

Spokane River Dissolved Oxygen TMDL Annual Meeting

Ecology Updates



TOPICS

2010 – 2014 Implementation Report

Karin Baldwin

Monitoring Trends

Jim Ross

FY 2016 EAP Study Proposals

Karin Baldwin

2015 Water Forecast

Guy Gregory

Little Spokane TMDL

Elaine Snouwaert

Hangman

TMDL

Elaine Snouwaert

2015 Livestock Grazing & Cropping Surveys

Chad Atkins

USGS Lake Spokane Study

Karin Baldwin

Ecology Water Quality Funding Proposals

Karin Baldwin

10 Year Assessment

Dave Knight



2010-2014 Implementation Report

2010-2014 Implementation Report

- Last comment period April 20-May 8
 - Received 8 comment emails
 - Clarifications/additions/corrections
 - Beef up progress report section
 - Look at adaptive management section





Questions and Discussion

Next Steps

Goal = publication process in June

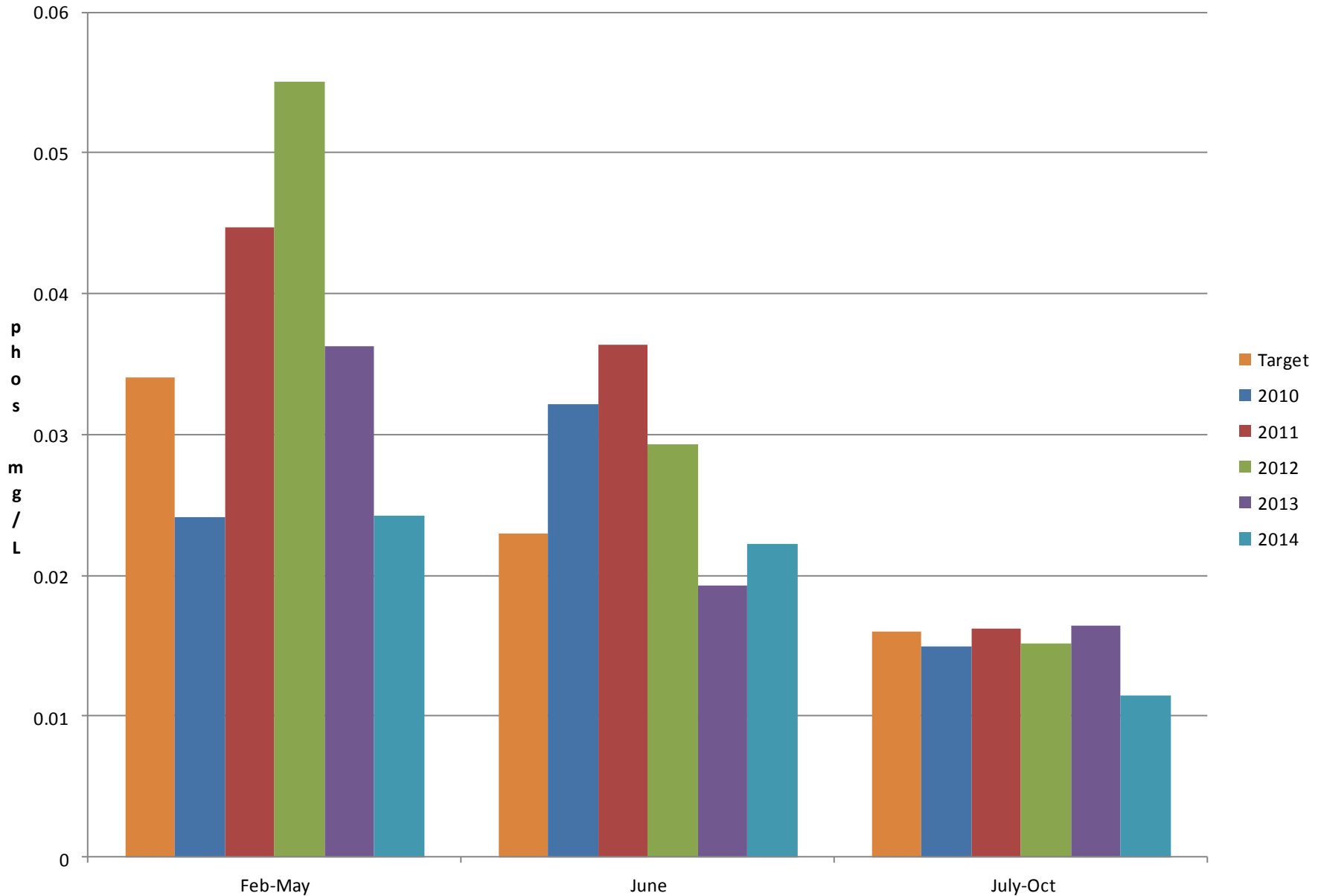
- Peer & supervisor reviews
- Formatting
- Publication coordinator
- Web coordinator
- Distribute report
- Public outreach



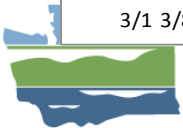
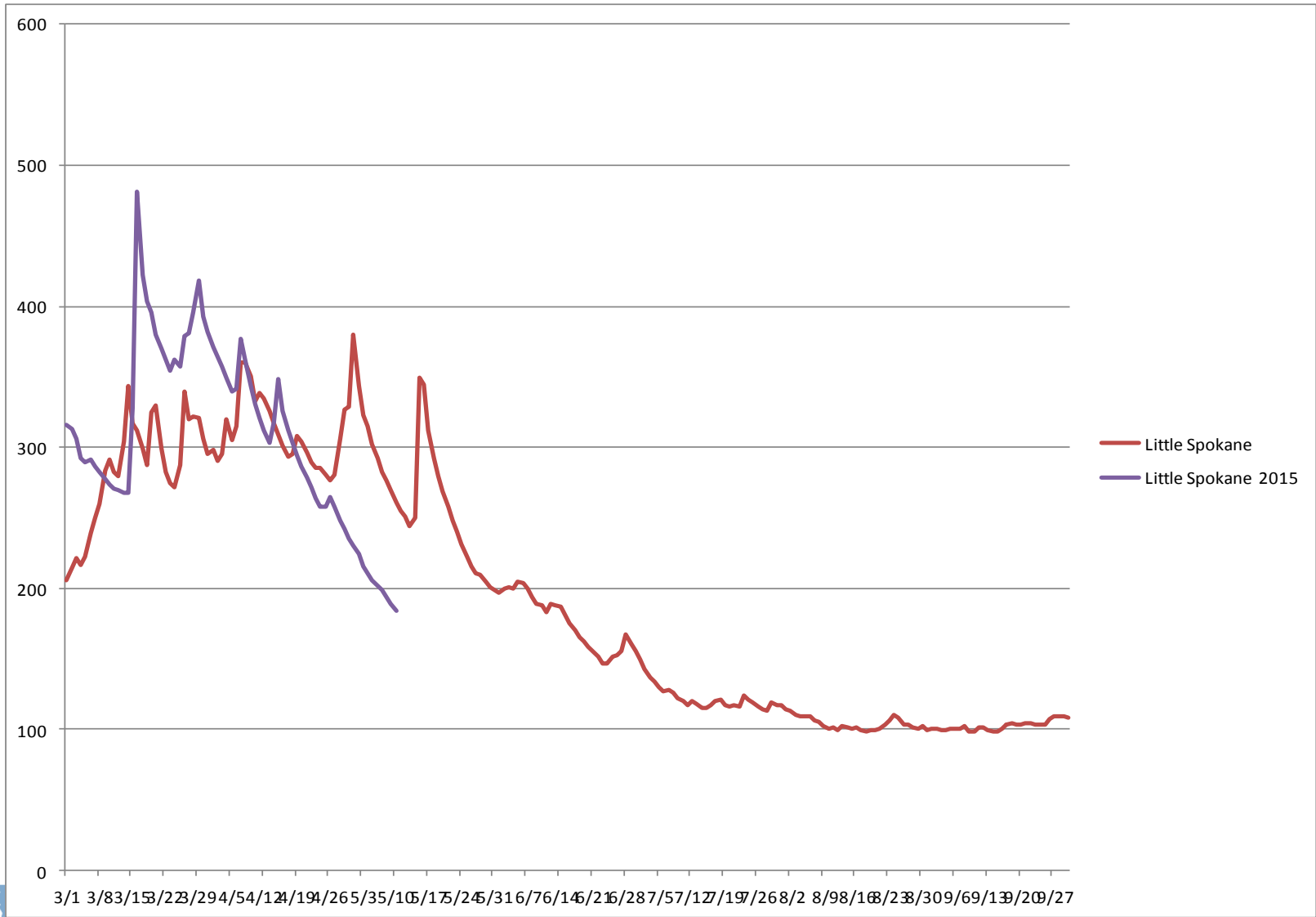


