

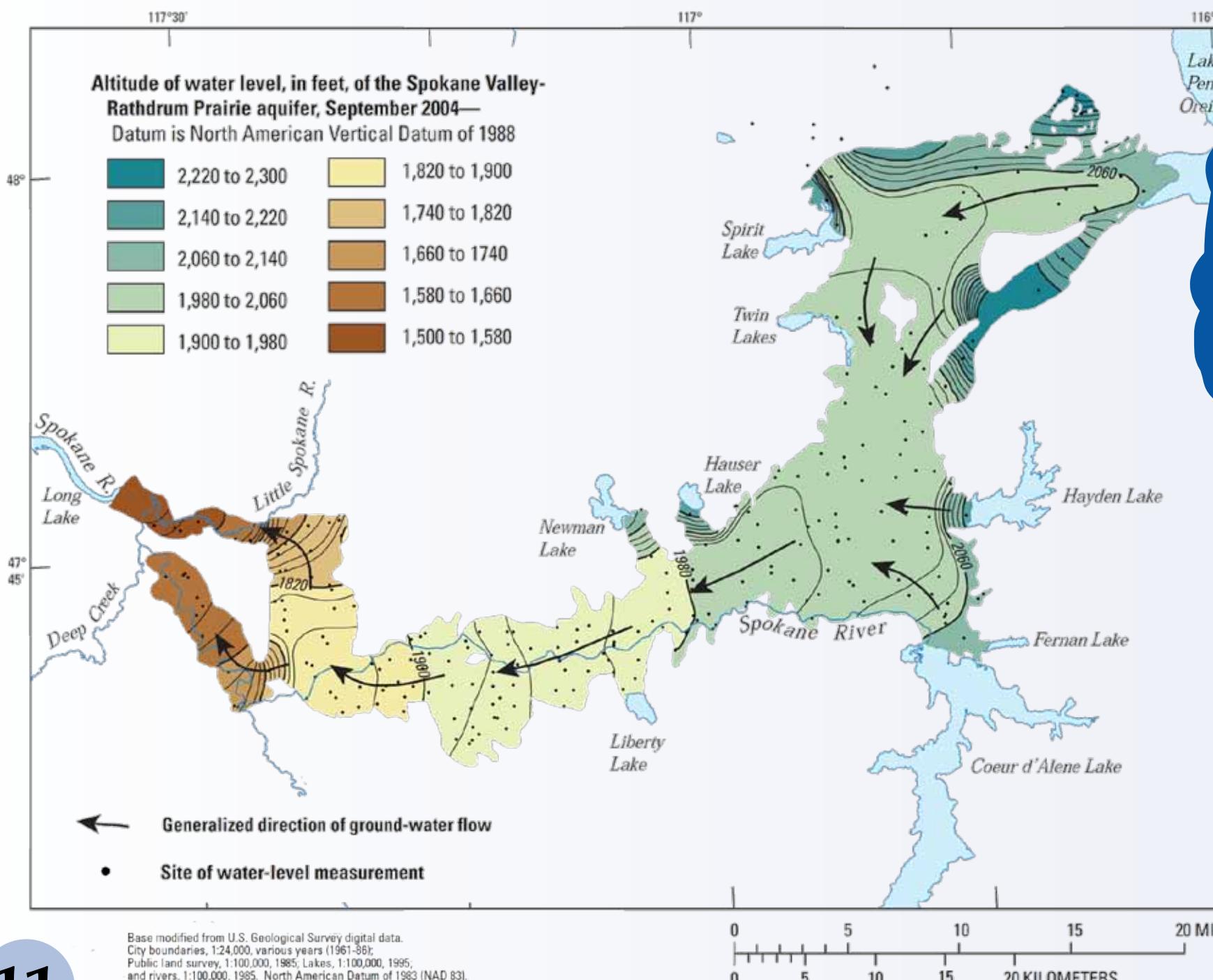
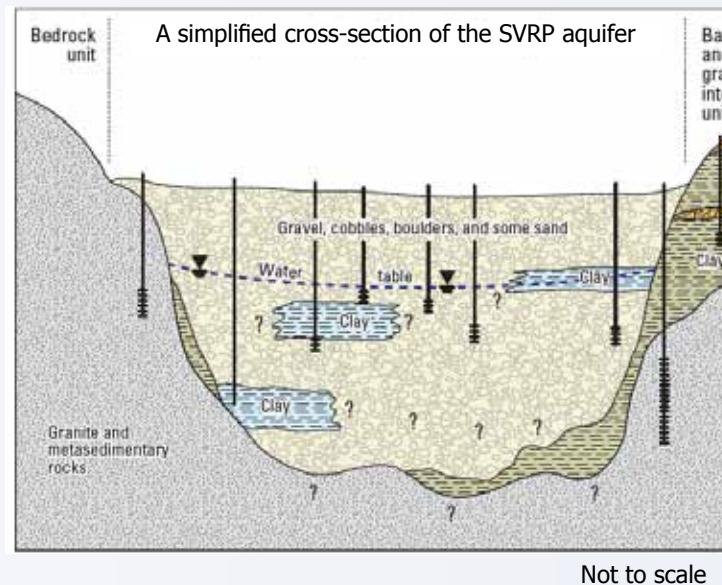
# HYDROGEOLOGY

