The SVRPA Study: Reasons for and Results of a Study of Boundary Waters of Idaho and Washington

Robert G. Haynes, P.E.

Idaho Dept. of Water Resources

Guy J. Gregory, L.G., L.Hg.

Washington Dept. of Ecology

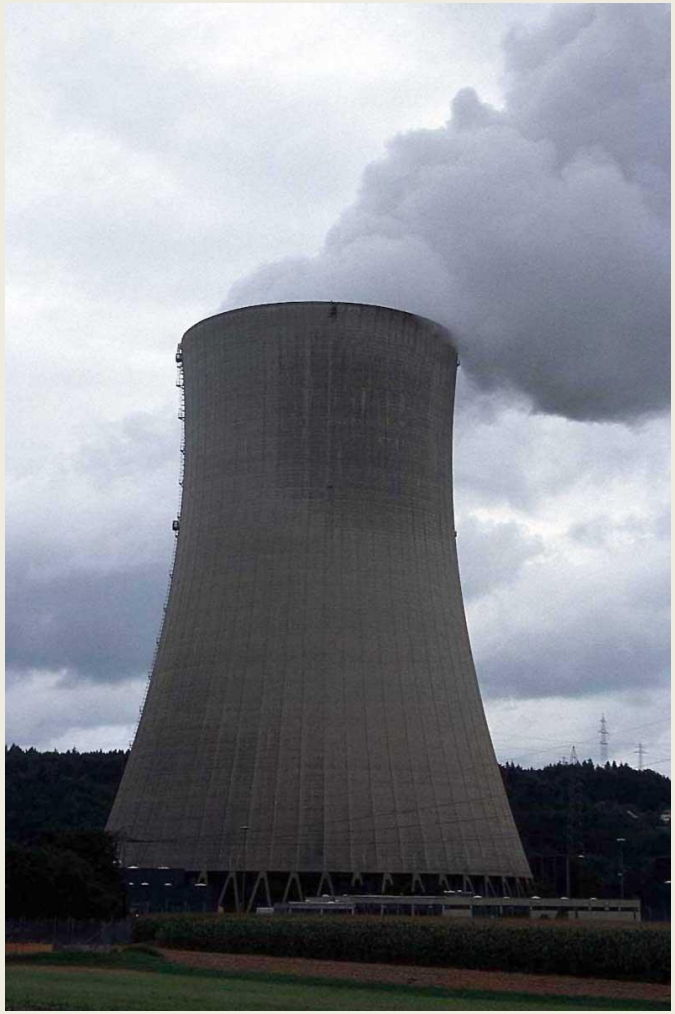
Presented to: Rathdrum Prairie Advisory Committee Meeting #2

January 29, 2010

Things we'll look at:

- **What caused the call to action**
- **The Spokane Valley Rathdrum Prairie Hydro-Geologic Characterization Study 2004-2007**
  - **Project process**
  - **Modeling**
  - **Messages from the study**
- **New and ongoing activities at the state level**

Why worry about managing water here?



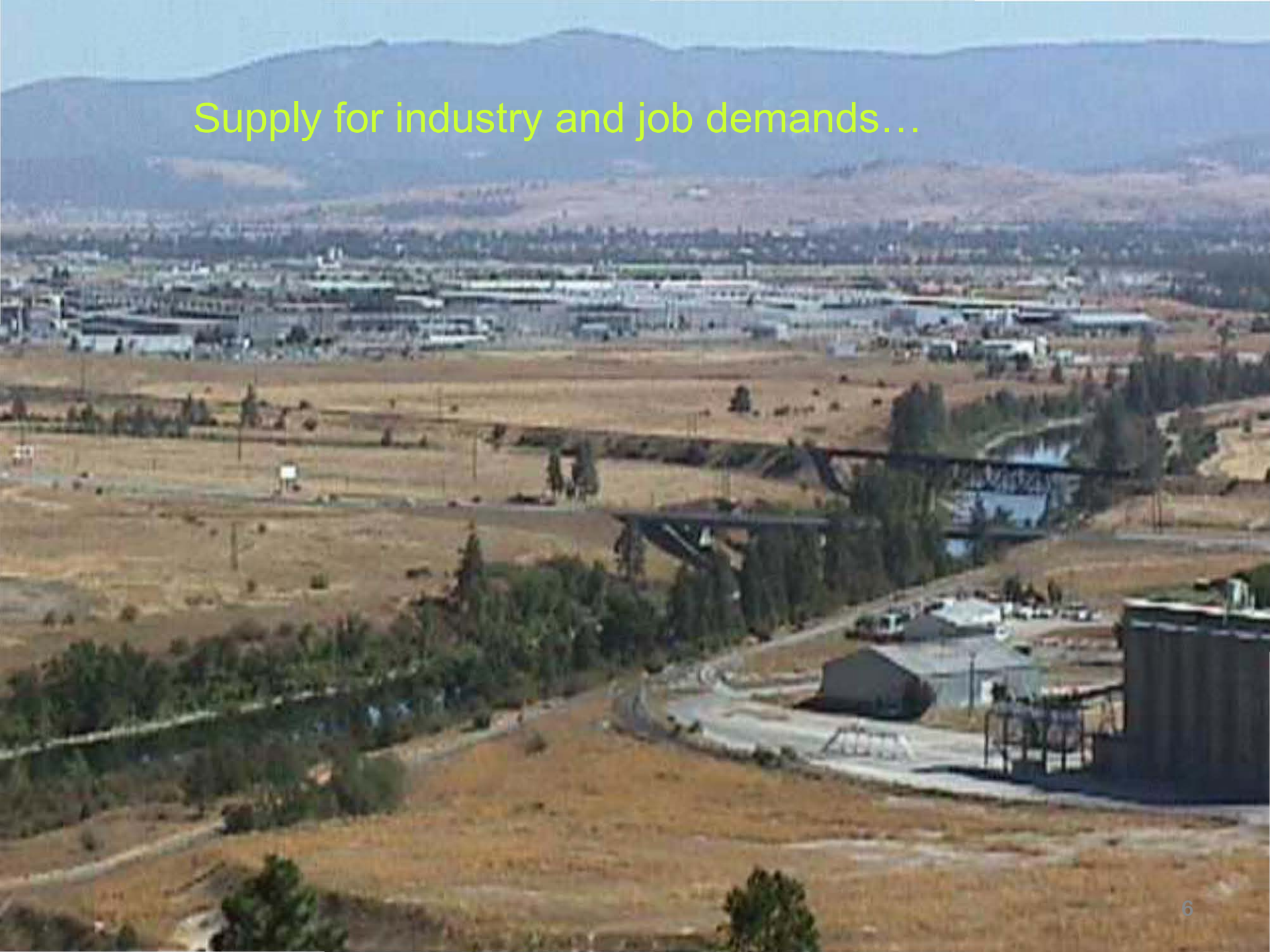
"The thing that sets this region apart is our infinite supply of clean water"

-Guy Gregory's Grade Earth Science Teacher

Then along came two 2001 Power Plant Proposals and we began to wonder about . . .

Our clean, potable, sole source of drinking water

Supply for Irrigated Agriculture

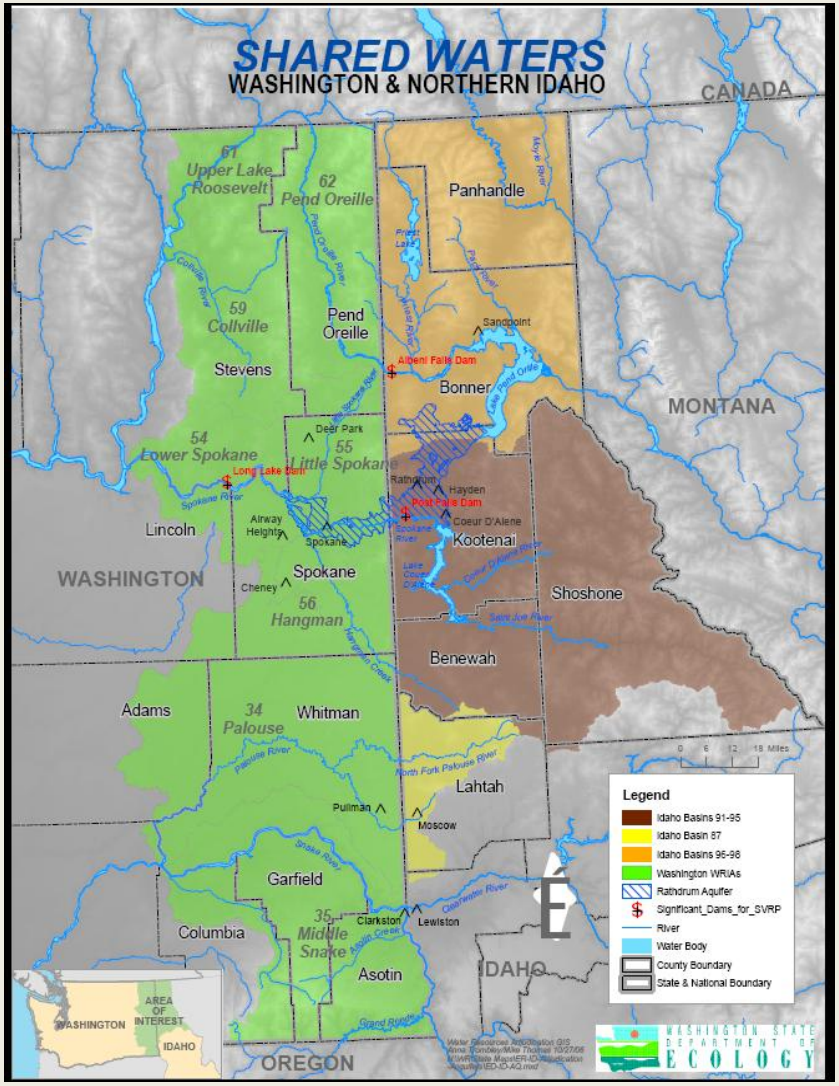

Supply for industry and job demands…

Waste management

Power Generation

Societal demand for quality of life & recognition of environmental needs…

Shared Water Basins and Agreements



- **Increasing water demand along Washington & Idaho border - growth, instream needs, water quality needs**
- **Memoranda of Agreement**
  - **Palouse Basin-1992**
  - **Spokane Valley Rathdrum Prairie Aquifer-2007**

Why Study the Aquifer?