Monitoring Trends

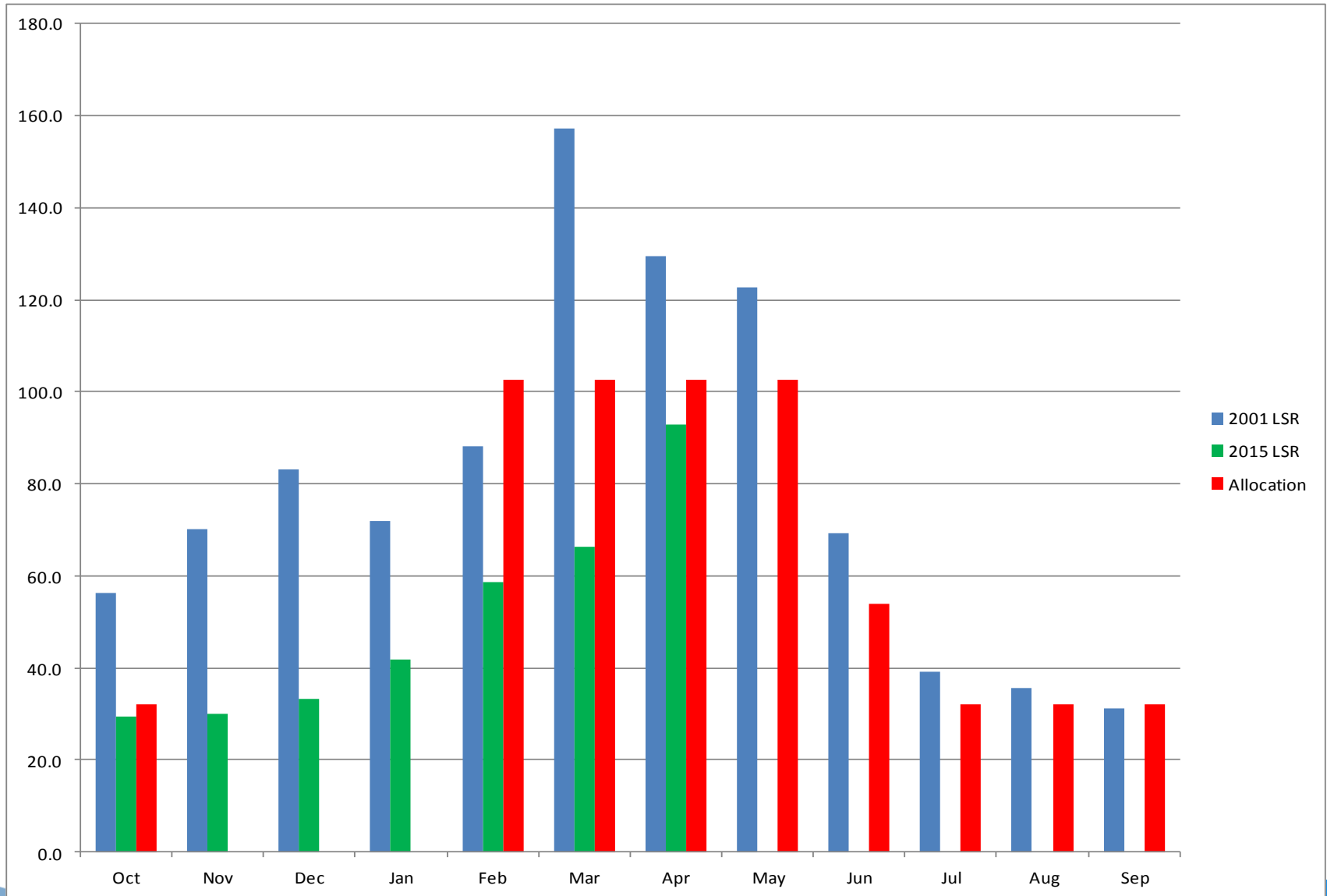
Little Spokane River Phosphorus 2010-2014