## The Spokane Valley – Rathdrum Prairie (SVRP) Aquifer

The SVRP aquifer covers about 370 square miles in northern Idaho and eastern Washington. It is composed of Ice Age flood deposited gravels, cobbles, and boulders and is filled with water. No continuous clay or silt layers exist across the SVRP aquifer to keep contaminants from the surface moving down into the SVRP aquifer.

The valley walls are composed of massive rocks and clay that continue below the ground surface to form the impervious basin that holds the SVRP aquifer gravels. Relatively flat basalt plateaus such as Five Mile Prairie and the Columbia Plateau rise hundreds of feet above the valley.

The Bitterroot Mountains east of Rathdrum Prairie and the Selkirk Mountains along the Washington – Idaho border also form the aquifer edges (or “basin”). These mountains are more than 2,000 feet higher than the basalt plateau to the southwest.



## SVRP Aquifer Recharge

Water enters the SVRP aquifer from several sources including

- 1) Precipitation
- 2) Inflow from upland bedrock watersheds
- 3) Seepage from lakes
- 4) Seepage from the Spokane River
- 5) Water from irrigation
- 6) Effluent from septic systems



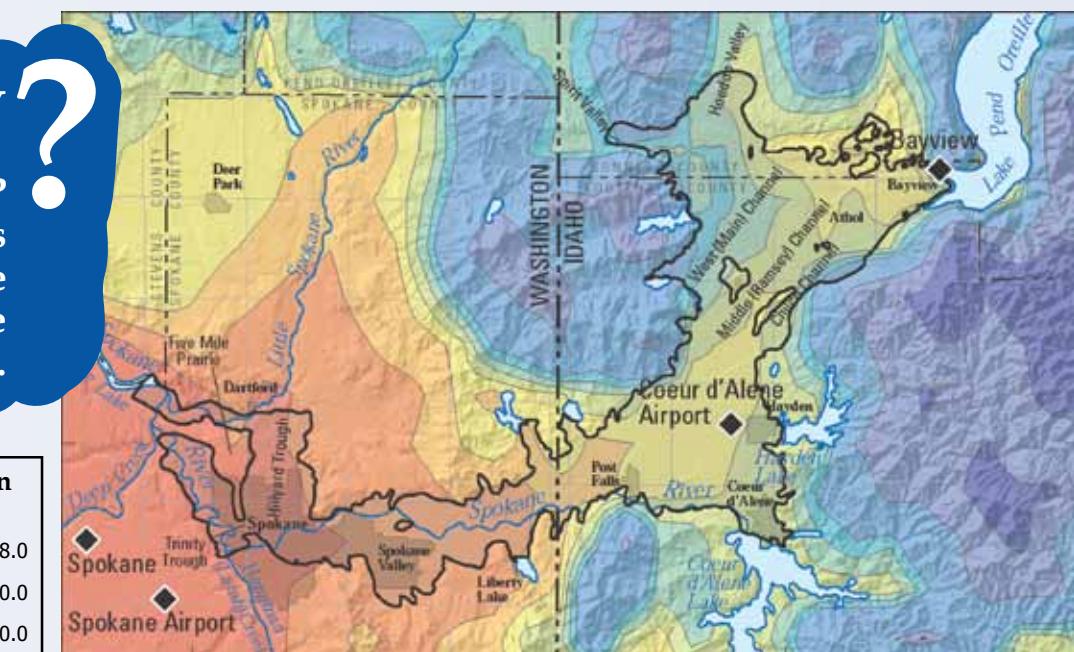
Precipitation that falls onto the land surface above the SVRP aquifer eventually infiltrates and recharges the aquifer. Precipitation that falls onto the bedrock upland areas infiltrates very little because the bedrock is not very permeable. The water moves more laterally eventually combining with other water in the watershed and forming small streams. These streams flow downhill and discharge onto the permeable soils above the aquifer and quickly infiltrate downward to the water table. Some of the watersheds have lakes at the bottom that collect all the water. The lakes contribute water to the aquifer either through seepage from the bottom or overflow to streams that discharge onto the land surface above the aquifer. The Water Budget on page 14 shows the average amount of water that enters the SVRP aquifer from each of these sources in a year.