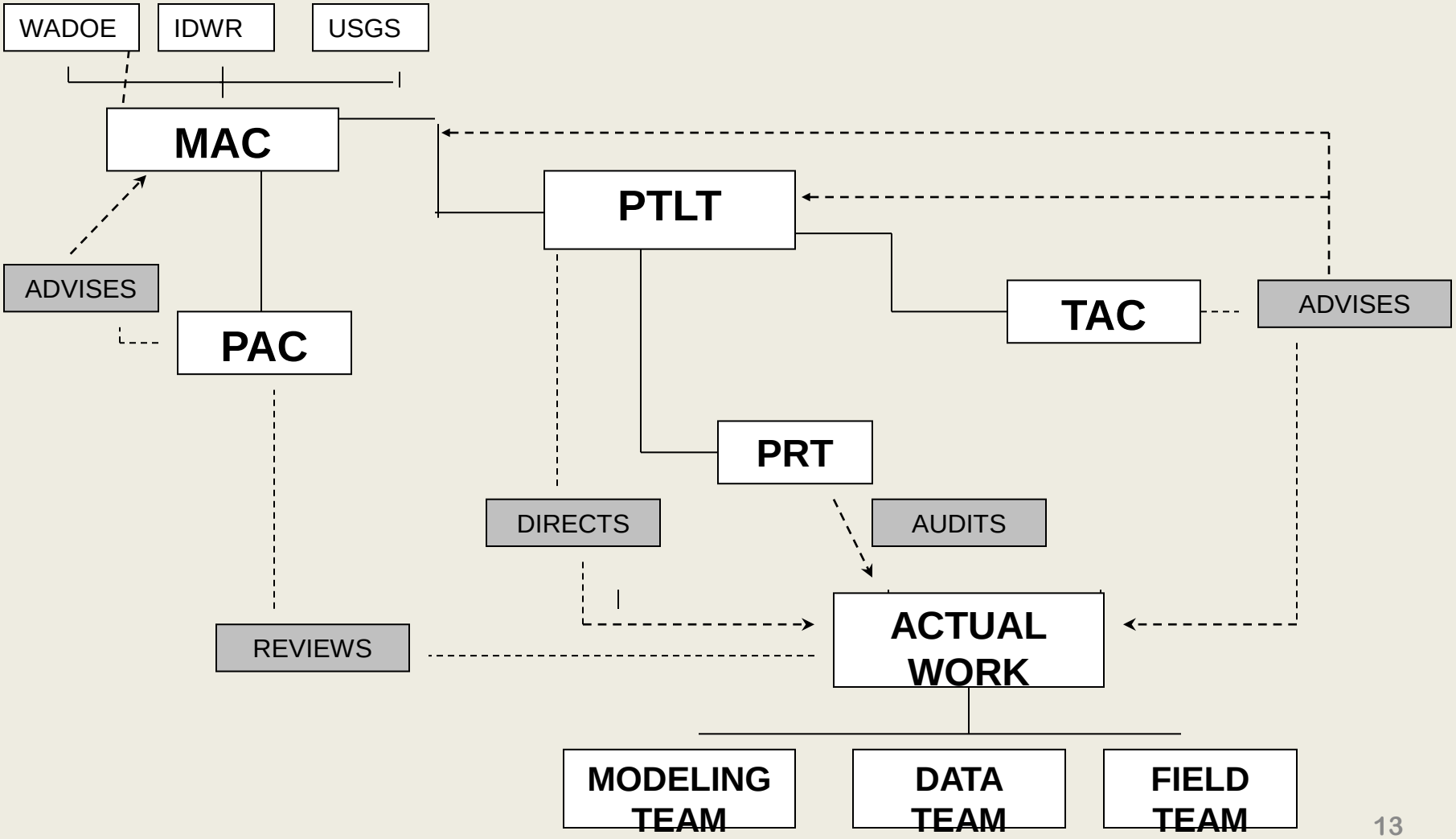
Questions that stakeholders want answered, from 2002 meeting:

1. What is currently known about the aquifer and how can this information be integrated into another study?
2. What is the volume of the aquifer?
3. What is the recharge to the aquifer?
4. What is flow rate of the aquifer?
5. What is current water withdrawal rate from the aquifer in Washington and Idaho?
6. What are current discharges to the river from the aquifer, by volume and region?
7. What is the relationship between the Spokane River and the SVRP aquifer?
8. What is the water quality in the aquifer?
9. What is the sustainable yield of the SVRP aquifer?
10. What model can be used to describe the interaction of the watershed and the aquifer?
11. Who does the study?

Newton's First Law…

- Pressures……
  - State Water management agency pressure.
  - Local Government management planning processes
    - WRIA, Kootenai County process
  - Stakeholder/NGO cooperation
    - Policy Advisory Committee
- Products….
  - Three Party Memorandum of Agreement: USGS, WDOE & IDWR
    - USGS participation, two-state study
    - 2.5 year schedule, Mid 2004, finish 2007 3.5M mixed federal/state funding
  - Gov't-Water Research institute partnership
    - Complete geologic and hydrologic reassessment of the basin
    - Preparation of a transient Modflow model for the basin
  - MOA between states for operation and maintenance
- Results….
  - Partnership of state water-management agencies
  - Scientific consensus on water resource conditions

Administrative Organization



Purpose and Goal of the Interstate Study

- The purpose of this study is to provide a scientific foundation for management of the SVRP aquifer. The study will culminate in the development of a numerical ground-water model that Washington and Idaho can use to cooperatively manage the SVRP aquifer and adjacent rivers and lakes

Intended use of model

- **The primary purpose of the model is to serve as a tool for:**
  - **analyzing SVRP aquifer inflows and outflows,**
  - **simulating the effects of future changes in ground-water withdrawals,**
  - **evaluating aquifer management strategies.**
- **The scale of the model and the level of detail are intended for analysis of aquifer-wide water-supply issues.**

USGS
science for a changing world

Prepared in cooperation with the
IDAHO DEPARTMENT OF WATER RESOURCES
WASHINGTON STATE DEPARTMENT OF ECOLOGY
UNIVERSITY OF IDAHO
WASHINGTON STATE UNIVERSITY

Ground-Water Flow Model for the Spokane Valley-Rathdrum Prairie Aquifer, Spokane County, Washington, and Bonner and Kootenai Counties, Idaho

Scientific Investigations Report 2007–5044

U.S. Department of the Interior
U.S. Geological Survey

USGS
science for a changing world

Prepared in cooperation with the
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WASHINGTON STATE DEPARTMENT OF ECOLOGY

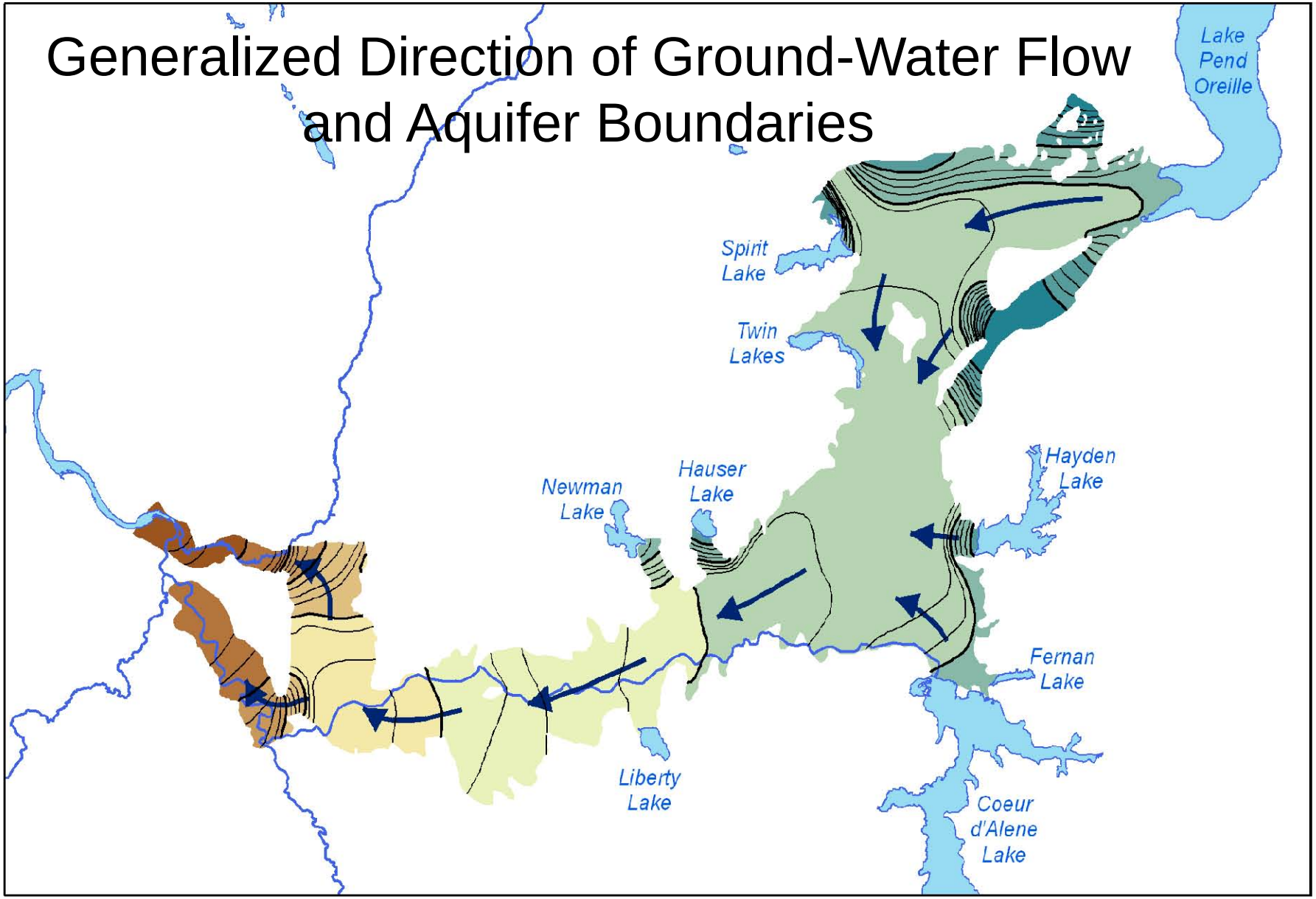
Hydrogeologic Framework and Ground-Water Budget of the Spokane Valley-Rathdrum Prairie Aquifer, Spokane County, Washington, and Bonner and Kootenai Counties, Idaho

Scientific Investigations Report 2007–5041

U.S. Department of the Interior
U.S. Geological Survey

May 8, 2007
CenterPlace
Spokane Valley, WA
What did we learn?

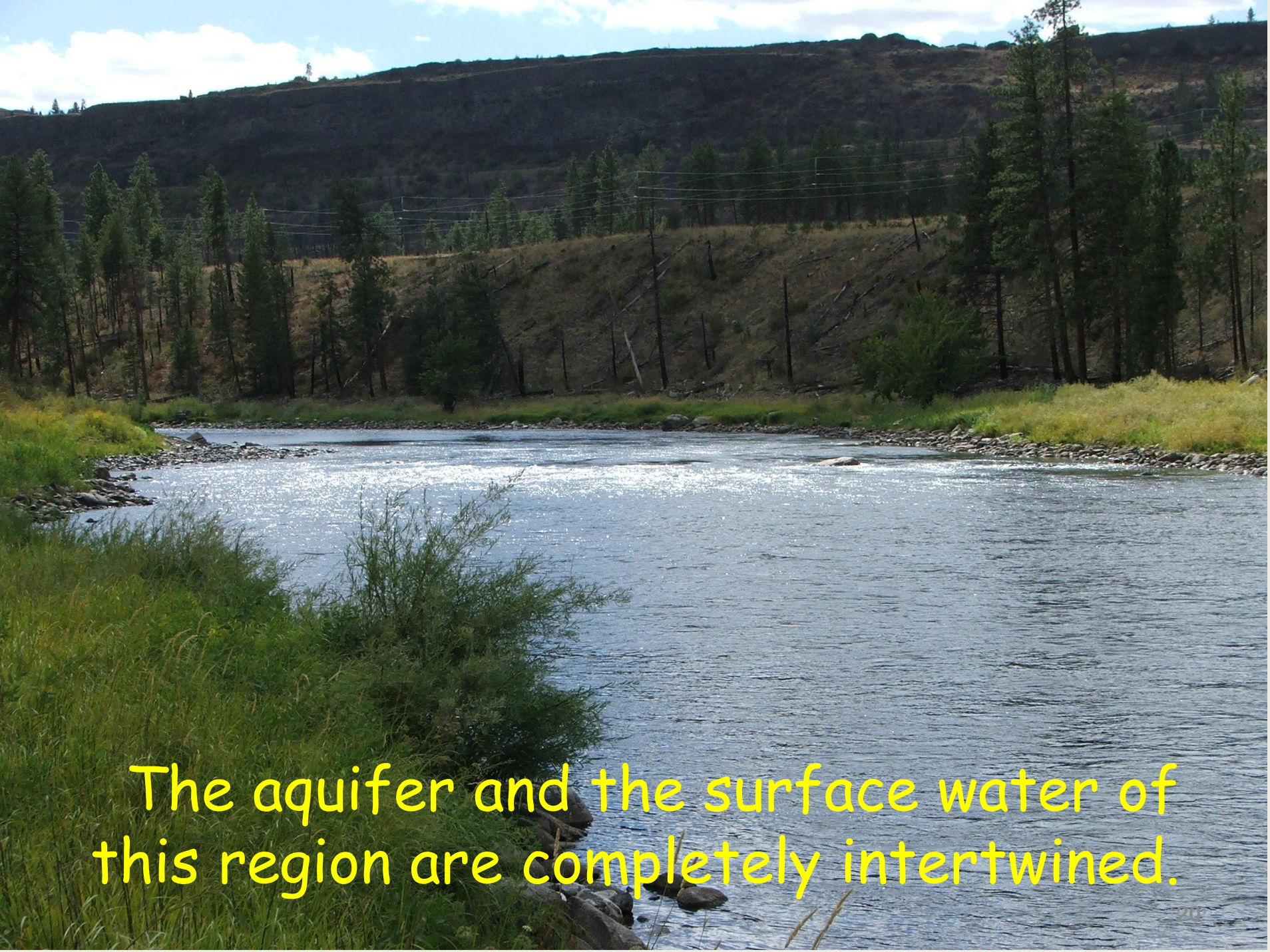
Generalized Direction of Ground-Water Flow and Aquifer Boundaries

