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Key research paper: abstract. full paper link: see below

HYDROLOGICAL CONTROLS AND FRESHENING IN
MEROMICTIC SOAP LAKE, WASHINGTON, 1939-20021
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ABSTRACT: The chemically stratified layer of naturally formed meromictic lakes exhibits unusual and often extreme physical and chemical conditions that have resulted in the evolution of uniquely adapted species. The Columbia Basin Irrigation Project appears to have had a marked effect on the hydrology of Soap Lake, a meromictic lake in the Grand Coulee of central Washington. The relation of hydrology to salinity was assessed by analyzing water budgets before and after the introduction of the irrigation project. Before irrigation, water gains were balanced by losses; after irrigation began groundwater gains approximately doubled. To manage lake levels and reduce groundwater influx, wells were installed to intercept groundwater.

Although the hydrological cycle has been restored to pre-irrigation conditions, the meromictic character of the lake continues to change. Interception wells remove 10 to 16 Mm³ of groundwater annually, but influx continues based on change in the monimolimnion. From 1958 to 2003 the chemocline descended 1.1 m and the volume of the monimolimnion from 698,000 m³ to 114,000 m³. Annual loss of volume is occurring at a rate of 1.9% since 1958.

Although groundwater interception wells are maintaining the volume of the entire lake, the recession of the chemocline indicates that conditions that have maintained meromixis at Soap Lake are currently not in equilibrium.

(KEY TERMS: surface water D groundwater interactions; irrigation; lakes; groundwater management; meromixis.)

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Soap Lake, Washington, 1939-2002. Journal of the American Water Resources Association (JAWRA) 46(4):744-

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