The amount of water that recharges the SVRP aquifer is lowest in the summer and highest in the spring when the snow melts.

### Did you know?

The surface of the SVRP aquifer is so porous creeks flow only a short distance on top of it before all the water soaks into the ground.

Average Annual Precipitation in inches	
16.0 - 18.0	26.1 - 28.0
18.1 - 20.0	28.1 - 30.0
20.1 - 22.0	30.1 - 40.0
22.1 - 24.0	40.1 - 50.0
24.1 - 26.0	50.1 - 67.0



## Groundwater Flow

The elevation of groundwater in the northern Rathdrum Prairie is about 2,110 feet while the elevation is about 1,550 feet near Lake Spokane. Groundwater in the SVRP aquifer flows from the northern Rathdrum Prairie area southward to Coeur d'Alene–Post Falls, then toward the west into Washington. The water flows through Spokane–Spokane Valley areas and separates to flow around the Five Mile Prairie. All the water eventually empties into the Spokane and Little Spokane Rivers that flow into Lake Spokane. Because of the very permeable nature of the aquifer, groundwater flow velocities can reach approximately 50 feet per day.

In some places, water seeps out of the bottom of the Spokane River and supplies a lot of recharge to the SVRP aquifer. Water is pumped from the SVRP aquifer for people to use. Some of this water is returned to the SVRP aquifer through irrigation or septic discharge. Generally people use more water than is returned to the SVRP aquifer, so there is a net loss.

# AQUIFER-RIVER INTERCHANGE

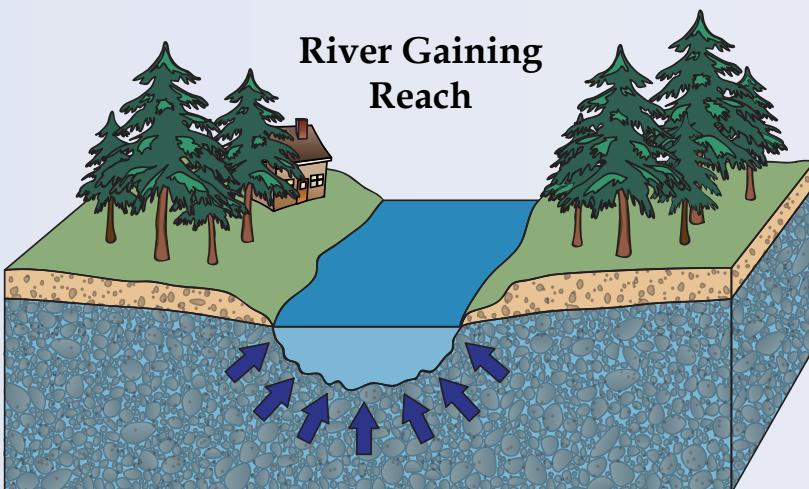
## Spokane Valley - Rathdrum Prairie (SVRP)

### Aquifer - Spokane River Interconnection

The large spaces between the rocks in the SVRP aquifer allow relatively large interchanges of water with the river. The losing reaches of the Spokane River are the largest recharge source to the SVRP aquifer. The gaining reaches of the river get a significant amount of water from the SVRP aquifer.