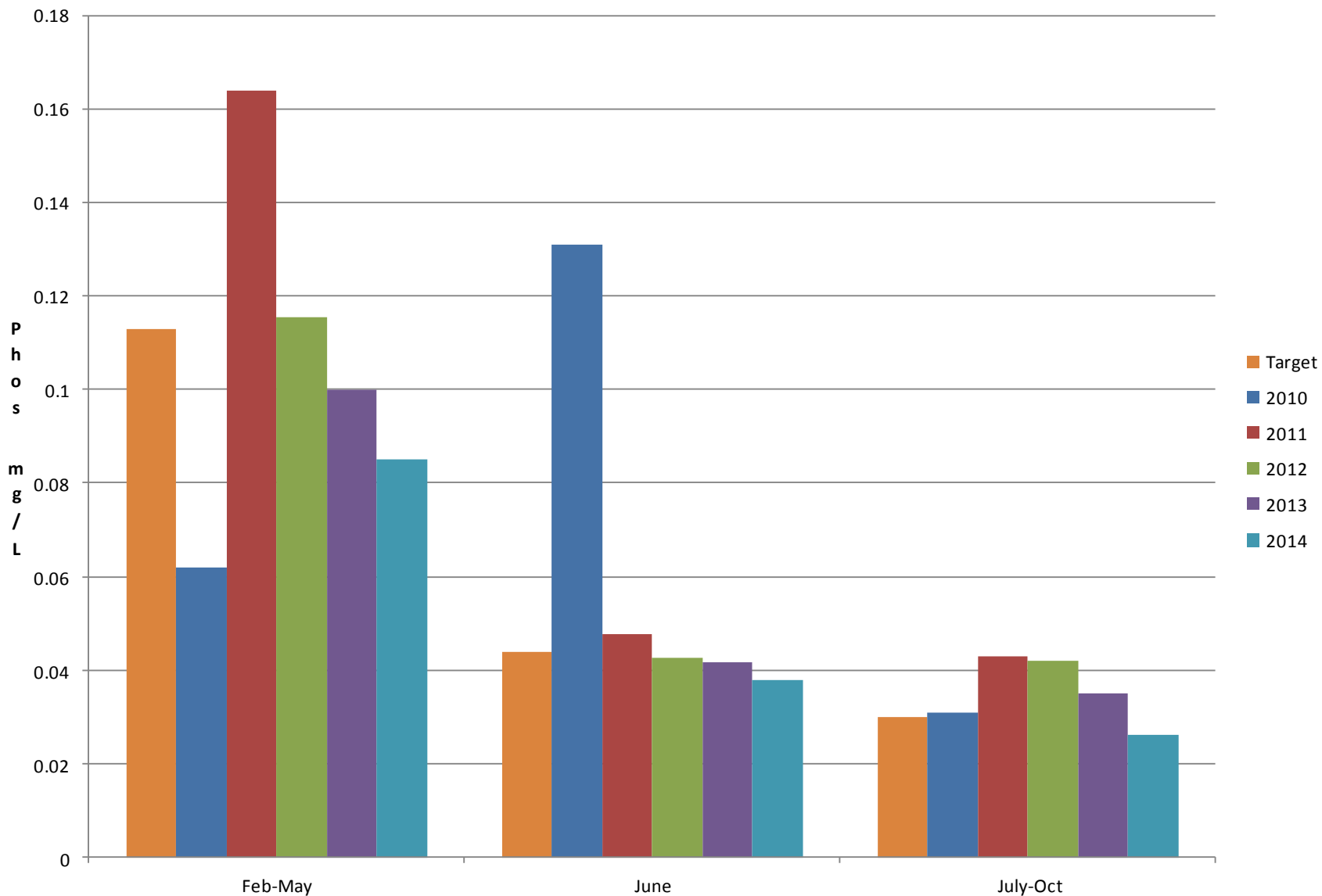
Little Spokane River Flow



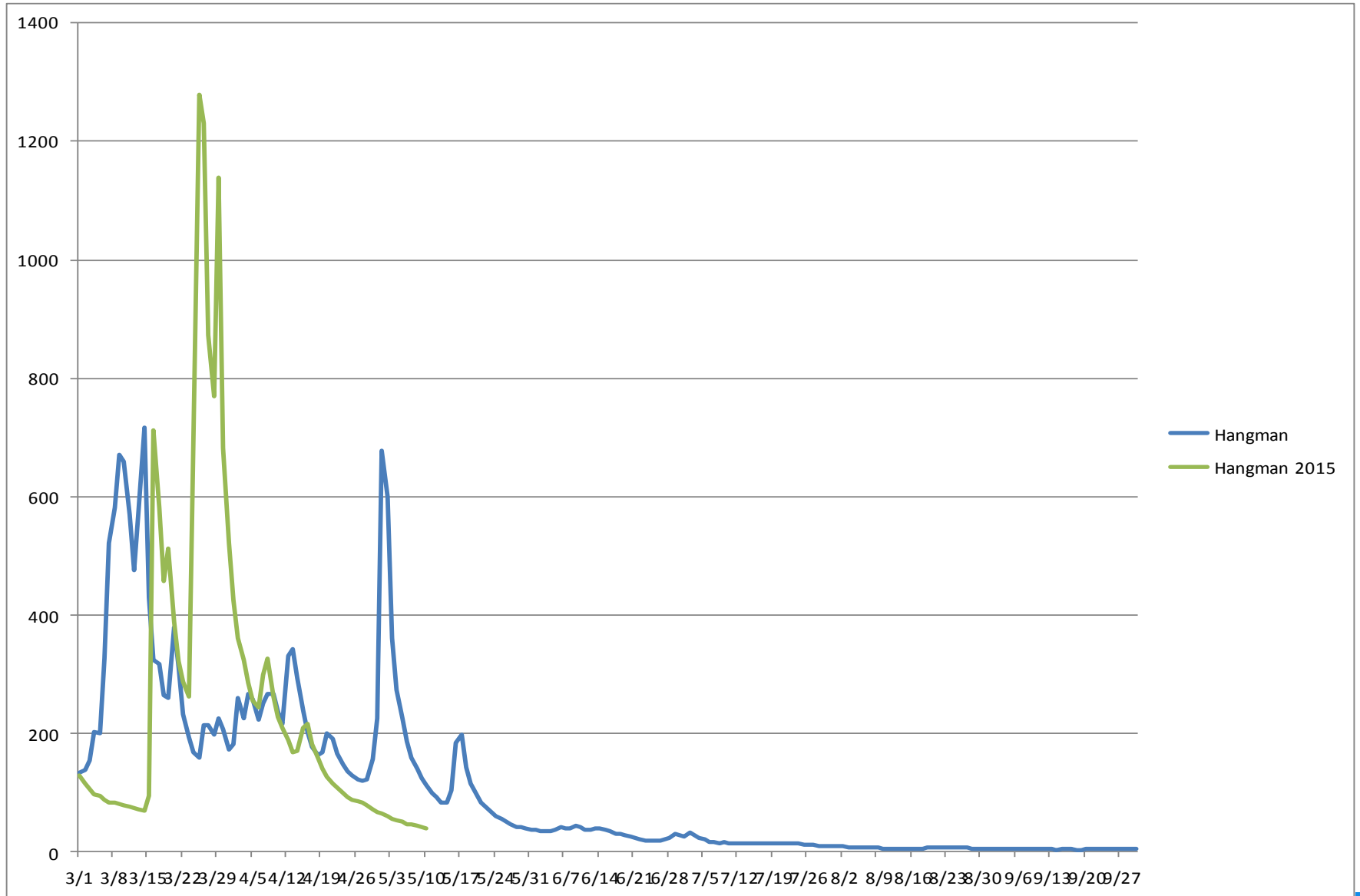
Little Spokane Phosphorus Load



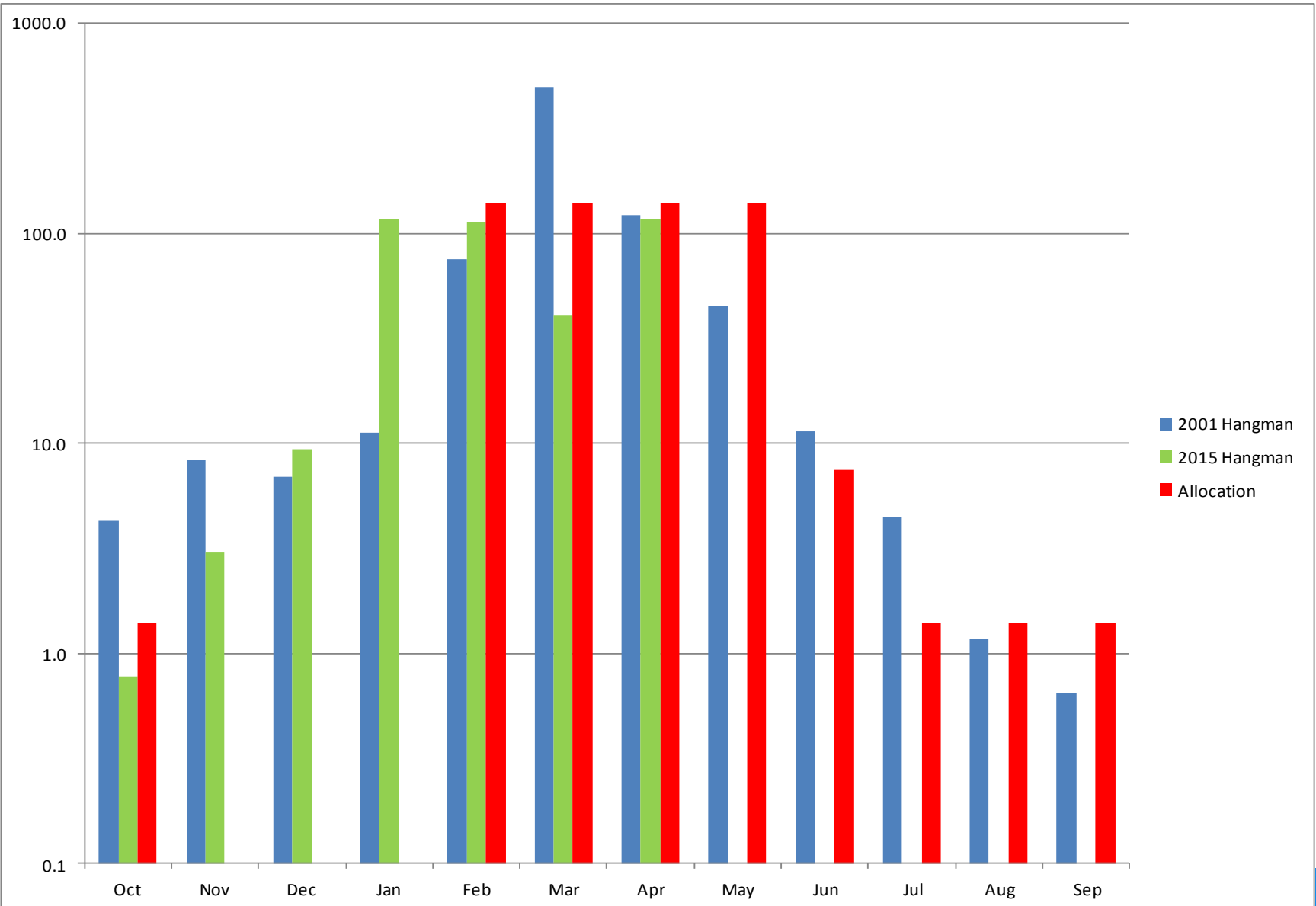
Hangman Creek Phosphorus 2010-2014



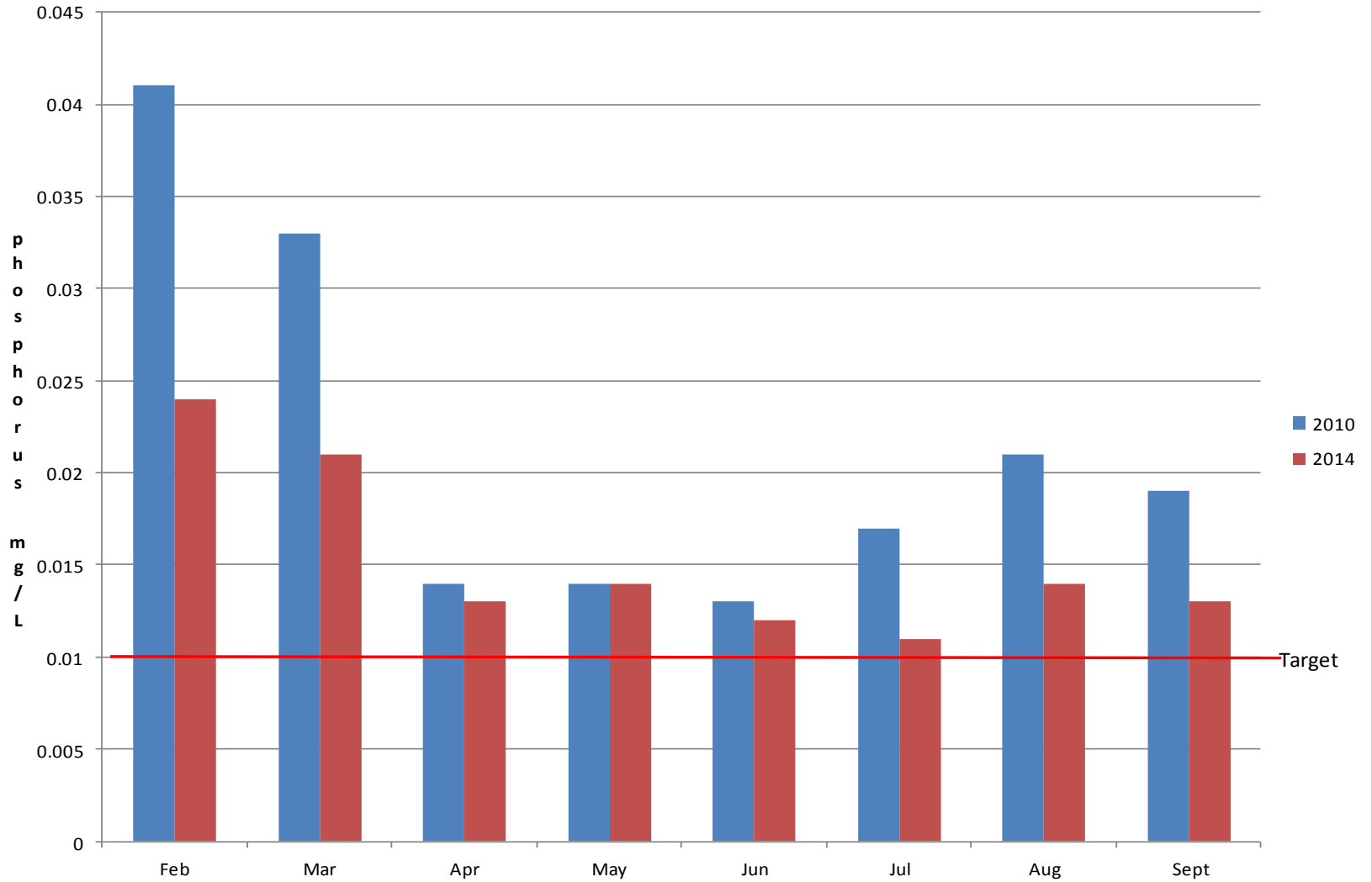
Hangman Creek Flow



Hangman Creek Phosphorus Load



Phosphorus at Riverine Assessment Point





Fiscal Year 2016 EAP Study Proposals

Environmental Assessment Program



- Ecology's scientists
- Water Quality Program proposes projects to EAP each year



The Proposal Selection Process

- Begins in Nov/Dec the year before
- WQ staff develop proposals
- Vetted & prioritized by WQ PMT
- Submit requests to EAP
- EAP assesses available resources & decides what projects they will do



FY 2016 Spokane Basin “Will Do” Proposals

- Little Spokane DO/pH data collection
- Deep & Coulee Creek monitoring
- Groundwater sampling @ Coulee Creek
- Lake Spokane “measuring improvement”
literature search



Little Spokane DO/pH Data Collection

- Needed more data to develop the TMDL
- Collect data every month for a year



Deep & Coulee Creek Monitoring

- Build on what we know about the system
- Include continuous data
- Understand nutrient sources, loading, etc.
