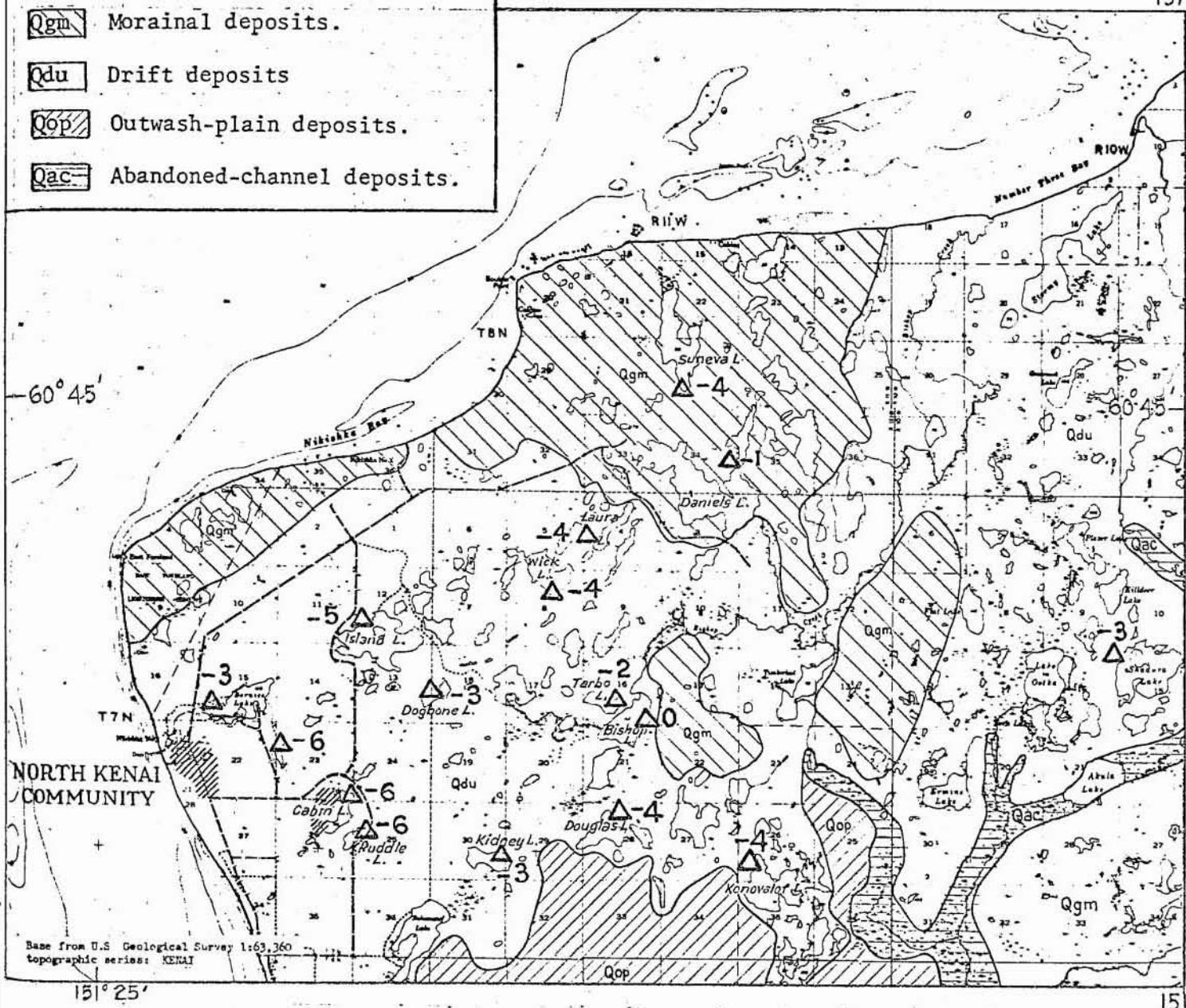


Figure 1.--Relation of 1970 lake levels to the highest established beach line; and geology of the Kenai-Soldotna area.



Figure 2.--Lake Suneva near Kenai showing decline of water level, summer 1970.