## Did you know ?

The Spokane River is the largest source of water to the SVRP aquifer and most water leaving the SVRP aquifer goes to the Spokane River.



The surface elevation of the SVRP aquifer is a little higher than the bottom of the river in parts of Washington. Water flows into the river through the bottom or through springs on the banks of the river. These are called "gaining reaches".

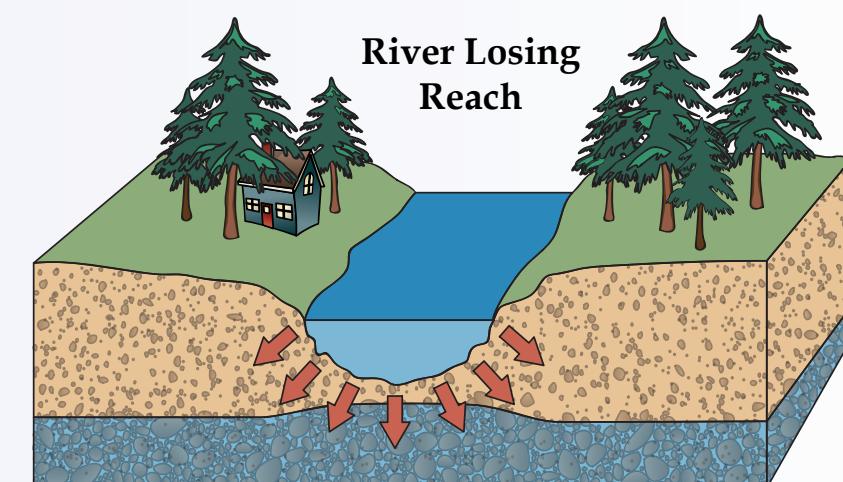
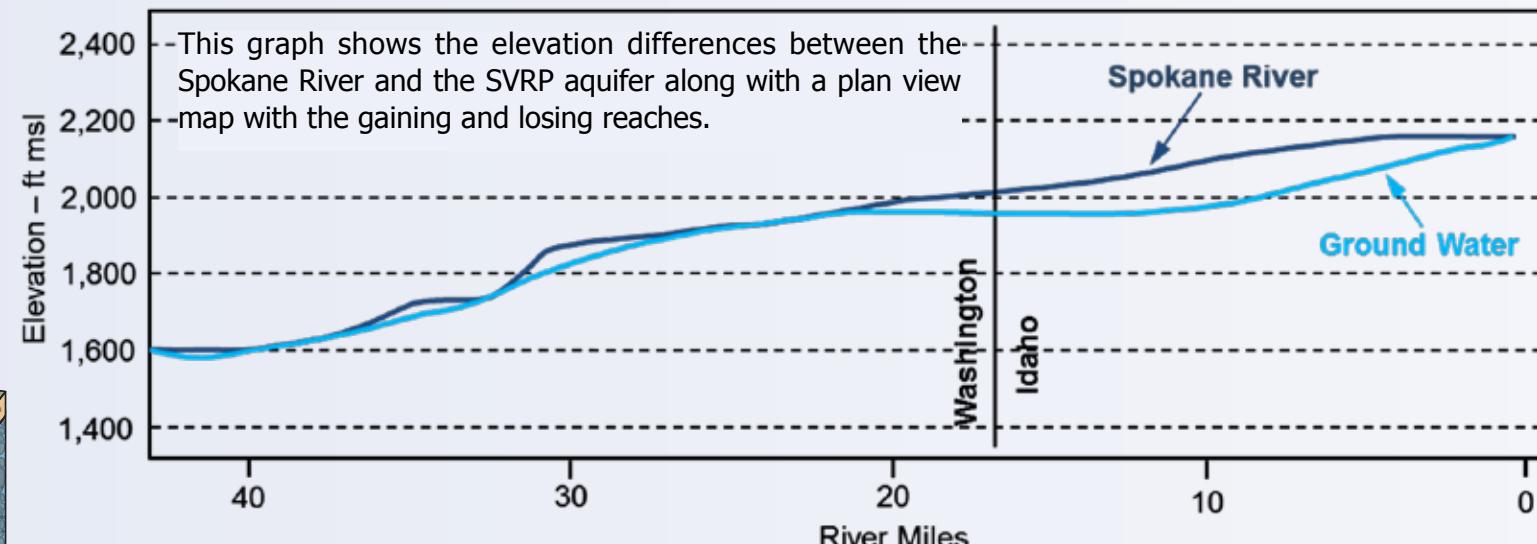
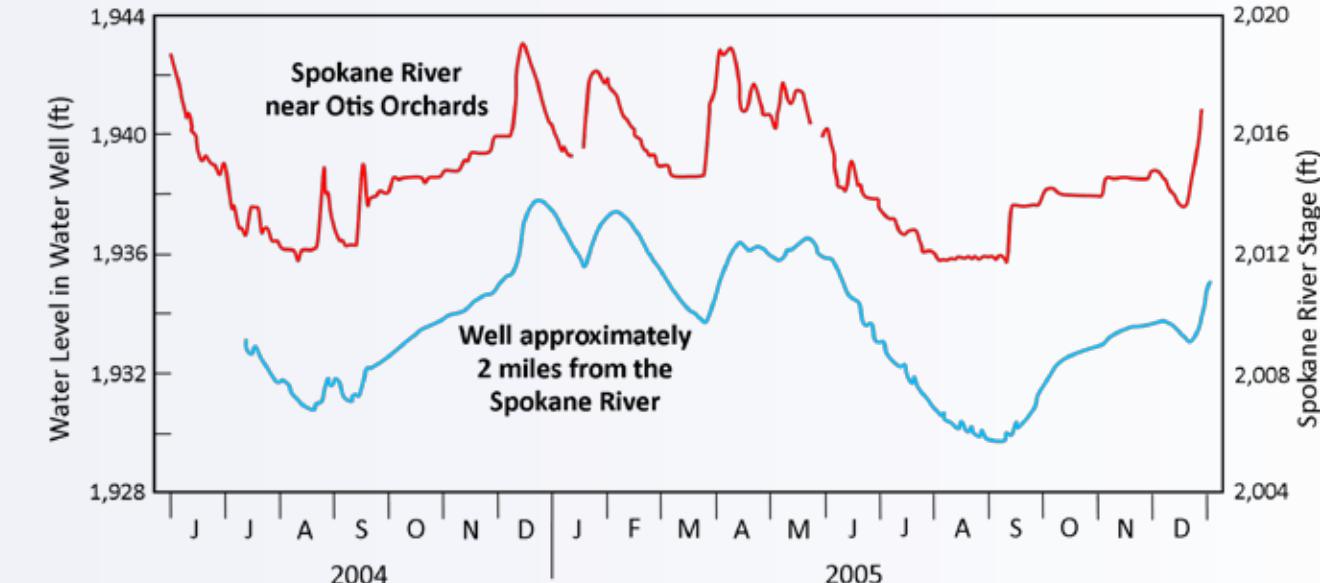