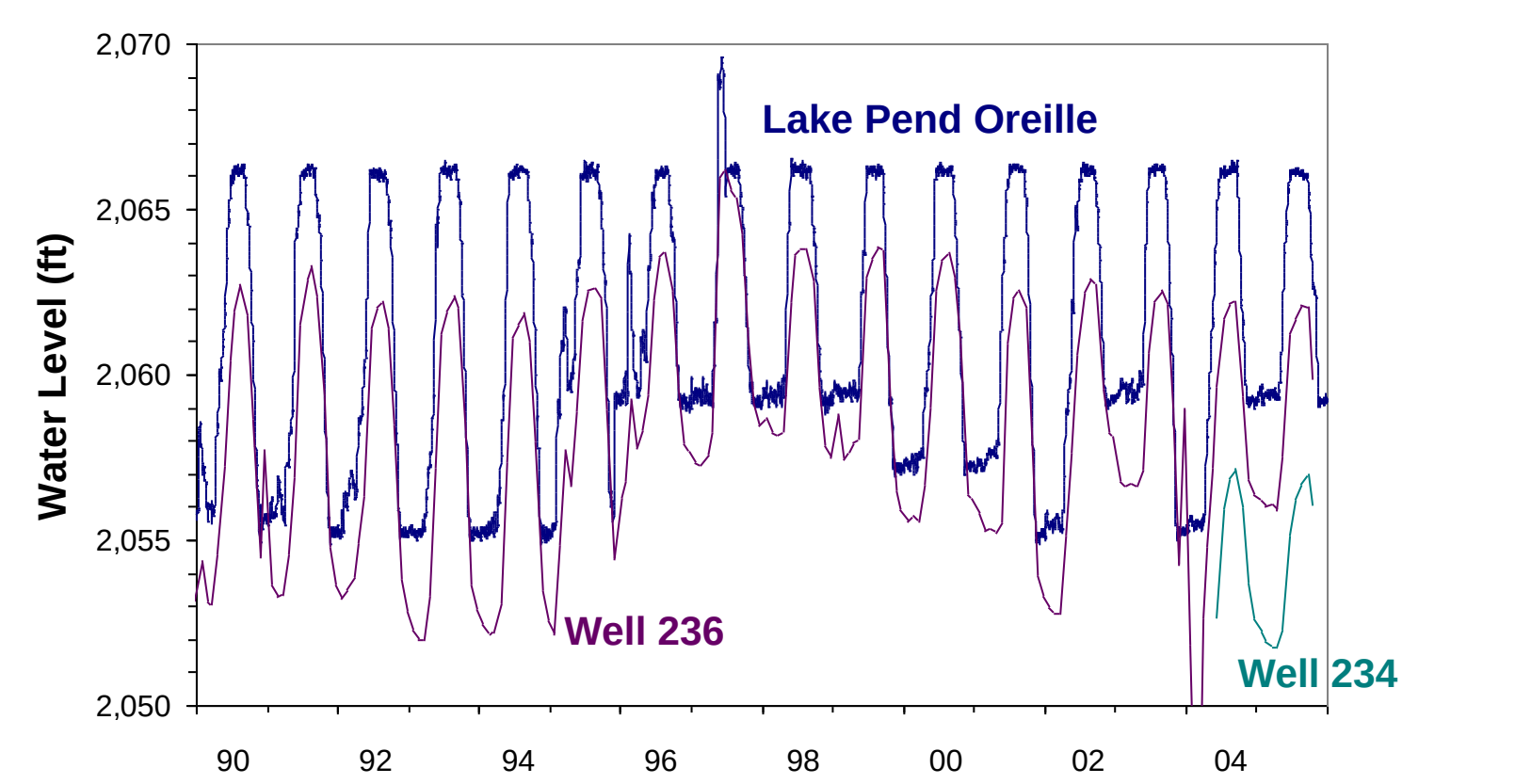


0 5 10 20 Miles

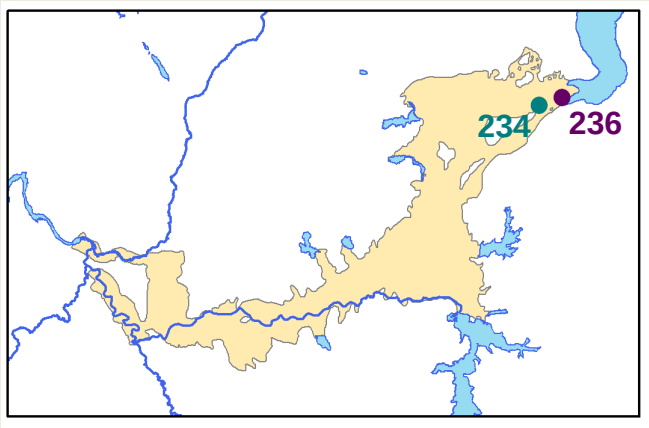
THE AQUIFER IN GENERAL

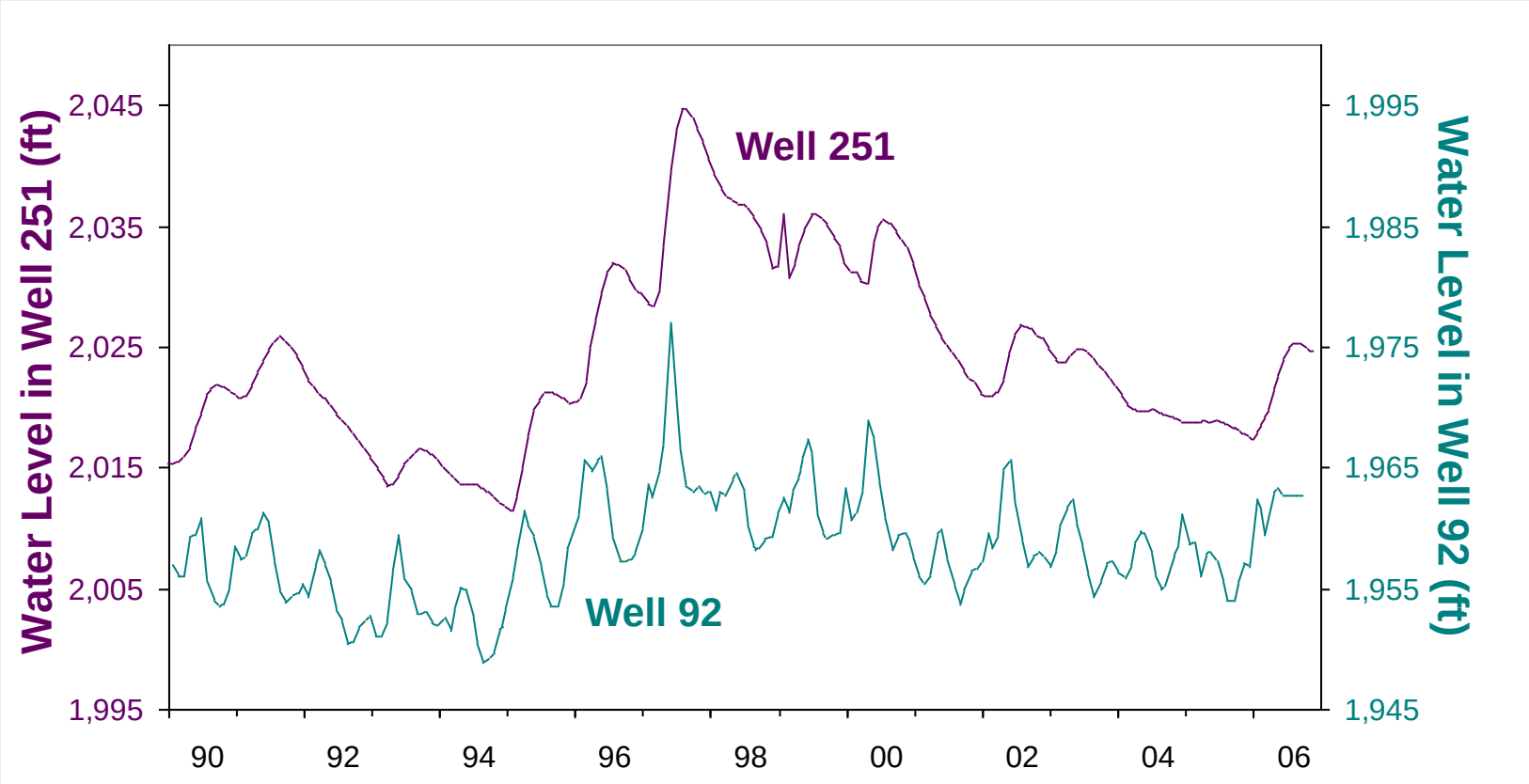
- **Responds rapidly to precipitation events.**
- **Lowest recorded water occurred in 1932.**
- **Heaviest pumping from the aquifer occurs during the periods of the lowest river flows**


The aquifer and the surface water of this region are completely intertwined.