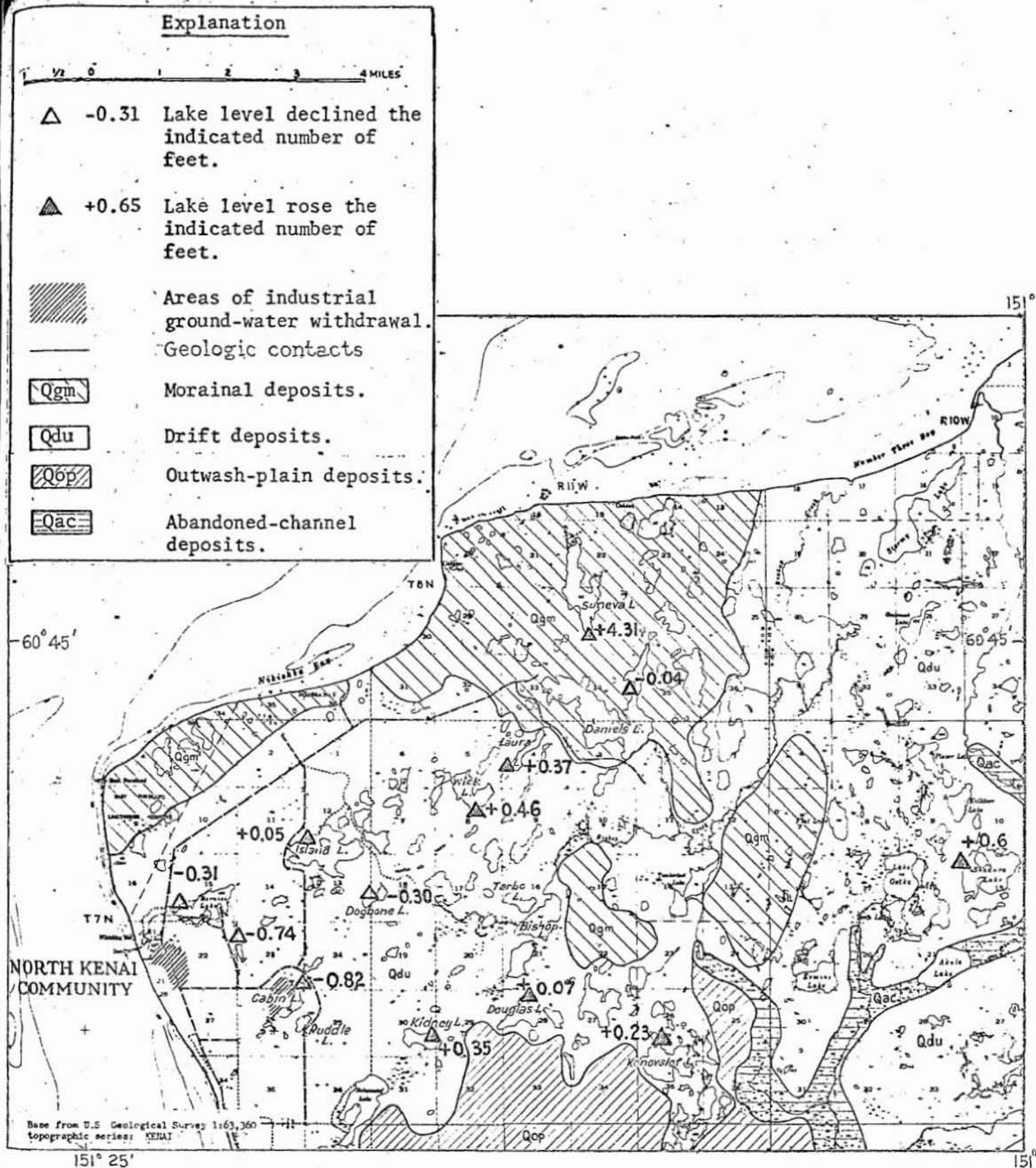


Figure 3.--Change in lake levels between the summers of 1970 and 1971; and geology of the Kenai-Soldotna area.