This is a gaining reach of the Spokane River near Sullivan Road. The ripples on the water at the bottom left corner of the picture shows water flowing out of the SVRP aquifer and into the river on August 20, 2003.

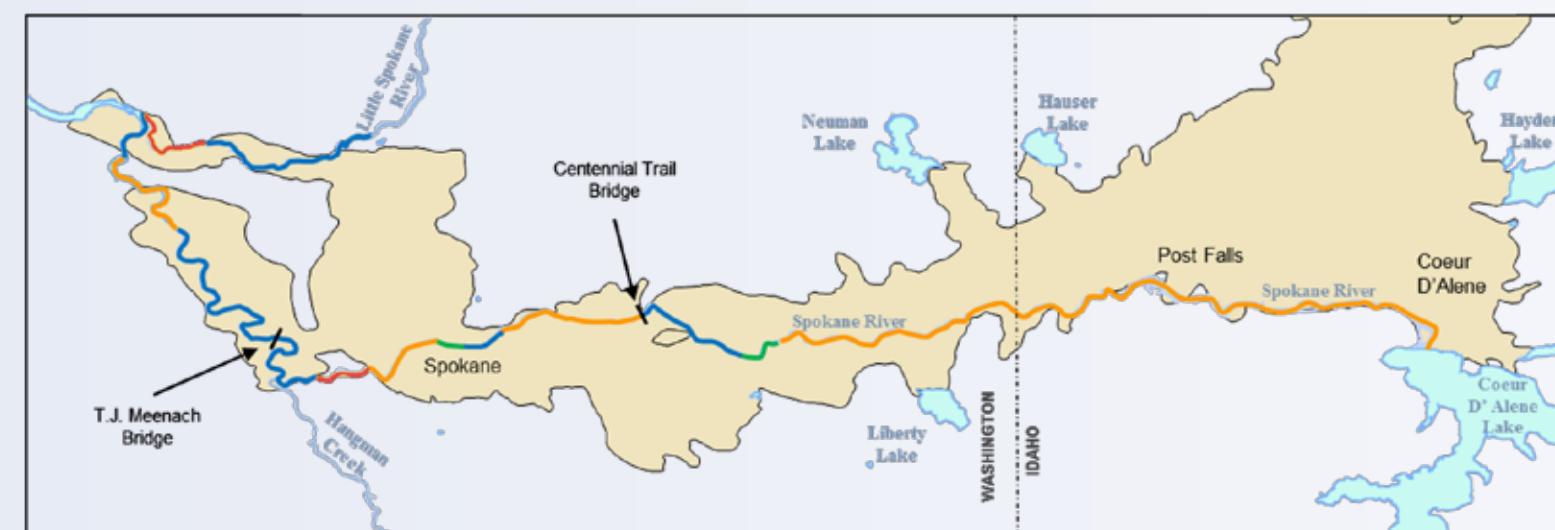
### SVRP Aquifer And Spokane River Water Levels

The aquifer surface levels in the SVRP aquifer downstream of Post Falls depend on the flow in the Spokane River. The Spokane Valley well on the graph is located 2 miles from the Spokane River. The many peaks and valleys of the aquifer surface levels seen in the Spokane Valley well correspond to peaks and valleys of Spokane River water levels, which show their interconnection.

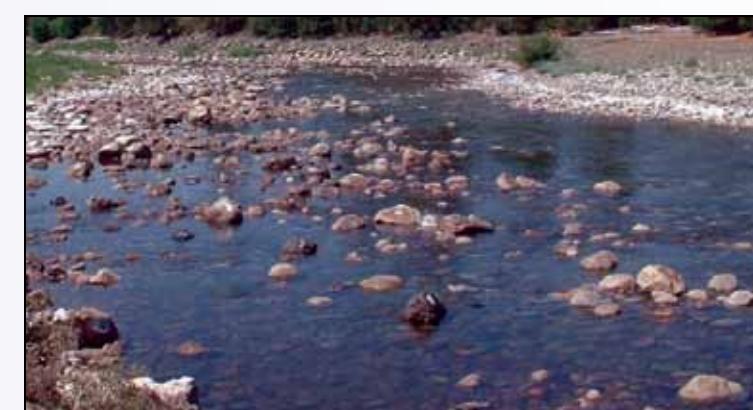
Pumping from the SVRP aquifer can lower the amount of groundwater that seeps into the Spokane River in the gaining reaches, which reduces the river flow. The closer a well is located to the gaining reach, or the greater the pumping rate, the larger the reduction will be. Keeping enough water in the Spokane River is important to maintain a healthy environment for fish and other aquatic life. It also supports recreation and scenic beauty.



The Spokane River flows from Coeur d'Alene Lake in Idaho westward into Washington and into Lake Spokane. The river bottom is higher than the SVRP aquifer in Idaho and parts of Washington. In these areas the water seeps out of the bottom of the river and recharges the Spokane Valley - Rathdrum Prairie (SVRP) aquifer. These are called "losing reaches" of the river.

