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POSSIBLE EFFECTS ON LAKE ABERT OF A PROPOSED IMPOUNDMENT ON CHEWAUCAN RIVER, SOUTH-CENTRAL OREGON

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By

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This statement is a response to questions raised by personnel of the U. S. Forest Service, Lakeview, Ore., with respect to the possible effects on Lake Abert and its basin if the proposed Coffeepot Reservoir is built on Chewaucan River. The responses are keyed to paragraphs in a letter of inquiry but are self-explanatory without reference to that letter.

Question in paragraph 3

Nowhere in U. S. Geological Survey Professional Paper 502-C is it stated that the present level of Lake Abert is 4,260 feet above mean sea level (as of the Fall of 1975, the lake surface was at about 4,258 feet--well above average). When considering long-term effects on the lake, the long-term average lake level is more pertinent than the level at any particular time, owing to the influence of natural climatic fluctuations. Table 3 in my recent report (Van Denburgh, 1975, p. C 10) indicates that the average level for 1916-65 was about 4,250 1/2 feet, which is equivalent to a lake-surface area of about 31,000 acres. According to my estimates, Chewaucan River has supplied an average of about 62,000 acre-feet per year during the same long-term period. This quantity does not quite balance the estimated average value for annual net evaporation (total evaporation minus lake-surface precipitation; about 2.5 feet, as indicated in table 3). A small amount of inflow from peripheral springs and streams (perhaps about 5,000 acre-feet per average year--see p. C 7) improves the balance. The small remaining imbalance probably can be explained by unavoidable errors of estimate and by the fact that the lake can dry completely even under near-natural circumstances (see figure 4). Note that the quantity of seep and spring flow actually reaching the lake is considered to be small (see paragraph 3, p. C 7 of Professional Paper 502-C, and p. B 12 of Professional Paper 502-B (Phillips and Van Denburgh, 1971)).

To answer the main question in your paragraph 3, the situation at Lake Abert would resemble that at Summer Lake (about 20 miles northwest of Lake Abert) if a large proportion of the potential inflow were depleted upstream. However, I have no way of knowing whether the dust problems at Lake Abert would be any more "tremendous" than the present situation at Summer Lake.

Questions in paragraph 4

Lake Abert presently contains 15 to 16 million tons of dissolved salts. As the lake recedes owing to evaporation, the ratio of water to salts decreases, which would be equivalent to an increase in the dissolved-solids concentration. This can occur naturally during periods of drought, but it also would occur in response to man's depletion of potential inflow, for example, by the construction of an upstream reservoir. The much smaller resulting lake would have a dissolved-solids concentration significantly greater than the 50,000-70,000-ppm(parts per million) average estimated for 1916-65 (see Professional Paper 502-C, p. C 28, paragraph 3). The five paragraphs beginning with the last paragraph on page C 20 describe this hypothetical situation.

The turbidity of Lake Abert is affected by several factors, including the abundance and turbidity of inflow. The potential effect of the proposed Coffeepot Reservoir on lake turbidity is difficult to evaluate because not enough is known about the present-day relations among the quantity, timing, and turbidity of streamflow at the river mouth versus the situation upstream from Paisley.

Question in paragraph 5

The water surface of Lake Abert is characteristically at 4,250-4,255 feet. Land-surface altitudes for almost all of the lower marsh exceed 4,280 feet, and the ground-water table is shallow. Closest areas of major pumping presumably would be more than 1 mile from the lake, and the sedimentary deposits from which the wells probably would drain water may be isolated from the lake and its underlying sediments by bedrock. For these reasons, and because of the fine-grained, impermeable character of the lake-bottom sedimentary deposits, I doubt whether heavy pumping in the lower marsh would have a significant effect on the lake level. The pumping could affect the quantity of flow in the river, however.

REFERENCES

Phillips, K. N., and Van Denburgh, A. S., 1971, Hydrology and geochemistry of Abert, Summer, and Goose Lakes, and other closed-basin lakes in south-central Oregon: U. S. Geological Survey Professional Paper 502-B, 86 p.

Van Denburgh, A. S., 1975, Solute balance at Abert and Summer Lakes, south-central Oregon: U. S. Geological Survey Professional Paper 502-C, 29 p.