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WATER NOTE

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STURGEON LAKE RESTORATION: DIAGNOSTIC/FEASIBILITY STUDY

SCOPE OF RESEARCH

An extensive investigation of the physical, chemical and biological characteristics of Sturgeon Lake was conducted during 1980-82. The information gained was used to identify, document, and diagnose water problems at Sturgeon Lake that may affect its uses and particularly its use by waterfowl. The investigation goal was to analyze the restoration needs and the possibilities for effectively dealing with the diagnosed problems.

THE PROBLEM AND RESEARCH FINDINGS

Sturgeon Lake, during the past four decades, has become an off-channel sedimentation basin for the Willamette and Columbia Rivers. Diking, dredge spoil disposal, blocking of creeks, and reservoir flood control operations have contributed to this change. In addition to rapid sedimentation and locally encroaching shore vegetation, water quality in the lake is poor due to relatively large amounts of organic matter and seasonally-high bacteria levels.

Sediment-laden river water fills the lake after each big storm. Sediment deposition has caused the lake bed to become predominantly fine silt. The rate of sedimentation is not as rapid as was earlier perceived; maximum accumulation of sediment is less than one inch per year. However, wildlife, cattle, waterfowl, fish, and other aquatic life add organic matter to the lake. Wind-waves keep the system sitrred up and cause currents that, along with tidal action, distribute sediment and organic matter throughout the lake.

The lake is quite shallow in late summer, having an average depth of 1.5 feet. Reservoirs in the Columbia River system have reduced the spring and summer snowmelt runoff and associated water levels at the lake, compared to natural conditions. Use of average numbers to describe the size or depth of the lake and to compare these values with past observations is very difficult. In any given year, the lake surface fluctuates by 10 or more feet, causing its mean depth to change by a factor of about six, its area by a factor of about three, and its volume by a factor of about 15.

The lake remains quite usable for waterfowl, which seldom feed on the lake but use it as a resting area and sanctuary. But shoaling is permitting local encroachment of willows along the shore. Coliform bacteria levels in the lake are seasonally higher than desireable for water contact activities.

A major problem is the inadequate periodic flushing of the lake. Without good flushing, siltation and poor water quality will continue to contribute to a slow deterioration of the lake.

THE OPTIONS

Many options exist for attempting to remedy the shoaling and water quality problems at Sturgeon Lake. Some are better than others at dealing with the causes of lake problems. Some only deal with symptoms. Others are little more than short-term maintenance efforts.

Ten major categories for options were evaluated. These are: (1) dredge the lake; (2) reopen Dairy Creek to improve flushing; (3) use dikes in the lake to flush the lake; (4) control the inflow through Gilbert River; (5) completely isolate the lake; (6) use settling basins to desilt the entering water; (7) control shoreline vegetation; (8) control the input of organic nutrients; (9) consolidate and shrink the bottom sediments; and (10) leave the lake alone.

RECOMMENDED ACTION

The researchers recommend that a long-term solution be implemented that will let the lake take care of itself as much as possible. The most effective action identified is to reopen Dairy Creek where it has been blocked by dredge spoils at the Columbia River.

The flushing benefit of reopening the creek can be maximized if a short-cut channel is excavated from Reeder Road into the south part of Sturgeon Lake east of Coon Point. This shortened route will maximize the flushing effect. The clearer water from the Columbia River will mix with the turbid lake water on incoming tides or rising river levels and help carry suspended sediment, organic matter, algae and bacteria out of the lake on outgoing tides - - just as used to happen years ago.

Sturgeon Lake will not become appreciably deeper than it now is. However, the lake's primary use is as a waterfowl refuge; this use will be protected if the present lake depths can be maintained. Also, fishing benefits can be protected and somewhat improved with greater lake flushing.