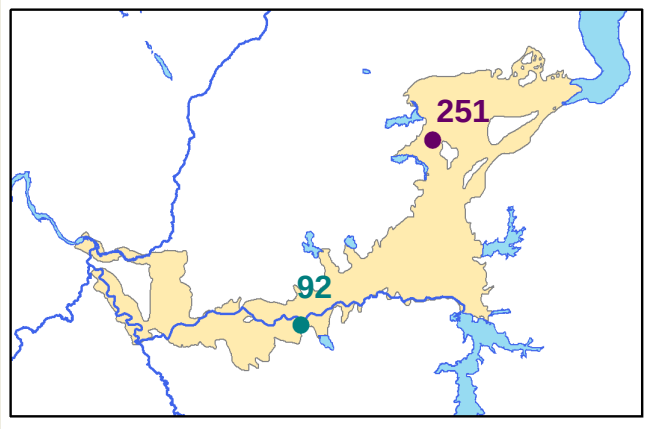


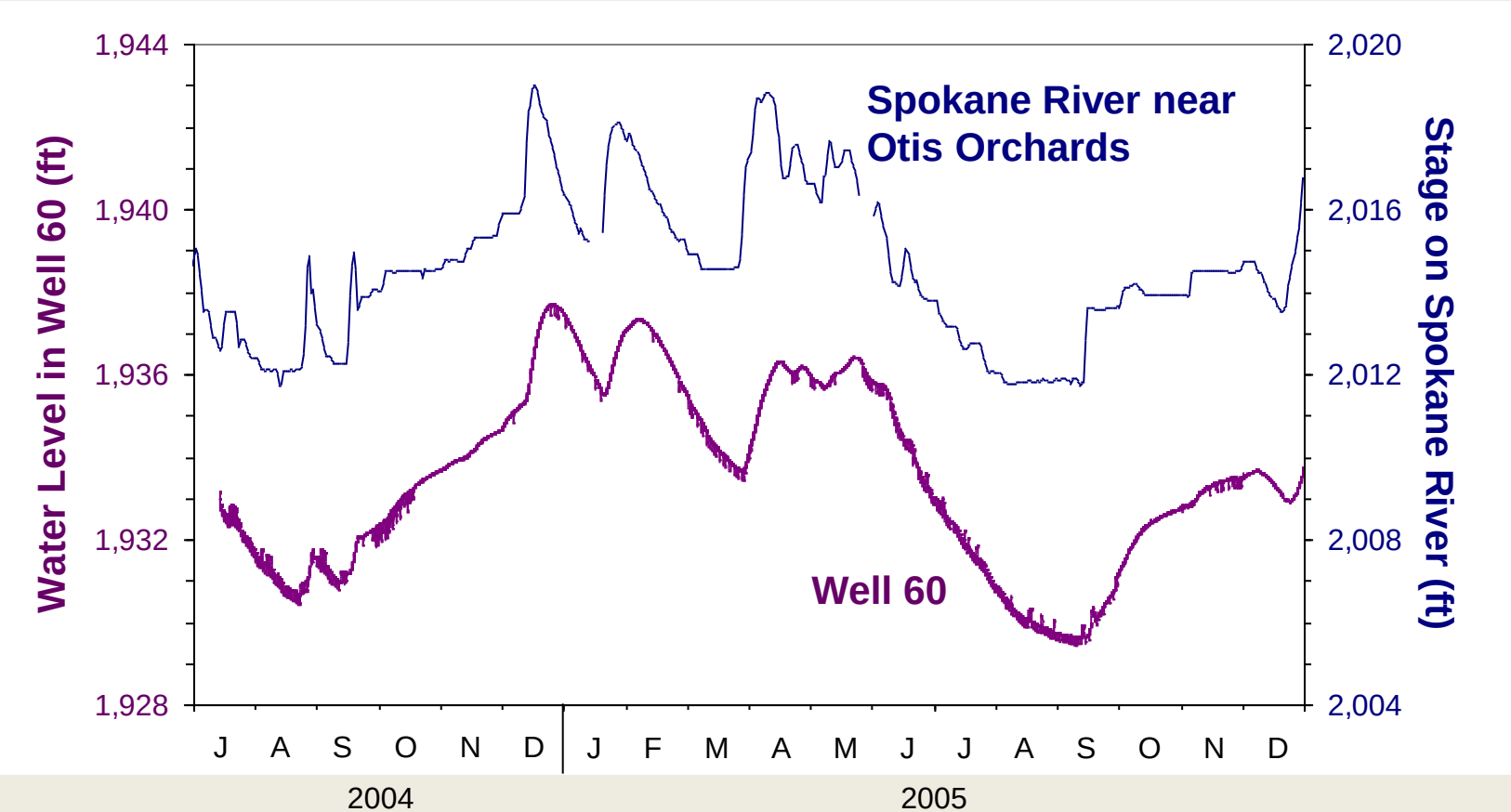
In the vicinity of Lake Pend Oreille, ground-water levels are controlled by lake level.



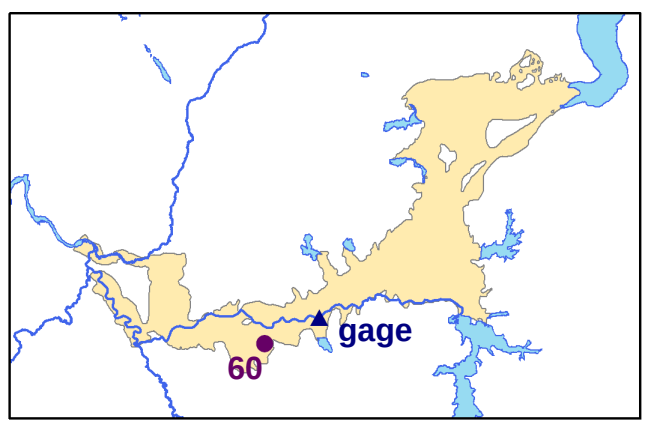


Ground-water levels in northern Rathdrum Prairie (well 251) are controlled by infiltration from precipitation.
Ground-water levels in Spokane Valley (well 92) are controlled by stage on the Spokane River.





In Spokane Valley, ground-water levels are controlled by stage on the Spokane River.



Spokane River water is easily exchanged with the aquifer through the rocky streambed

In IDAHO

The Aquifer

- Surface water is tributary to ground water.
- Ground water is **NOT** tributary to surface water so stream flows in the Spokane River are not affected by ground water recharge or ground water pumping.

The River

- Flows totally depend on outflow from Post Falls Dam.
- Part of the year the dam controls flows and part of the year the river free flows.

In WASHINGTON

The Aquifer

- Surface water is tributary to ground water

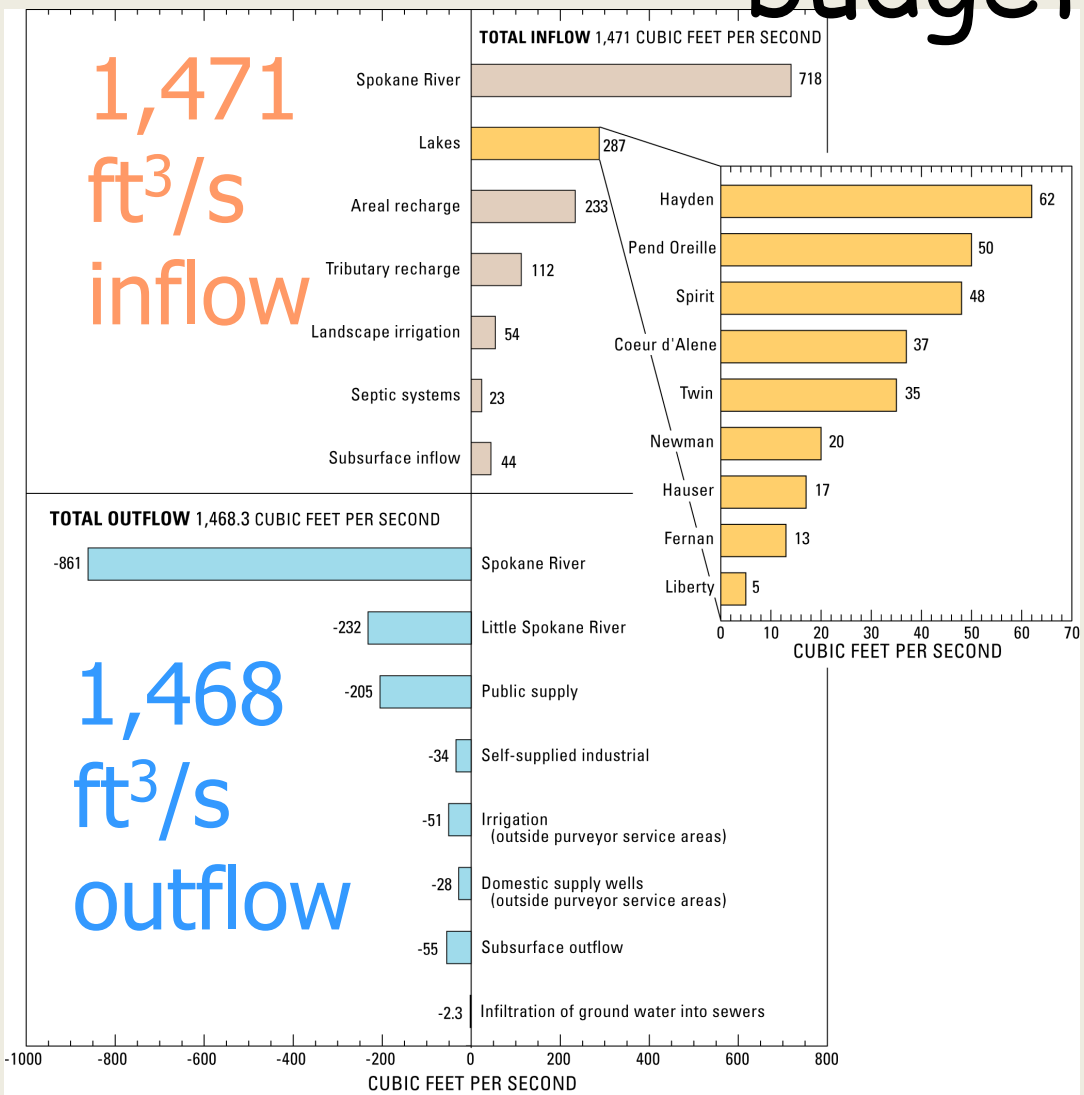
AND

- Ground water is tributary to surface water.

The River

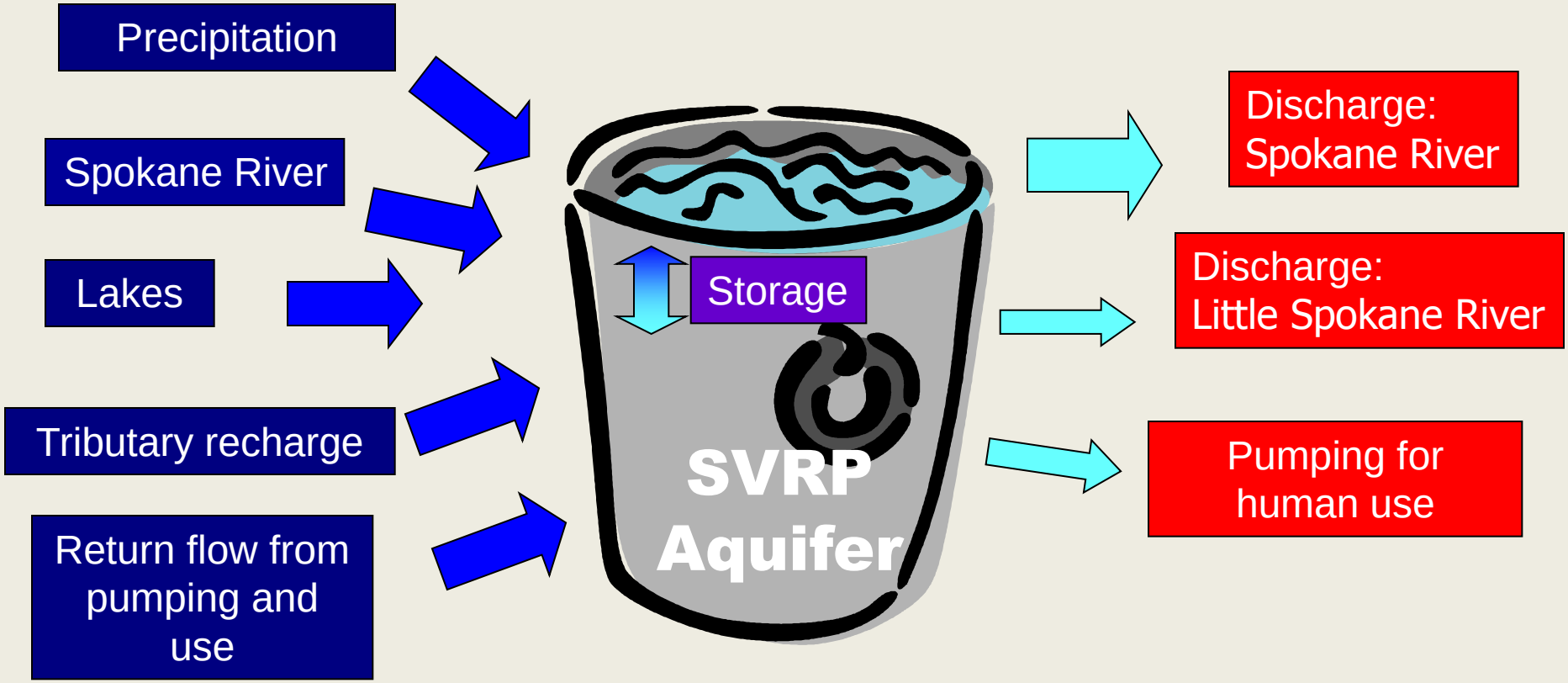
- Flows are dependant on outflow from Post Falls Dam and inflow from the aquifer in a section below Sullivan Road and in the City of Spokane.
- Aquifer discharges are impacted by precipitation and ground water pumping.

