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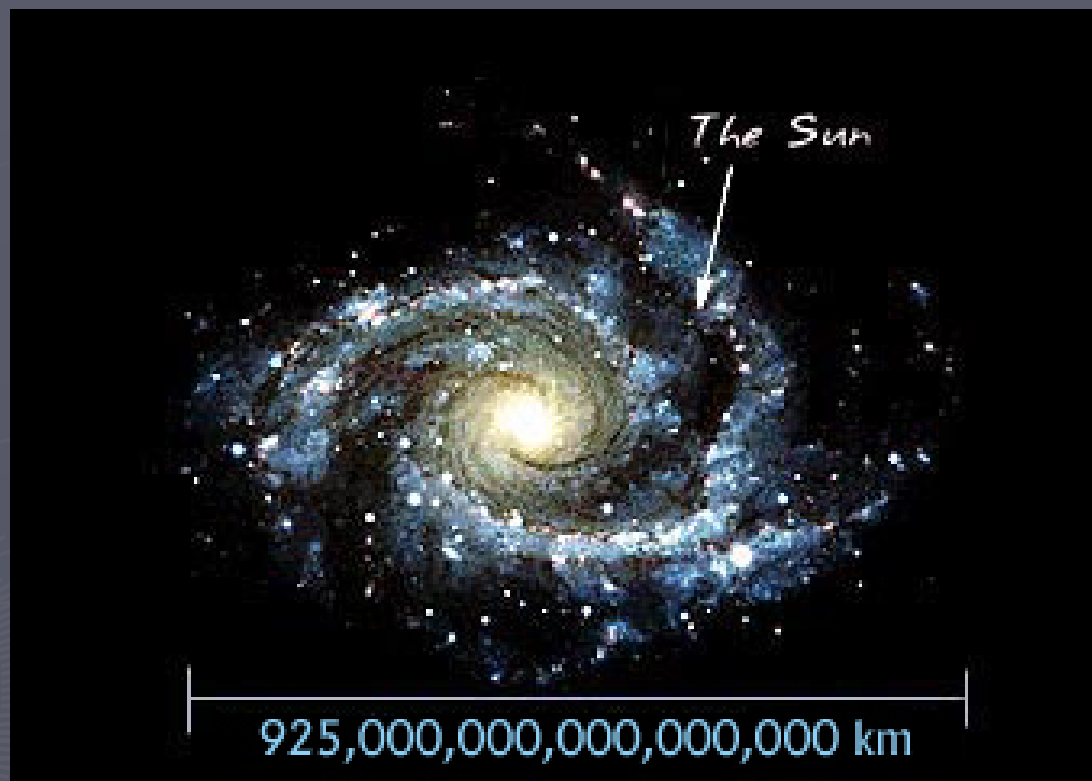
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Spokane River & Aquifer: An Uncompacted Watershed

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Chapter 1: Watershed Hydrology

- ▶ Overview map
- ▶ Dramatic formation via glacial floods
- ▶ Contemporary boundaries
- ▶ Characteristics



▶ NASA (2003)

Map of Watershed

- ▶ Request in to Spokane County GIS for watershed map



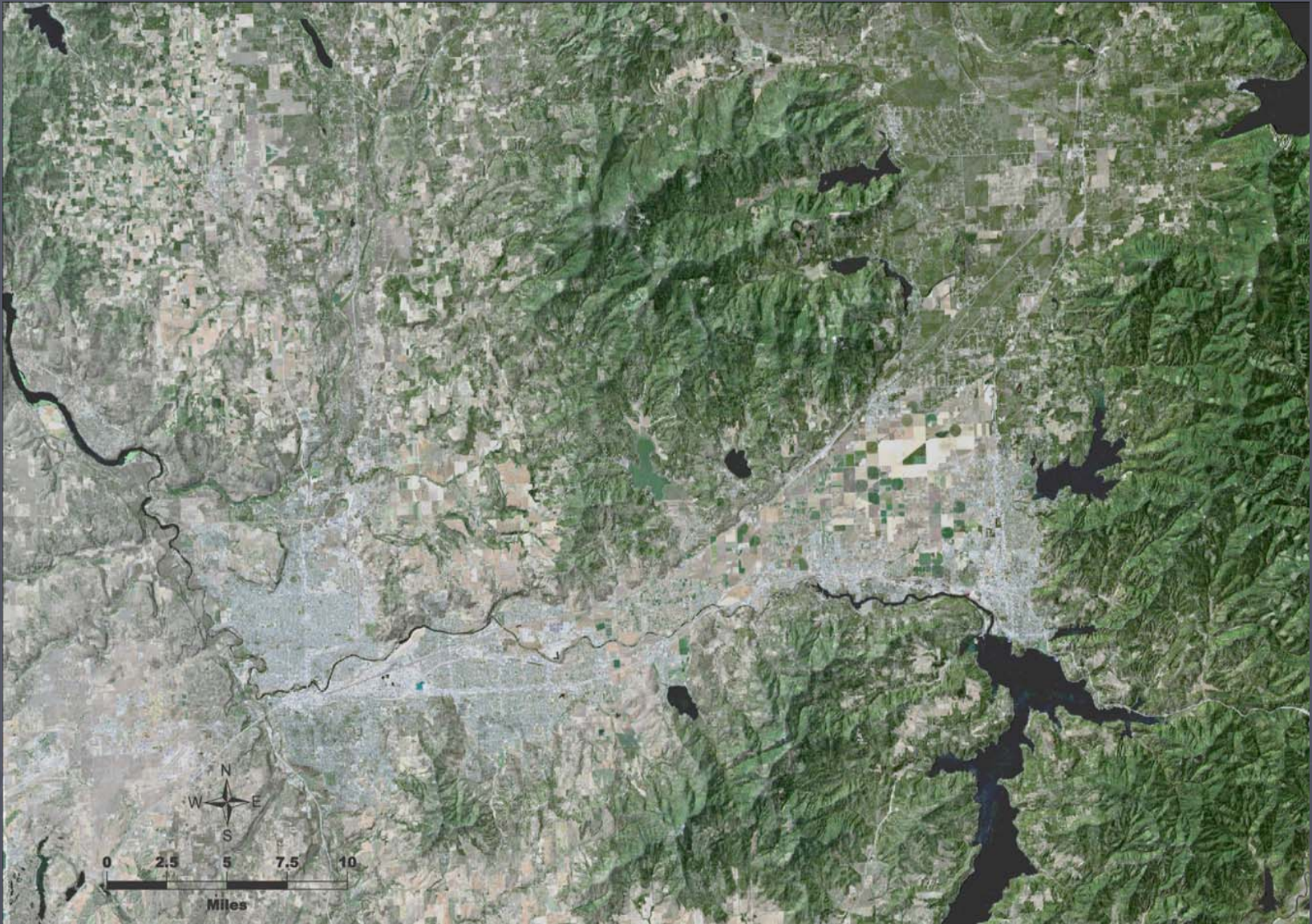
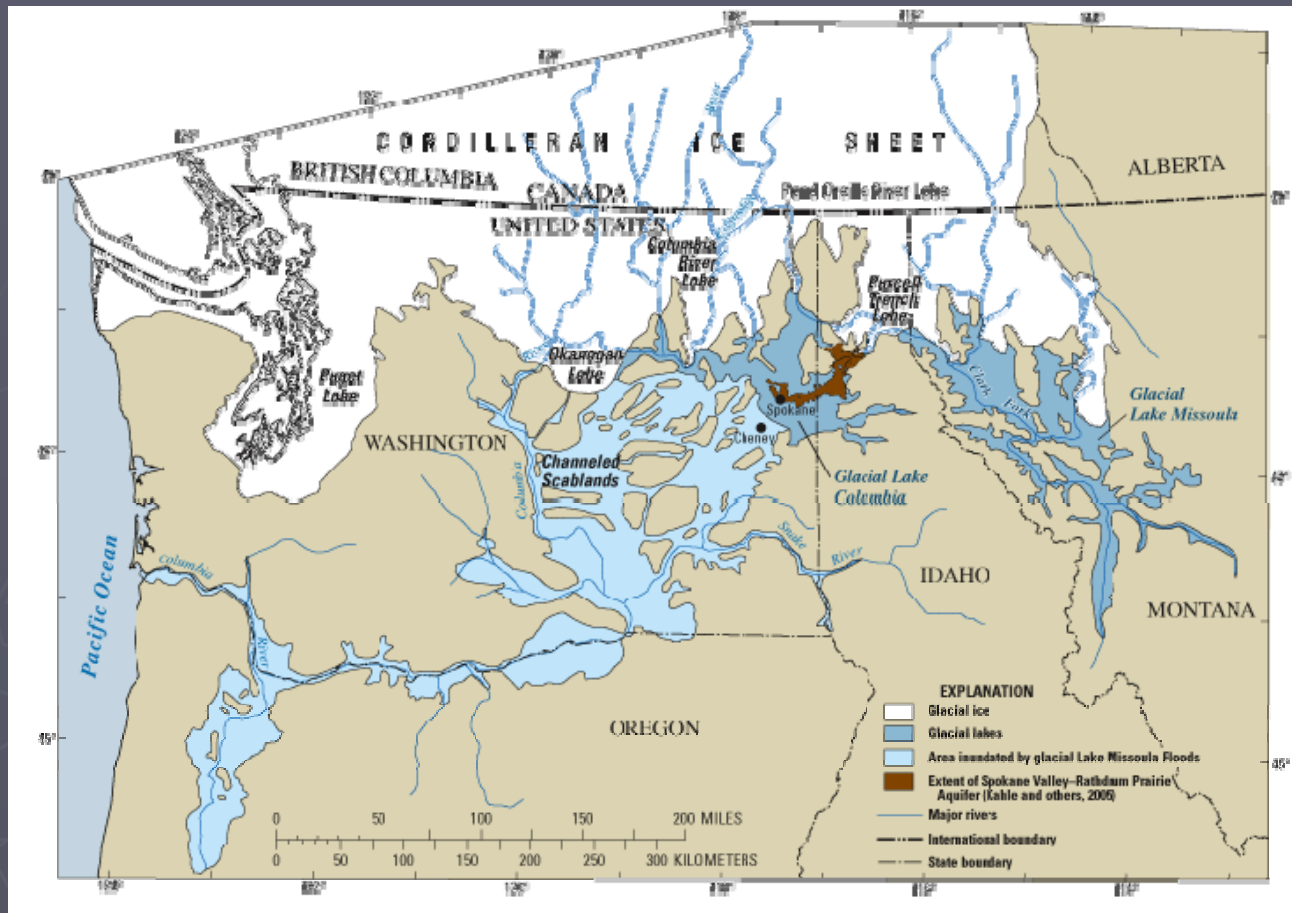


Image: NASA, reprinted in The SVRP Atlas (2d ed 2004)