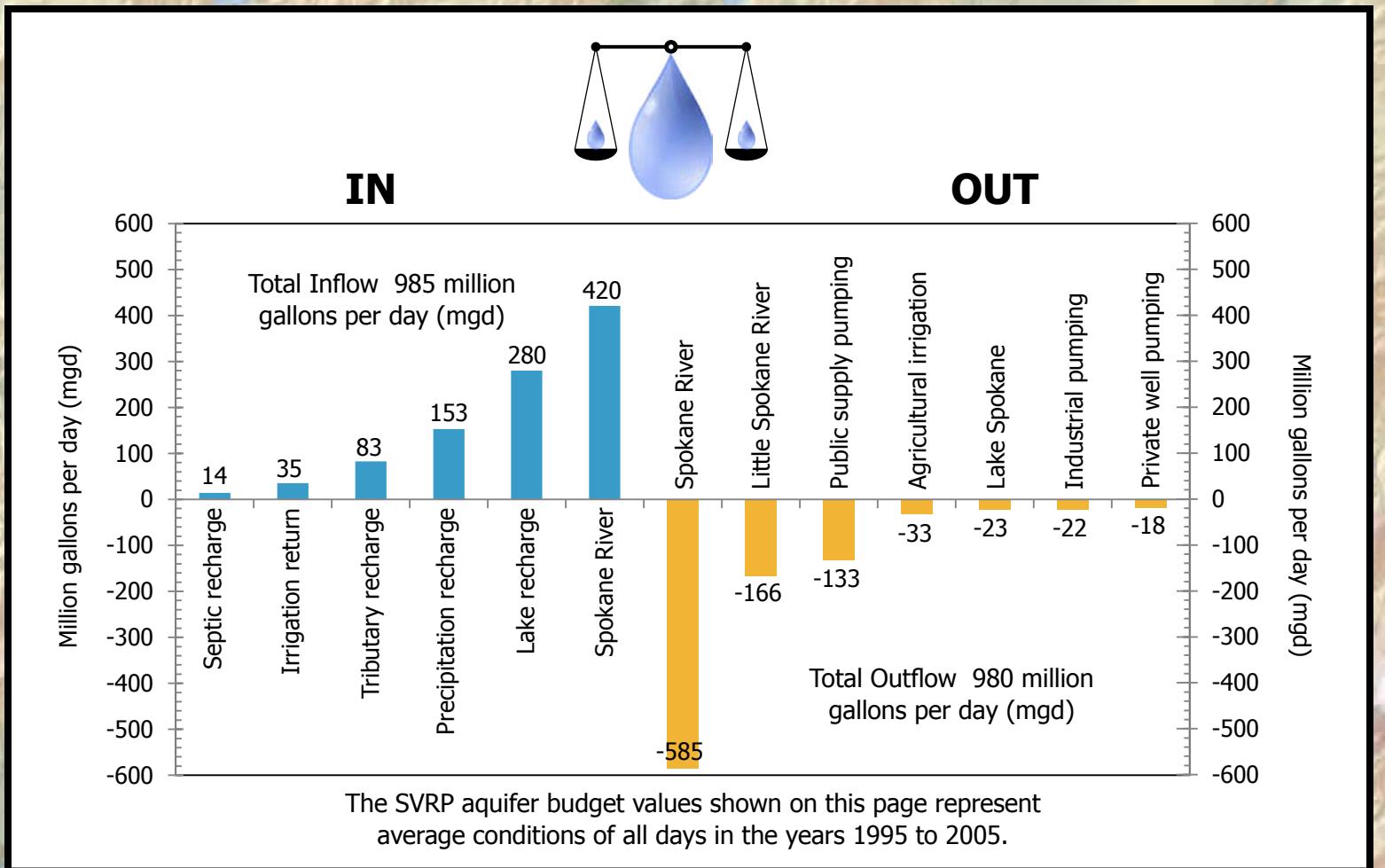


- **Losing Reach:** the river loses water to the aquifer
- **Gaining Reach:** the river gains water from the aquifer
- **Transitional Reach:** changing condition between gain/lose
- **Minimal Interaction:** the river neither gains nor loses



This losing reach of the Spokane River near Greenacres had very little flow on August 1, 2003.

# WATER BUDGET



The Spokane Valley – Rathdrum Prairie (SVRP) aquifer is dynamic with water flowing into and out of the system. Like a household budget, a water budget is an accounting of the amount and source of water recharging the SVRP aquifer, and the amount and destination of water discharging from the SVRP aquifer. This water budget is organized into two categories: inflow (water that recharges or flows IN to the SVRP aquifer) and outflow (water that discharges or flows OUT of the SVRP aquifer). In any successful budget, the IN and OUT numbers should match. More information could narrow the small gap in this budget.

