Spokane River & Aquifer: An Uncompacted Watershed

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Chapter 1: Watershed Hydrology

- Overview map
- Dramatic formation via glacial floods
- Contemporary boundaries
- Characteristics
Map of Watershed

- Request in to Spokane County GIS for watershed map
The SVRP Aquifer 15,000 years ago

Kahle & Bartolino, Hydrogeologic Framework & GroundWater Budget of the SVRP Aquifer (USGS SIR 2007-5041)
SVRP Aquifer 5 years ago

From: Spokane Valley-Rathdrum Prairie Aquifer Atlas
(Spokane County, et al., 2000)
SVRP Aquifer Today

Kahle & Bartolino, Hydrogeologic Framework & Groundwater Budget of the SVRP Aquifer (USGS SIR 2007-5041)
SVRP Aquifer characteristics

- Unconfined
- Highly transmissive (fast moving)
- Horizontal hydraulic conductivity
  - Ranges from 1,000 up to 52,000 feet/day
Susceptible to contamination

Well head contamination zone

CH2M HILL 2000
Wellhead protection zones
Multiple Ground-Surface Water Connections

Spokane County GIS
Hydraulic Connectivity to the Spokane River

A strong relationship exists between the Aquifer and the Spokane River as it extends throughout the river's length, from Lake Coeur d'Alene to the confluence with the Little Spokane River. Although the Aquifer-River interchange is complex, studies of the river have identified four types of interaction: gaining, losing, transitional, and minimal.

In areas along the Spokane River where the water table is below the bed of the river, water percolates through the gravel bed and discharges into the Aquifer, enhancing the groundwater system. In these areas, the reach of the river is gaining, and these reaches are shown as green on this image. This is the typical relationship between the river and Aquifer throughout Spokane and into Washington near Fort Hood.

In other areas where the water table in the adjacent river reach is higher than the gravel bed, the Aquifer loses water through springs and seeps and ultimately adds volume to the river flow. In these areas, the reach of the river is losing, and these reaches are shown as blue on this image. The reach between Sullivan Road and the Centennial Trail Bridge is a gaining reach.

In a few areas, the Aquifer-River interaction is either transitional or minimal. Transitional reaches vary between gaining and losing depending upon the magnitude of the river flow, and these reaches are shown as brown on this image. Part of the water in the Little Spokane River comes from overflow from the Aquifer. Along the Little Spokane River's gaining reach, river stage on this page above 150 cubic feet per second of water is added to the river from the Aquifer. This is why the Little Spokane River flows consistently throughout the summer months and has cold water temperatures.

Understanding the Aquifer-River interchange is very important to Aquifer sustainability and Spokane River low discharge issues. Water withdrawals from the Aquifer can reduce river flows, and during periods of low flow in the Spokane River, substantial loss of water to the Aquifer could impair the biological use of the river.

Interpreting the Data

Three different data sets are included together on this image to provide a current comprehensive picture of the Aquifer-River interchange. First, Aquifer-River computer modeling provided the computer model river reaches (in blue) and the location of the interchange (in green). The river stage on this page above 150 cubic feet per second of water is added to the river from the Aquifer for this flow event on September 21, 2004. Last, the orange squares and numbers represent estimated low river flow volumes based on historic gauging and computer modeling.

From: Spokane Valley-Rathdrum Prairie Aquifer Atlas (Spokane County, et al., 2d ed. 2004)
Seepage loss from Spokane River to aquifer

- Total River Gain above 9 Mile
- Gun Club to blw 9mile, Dam
- Meenach Br to Gun Club
- Blw Greene St to Spokane
- Myrtle Point to Blw Greene St
- Flora Rd to Myrtle Point
- Greenacres to Flora Rd
- abv Liberty Br to Greenacres
- Post Falls to abv Liberty Br
- Blackwell Isl. to Post Falls
- State Line

© 2007 Guy Gregory
WA Dep’t of Ecology 2007

Courtesy Guy Gregory
WA Dep’t of Ecology 2007
Spokane River Mean Annual Flow

Spokane River at Spokane
12422500

Discharge in cfs


Courtesy Guy Gregory
Spokane River: 7-Day Low Flow

7-Day Low Flow recorded between June 1 and October 31 each year

Courtesy John Covert
Chapter 2: The Political Dimension

- Political (state/fed/tribal) boundaries
- Coeur d’Alene Spokane Tribes’ aboriginal territories
- Satellite photo?
The Coeur d'Alene Tribe's Aboriginal Territory spans more than 5 million acres of today's Washington, Idaho & Montana.