The SVRP Aquifer 15,000 years ago



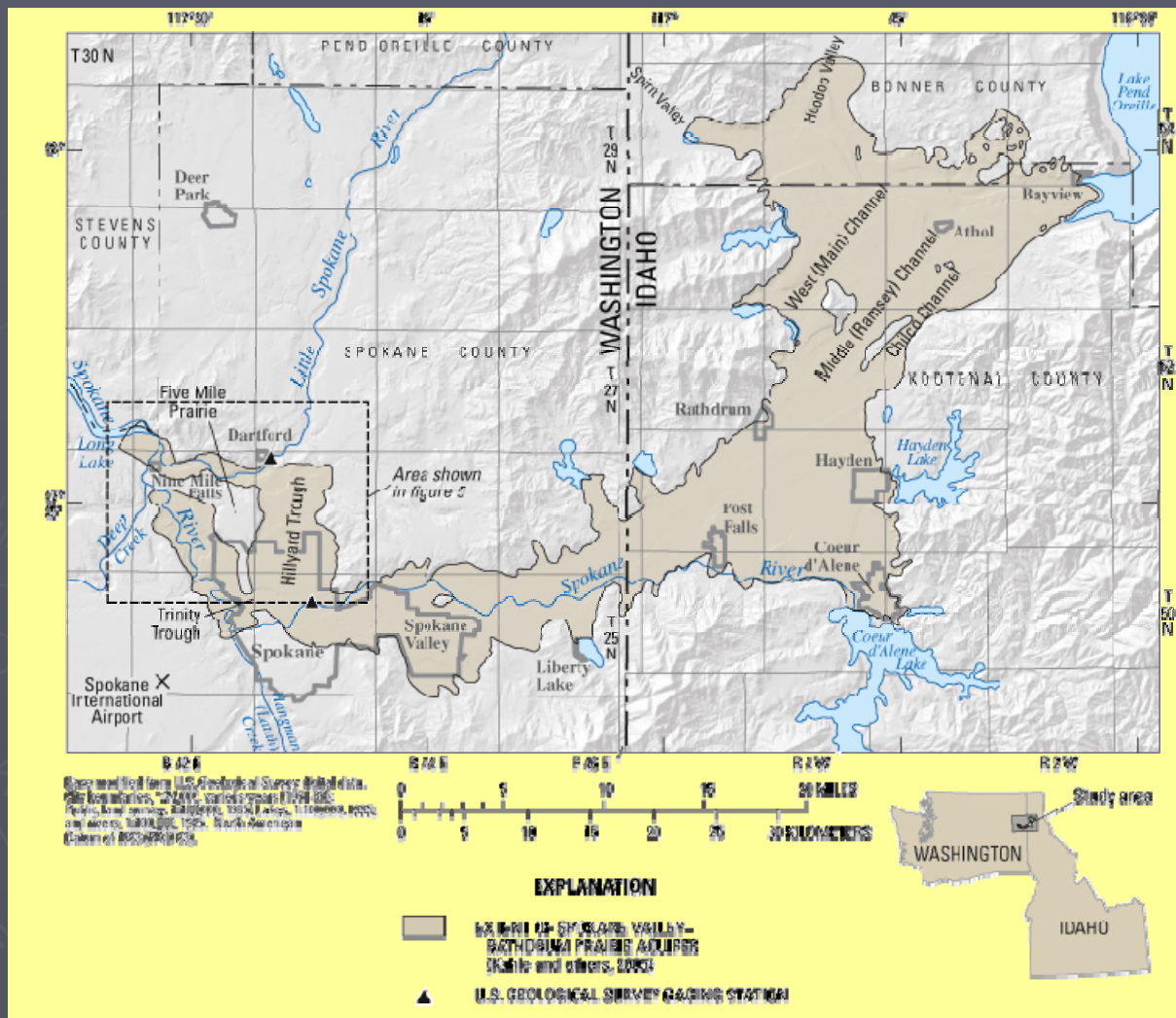
Kahle & Bartolino, Hydrogeologic Framework & Groundwater Budget of the SVRP Aquifer (USGS SIR 2007-5041)

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)