- Different nutrient loads than assumed during TMDL development
- Update info for 10 year assessment



Groundwater sampling at Coulee Creek



- Proposed groundwater monitoring near the mouth
- The creek does not flow every year & not after May
 - Goes dry ~ 2 miles upstream from the Spokane River
 - Only flows during rain on frozen soil or snow
- We don't know:
 - How much groundwater enters the Spokane River
 - The quality of the groundwater



Lake Spokane Measuring Improvement Literature Search

- To determine if other water quality indicators exist for lakes & if it would apply to Lake Spokane
 - For showing progress in the interim rather than costly model runs
 - If achieving water quality standards lags behind attainment of beneficial uses
 - If one parameter meets water quality standards and others do not
 - If most, but not all, of the hypolimnion meets the dissolved oxygen standard



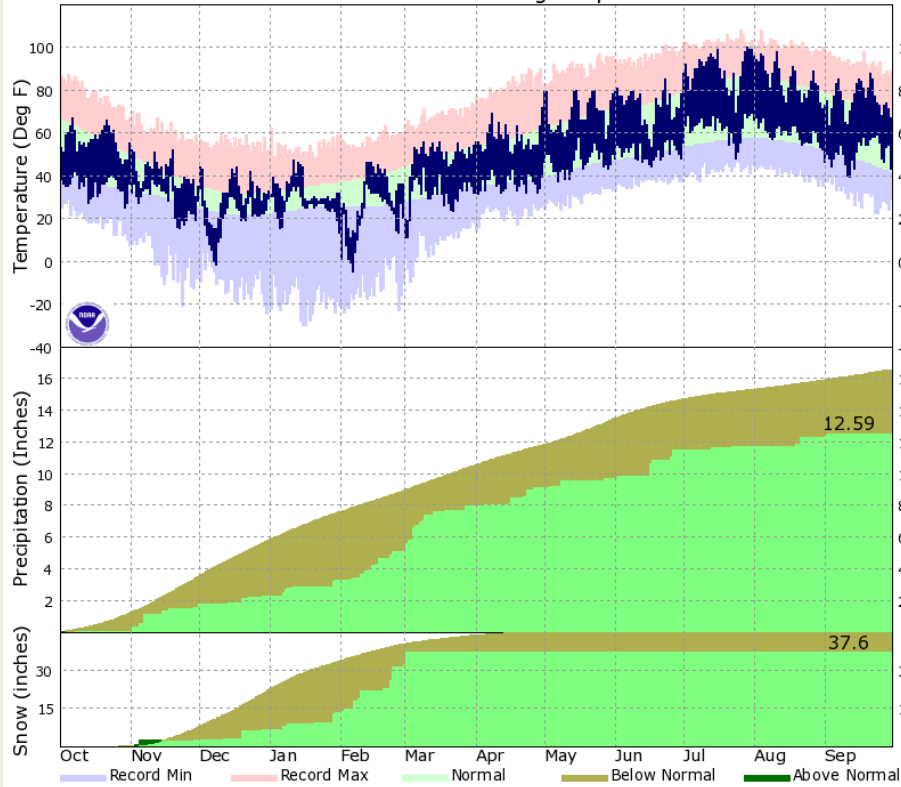
A scenic view of a river flowing through a forested area. The river is dark blue and flows from the background towards the foreground. The banks are rocky and covered with green vegetation. The background shows a dense forest of evergreen trees under a clear blue sky.

