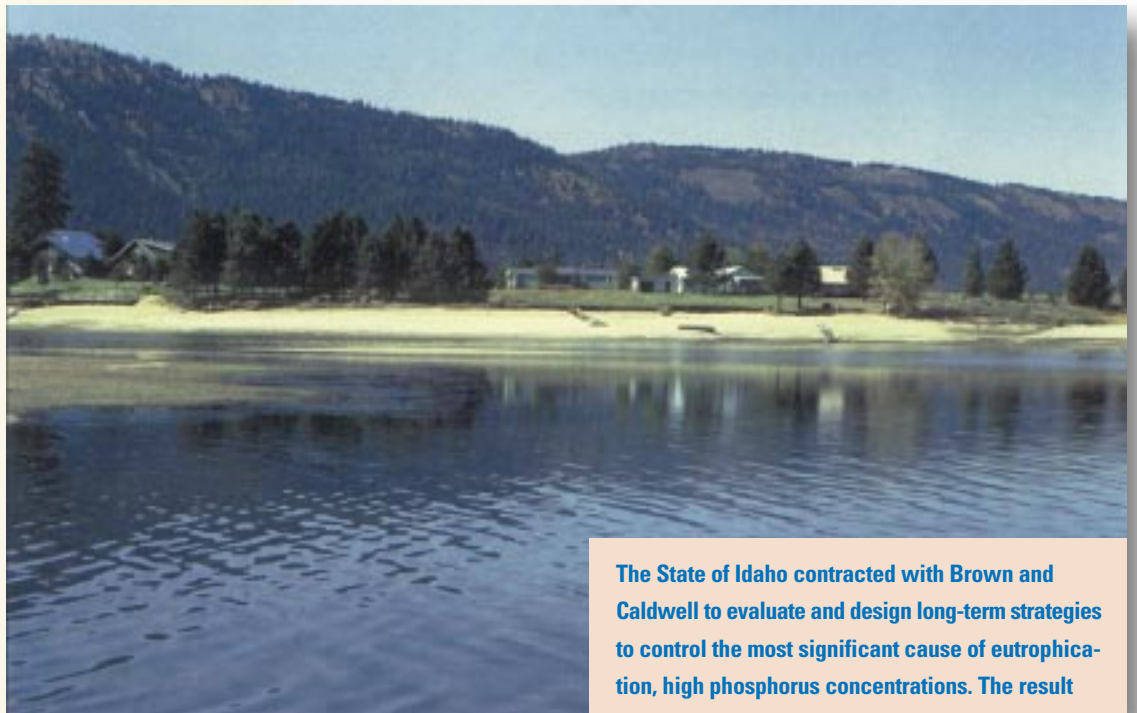


Source-Control Strategies Protect Against Eutrophication

Brown and Caldwell developed an integrated watershed management strategy to enable local agencies and citizens to restore and protect one of Idaho's most valuable water resources.



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The State of Idaho contracted with Brown and Caldwell to evaluate and design long-term strategies to control the most significant cause of eutrophication, high phosphorus concentrations. The result was an integrated watershed management strategy to increase watershed detention and to increase uptake of phosphorus at source locations.

THE SITUATION

Located in Valley County, Idaho, the Cascade Reservoir had supported a healthy aquatic community in the past and was the most popular fishery in the state. But rapid development in the watershed, with consequent inflow of excessive nutrients, had led to rampant algae blooms and depletion of dissolved oxygen. Contributors to the influx of nutrients included point sources (domestic wastewater and fish hatchery waste), as well as nonpoint sources (agriculture, forestry, septic tanks, internal recycling, and urban/recreation activities).

By the early '90s, noxious algae blooms, increasing growth of aquatic weeds, and episodes of fish kills had aroused public concern. A severe outbreak of toxic blue-green algae in 1993 caused the death of 23 cattle after they drank reservoir water. The reservoir's large size and relatively shallow depth (25 feet, on average) compounded the problem. Phosphorous inflow from the surrounding watershed was particularly damaging to water quality.

CONTINUED ON BACK

After several years of monitoring, the Idaho Department of Health and Welfare, Division of Environmental Quality (IDEQ) developed a nutrient-management plan that included programs to reduce nonpoint-source inputs. And the state contracted with Brown and Caldwell to design engineering improvement projects to reduce inputs of phosphorous and sediment.

Solutions

After evaluating several watershed management techniques, Brown and Caldwell developed an integrated strategy to increase basin water detention and increase uptake of phosphorous. A key element of the strategy was a stormwater best management practice (BMP) handbook that was adopted by local agencies. Among other measures, the BMP handbook advocated controlling erosion from construction sites and creating wetlands and wet detention basins. Brown and Caldwell also took the following measures:

- Used a geographic information system to develop recommendations for prioritizing BMPs by subwatershed.
- Reviewed and evaluated numerous in-reservoir management techniques. These included chemical approaches such as sediment oxidation with aluminum sulfate; biomanipulation through controlled use of viruses and bacteria; physical approaches, including hypolimnetic withdrawal and artificial circulation; and harvesting algae and wetland plant material. The evaluation process considered several criteria, including effectiveness, planning costs, potential for negative impacts, and applicability to the unique conditions at Cascade Reservoir.
- Conducted a preliminary feasibility study of large-scale detention structures at three primary reservoir tributaries.
- Provided decision-making tools, including a summary matrix of watershed management techniques and associated performance and cost factors, to agency and community leaders.

Details

- System specifications: 300 miles of pipe, ranging from 8 to 114 inches in diameter
- Completed in May 1949, the Cascade Reservoir was constructed to provide flood control, irrigation storage, and recreation.
- The reservoir reached full capacity in June 1957.
- The total watershed encompasses approximately 357,000 acres, with forestlands composing more than 77 percent of the acreage and agricultural lands accounting for 17 percent.

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