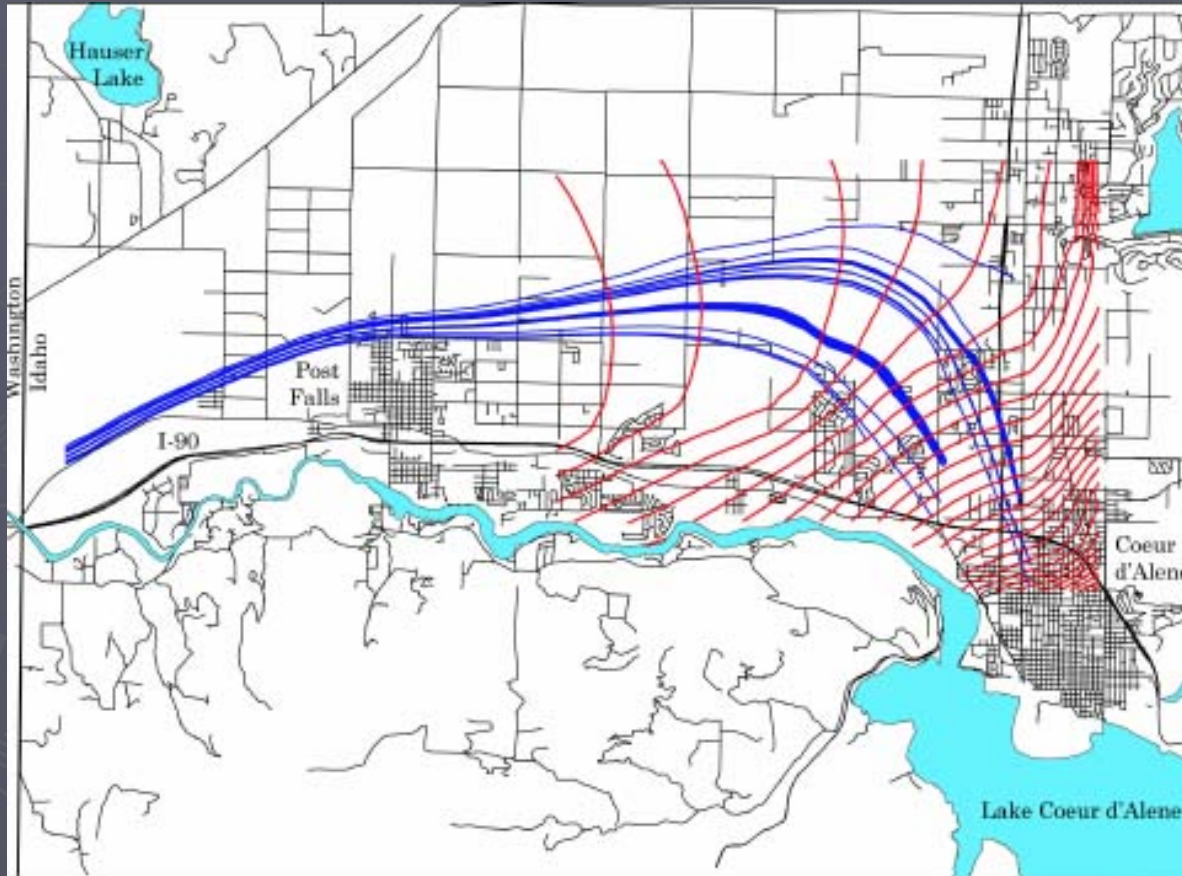
SVRP Aquifer characteristics

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

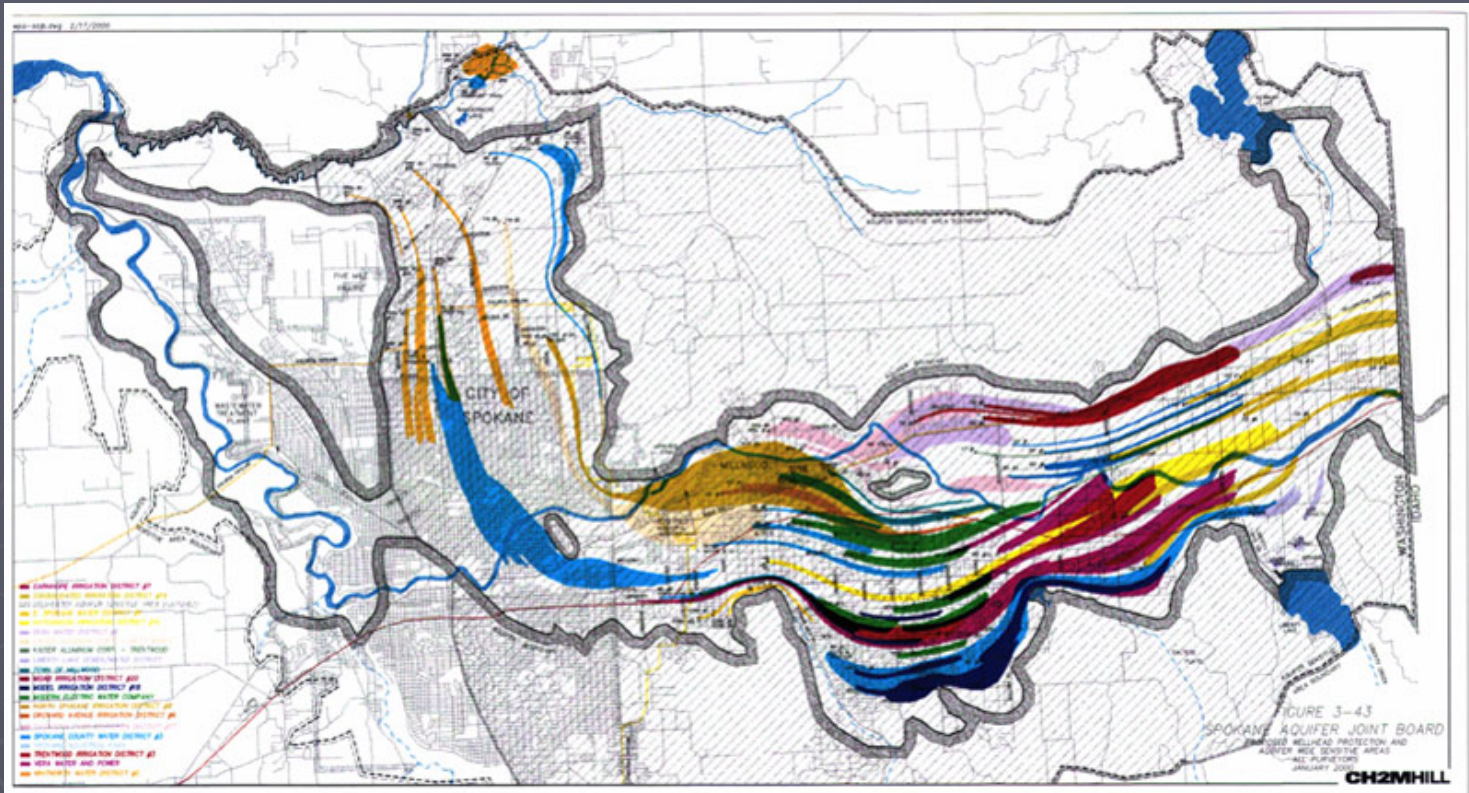


Susceptible to contamination

Well head contamination zone

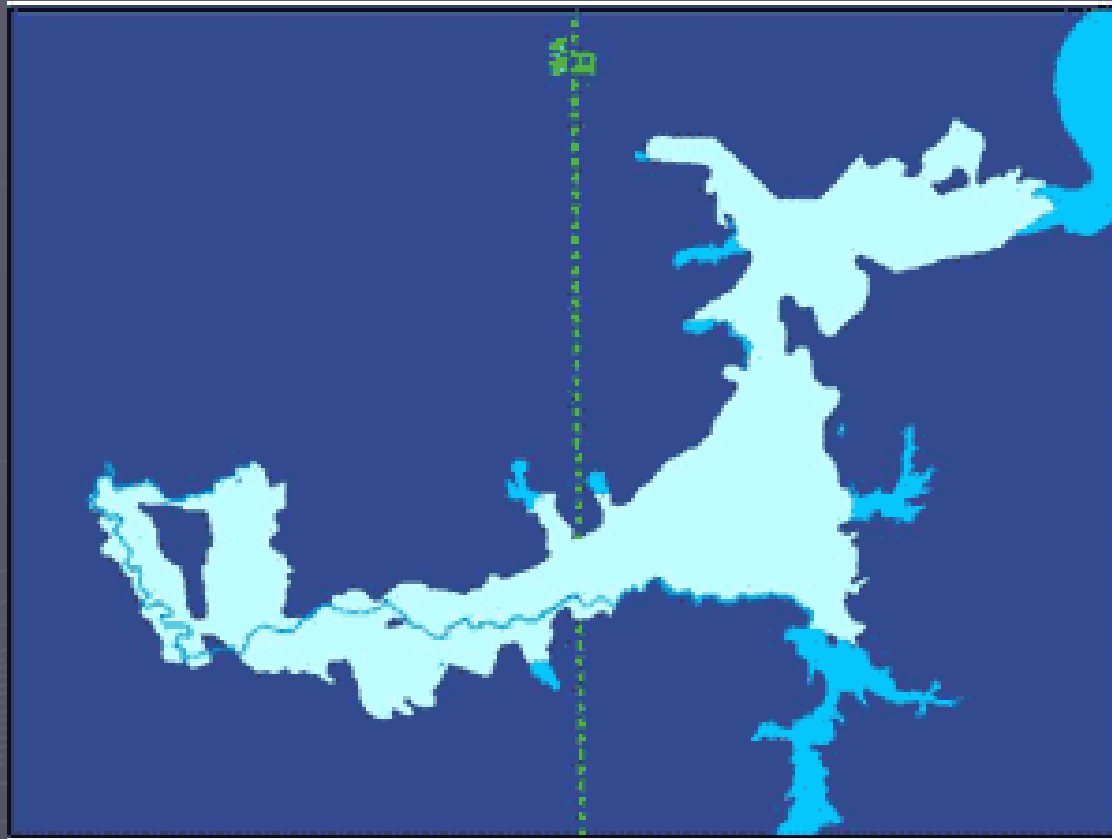


Wellhead protection zones