2015 Water Outlook for the Inland Northwest

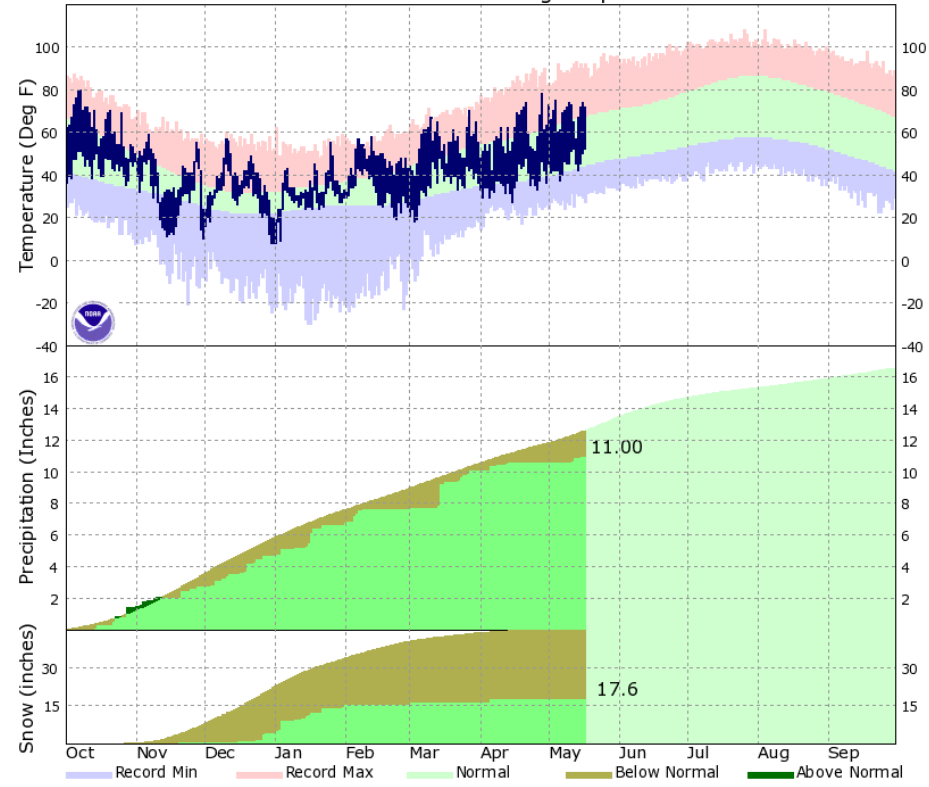
Guy J. Gregory
Washington Dept. of
Ecology
Spokane, WA

Precipitation

KGEG - Oct 2013 Through Sep 2014



KGEG - Oct 2014 Through Sep 2015

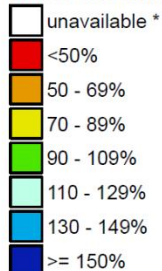


Spokane Averages: Snowfall: 45 inches
Rainfall: 16.52 inches

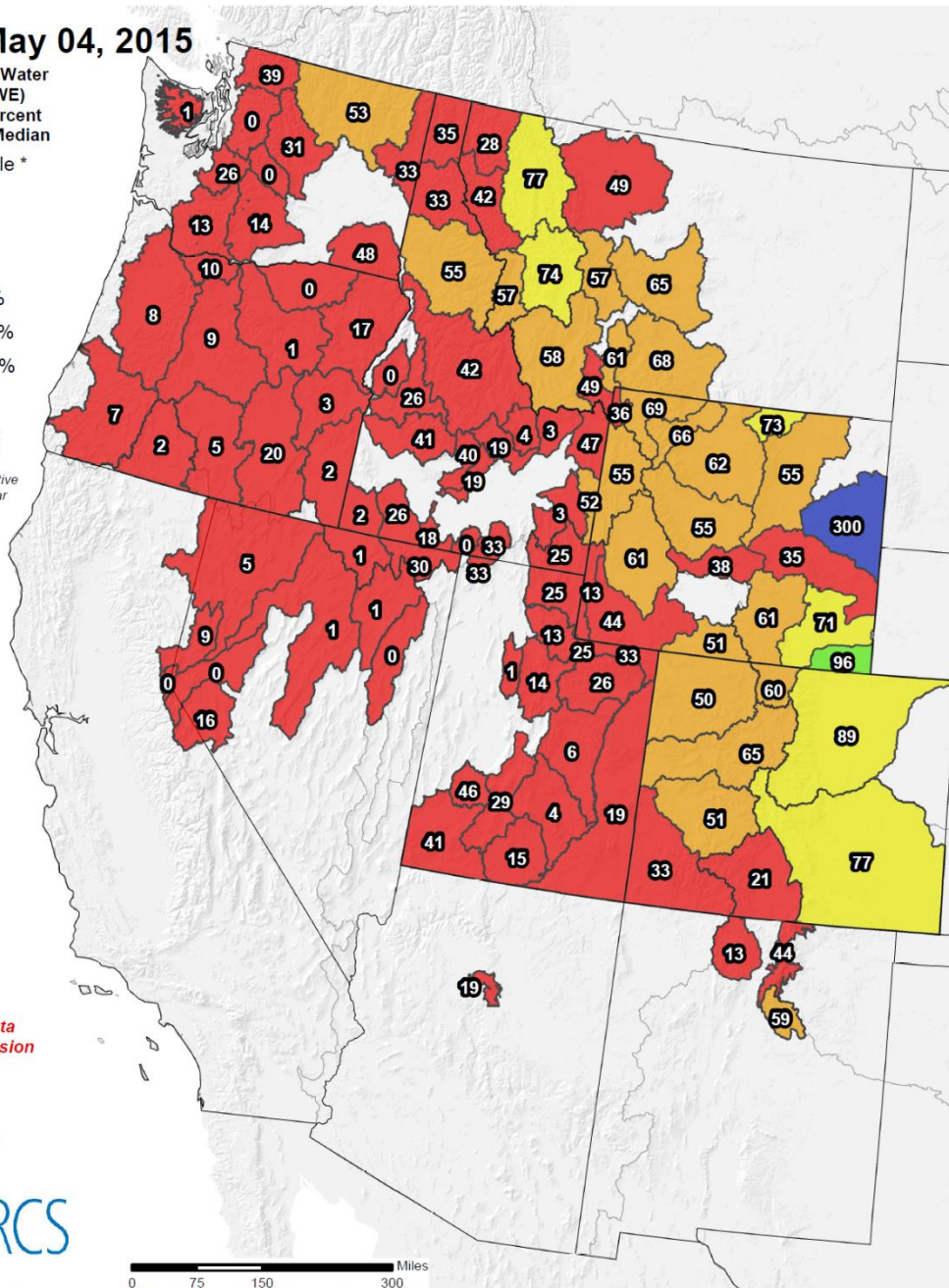
Westwide SNOTEL Current Snow Water Equivalent (SWE) % of Normal

May 04, 2015

Current Snow Water Equivalent (SWE) Basin-wide Percent of 1981-2010 Median



* Data unavailable at time of posting or measurement is not representative at this time of year



Provisional data subject to revision



0 75 150 300 Miles

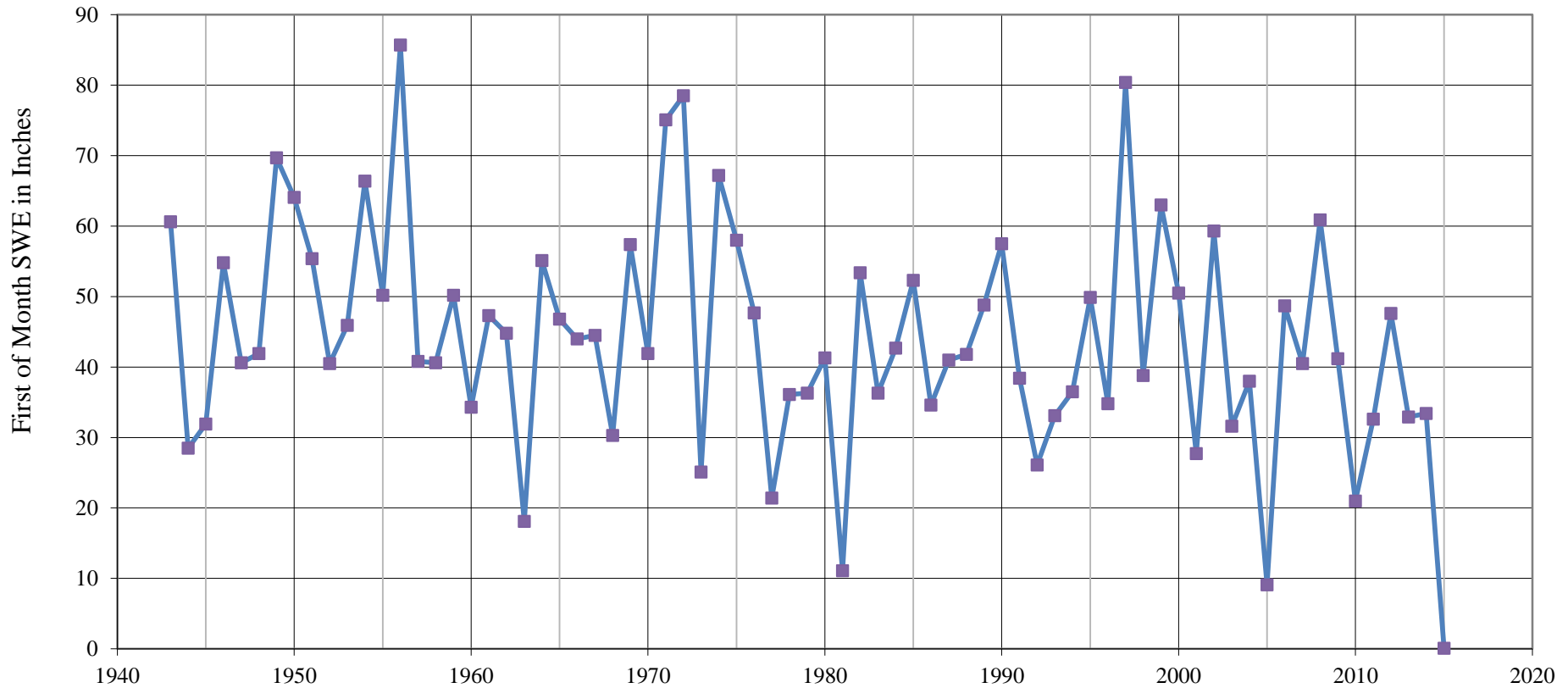
The snow water equivalent percent of normal represents the current snow water equivalent found at selected SNOTEL sites in or near the basin

