Applying knowledge to improve water quality
Pacific Northwest
Regional Water Program
A Partnership of USDA NIFA
& Land Grant Colleges and Universities

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PNWWATER 140

Spokane Valley-Rathdrum Prairie Aquifer: Working Toward a Shared View of the Resource

Approximately 500,000 people in Spokane County, Washington, and Bonner and Kootenai Counties, Idaho rely on the Spokane Valley-Rathdrum Prairie (SVRP) aquifer as their sole source of drinking water. Managing this resource for the mutual benefit of all concerned is a difficult task given the bi-state nature of the watershed. Continuing the collaborative effort initiated by the states of Idaho and Washington and the U.S. Geologic Survey back in 2003, the State of Washington Water Research Center (SWWRC) and the Idaho Water Resources Research Institute (IWWRI) are working together to improve science and outreach activities associated with the original Spokane Valley-Rathdrum Prairie Aquifer (SVRP) model (Hsieh et al. 2007). Surface water and ground water are intimately connected throughout most of SVRP. Surface water bodies such as Lake Pend Oreille, Lake Coeur d'Alene, the Spokane and Little Spokane rivers gain water from, and/or lose water to, the underlying SVRP aquifer. When developing the original MODFLOW computer model researchers acknowledged a need to better quantify the exchange rates of water at the boundaries of the aquifer including the spatial recharge characteristics that account for infiltration of precipitation that occurs over the aquifer. In addition, it was determined that public users needed a straight-forward interface to better understand the implications of water management decisions. Thus, a joint project was proposed to address these issues.

Researchers have installed four climate stations around the watershed to monitor precipitation, wind, solar radiation, temperature, and soil moisture conditions that will enable better estimates of infiltration versus evapotranspiration rates regionally. Ultimately these values will replace theoretically-derived values initially used which will reduce uncertainty in the model and thus improve management decisions.

In order better demonstrate and explain the connectivity between surface and ground water supplies, a series of maps were created. These maps illustrate the location, timing, and magnitude of the effects of continuous ground water pumping and recharge on surface water bodies in the SVRP area. The maps show the spatial distribution of the percentage of pumping or recharge which appears as depletion or accretion in specific surface water bodies in the SVRP at specific times. Results are presented for six surface water bodies: 1) the Spokane River above the Spokane gage; 2) the Spokane River between Avista Dam and Deep Creek; 3) the Spokane River below Deep Creek combined with Little Spokane below Painted Rocks gage and Long Lake; 4) Little Spokane River above Painted Rocks gage; 5) Lake Coeur d'Alene; and 6) Lake Pend Oreille.

The maps were created by performing one simulation of the MODFLOW aquifer model developed by Hsieh et al. (2007) for each of the 5,268 active cells (1/4 mile square) of the model. In these simulations a recharge was applied, in turn, to each cell and changes to the gains and losses of the six reaches were recorded for various elapsed pumping times. Changes in gains and losses were expressed as a percentage of the recharge rate and these values were mapped to provide the estimates of capture illustrated in a series of figures. These maps provide an estimate of ground water

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Pacific Northwest Regional Water Quality Coordination Project Partners

Land Grant Universities

Alaska
Cooperative Extension Service
Contact Fred Sorensen:
907-786-6311
http://www.uaf.edu/ces/water/
University Publications:
http://www.alaska.edu/uaf/ces/publications/

Idaho
University of Idaho
Cooperative Extension System
Contact Bob Mahler: 208-885-7025
http://www.uidaho.edu/wq/wqhome.html
University Publications:
http://info.ag.uidaho.edu/Catalog/catalog.htm

Oregon
Oregon State University
Extension Service
Contact Mike Gamroth: 541-737-3316
http://extension.oregonstate.edu/
University Publications:
http://extension.oregonstate.edu/catalog/

Washington
Washington State University
WSU Extension
Contact Bob Simmons:
360-427-9670 ext. 690
http://wawater.wsu.edu/
University Publications:
http://pubs.wsu.edu/