SVRP aquifer ground-water budget

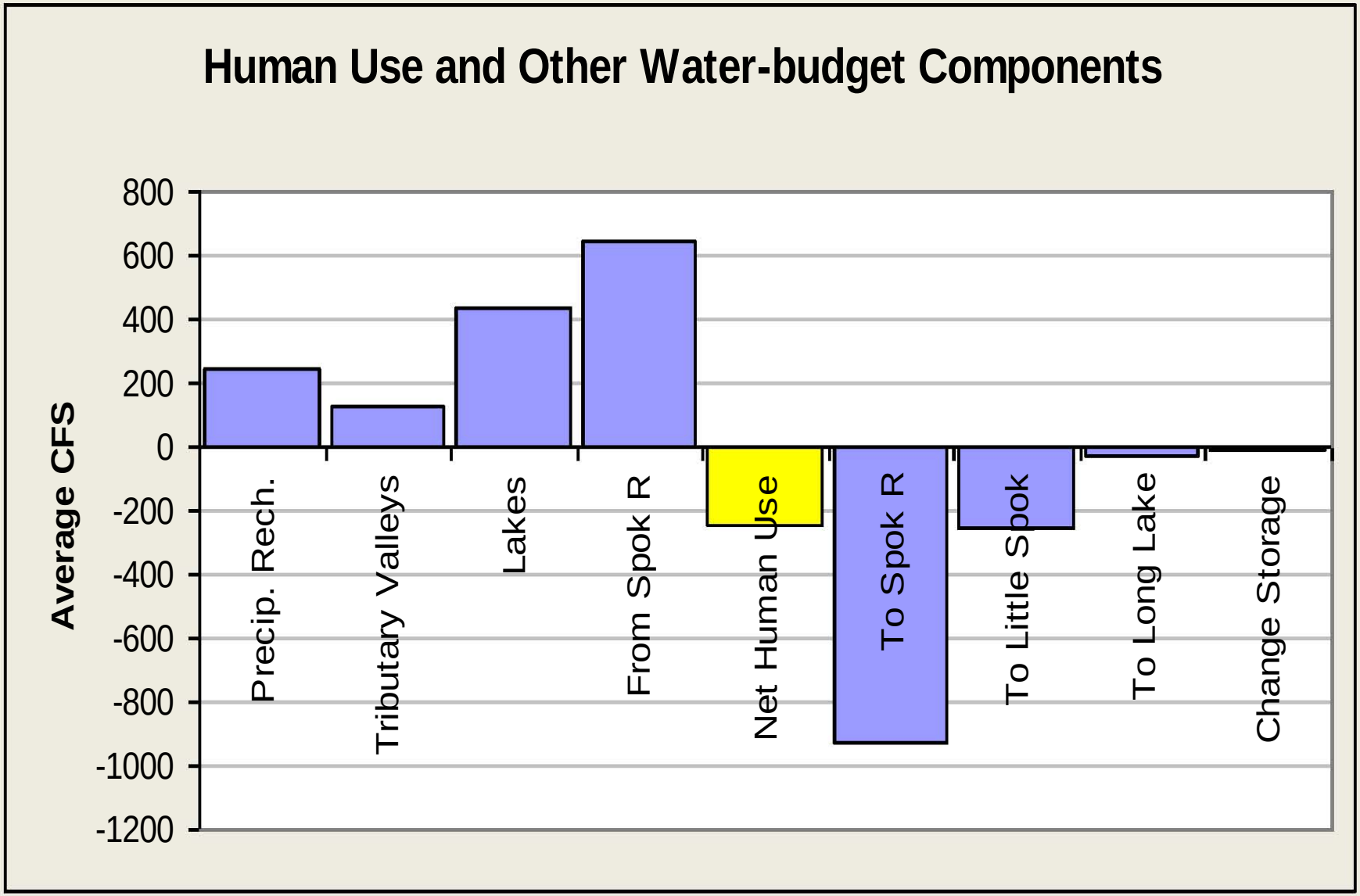


- The Spokane River is about half of both inflows and outflows—3-4 times more than next largest component
- Lakes are important, but contribute about the same volume as areal recharge
- The lack of significant water level declines suggests that there's not much change in storage
- Some uncertainty, but for smaller volume components

Resultant conceputal model:

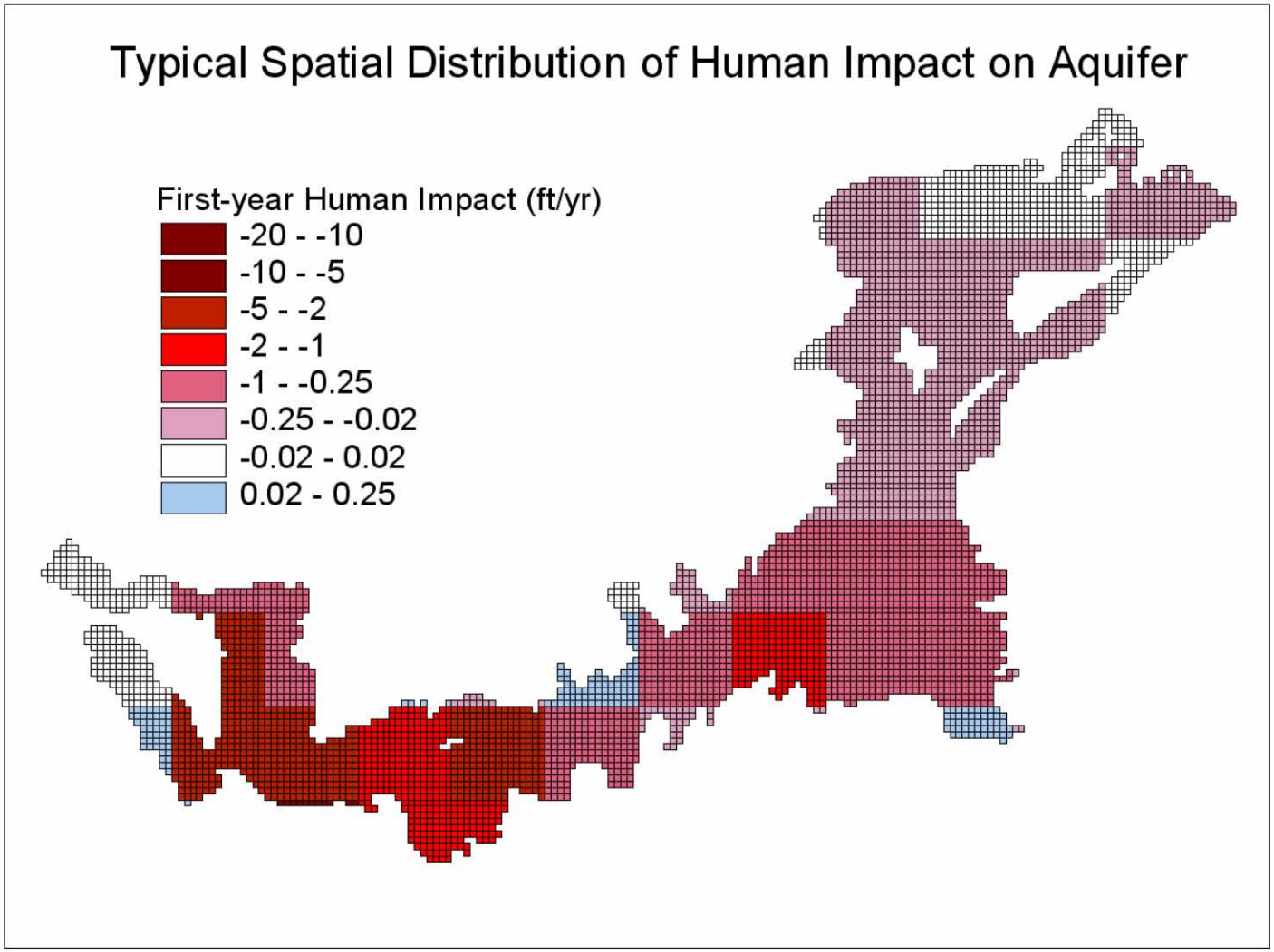


Water "balance"….



Regional Water Use

Where is most water used?