Prepared by: USDA/NRCS National Water and Climate Center

Snowpack:
It's more than California

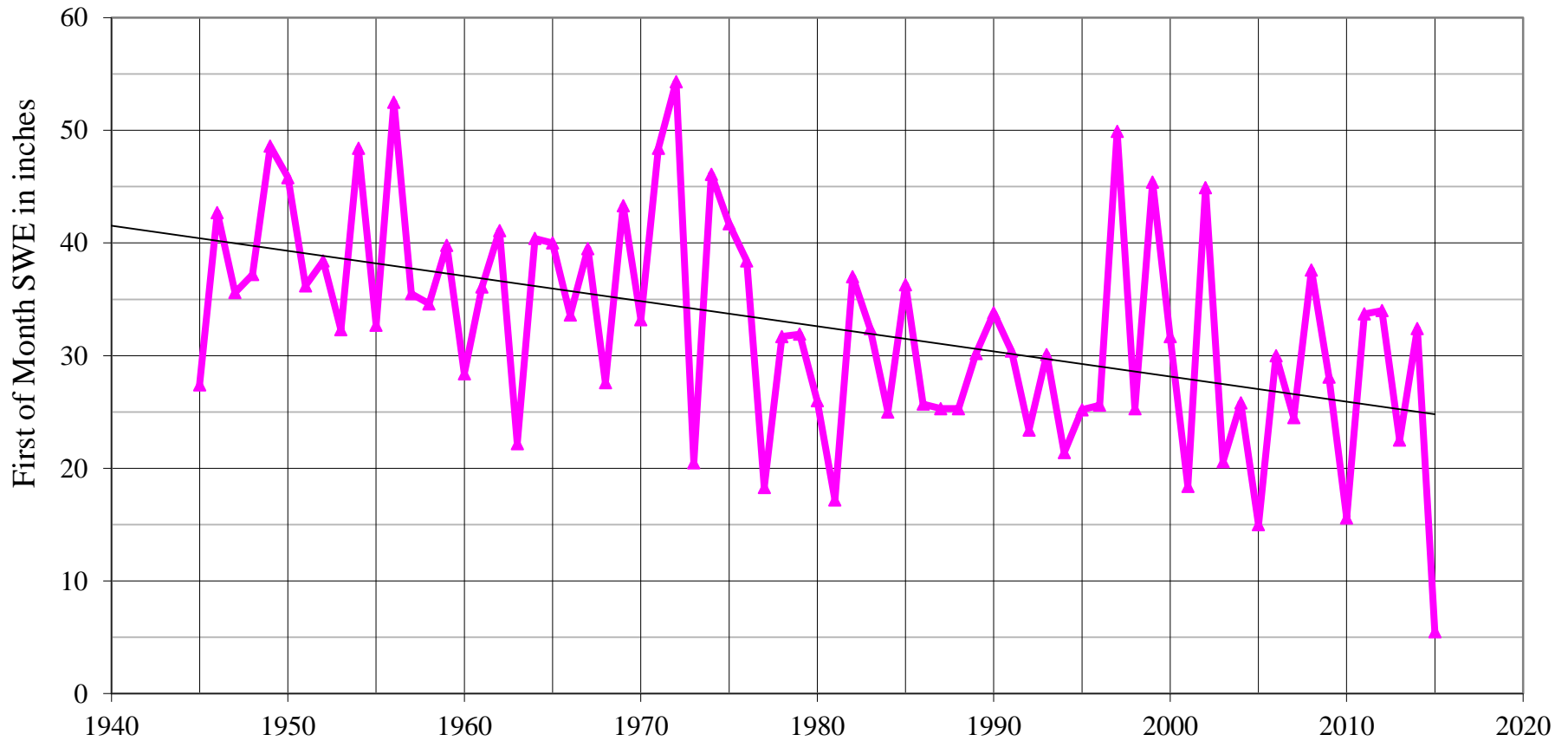
Snowpack-Cascades

**Stampede Pass SNOTEL Site
April 1st SWE**



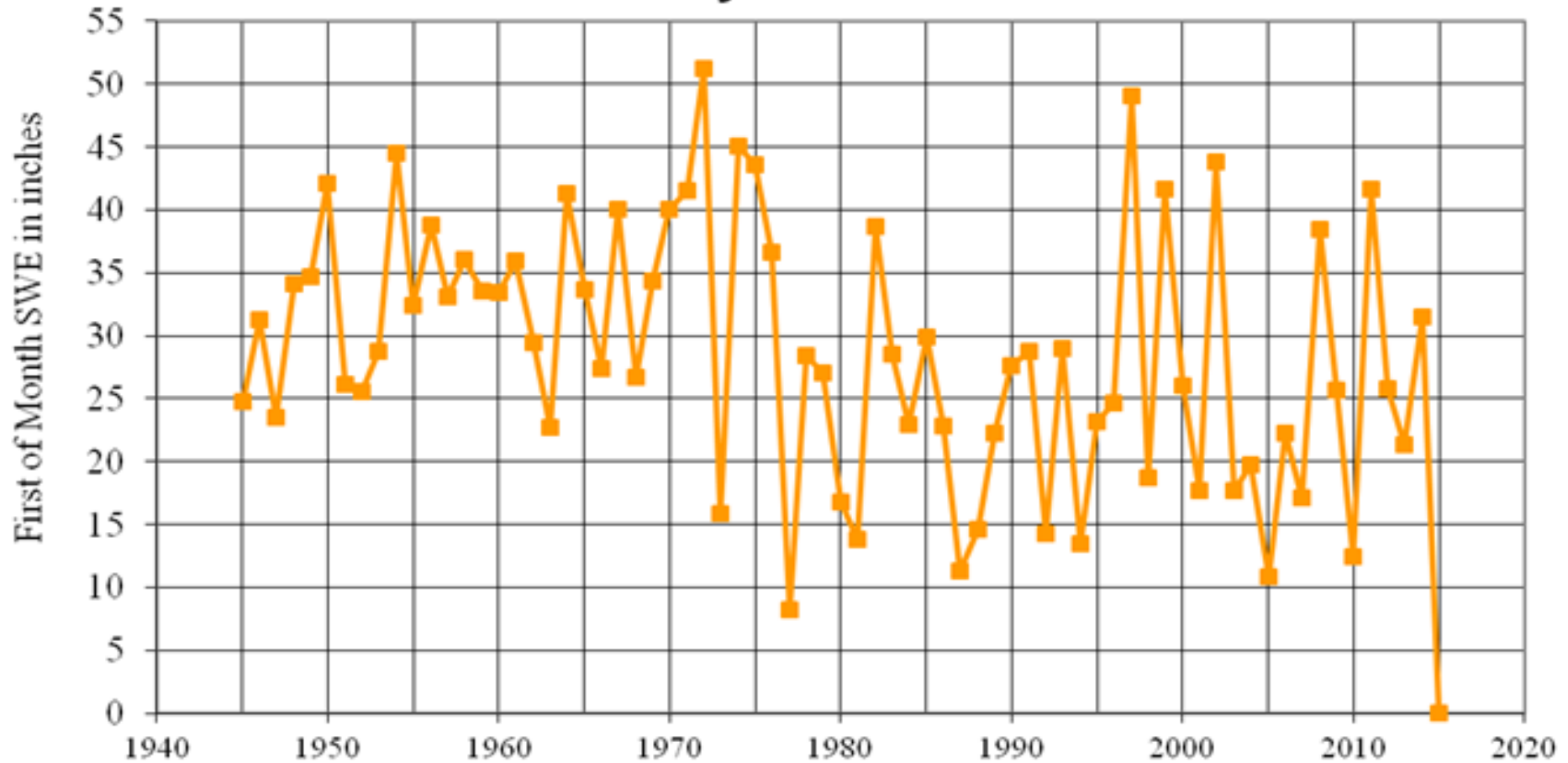
Snowpack-Spokane Basin

**Lookout Pass SNOTEL Site
April 1st SWE**

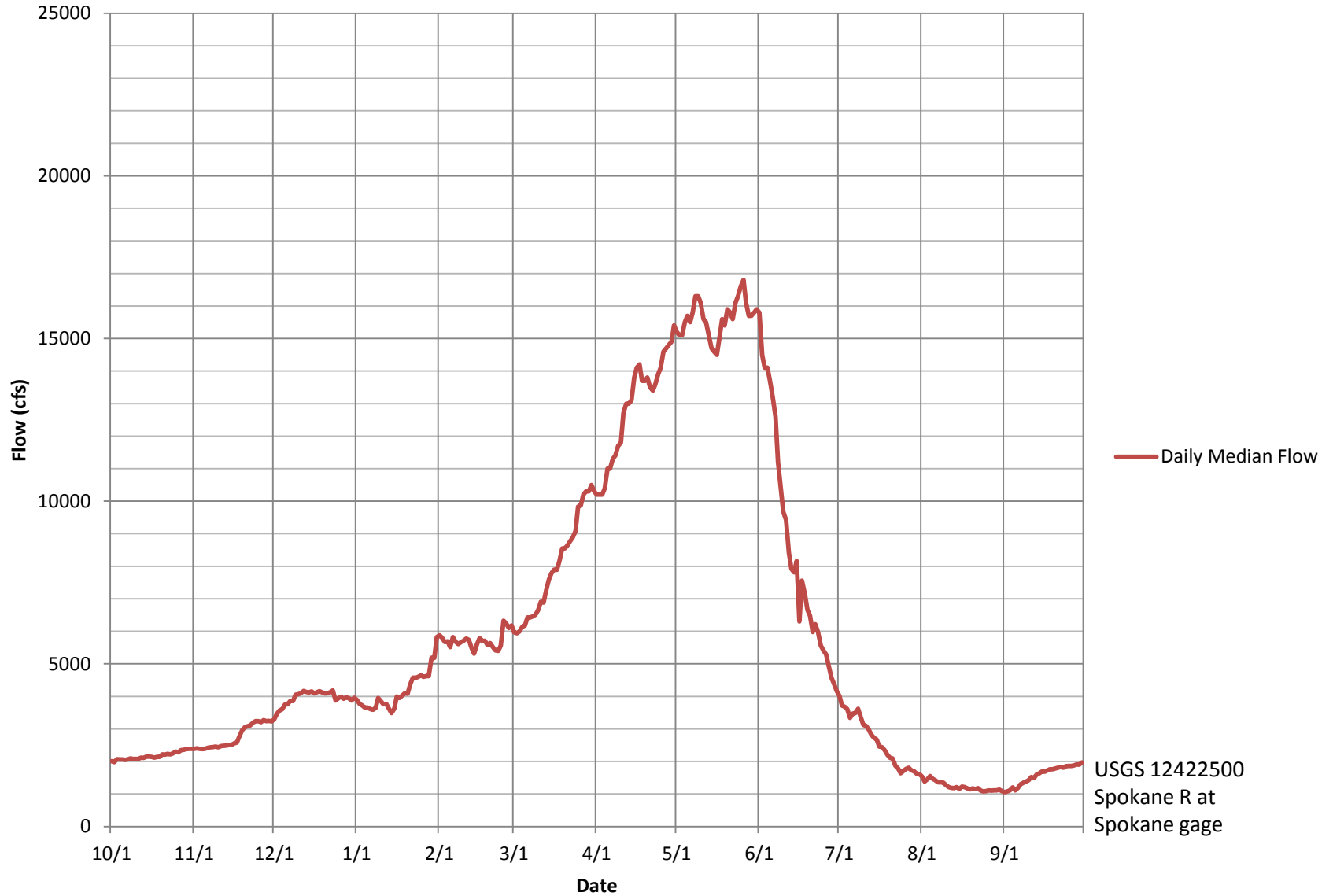


Snowpack-Spokane Basin

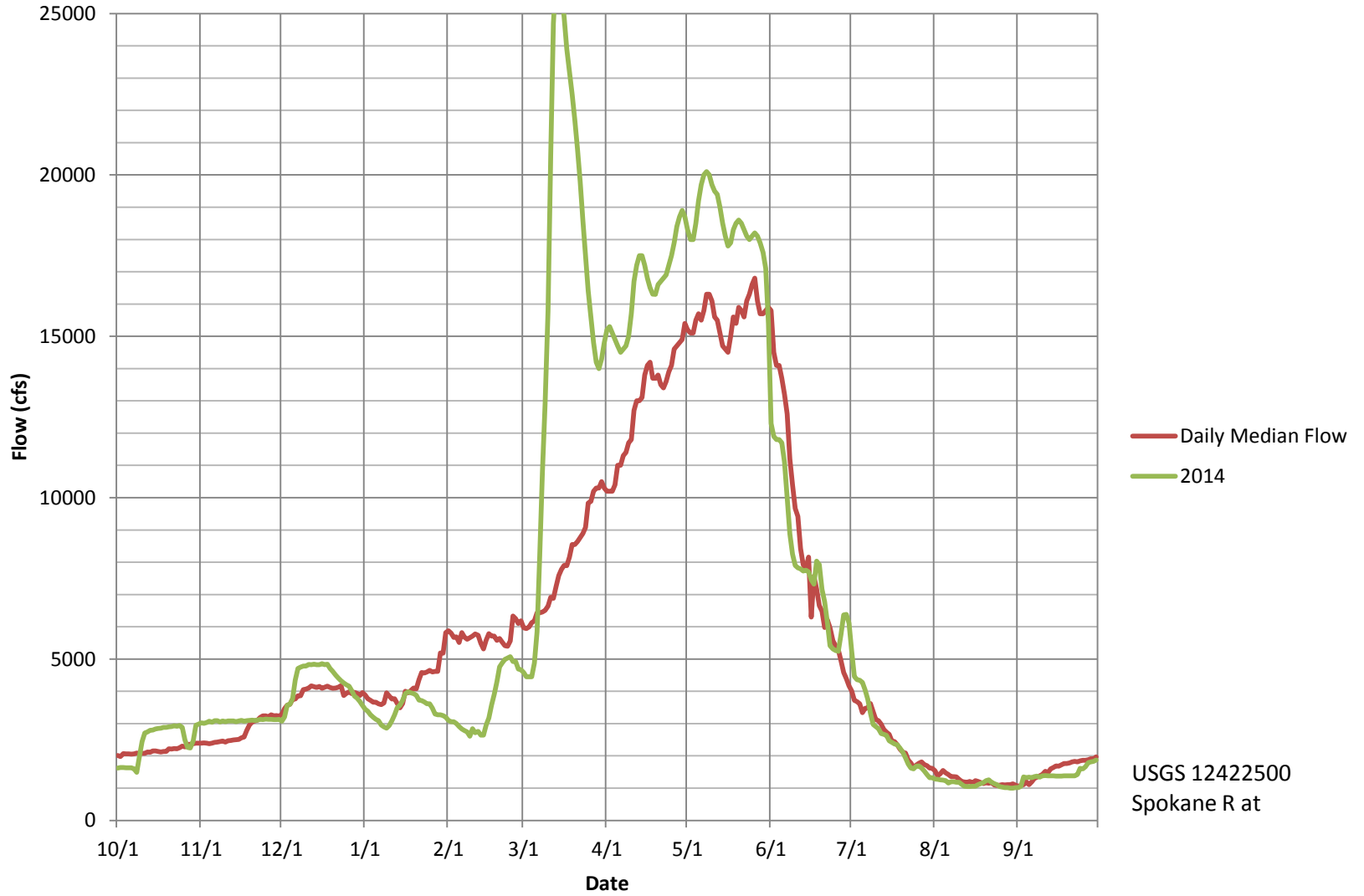
**Lookout Pass SNOTEL Site
May 1st SWE**