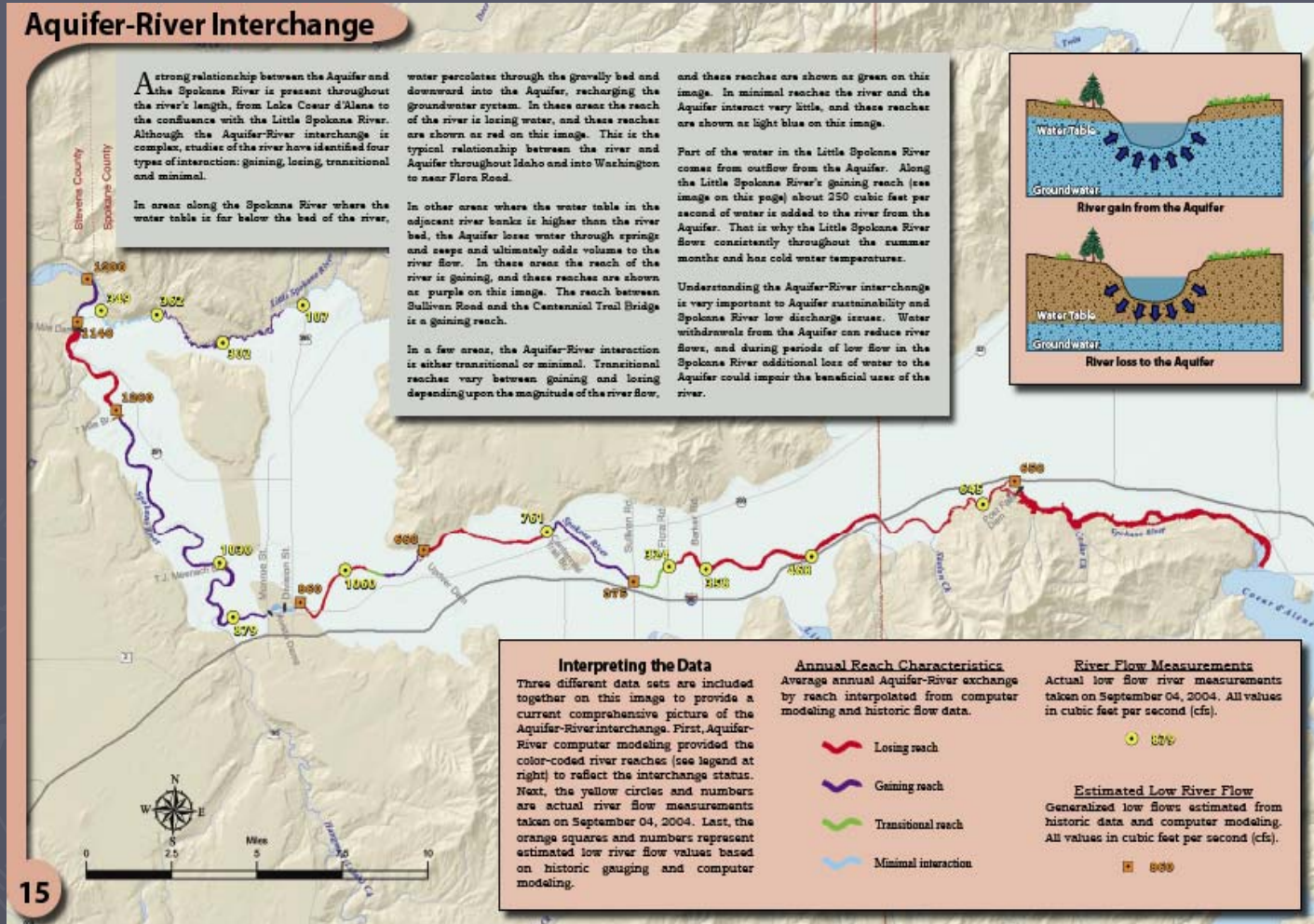
CH2MHill 2000

Multiple Ground-Surface Water Connections



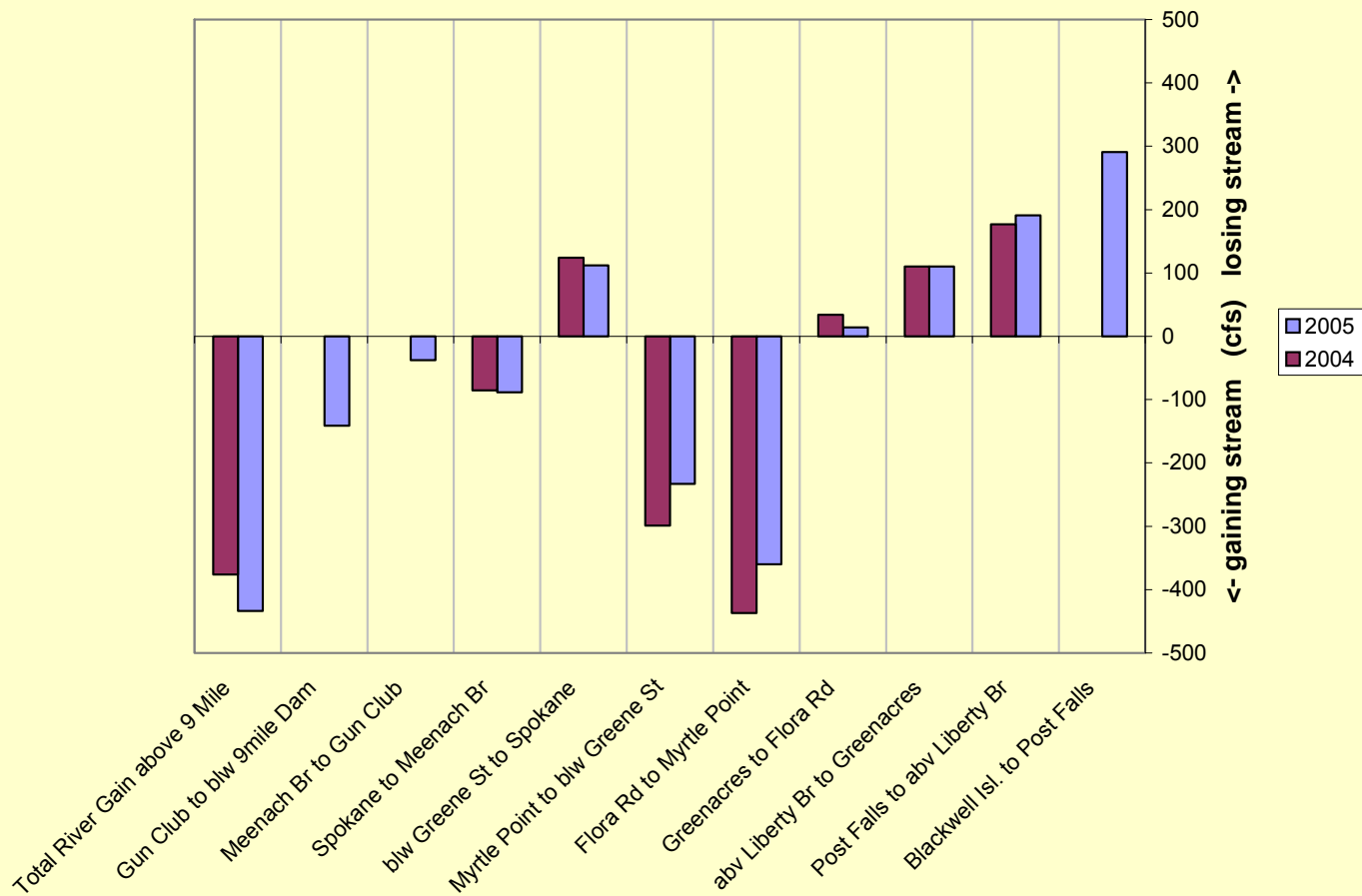
Spokane County GIS

Hydraulic Connectivity to the Spokane River



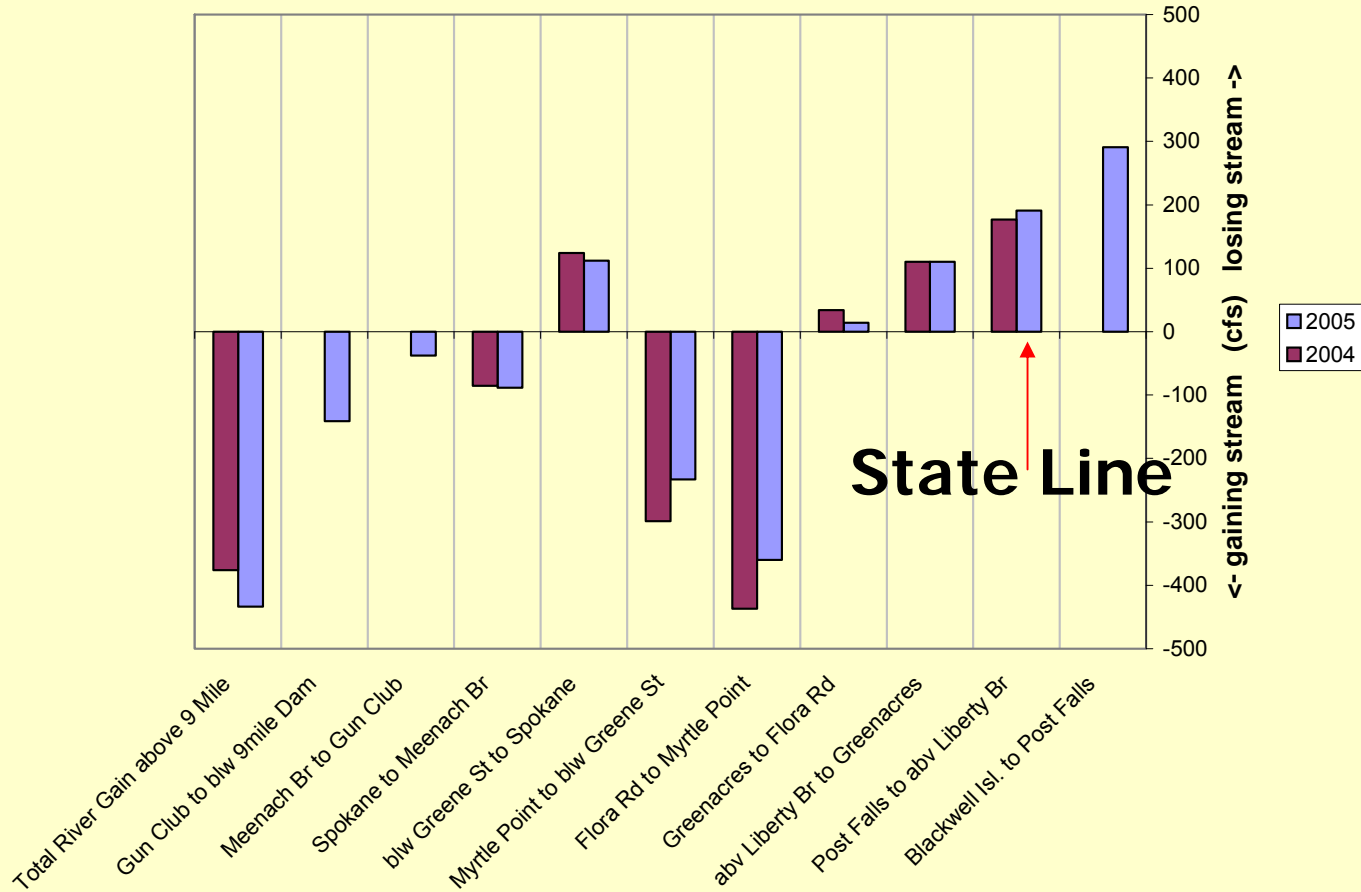
From: Spokane Valley-Rathdrum Prairie Aquifer Atlas (Spokane County, et al., 2d ed. 2004)