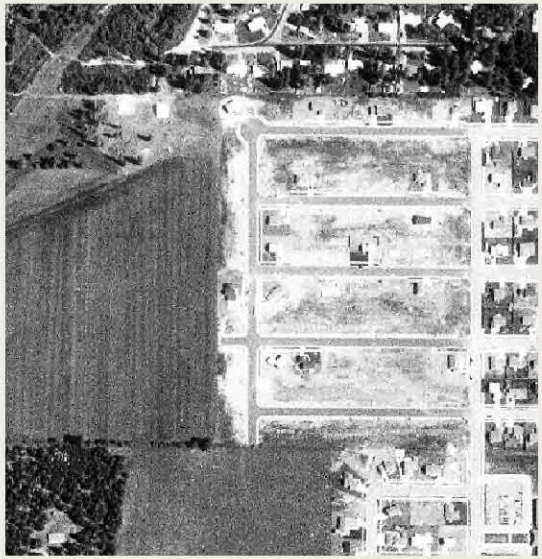


Variability over study period

City Polygon Experiment -
1992 Image 1:4000

300 0 300 600 Feet

City Polygon Experiment -
circa 1998 Image 1:4000

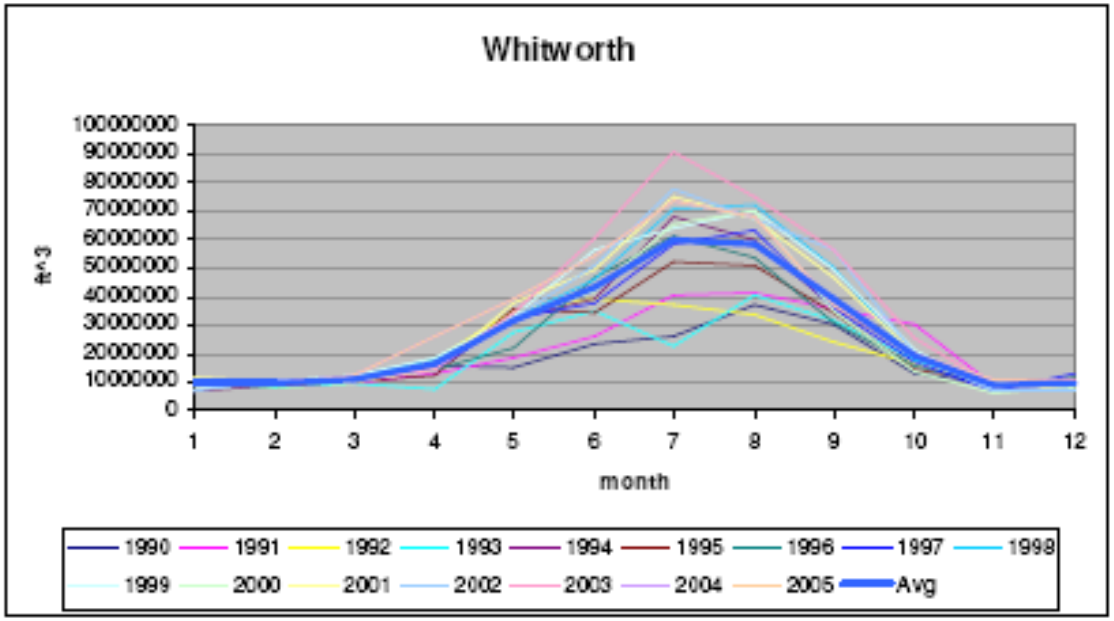


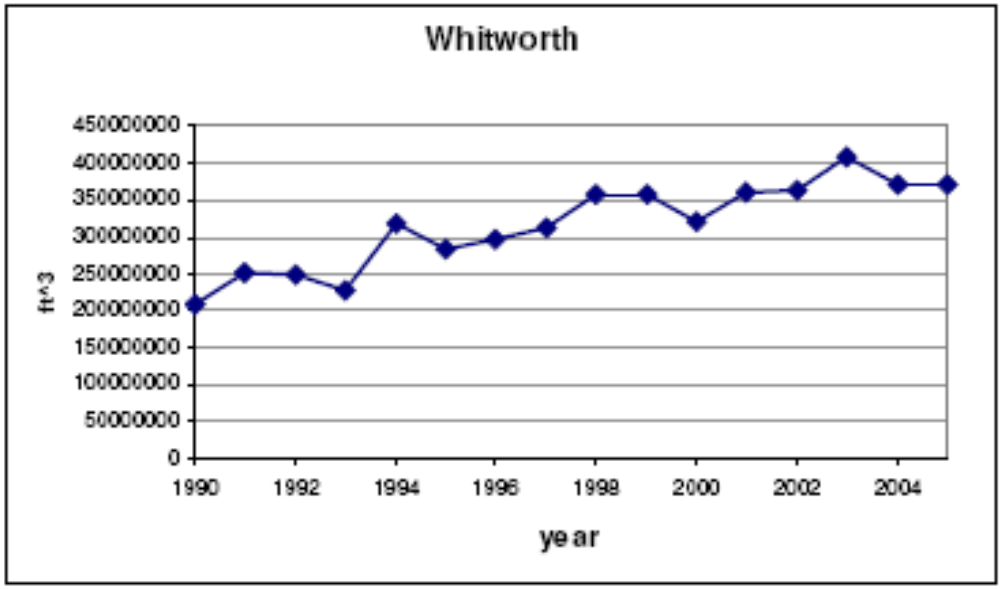
300 0 300 600 Feet

City Polygon Experiment -
2004 Image 1:4000

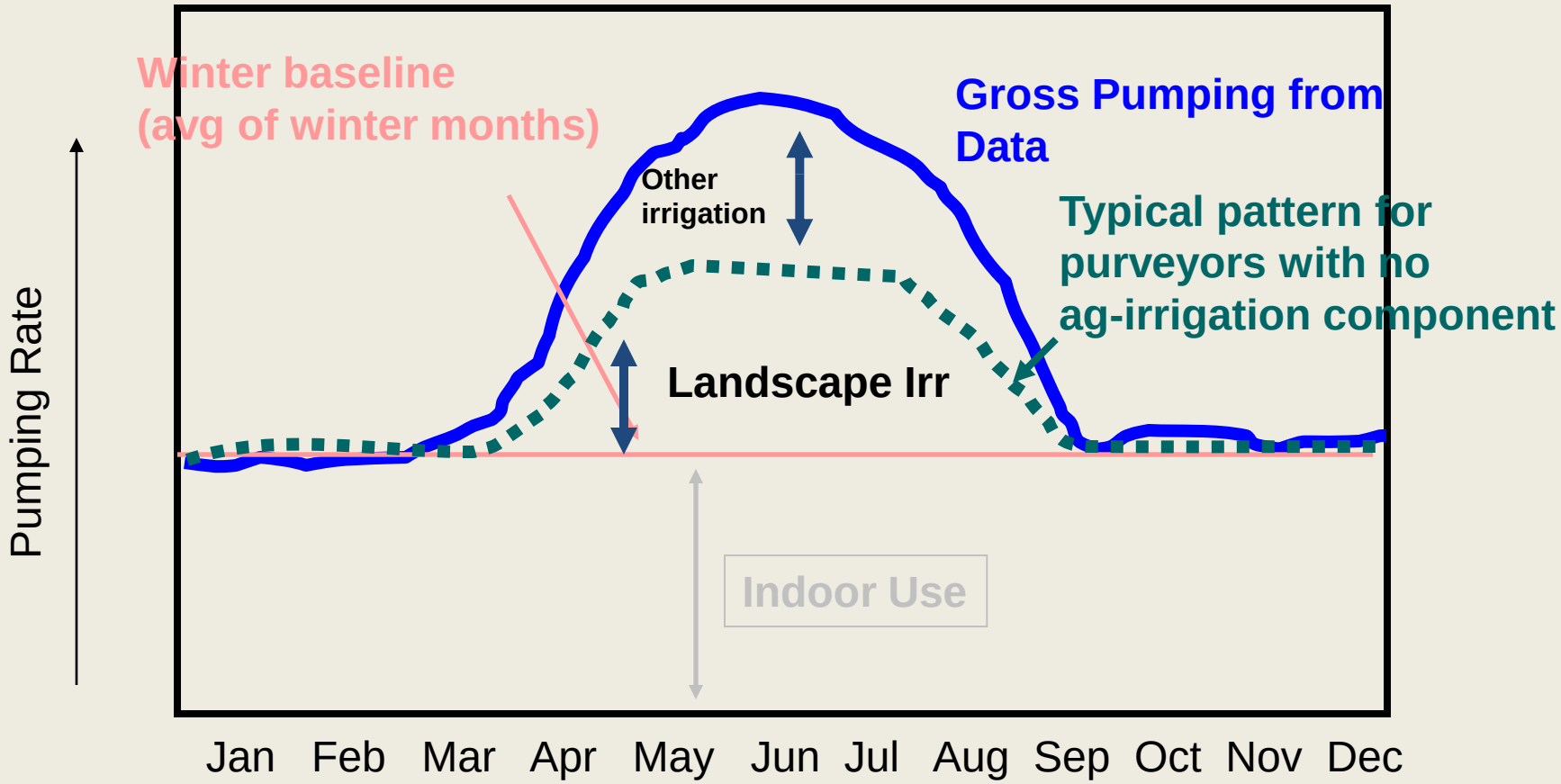
300 0 300 600 Feet