Northwest Indian College
Contact Charlotte Clausing:
360-392-4319
cclausing@nwic.edu or
http://www.nwic.edu/

Water Resource Research Institutes

Water and Environmental Research Center (Alaska)
http://www.uaf.edu/water/

Idaho Water Resources Research Institute
http://www.boise.uidaho.edu/

Institute for Water and Watersheds (Oregon)
http://water.oregonstate.edu/

State of Washington Water Research Center
http://www.swwrc.wsu.edu/

Environmental Protection Agency

EPA, Region 10
The Pacific Northwest
http://www.epa.gov/r10earth/

Office of Research and Development, Corvallis Laboratory
http://www.epa.gov/wed/

For more information contact Jan Seago at 206-553-0038 or seago.jan@epa.gov

The Project

Land Grant Universities, Water Research Institutes, and EPA Region 10 have formed a partnership to provide research and education to communities about protecting or restoring the quality of water resources. This partnership is being supported in part by the USDA's National Institute of Food and Agriculture (NIFA).

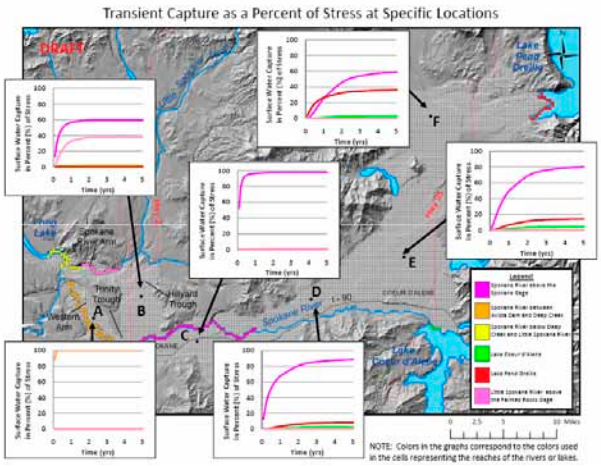
Our Goal and Approach

The goal of this Project is to provide leadership for water resources research, education, and outreach to help people, industry, and governments to prevent and solve current and emerging water quality and quantity problems. The approach to achieving this goal is for the Partners to develop a coordinated water quality effort based on, and strengthening, indivudual state programs.

Our Strengths

The Project promotes regional collaboration by acknowledging existing programs and successful efforts; assisting program gaps; identifying potential issues for cross-agency and private sector collaboration; and developing a clearinghouse of expertise and programs. In addition, the Project establishes or enhances partnerships with federal, state, and local environmental and water resource management agencies, such as by placing a University Liaison within the offices of EPA Region 10.

pumping and recharge impacts on the surface water. The figure below summarizes the outcome of responses across the broad spectrum of the SVRP aquifer.



The ultimate goal of this work will be to provide the public with easy to understand graphics such that management decisions involving the allocation of water around the watershed can be better understood.

IWWRI and SWWRC researchers have been working hand-in-hand to make this project a success by promoting partnerships rather than create a competitive us versus them attitude. This project highlights the benefits of working together in collaborative efforts to reduce duplication and develop a shared view of the resource.

Hsieh, P.A., M.E. Barber, B.A. Contor, Md.A. Hossain, G.S. Johnson, J.L. Jones, and A.H. Wylie. 2007. Ground-water flow model for the Spokane Valley – Rathdrum Prairie Aquifer, Spokane County, Washington, and Bonner and Kootenai Counties, Idaho. U.S. Geological Survey Scientific Investigations Report 2007-5044, 78 p.

National Water Quality Program Areas

The four land grant universities in the Pacific Northwest have aligned our water resource Extension and research efforts with eight themes of the USDA's National Institute of Food and Agriculture.

1. Animal Waste Management
2. Drinking Water and Human Health
3. Environmental Restoration
4. Nutrient and Pesticide Management
5. Pollution Assessment and Prevention
6. Watershed Management
7. Water Conservation and Management
8. Water Policy and Economics

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