Coeur d’Alene Tribe GIS (2006)
Spokane Tribe aboriginal territories

ICEBMP, Supplemental EIS (2000)
Chapter 3: Value to the Community

- Historic perspectives on the aquifer
- Sole source designation in 1978
- Municipal water use
- Population Growth
- Historic Perspectives on the river
- Resurgence of the River
SPOKANE'S WATER
PUREST IN WORLD

Tests Shows Average of Only Seven or Eight Germs to Centimeter

"It can be said that there is no city in the world that has a better water supply than Spokane."

Spokesman-Review, May 6, 1909
1978 Sole Source Designation

- Sole source of drinking water for 500,000 people in the region

1988-1994: The $1 Million Perk

- Studies, education
- Management programs, ID & WA
- Focus on quality, not quantity
Municipal Districts and Points of Withdrawal

Courtesy Guy Gregory
Numbers are generally representative of aquifer usage in both states: 250 gpcd on an annual average

<table>
<thead>
<tr>
<th>Use</th>
<th>Annual</th>
<th>July and August</th>
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<tr>
<td></td>
<td>Residential</td>
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<tr>
<td></td>
<td>gallons/</td>
<td>gallons/</td>
</tr>
<tr>
<td></td>
<td>person/day</td>
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<td>Municipal Non-</td>
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<td>118.1</td>
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<tr>
<td>Commercial Irrigation</td>
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</tr>
<tr>
<td>Total</td>
<td>437.1</td>
<td></td>
</tr>
</tbody>
</table>

1. average of November - March pumping represents "indoor" (Non-irrigation) use
2. not supplied by municipal sources
3. parks, schools, golf courses etc. not supplied by municipal sources

Table 4.I.B summarizes daily per capita water use for Spokane County and other locations in the Western United States to provide a comparison with Spokane area water use.
Withdrawal Rates from Wells

Typical Municipal Pumping

[Graphs showing municipal pumping data over time]

Courtesy: Guy Gregory
Population Growth

Image: NASA 2006
The Spokane: River of Kings
The Spokane: River of Sewage & Toxics
Kayaking on the Spokane Aquifer

Image: Tracy Wilson-Burns
Fishing on the SVRP Aquifer

Image: John Osborn
Scenic/Aesthetic Values

Image: John Osborn
Chapter 4: Management Efforts to Date

► Water Rights

► Planning
  ▪ WA watershed planning
  ▪ ID groundwater management planning

► Conservation
  ▪ Post Falls leading
  ▪ SAJ B, City Spokane coming along

► Adjudications
  ▪ North Idaho
  ▪ WA pre-adjudication
Kahle & Bartolino, Hydrogeologic Framework & Ground Water Budget of the SVRP Aquifer (USGS SIR 2007-5041)
Idaho & Washington Ground Water Rights

► On Paper
  - Washington: 614 cfs
  - Idaho: 705 cfs
  - Unknowns: surface rights, claims, exempt wells

► In Use
  - Annual average 317 cfs
  - Peak summer use @ 750 cfs
Spokane River Instream Flows

► Idaho:
- Instream water right established by Idaho Water Resources Board
- Priority: June 15, 1992
- Purpose: protection of fish & wildlife habitat, aquatic life & recreation
  - 951 cfs (July-October) (rarely met)
  - 2495 cfs (Nov-June)
- Subordinated to future municipal uses

► Washington:
- 2,000 cfs minimum at Spokane gage (rarely met)
- WA Dept. of Fish & Wildlife recommendation
- Instream flow regulation in process; priority date no earlier than 1999
Idaho & Washington
Water Resource Planning