15 year Dataset on Regional Municipal and Industrial Pumping

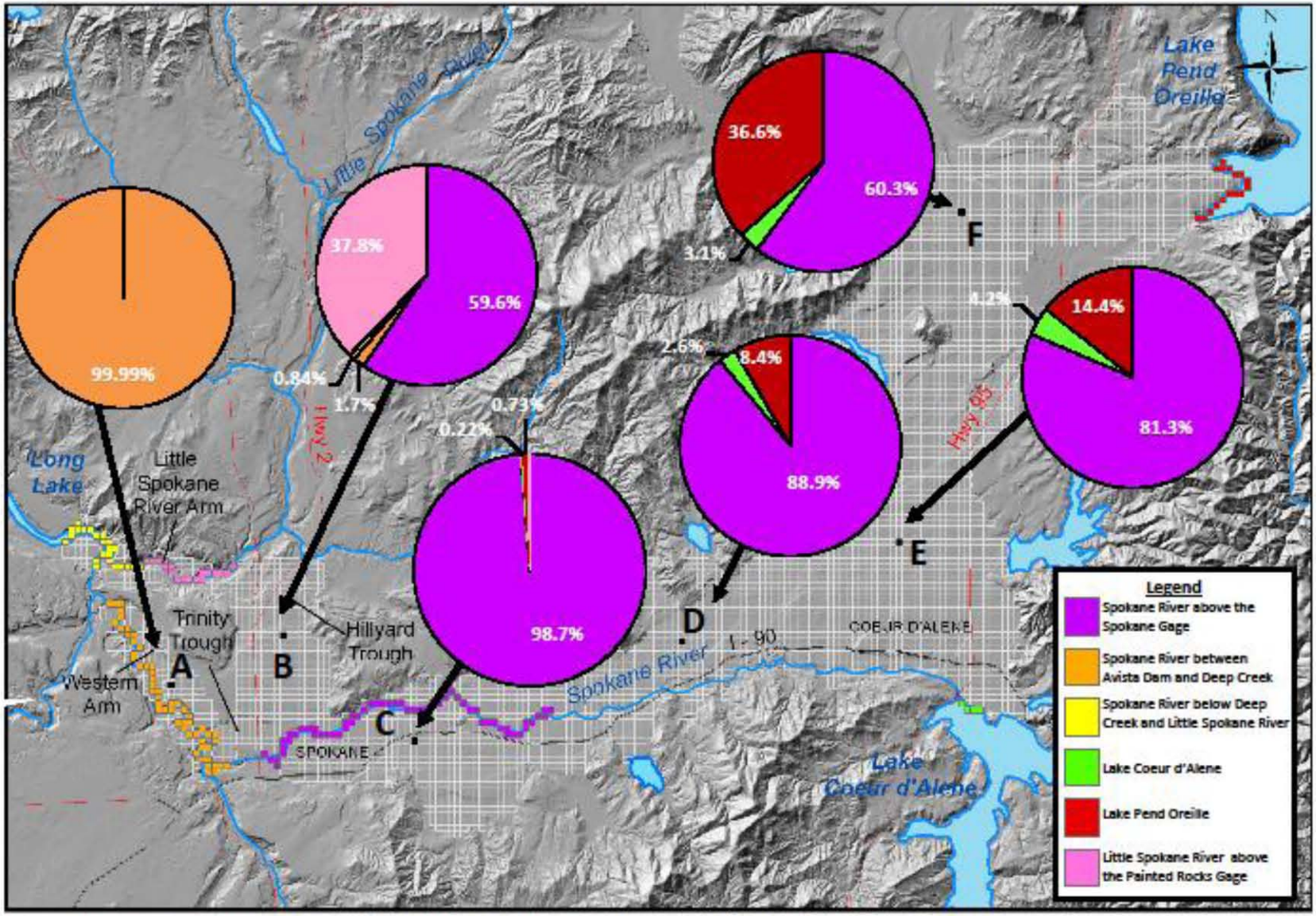




General Components of Annual Water Use

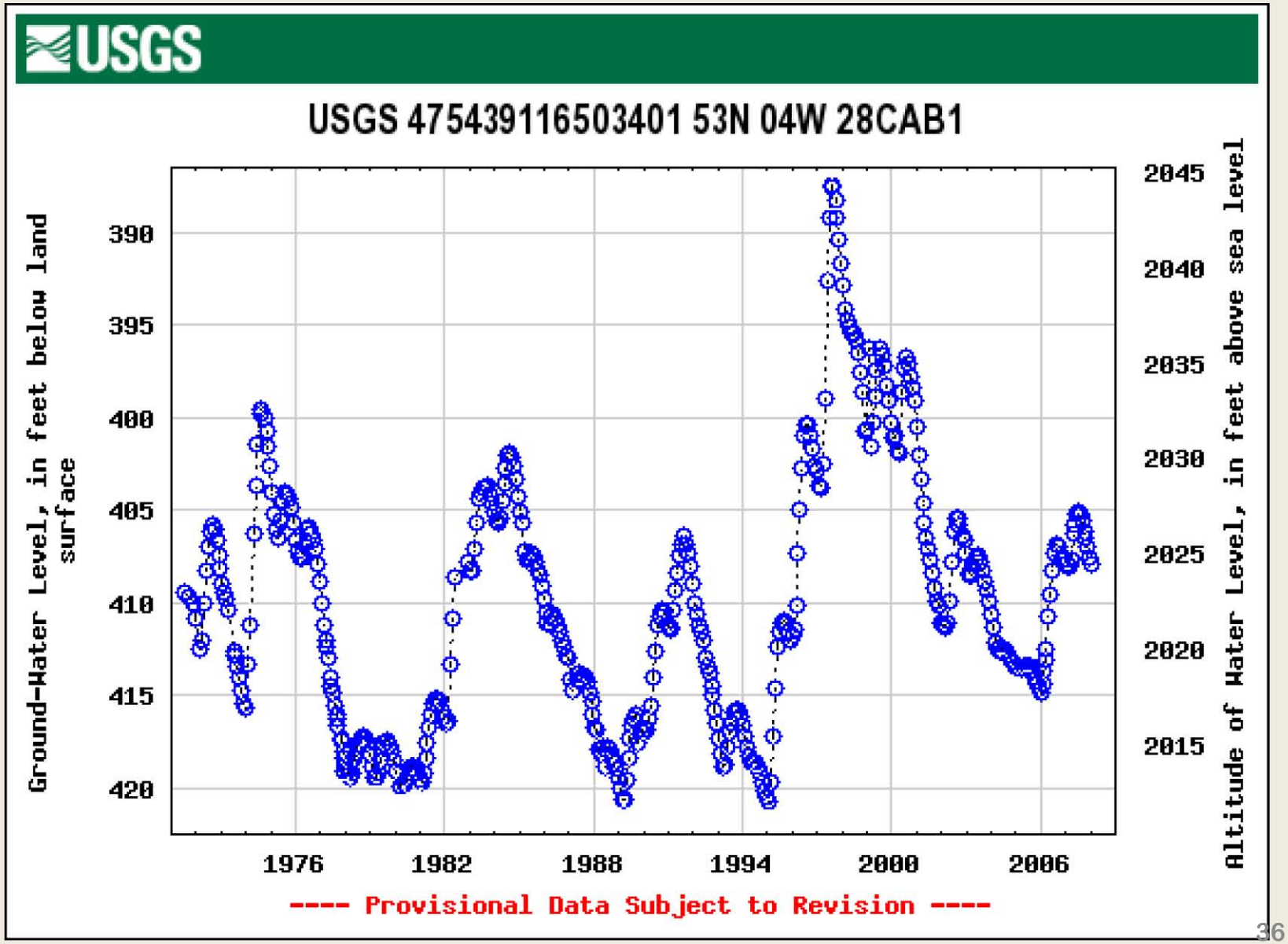


Steady State Capture as a Percent of Stress at Specific Locations

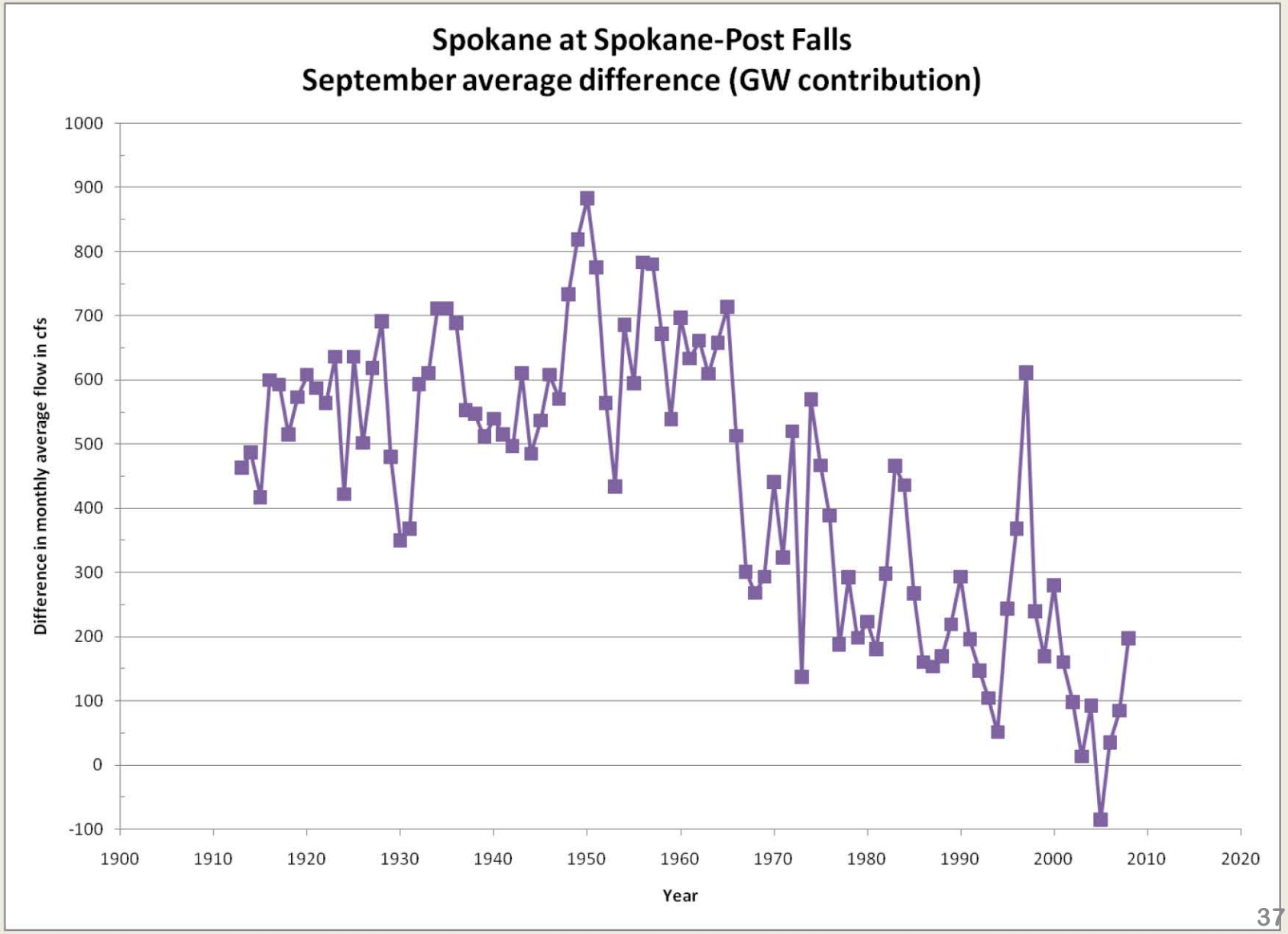


NOTE: Colors in the pie charts correspond to the colors used in the cells representing the reaches of the rivers or lakes.

Are we mining the Aquifer?

