



Focus on Rathdrum-Spokane Aquifer Study

from Ecology's Water Resources Program, Eastern Region

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Studying a bi-state underground resource

History

The Rathdrum-Spokane aquifer is located in Spokane County, Washington, and Bonner and Kootenai counties, Idaho. It is the sole source of drinking water for more than 500,000 residents, and that number is expected to rise significantly.

In the summer of 2001, Idaho received several requests for large, new water-rights from the Rathdrum-Spokane aquifer. The amount of water requested raised concern among community leaders and public interest groups in Spokane and Kootenai counties.

In 2002, a large number of water users in the Spokane-Coeur d'Alene area convened a series of meetings to discuss how to meet the water needs of future urban growth in the Spokane River basin.

It became apparent that our region lacked the scientific data to sufficiently define and agree upon the sustainable capacity of the aquifer. Decision-makers were relying on a number of small-scale and sometimes conflicting studies. Managing the resource across state boundaries added to the complexity of the situation.

Recognizing this problem prompted several organizations in the region to pursue a comprehensive, bi-state study of the aquifer. The organizations included: Idaho and Washington chambers of commerce, the Kootenai Environmental Alliance, and The Lands Council in Spokane.

Federal and state appropriations were secured to conduct a comprehensive hydro-geologic study of the aquifer. The study was conducted jointly by the Washington Department of Ecology (Ecology), Idaho Department of Water Resources (IDWR), and U.S. Geological Survey (USGS). They worked with the help of academic experts and the group of water users that began the process.

The study was completed in three years, at a cost of approximately \$3.5 million. This included about \$2.6 million from federal sources and about \$750,000 in state funds and staff-time contributions.

Conducting the study

Getting a precise picture of what the aquifer basin looks like underground involved many researchers and cutting-edge technologies. Researchers from at least nine institutions directly participated in the study, including:

- USGS in Boise, ID; Tacoma, WA; and Menlo Park, CA
- State of Washington Water Resources Research Center
- Idaho Water Resources Research Institute
- Idaho Department of Water Resources
- Washington Department of Ecology
- University of Idaho
- Washington State University.

Water purveyors, water districts, city, county public works, health, and local conservation district officials also were instrumental. Large thanks also go to the countless well and property owners who provided information and granted access to their wells.

The following are some of the activities conducted over some 40 months of research:

- Researchers took "snapshot" measurements of stream flows in the Spokane and Little Spokane rivers at more than 20 points. Two sets of these readings were obtained during summer low flow, and one during spring runoff.
- Two more projects measured the water table elevation at 268 wells throughout the area. Use of Global Positioning System technology enabled precise comparison of all 268 wells and approximately 100 other points.
- Ecology and USGS installed automatic instruments to measure water levels in 20 wells throughout the aquifer area.
- Fifty-six additional wells were measured monthly by USGS. Other entities measured many others.
- Nearly 1,000 new geophysical gravitational field measurements, added to an existing set of 1883, completed the basin shape evaluation.
- Researchers collected lake-level data from all nine lakes in the vicinity and stream-gauging information from seven stream-flow gauges.
- Nearly all the water purveyors in the study area provided precise information on their water use during the period 1990-2005.
- Daily weather data, for six local stations, over a 15-year period was the basis for estimating aquifer recharge from rain and snow in the basin.

A technical advisory committee with 13 government, industry, and university representatives reviewed the draft material. An independent peer-review team then checked the final products.

Study Results

The study augmented several previous studies of the Rathdrum-Spokane aquifer conducted over the past four decades. It confirmed the aquifer is largely "unconfined," meaning that there is no hard, impervious top to the water table. Moisture can seep through the ground to the aquifer water. The exception to this is in the vicinity of the Little Spokane River north and west of Spokane. Here a continuous clay layer divides the aquifer into an upper *unconfined* unit and a lower *confined* unit.

Building upon previous work, the hydro-geology of the region has been completely reassessed. By incorporating recently available geologic information, scientists have revealed an extremely complex "map" of sediments and water, making up the aquifer.

Using geophysical tools, scientists have "looked" under the surface of the area. The result is a new, detailed estimate of the shape of the basin. Project partners are confirming that estimate with drill testing.

Frequent measurements of stream flow and groundwater levels during the study have given scientists the data needed to better understand ground and surface water and their interaction. This study refined previous estimates of groundwater-flow directions and rates. This resulted in a better understanding of the interaction between groundwater and surface water, particularly Lake Pend Oreille and the Spokane and Little Spokane rivers.

Groundwater-flow computer model

The most important product of this study is a groundwater-flow computer model of the Rathdrum-Spokane aquifer system. A team of experts representing each of the participating agencies developed the model. It will be a valuable tool for future management of water resources in the Rathdrum-Spokane watershed. The model can be used to predict how proposed groundwater and surface-water withdrawals will affect the aquifer. It can also predict the effects of various water management scenarios, such as:

- Replenishing the aquifer by adding water from other sources.
- Adding storage capacity for dry months.
- Predicting effects of increased growth or conservation efforts.

This computer model includes significantly more data than used in previous models. In addition, test runs of the model closely match actual observations. This shows that the model gives a reasonable picture of groundwater flow in the Rathdrum-Spokane aquifer.

Find the study, and all associated documents, at IDWR's project repository:

<http://www.idwr.state.id.us/hydrologic/projects/svrp/>

The USGS project website:

<http://wa.water.usgs.gov/projects/svrp/>

Ecology's website, for the Spokane River:

http://www.ecy.wa.gov/geographic/spokane/spokane_river_basin.htm

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