- Little/Middle Spokane 55/57 Watershed Plan (2005)
- Rathdrum Ground Water Management Plan (2005)
- Existing rights --
  - Protect all existing rights, including unused “paper” water rights
- Water Conservation --
  - Washington – none
  - Idaho – all water right holders (new and existing) must develop and implement water conservation plans. The more used, the more stringent the conservation requirements.
- Moratorium on future rights --
  - Idaho – none
  - Washington – lift moratorium if new rights are mitigated
Rathdrum-Coeur d’Alene Adjudication

Timeline
- 2006 Legislative authorization
- 2008 Petition, service, claims filing
- 2009-2010 Field exams
- 2012 Resolution of objections

Major Issues
- Coeur d’Alene Tribe reserved water rights
- Accomplished transfers
- Substantial non-use (?)
Washington Pre-Adjudication

Pre-Adjudication Assessments

- 2007 appropriation from WA state legislature to “clarify Spokane watershed water rights”
- Mapping, information assessment, metering,

Issues

- Spokane Tribe reserved water rights
- Substantial unused water rights
Sen. Dick Compton, R-Coeur d’Alene, said the state of Washington is laying claim against North Idaho’s water, and the adjudication will help Idaho defend its water. “Unless we have some pretty good legal basis to hang our hat on, they’re going to get their way,” he told the Senate. (Spokesman Review, March 22, 2006)

“This work will provide essential and timely information on water rights and uses to protect Washington's interests in the use of interstate water sources as Idaho proceeds with a large-scale general adjudication of the Spokane River and tributaries in Idaho” (2007 state budget proviso)
Spokane Tribe

- Tribal ownership of Spokane River
- Anderson v. US:
  - Adjudication of rights in Chamokane Creek, boundary water for Spokane Reservation
Coeur d’Alene Tribe

Tribal ownership of Lake Coeur d’Alene
Chapter 5: Culminating Events

- Power Plant Water Rights
- Bi-State Aquifer Study
- ID continued permitting of new water rights
- WA inchoate water rights
- Dam relicensing & water quality issues
  - 401, TMDL, NPDES 7Q10
2002: The “Power Plant” cases

- IDWR denies water rights to two proposed power plants
- 14 mgd (100% consumptive)
- Such use is “contrary to conservation of water resources in Idaho.”

Image: John Osborn
Idaho Continued Permitting

- 95 new SVRP ground water rights between 2002-2007
- Approx. 60 cfs QA
Washington issued and legislatively validated large inchoate water rights

WRJA 57 Municipal Uses
Water Use vs Rights
in Acre-feet per year

WRJA 57 'paper rights' total
211,634 acre-feet per year

107,672, 51%

103,962, 49%

Data from Watershed Assessment Phase II,
Level I Assessment, Golder Associates, 2004

Graphic: WA Dept. of Ecology
Water Resources Program
Dam Relicensing:
minimum discharge conditions

Image: John Osborn
Chapter 6: Where we stand today

- Spokane-Coeur d’Alene water resources – an integrated system
- Climate change projections – problematic but not yet dealt with
- Shared values in the Spokane River
The watershed is integrated

Image: Spokane County GIS
Another view

Image courtesy - William Bowen © 2003
Panoramic Aerial Maps of the American West
Global Warming

- Snow water equivalent: most PNW stations showing a decline in April 1 SWE

Image: Univ. of WA Climate Impacts Group
Losing our glaciers

- **Grinnell Glacier in Glacier Nat’l Park**

- **All glaciers in GNP will be gone by 2070 at current rate of melt**
Less snow, earlier melt means less water flowing in rivers during summer months.

Natural Columbia River flow at the Dalles, OR

Courtesy Dr. Philip Mote
UW Climate Impacts Group
Idaho & Washington

Shared Values & Interests:

- Groundwater
- Surface Waters
- Economy
- Peace & Prosperity
Idaho & Washington: Shared interests in groundwater

Courtesy Guy Gregory (adapted from Kahle et al, 2005 (USGS SIR 2005-5227))
ID-WA shared interests in the river

- Native redband rainbow trout population
ID-WA shared interests in the river

Stringent sewage effluent limits based on dissolved oxygen standards
ID-WA shared interests in the river: Lake Coeur d’Alene lake levels

Image: NIDT
Shared Economy