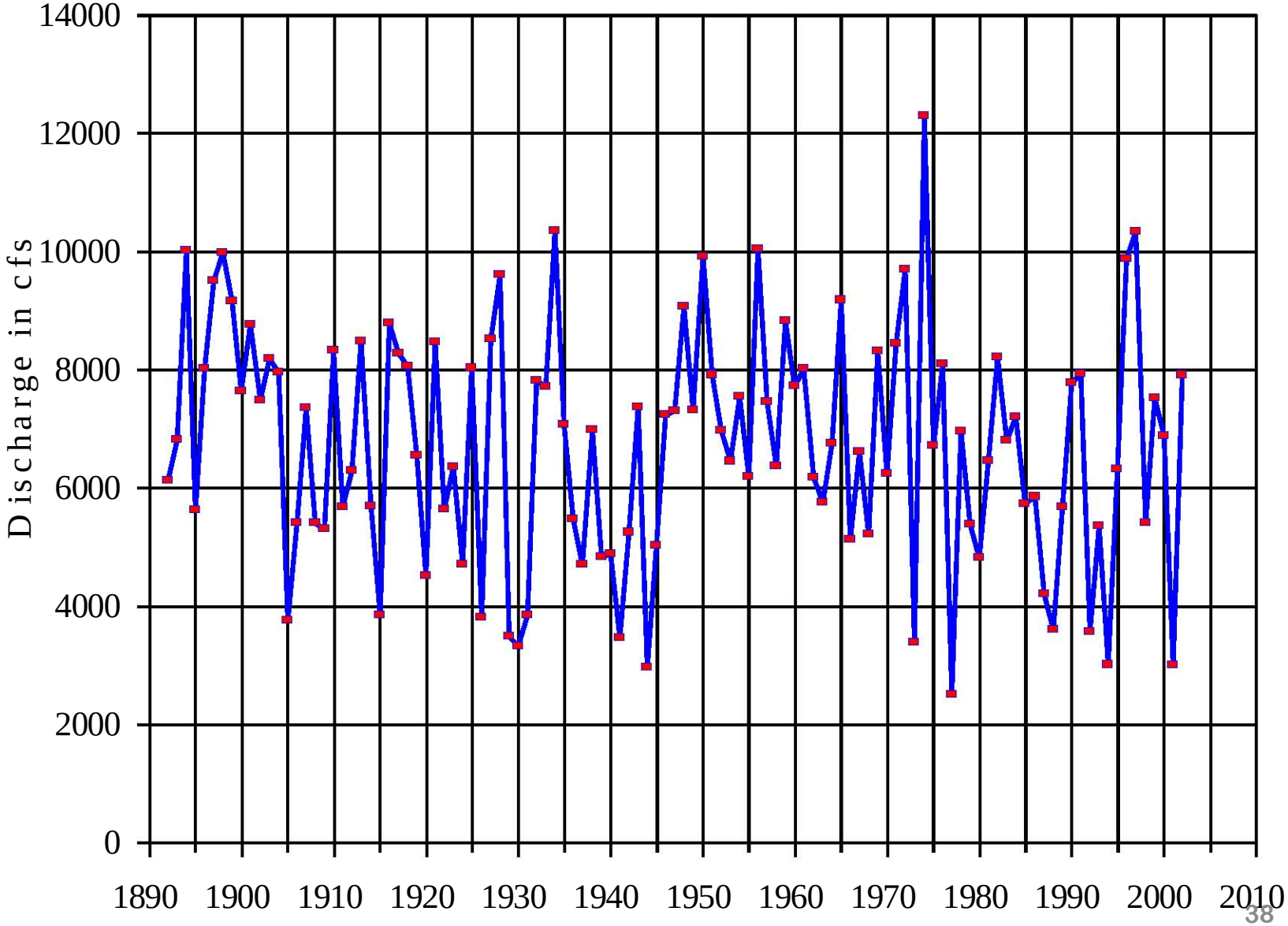


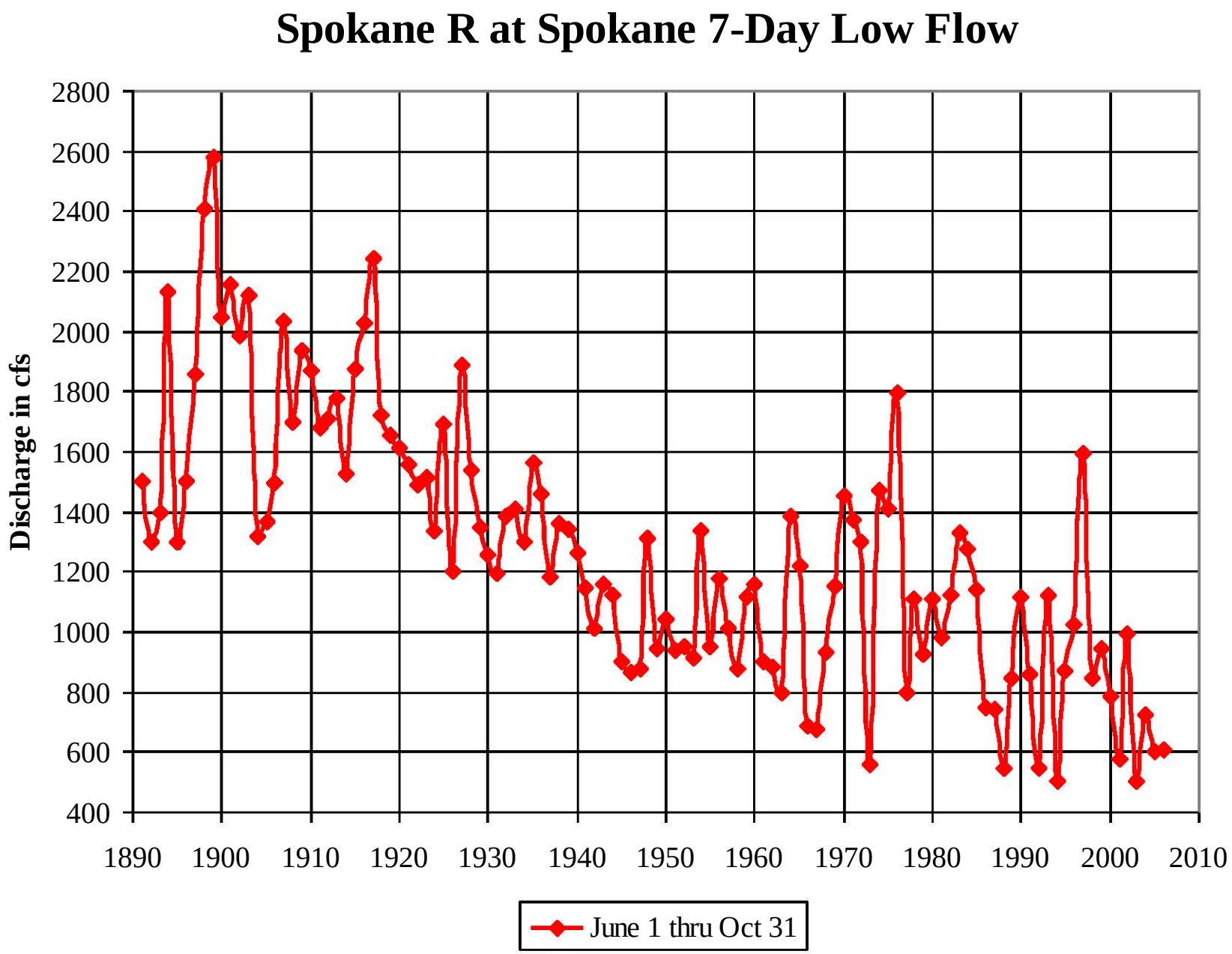
Nope….We're mining the river



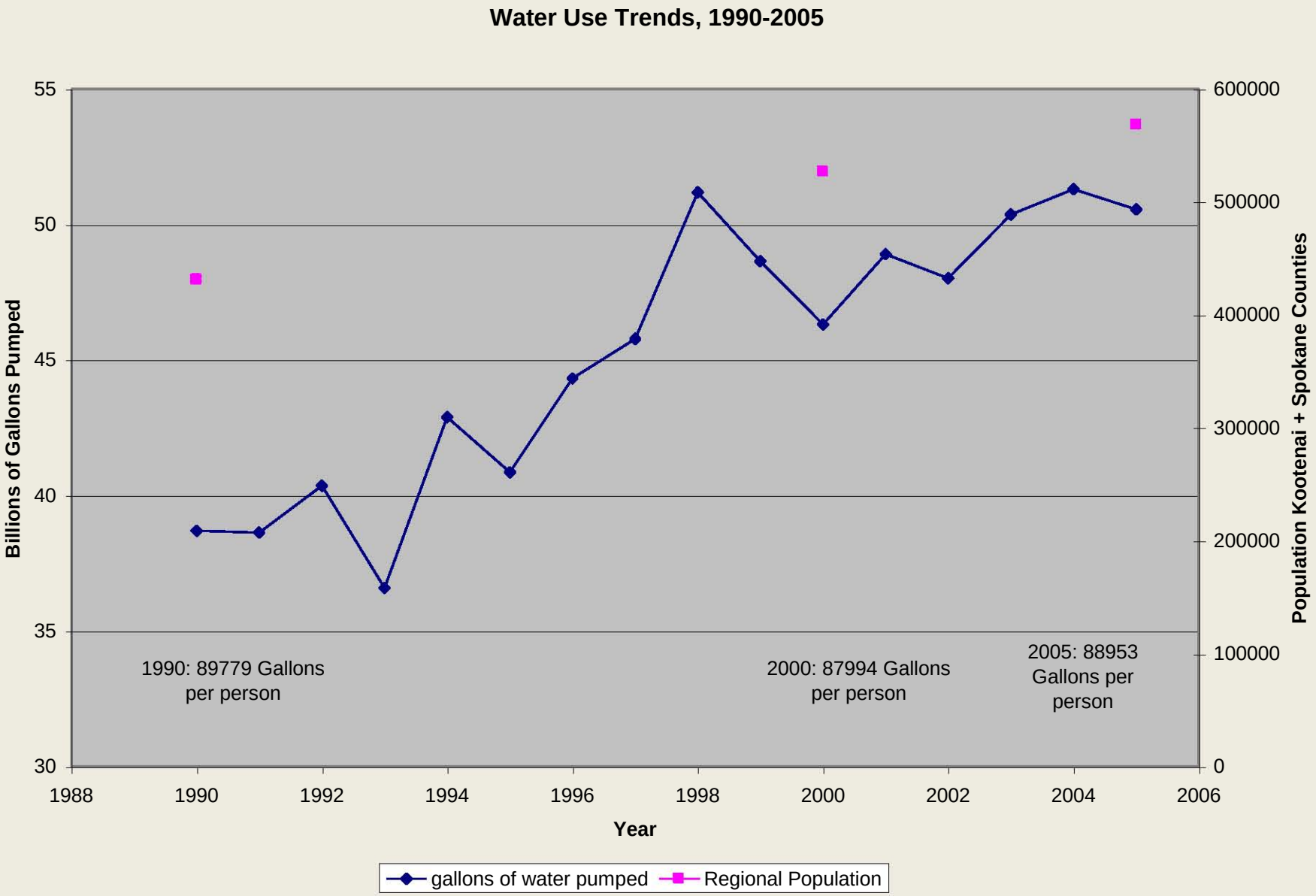
Spokane River at Spokane

12422500

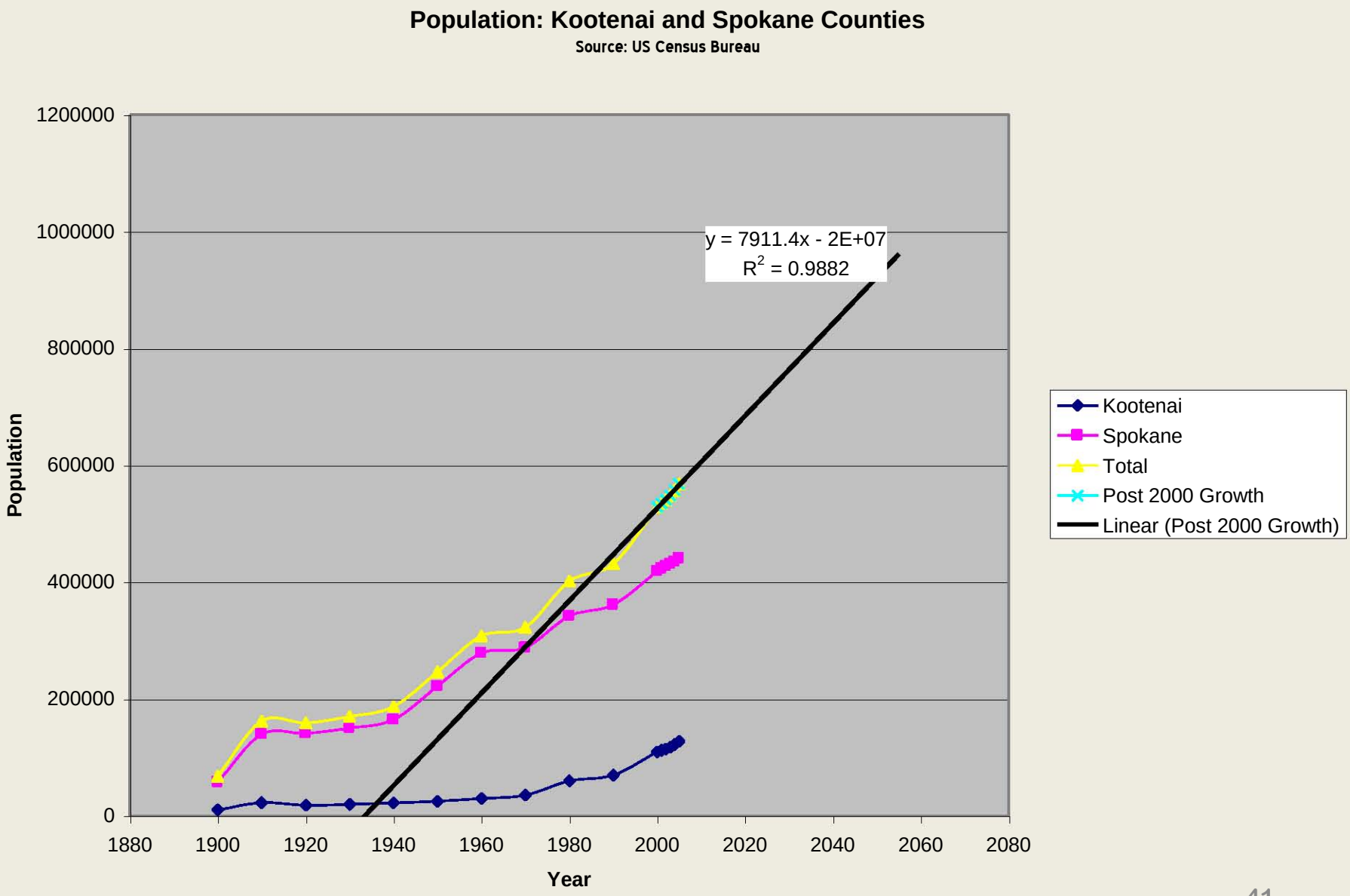



Spokane R at Spokane 7-Day Low Flow
Discharge in cfs
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
June 1 thru Oct 31

Growth over the period of the study…



Growth-future



Idaho: Action

- **Planning and outreach**
  - **RP Groundwater Management Area**
  - **Comprehensive Aquifer Management Planning (CAMP) process**
  - **Aquifer Protection District**
- **Studies**
  - **Grader and others, 2008 Spokane and Coeur d'Alene areas**
  - **North Boundary and Pend Oreille investigations**
  - **Well installation and ongoing monitoring**
- **Adjudication**
  - **Underway 2009**

Washington: Action

- **Planning and Outreach**
  - **Water Resource Inventory Area 55/57 process**
  - **Conservation education efforts**
- **Studies**
  - **SWWRC study of mitigation potential**
  - **IWRRI spreadsheet tools for model accessibility**
  - **Ongoing monitoring**
- **Adjudication**
  - **Preliminary phase, begin late 2010**

Enhance and preserve the model
Partner in ongoing inquiry and action…..

- **Make the model accessible**
  - **Spreadsheet tools for transient and steady state simulations.**
- **Gather data to make the model better**
  - **Lake Coeur d'Alene water balance**
  - **Spokane River detailed geologic analysis**
- **Apply the model to address questions of supply**
  - **mitigation opportunities, i.e. artificial recharge, manipulation of aquifer pumping**
- **Engage the public**
  - **Meetings, outreach, stakeholder support**

Questions?

- **Robert G. Haynes, P.E.**

  Idaho Dept. of Water Resources
  Northern Regional Office
  7600 Mineral Drive
  Suite 100
  Coeur d'Alene, ID 83815
  (208) 762-2800
  bob.haynes@idwr.idaho.gov

- **Guy J. Gregory, L.G., L.Hg.**

  Washington Dept. of Ecology
  N. 4601 Monroe
  Spokane, WA 99205
  509-329-3509
  guy.gregory@ecy.wa.gov