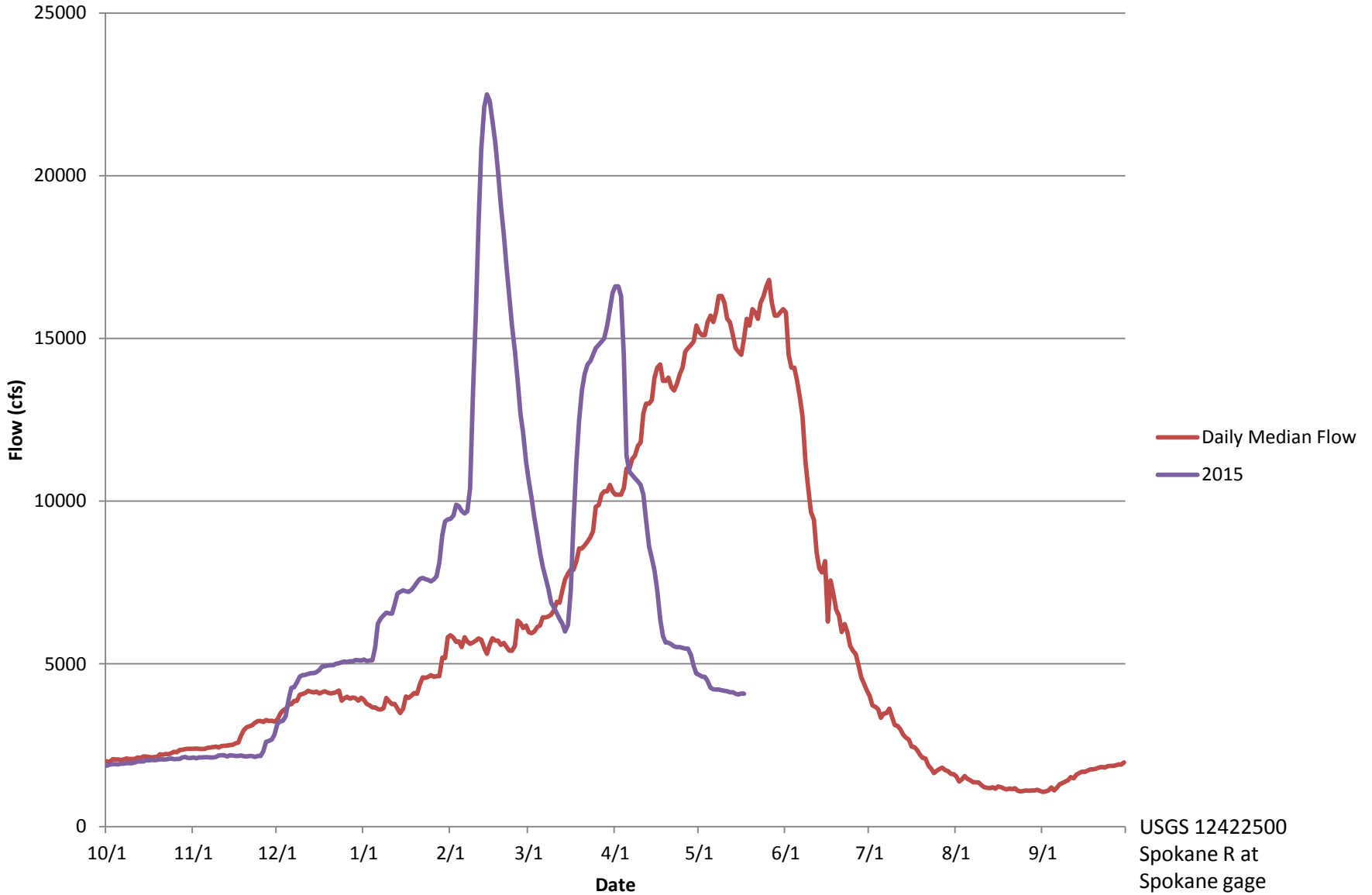
Spokane River Flows 1968-2014



Spokane River Flows

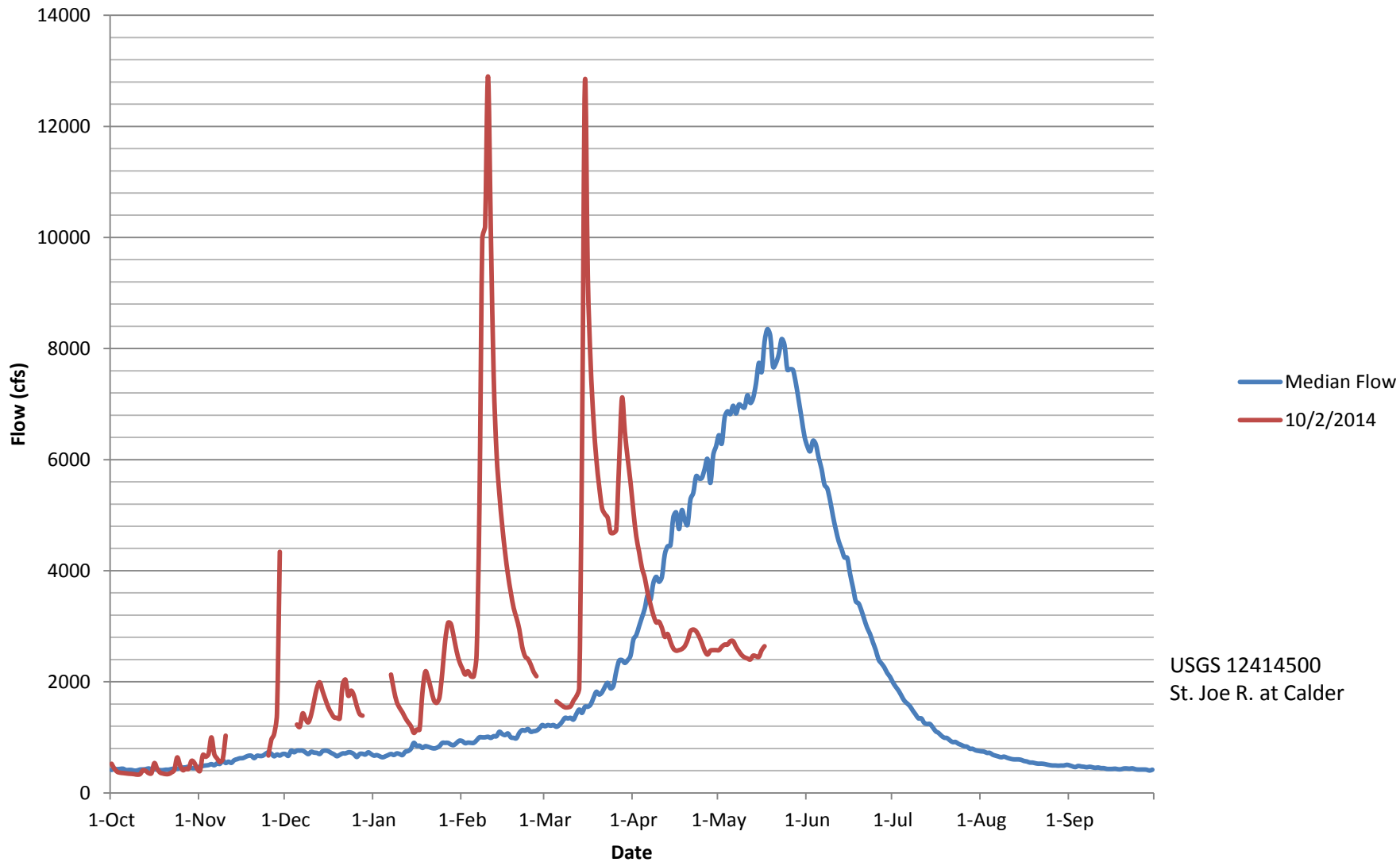


Spokane River Flows through May 18



USGS 12422500
Spokane R at
Spokane gage

St. Joe River at Calder Flows



USGS 12414500
St. Joe R. at Calder

Groundwater and Lakes



Spokesman Review photo



National Water Information System: Mapper

Help Info

Sites Map

Search

Surface-Water Sites

Groundwater Sites

- Active Sites
 - Any data
 - Instantaneous data
 - Daily data
 - Water-quality data
 - Measurements
 - Annual Report
- Inactive Sites
 - Any data
 - Instantaneous data
 - Daily data
 - Water-quality data
 - Measurements
 - Annual Report