Seepage loss from Spokane River to aquifer

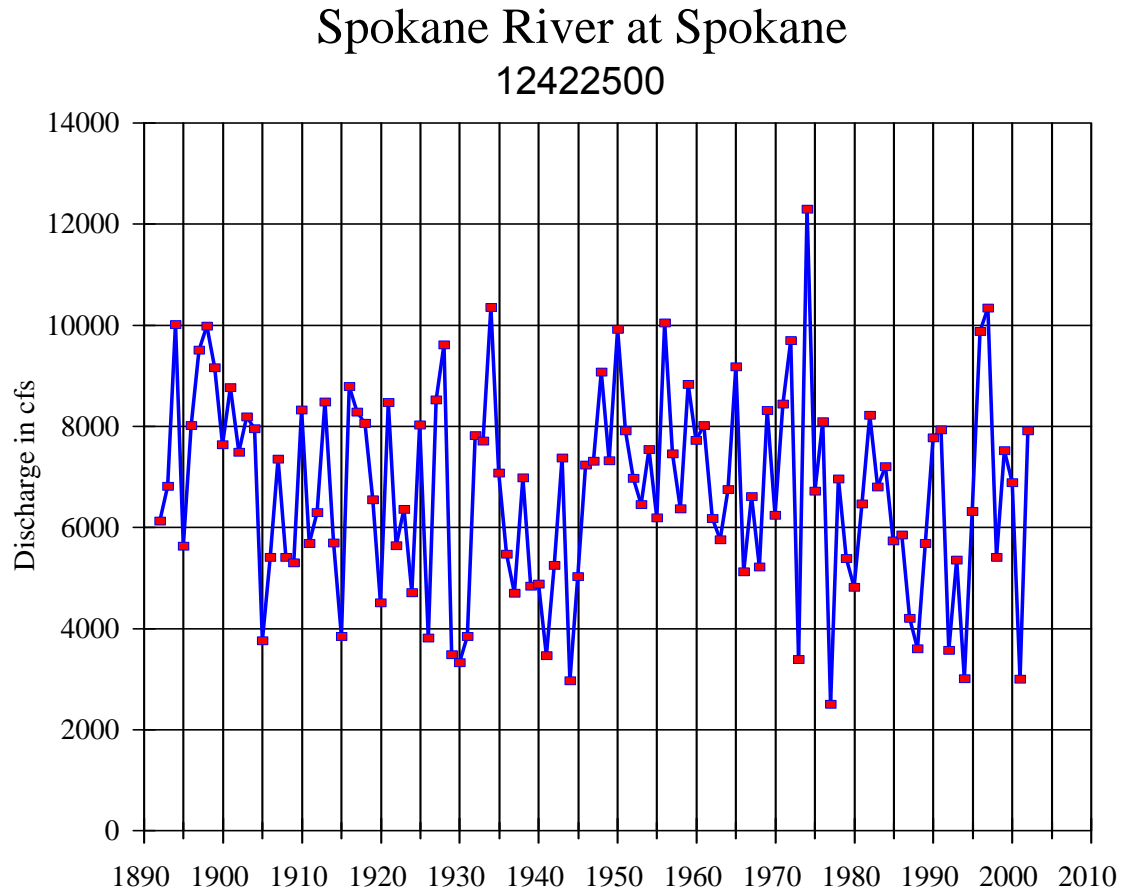


Courtesy Guy Gregory
 WA Dep't of Ecology 2007

Seepage loss from Spokane River to aquifer

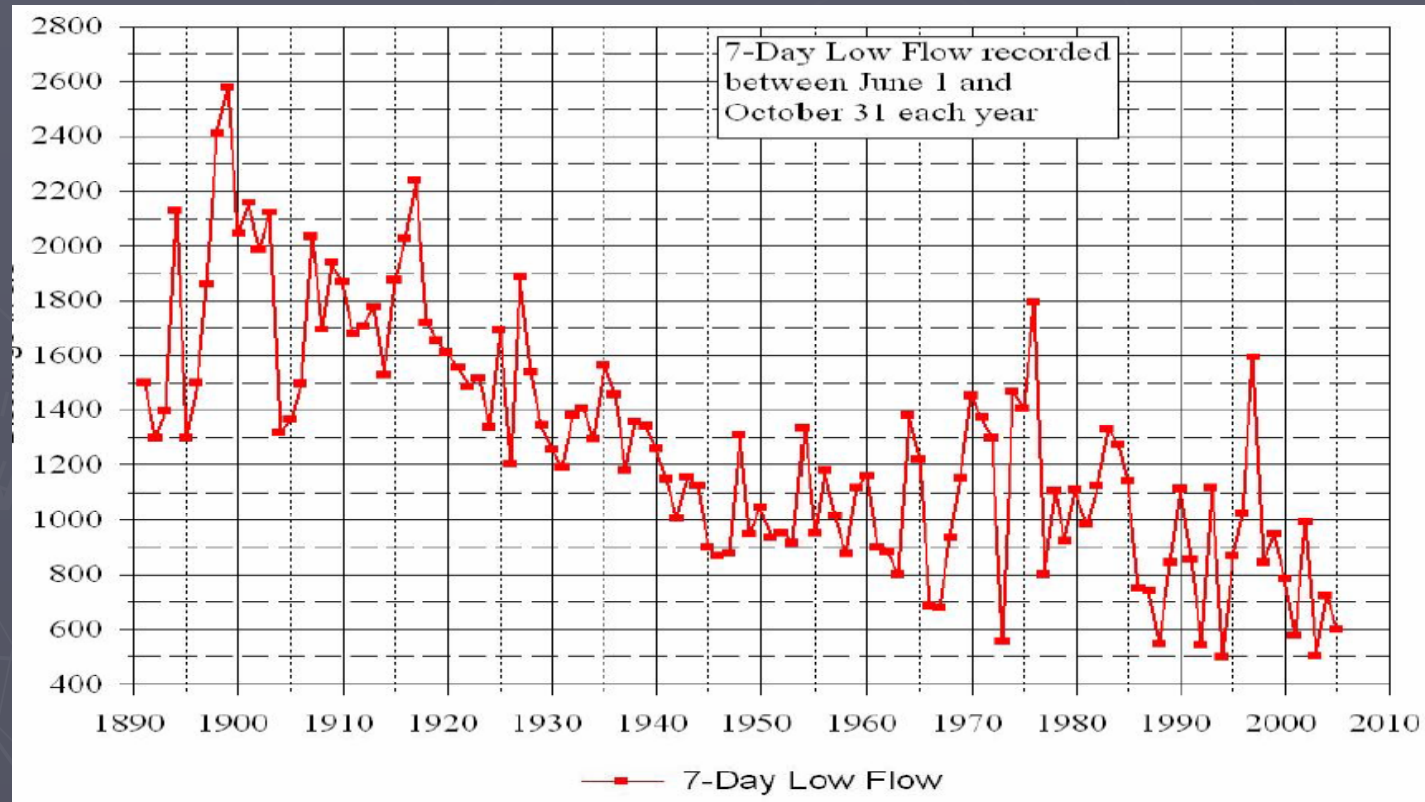


Spokane River Mean Annual Flow



Courtesy Guy Gregory

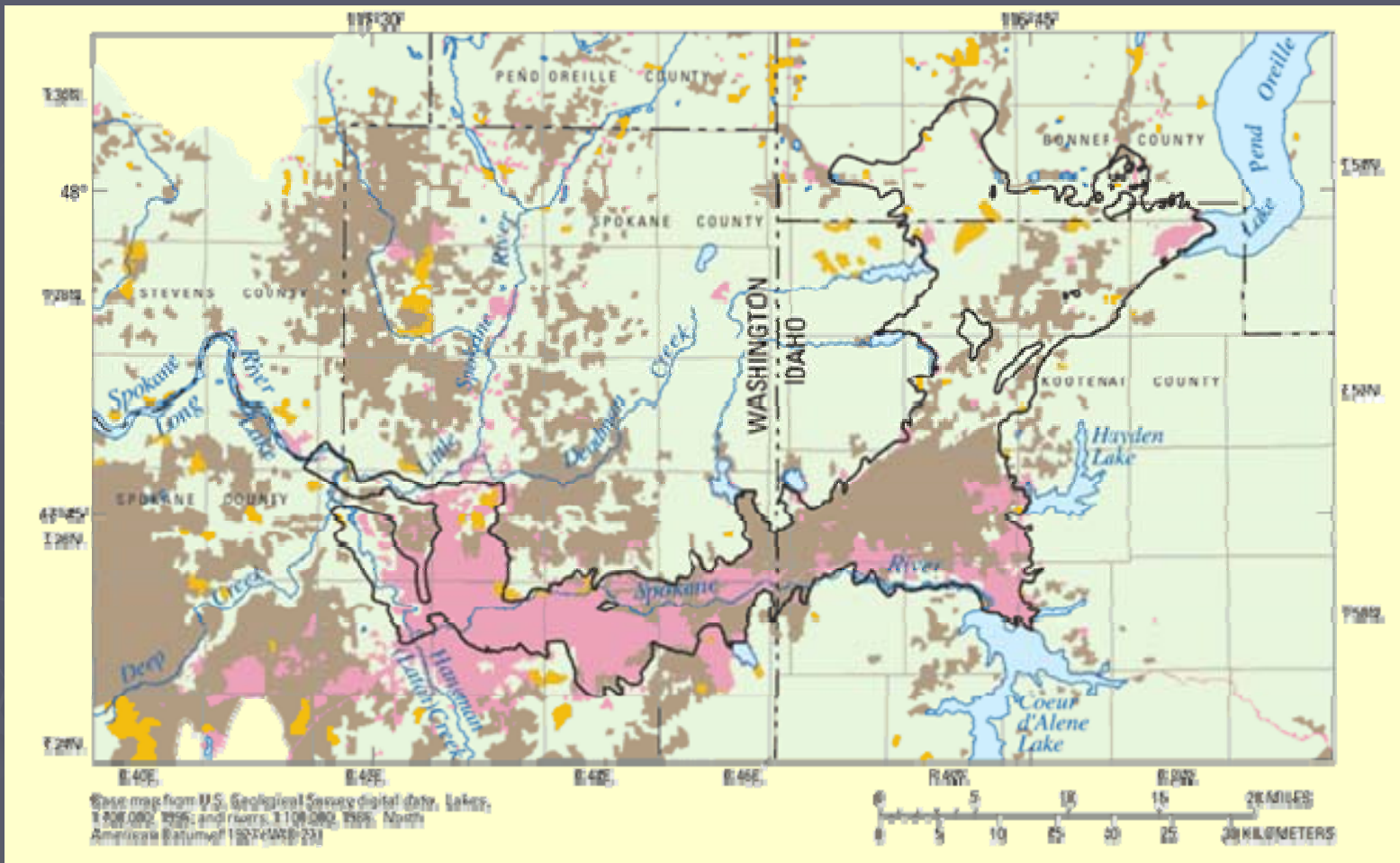
Spokane River: 7-Day Low Flow



Courtesy John Covert

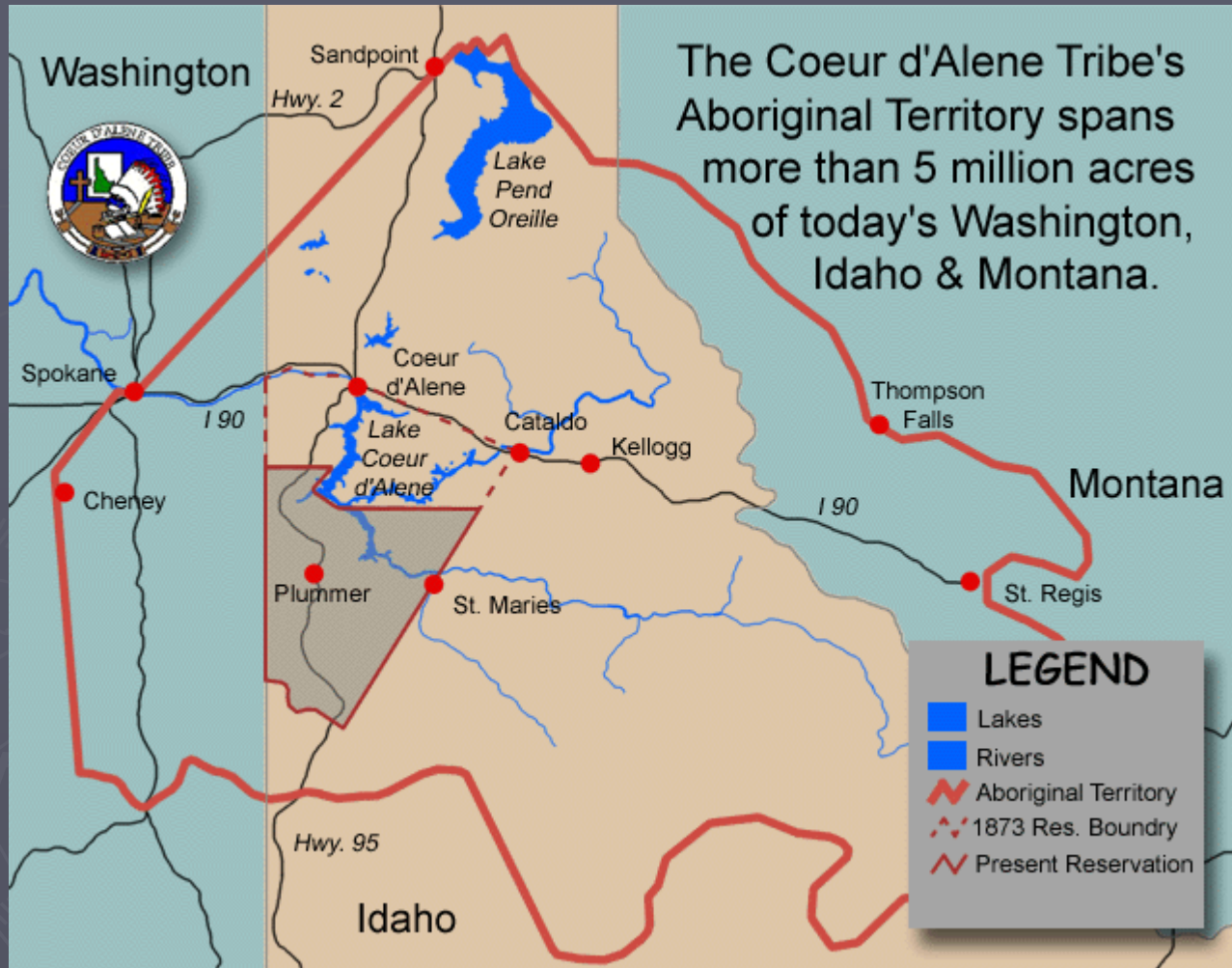
Chapter 2: The Political Dimension

- ▶ Political (state/fed/tribal) boundaries
- ▶ Coeur d'Alene Spokane Tribes' aboriginal territories
- ▶ Satellite photo?

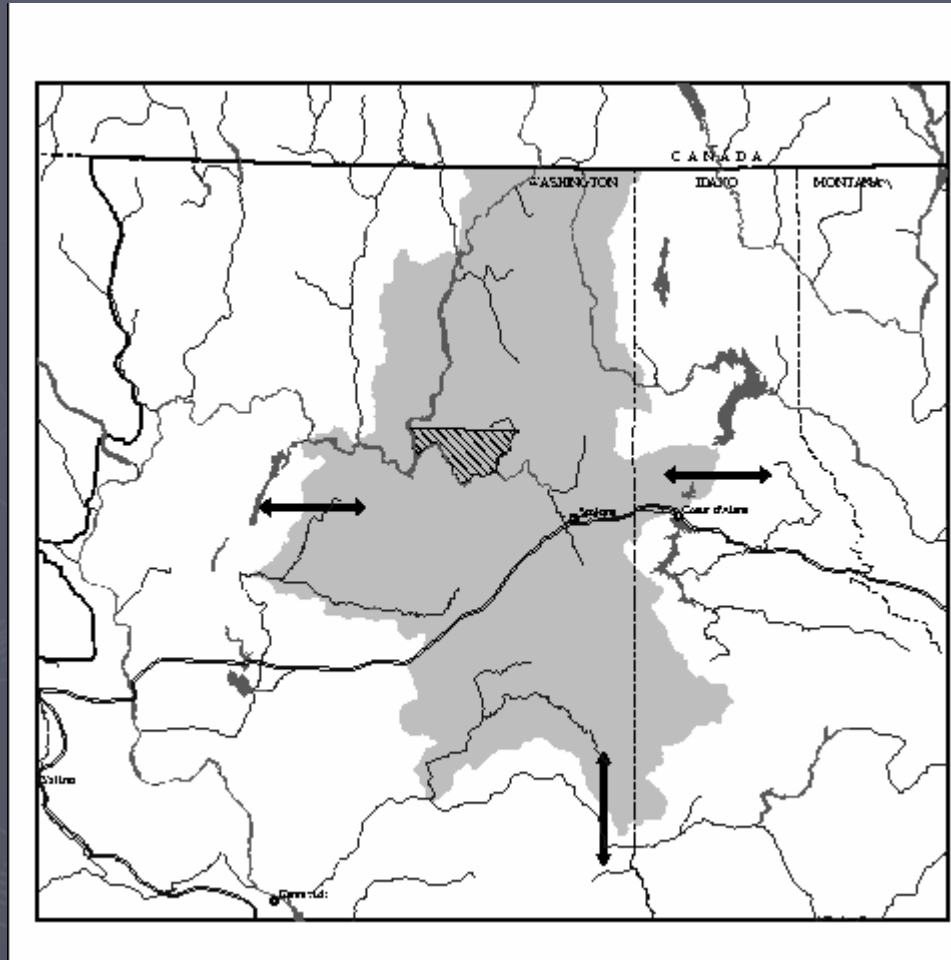


Kahle & Bartolino, Hydrogeologic Framework & GroundWater Budget of the SVRP Aquifer (USGS SIR 2007-5041)

Coeur d'Alene Tribe aboriginal territories



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



Photo: Spokane Aquifer Joint Board

"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

Copyright 1909, The Spokesman-Review. Used with permission of The Spokesman-Review.