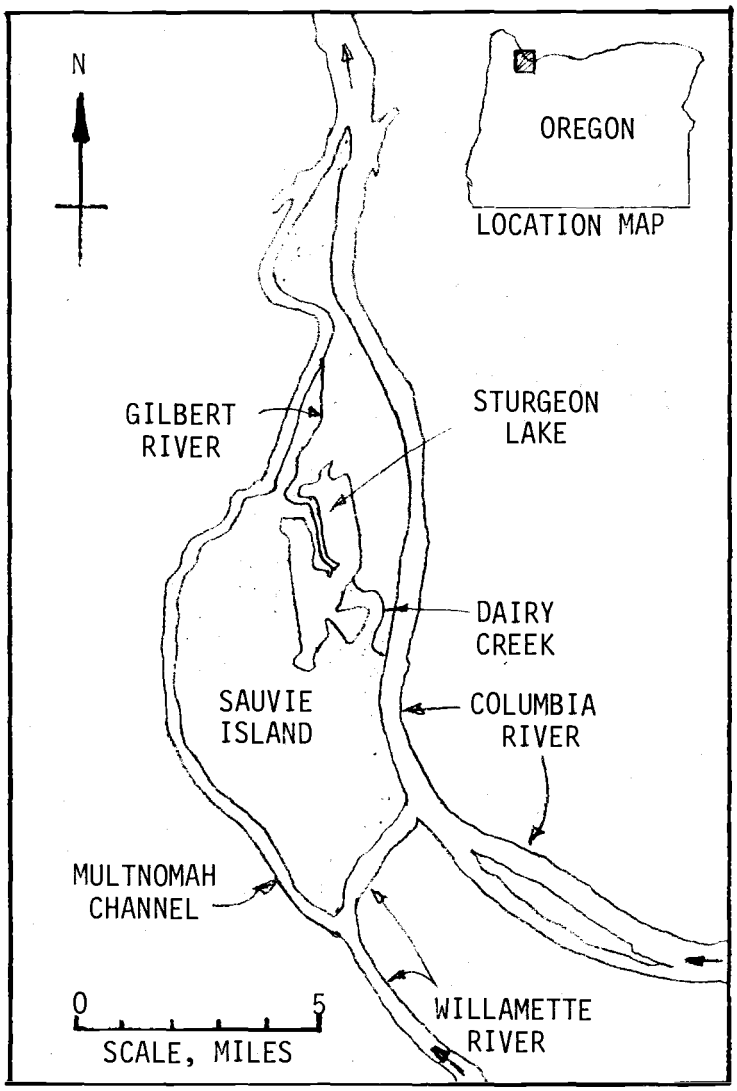
OTHER BENEFICIAL OPTIONS

Other options can be implemented as well. Removal of encroaching willows can arrest their spread, but some bird and wildlife habitat may be lost. Localized excavation of exposed unvegetated shore sediment will help maintain the lake volume and simultaneously provide a source of soil that is suitable for growing crops.

THE LIKELY COSTS

Costs are difficult to estimate accurately on water-related construction. Inflation and the recession have added to the uncertainty involved. Furthermore, implementation may not take place immediately. Some choices can be made in design that will also affect the cost. Therefore, a general target cost is presently $675,000.

Some of the included costs involve work that could instead by undertaken by organized volunteer civic groups. Costs that can not be avoided involve design, skilled labor and heavy equipment seldom available to volunteer groups.



WHAT IF NOTHING IS DONE?

The question remains, what if no action is taken in the near future? It is expected that the lake will slowly continue to shoal due to continued sediment input. The water quality will remain marginal-to-poor and bacteria levels will seasonally inhibit use of the lake. But wind-wave agitation will remain an effective means of resuspending the settled sediment so that tidal flows can carry some of it back out of the lake. Hence, Sturgeon Lake will remain a usable waterfowl habitat as long as nearby lands continue to be available as feeding grounds.

PROJECT DATA

Investigation Period: September 16, 1980- July 31, 1982

Sponsors of Investigation

Funding Sponsor: U.S. Environmental Protection Agency (Clean Lakes Program)
Lead State Agency: Oregon Department of Environmental Quality
Local Sponsor: West Multnomah Soil and Water Conservation District (WMSWCD)
Contract Participants (work, technical assistance, cost sharing)
- Water Resources Research Institute, Oregon State University
- Oregon Department of Fish and Wildlife
- West Multnomah Soil and Water Conservation District
- U.S.D.A. Soil Conservation Service with WMSWCD
- Soil and Water Conservation Division, Oregon Department of Agriculture (with State Soil and Water Conservation Commission and WMSWCD)

Investigation Team

Co-Principal Investigators: Professor Peter C. Klingeman, OSU Civil Engineering Department/WRRI; Professor Robert L. Jarvis, OSU Fisheries and Wildlife Department
Associated Investigators: Professors David A. Bella and Peter O. Nelson, OSU Engineering Department
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Technical Assistants: Michael W. Spalti, Jeffrey M. Pike

REPORTS AVAILABLE FROM WRRI

Technical Report 1: Physical, Chemical and Biological Description of Sturgeon Lake. 1982. 124+ pp. Cost $4.00.
Technical Report 2: Sturgeon Lake Problem Diagnosis, Options for Restoration, and Recommendations. 1982. 52+ pp. Cost $2.00.
Appendix Set 1 (Schedule and Biology). 1982. 53+ pp. Cost $2.00.
Appendix Set 2 (Hydrology, Hydraulics, Hydrography). 1982. 145+ pp. Cost $5.00.
Appendix Set 3 (Water Quality). 1982. 44+ pp. Cost $2.00
Appendix Set 4 (Sediment). 1982. 179+ pp. Cost $6.00

Order requests should identify specific reports desired and be accompanied by prepayment check, payable to Water Resources Research Institute. Prices listed include mailing (4th class) and handling charges.

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