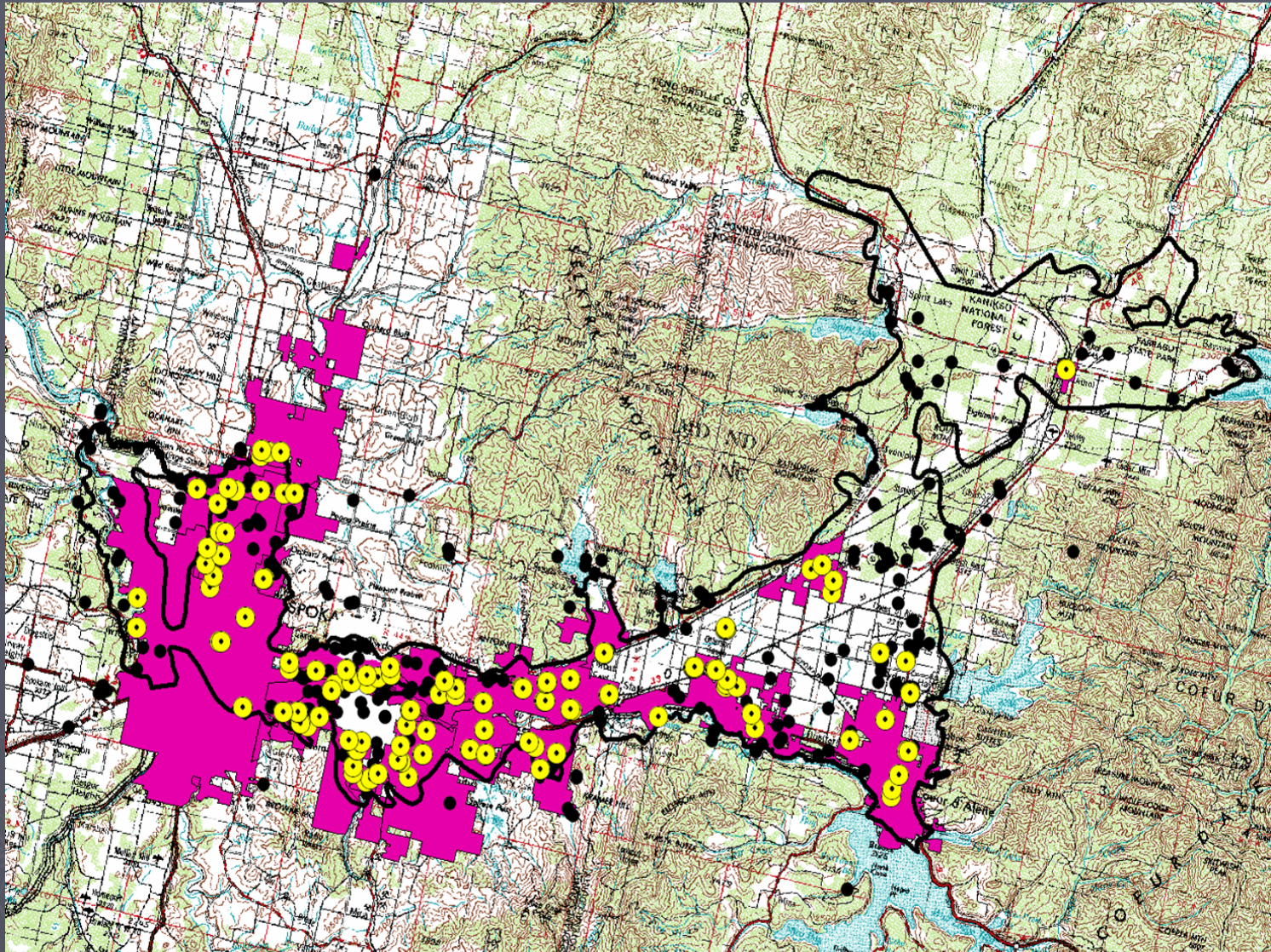
▶ 1978 Sole Source Designation

- 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

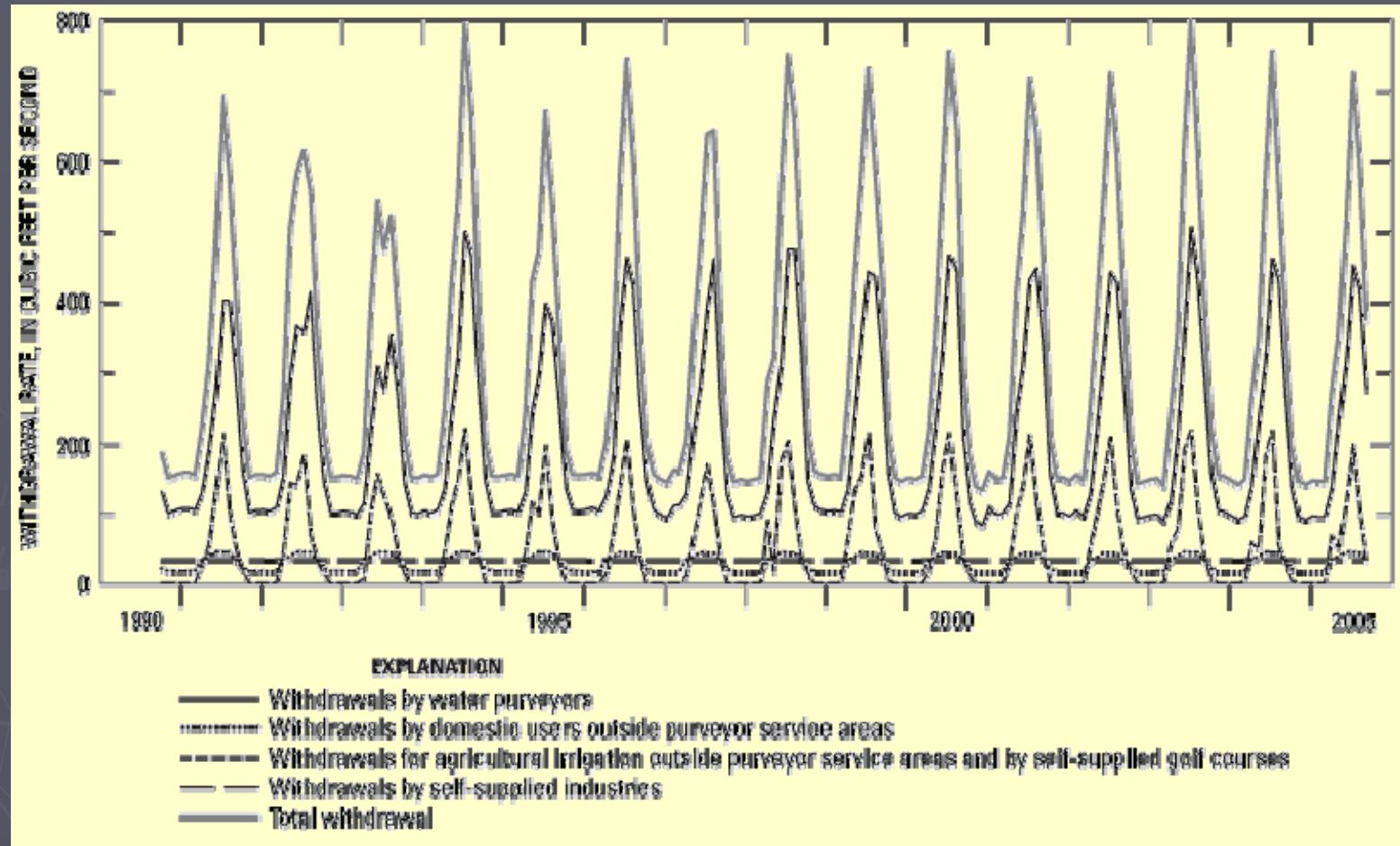
Table 4.I.A. Spokane Metro Area Public Supply Groundwater Pumping (1994 to 1999)

Use	Annual			July and August		
	Residential	Metered M&I	Total Production	Residential	Metered M&I	Total Production
	gallons/ person/ day	gallons/ person/ day	gallons/ person/ day	gallons/ person/ day	gallons/ person/ day	gallons/ person/ day
Municipal Non-irrigation Use ¹	76.2	118.1	156.7	76.2	118.1	156.7
Municipal Irrigation	108.1	150.8	171.4	314.2	451.3	547.5
Municipal Subtotal	184.3	268.9	328.1	390.4	569.4	704.2
Commercial Industrial ²			105			107
Commercial Irrigation ³			4			12
Total			437.1			823.2

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

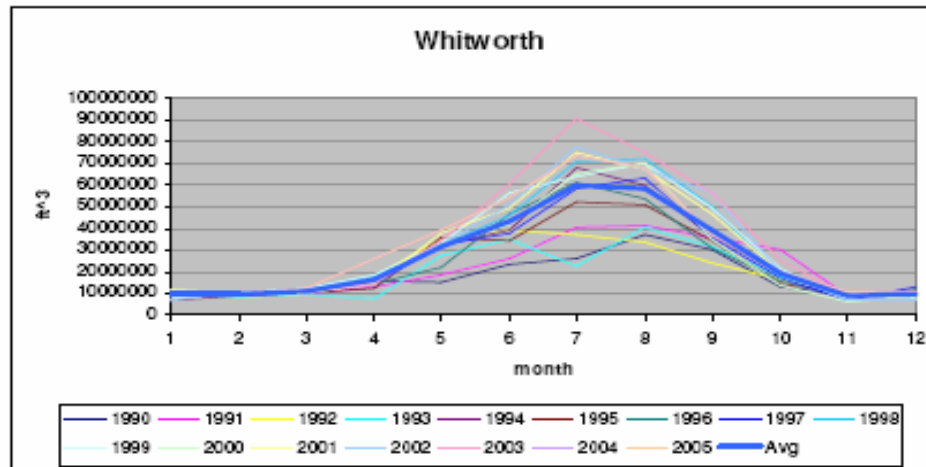
Table 4.I.B summarizes daily per capita water use for Spokane County and other locations in the Western United States to provide a comparison with Spokane area water use.

Withdrawal Rates from Wells



Hsieh, P.W., et al., Ground-Water Flow Model for the SVRP Aquifer , USGS SIR 2007-5044

Typical Municipal Pumping



GWPumping_Contor_20060405.ppt

Courtesy:
Guy
Gregory

Population Growth



Image: NASA 2006

The Spokane: River of Kings

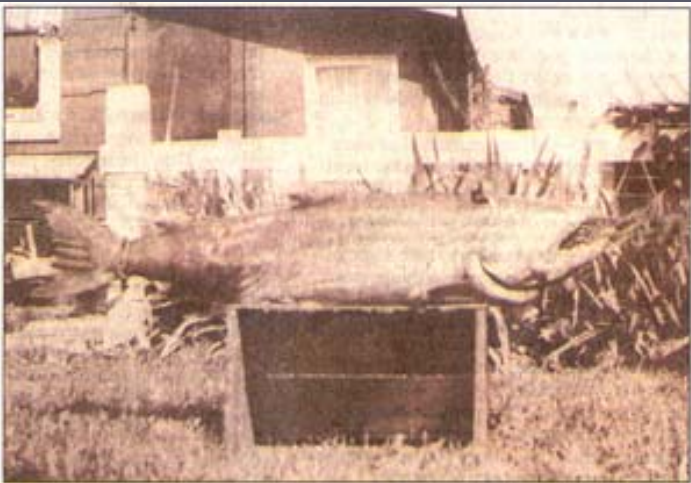


Photo courtesy of Alan Scholz

■ The Spokane River produced the biggest of the big chinook (king) salmon. This whopper was pulled from below Little Falls in 1938 by a Spokane Indian tribal member.



■ A fisherman in Spokane's early days angles for salmon at the foot of Lower Falls. Salmon by the thousands once spawned in the Spokane River.

The Spokane: River of Sewage & Toxics

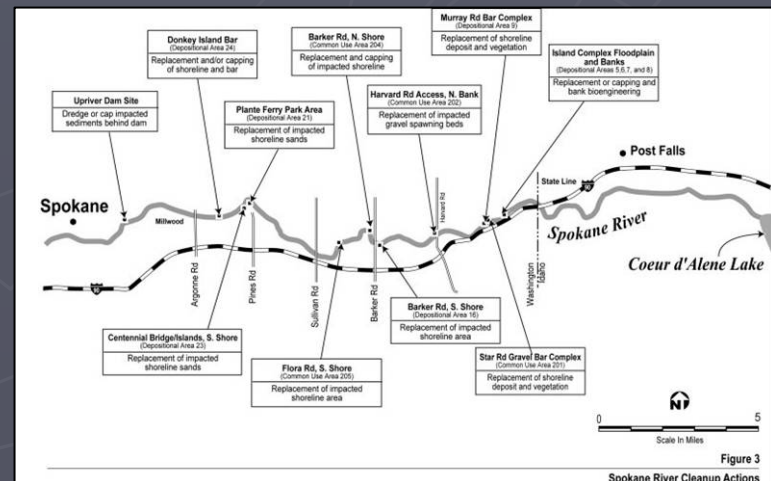
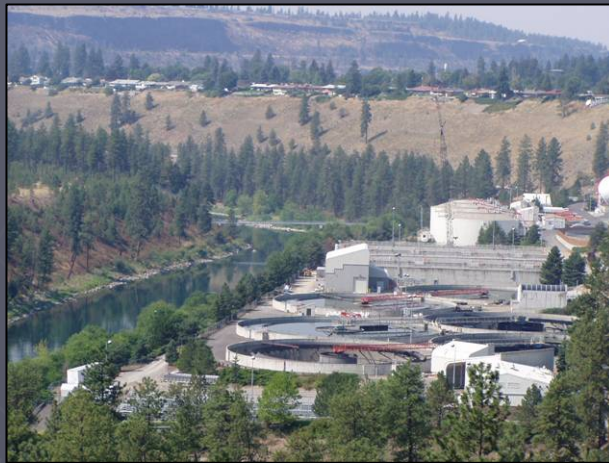


Figure 3
Spokane River Cleanup Actions

Kayaking on the Spokane Aquifer



Image: Tracy Wilson-Burns

Fishing on the SVRP Aquifer



Image: John Osborn

Scenic/Aesthetic Values

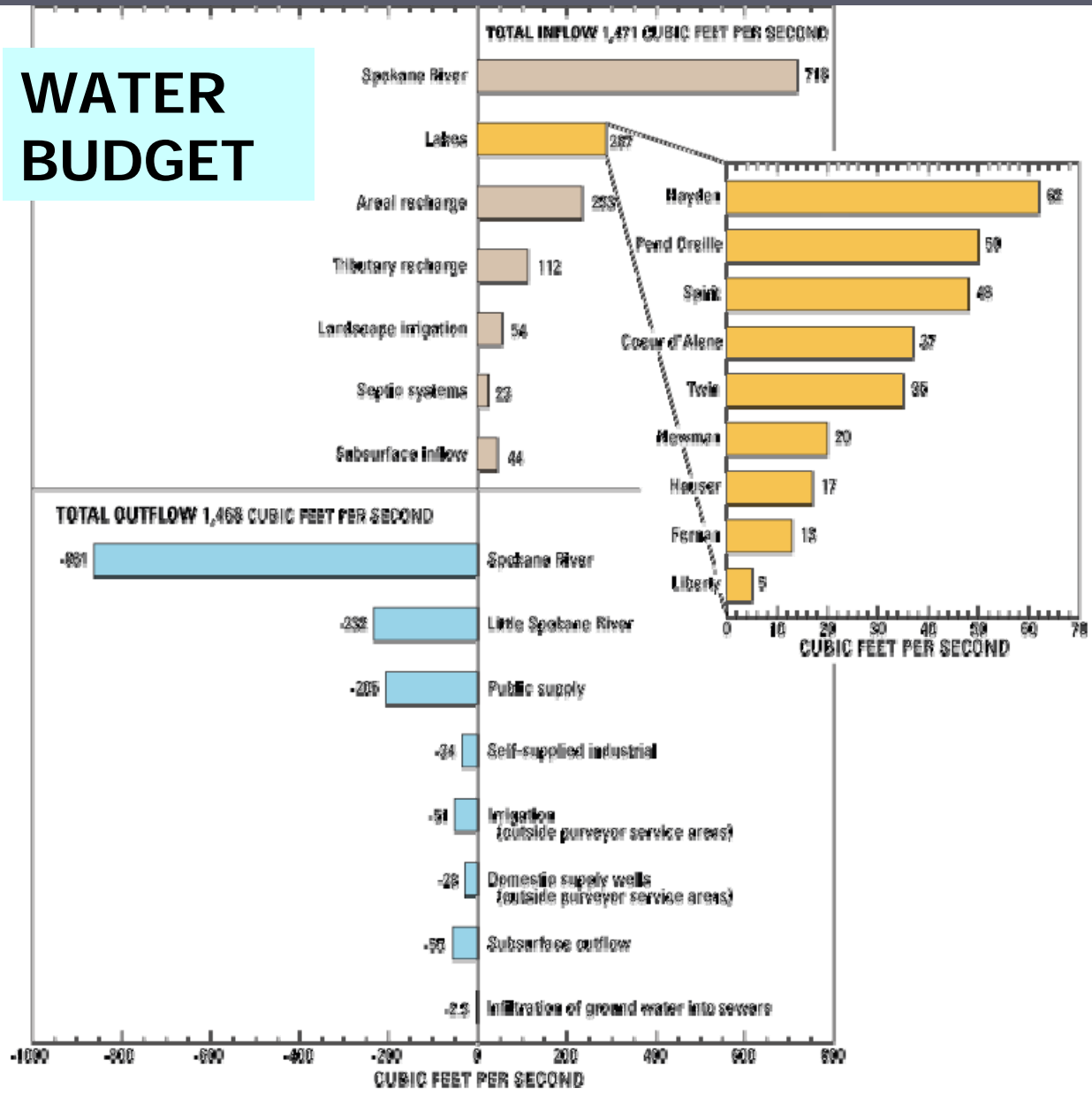


Image: John Osborn

Chapter 4: Management Efforts to Date

- ▶ Water Rights
- ▶ Planning
 - WA watershed planning
 - ID groundwater management planning
- ▶ Conservation
 - Post Falls leading
 - SAJB, City Spokane coming along
- ▶ Adjudications
 - North Idaho
 - WA pre-adjudication

WATER BUDGET



Kahle & Bartolino,
 Hydrogeologic
 Framework &
 GroundWater
 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.”

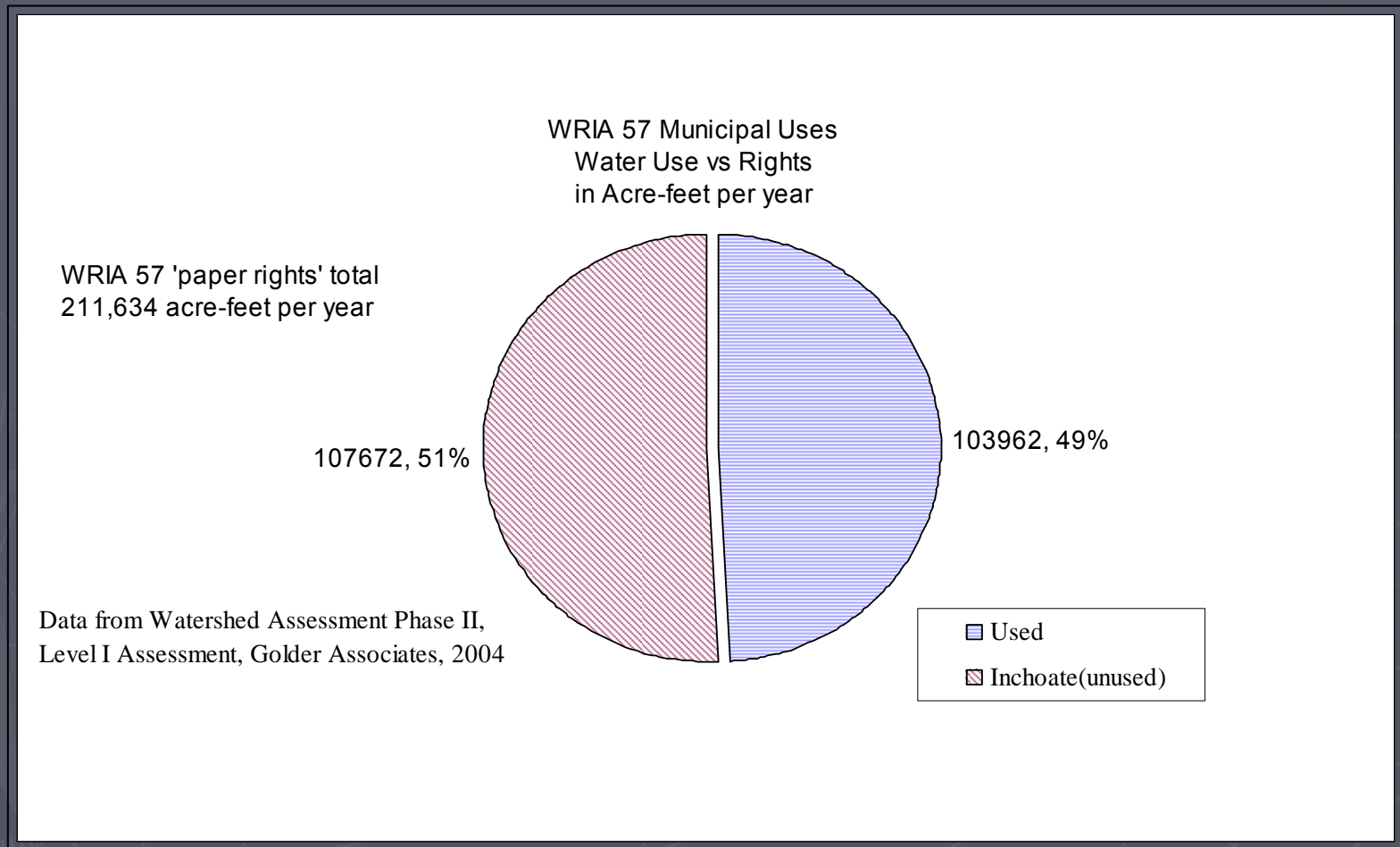


Image: John Osborn

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



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

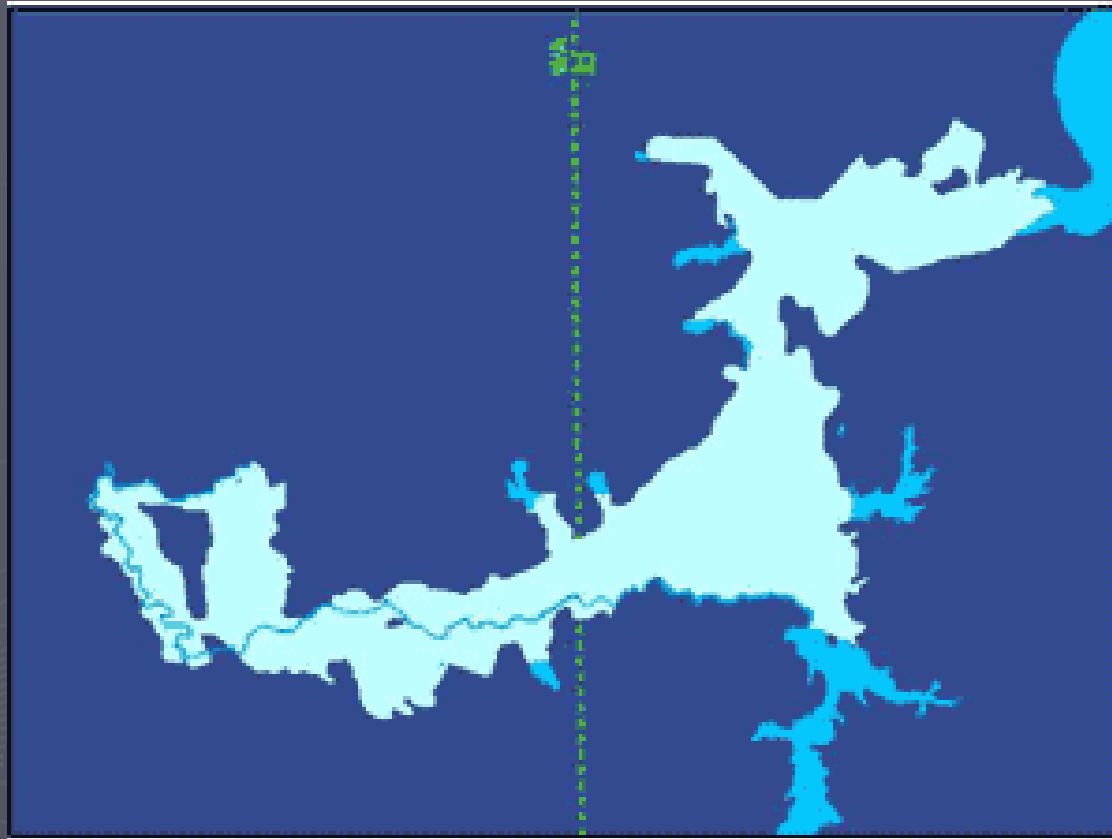


Image: Spokane County GIS

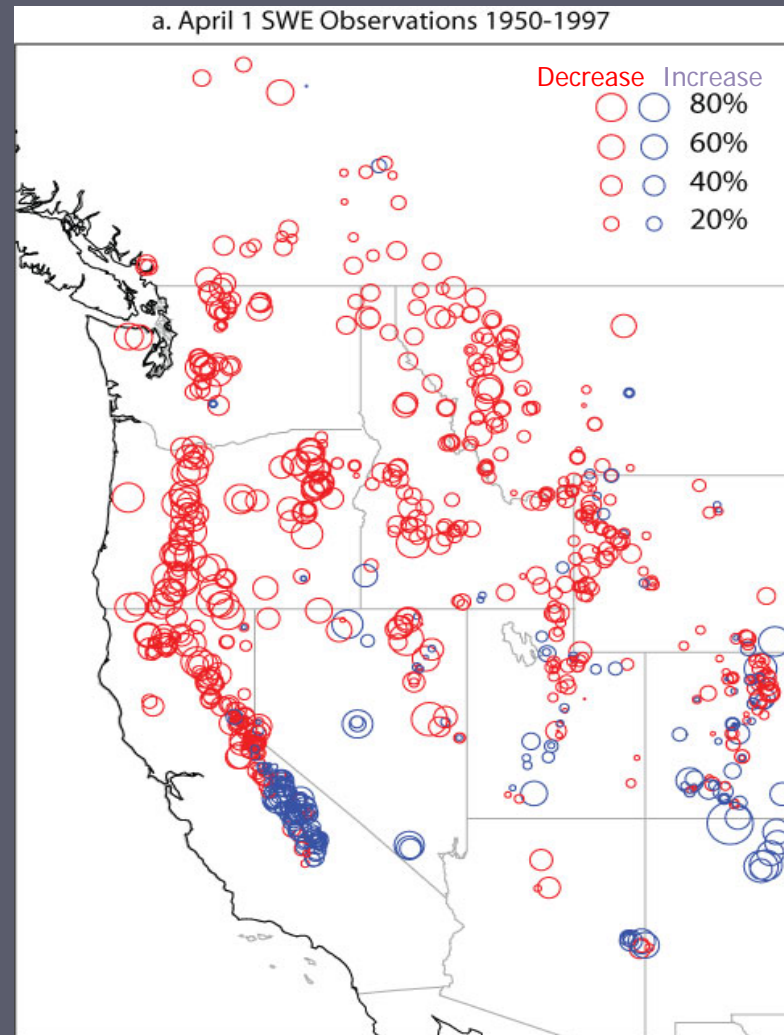
Another view



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



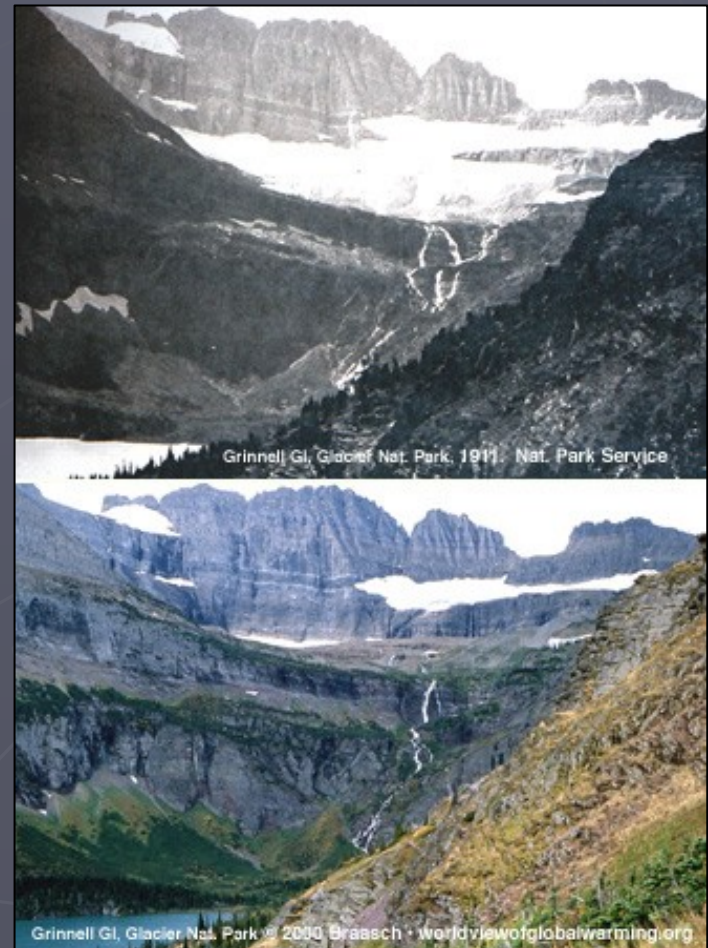
Increase

Image: Univ. of WA
Climate Impacts
Group

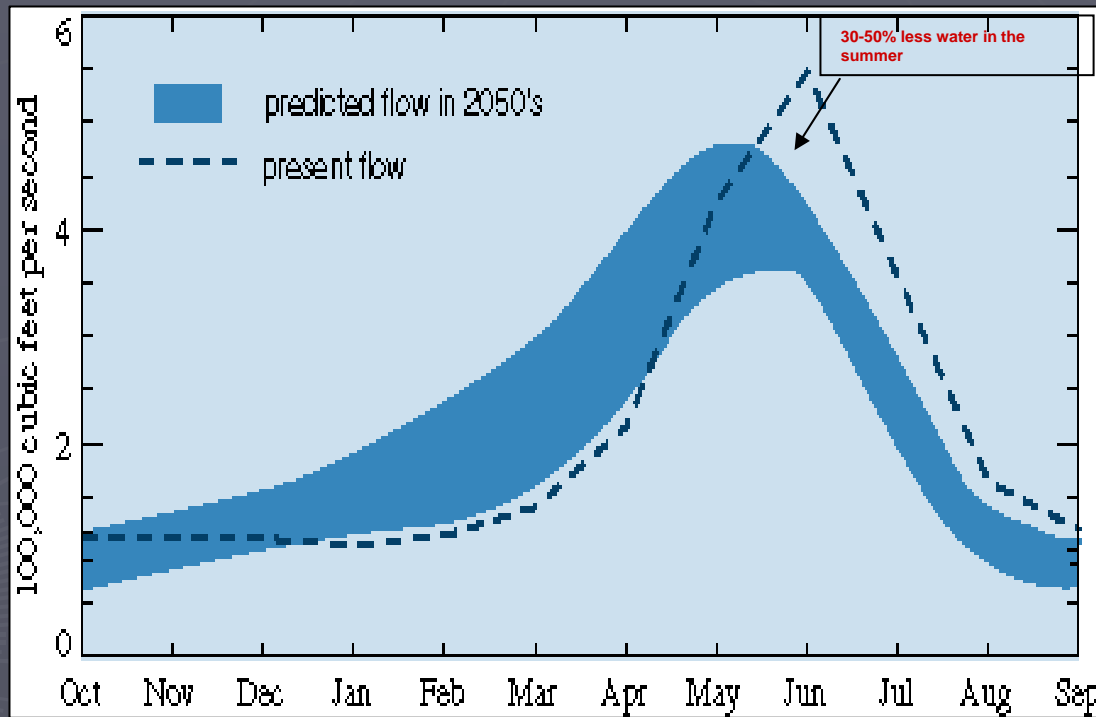


Losing our glaciers

- ▶ 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.



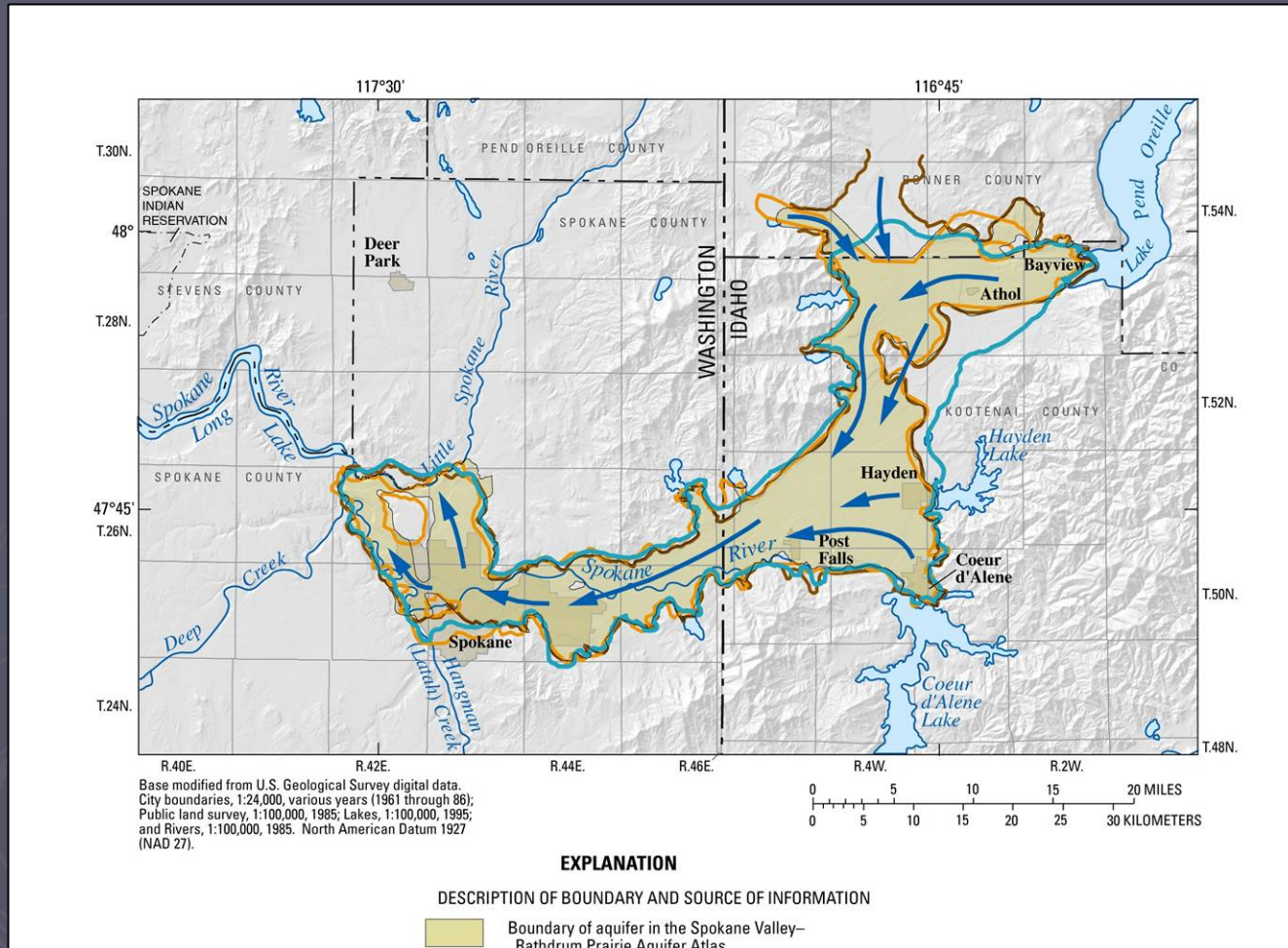
Natural Columbia River flow at the Dalles, OR

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))

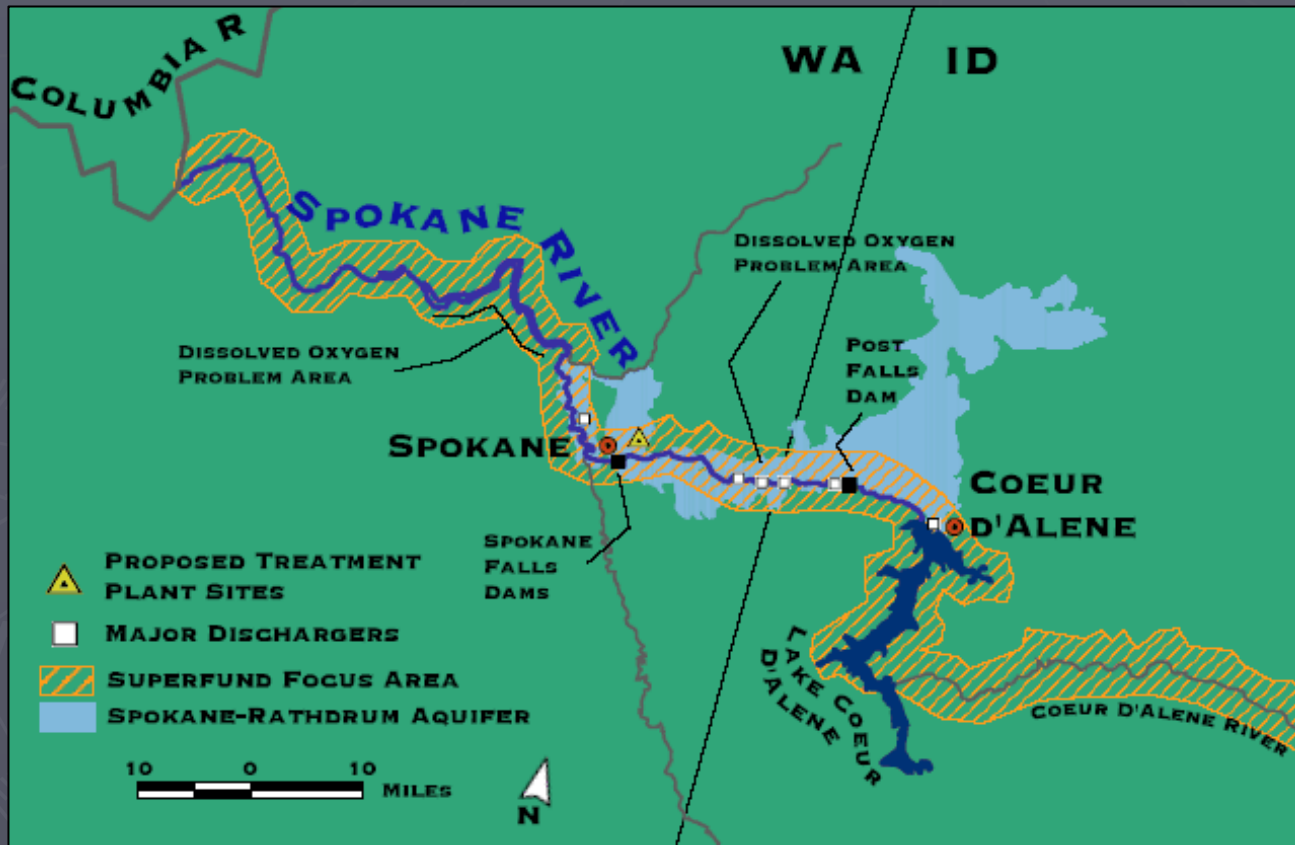
ID-WA shared interests in the river

- ▶ Native redband rainbow trout population



ID-WA shared interests in the river

Stringent sewage effluent limits based on dissolved oxygen standards



Graphic: Sierra Club

ID-WA shared interests in the river: Lake Coeur d'Alene lake levels



Image: NIDT

Shared Economy





Photo: John Osborn