Springs

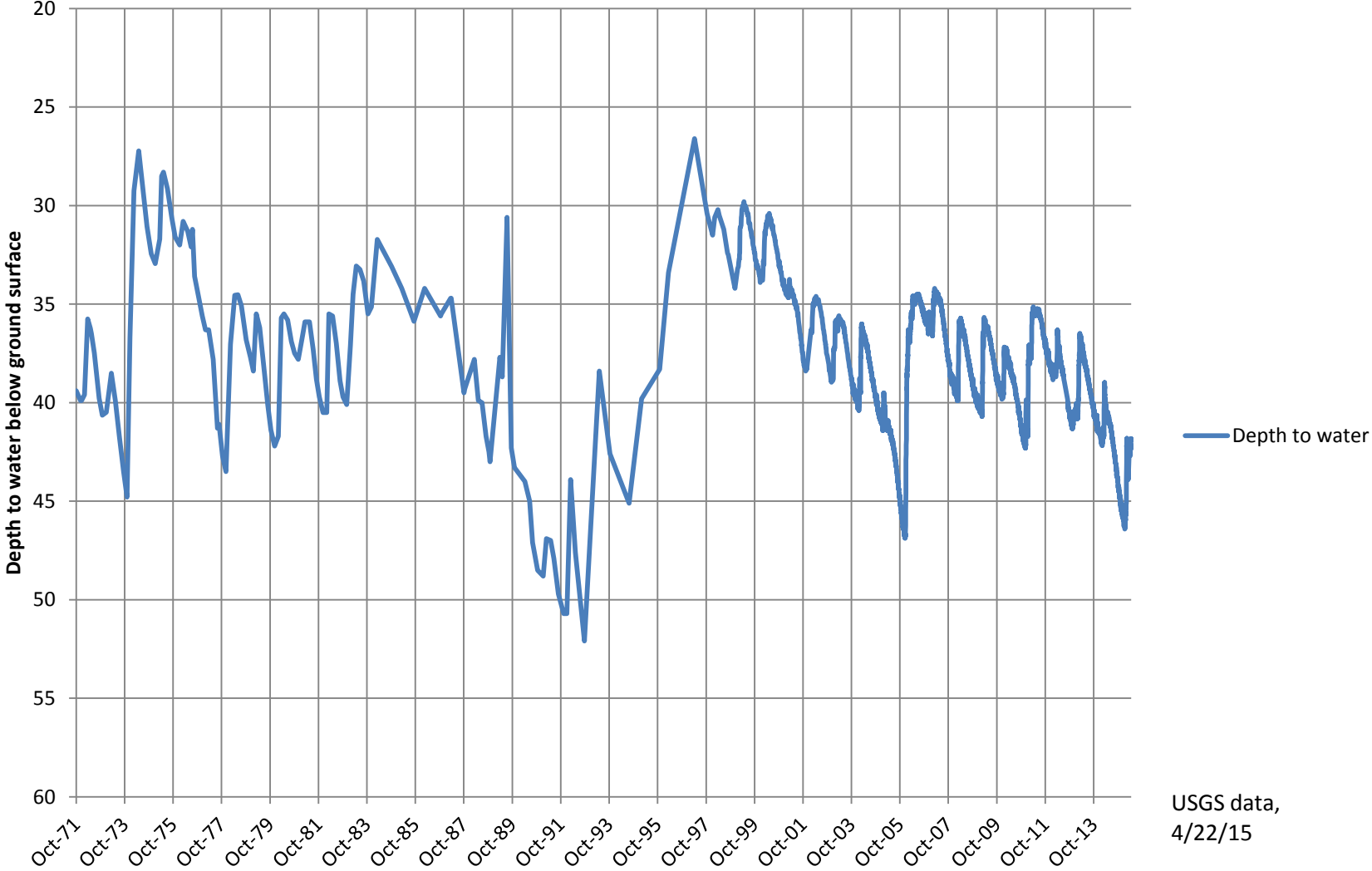
Atmospheric Sites

Other Sites



Site Information

Davenport Well



USGS data,
4/22/15



National Water Information System: Mapper

Help Info

Sites Map

Search

Surface-Water Sites

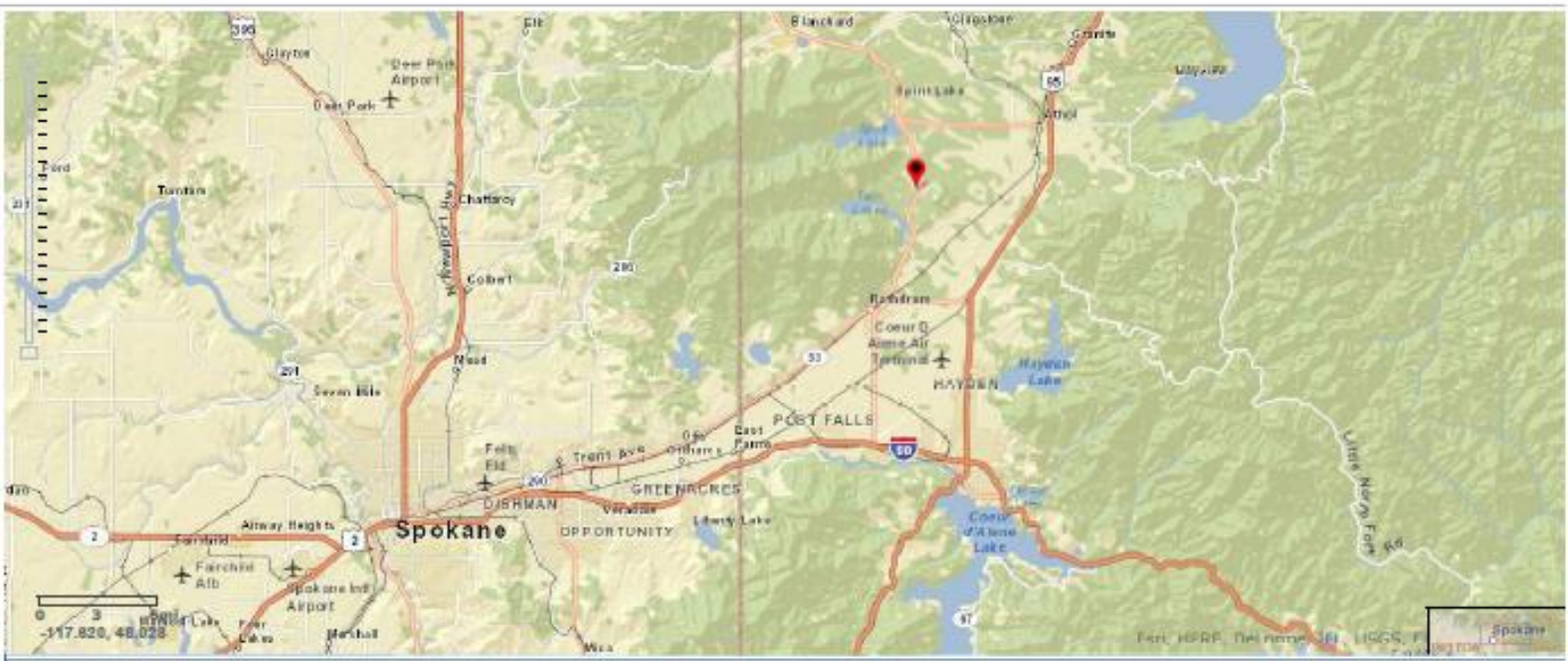
Groundwater Sites

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Springs

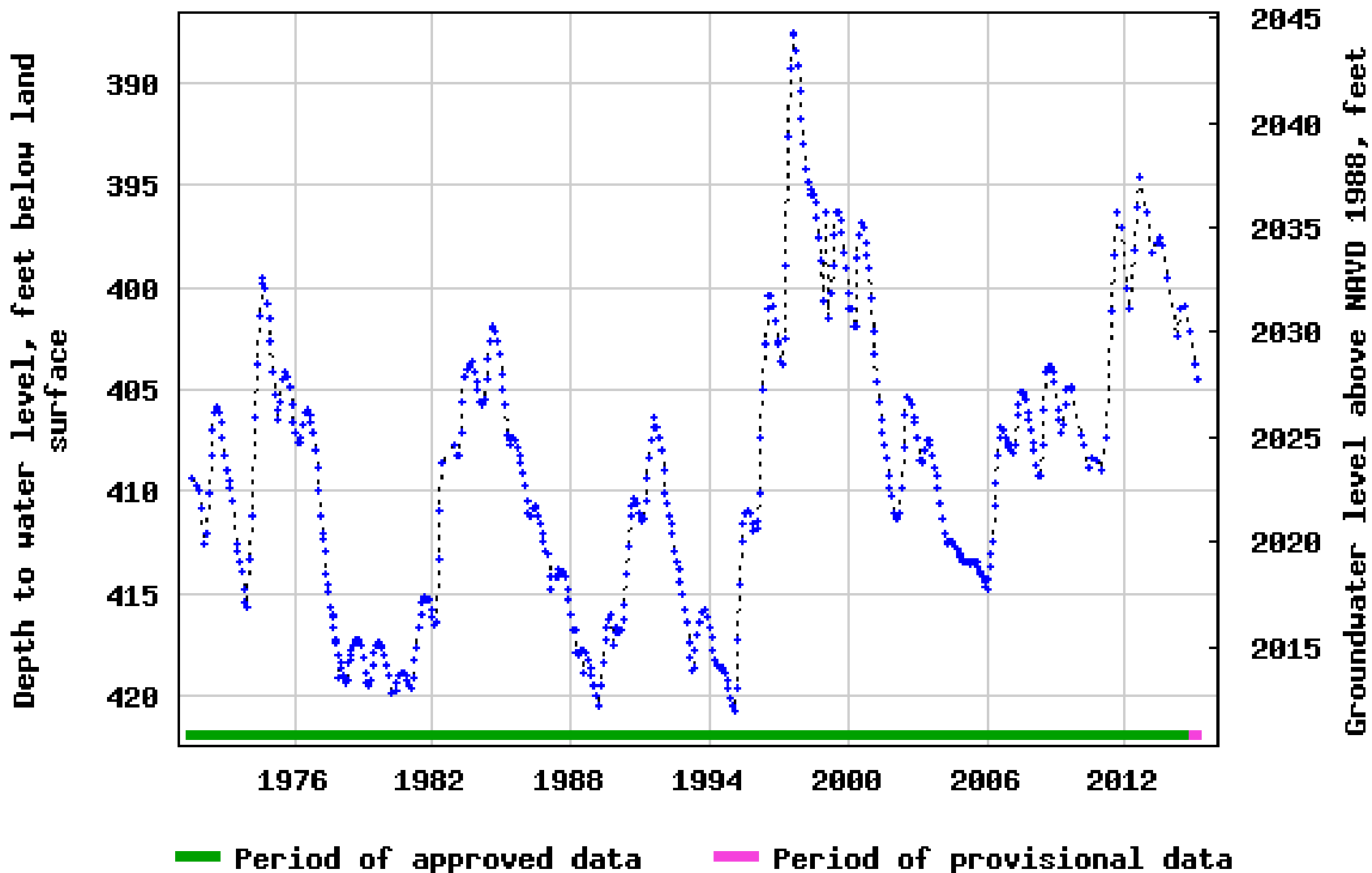
Atmospheric Sites

Other Sites



Site Information

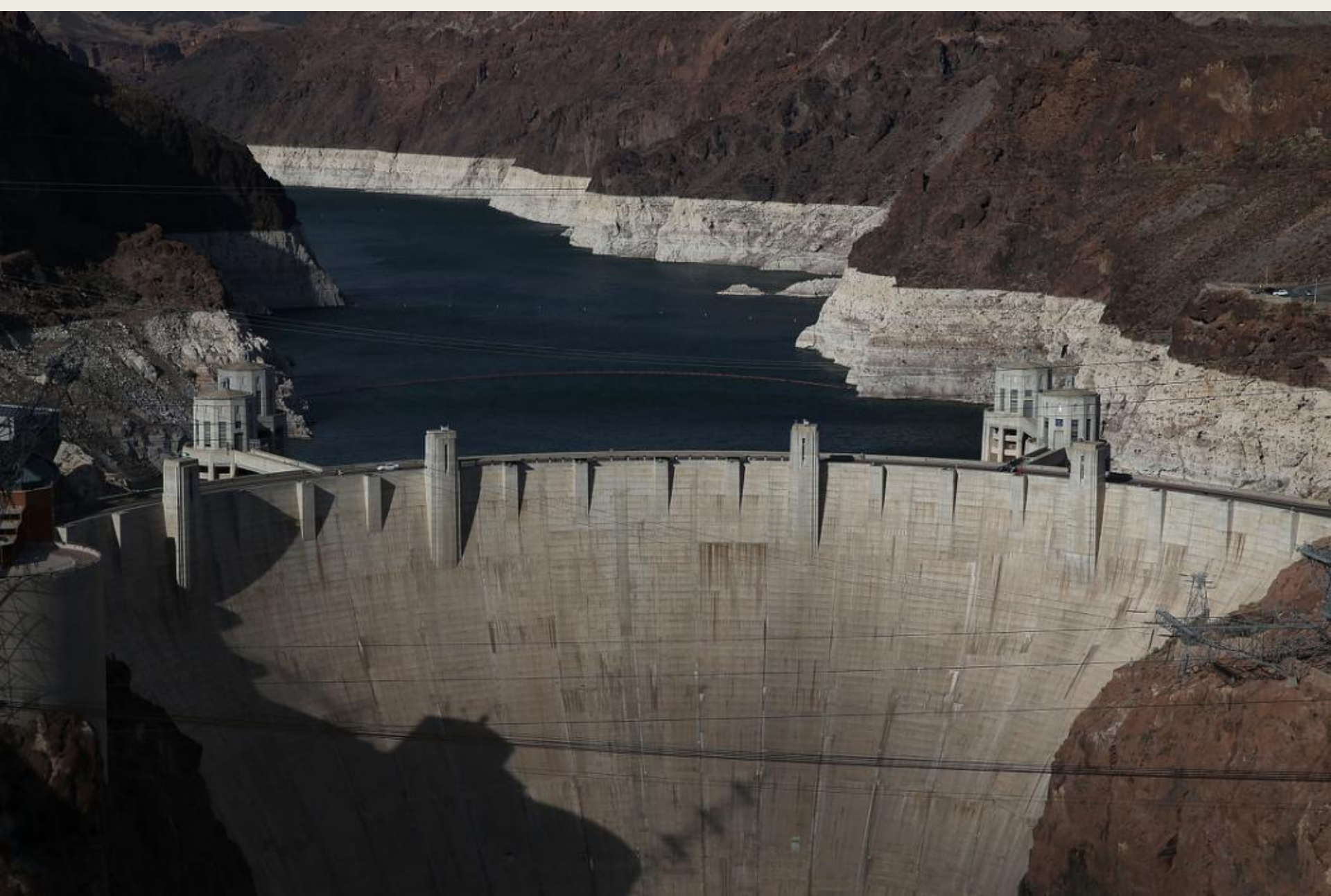
USGS 475439116503401 53N 04W 28CAB1



Summary

- Rivers: Early runoff, expect late summer flows early. Controlled streams (Spokane, Kootenai) will keep flow longer.
- Lakes: Low. Groundwater supply will feed lakes this year, another dry year and we will see very low levels next year. Small water gone.
- Local supply: Okay for now. Wells will be declining, low yield wells at risk.





Lake Mead @ Hoover Dam 5-21-2015:
Lake Elevation=1076.91 Full Pool=1221.4 Level=FP-144.49

Tributary TMDL Update

Little Spokane River & Hangman Creek



SPOKANE DO TMDL ANNUAL
MEETING

MAY 21, 2015

ELAINE SNOUWAERT

Little Spokane River

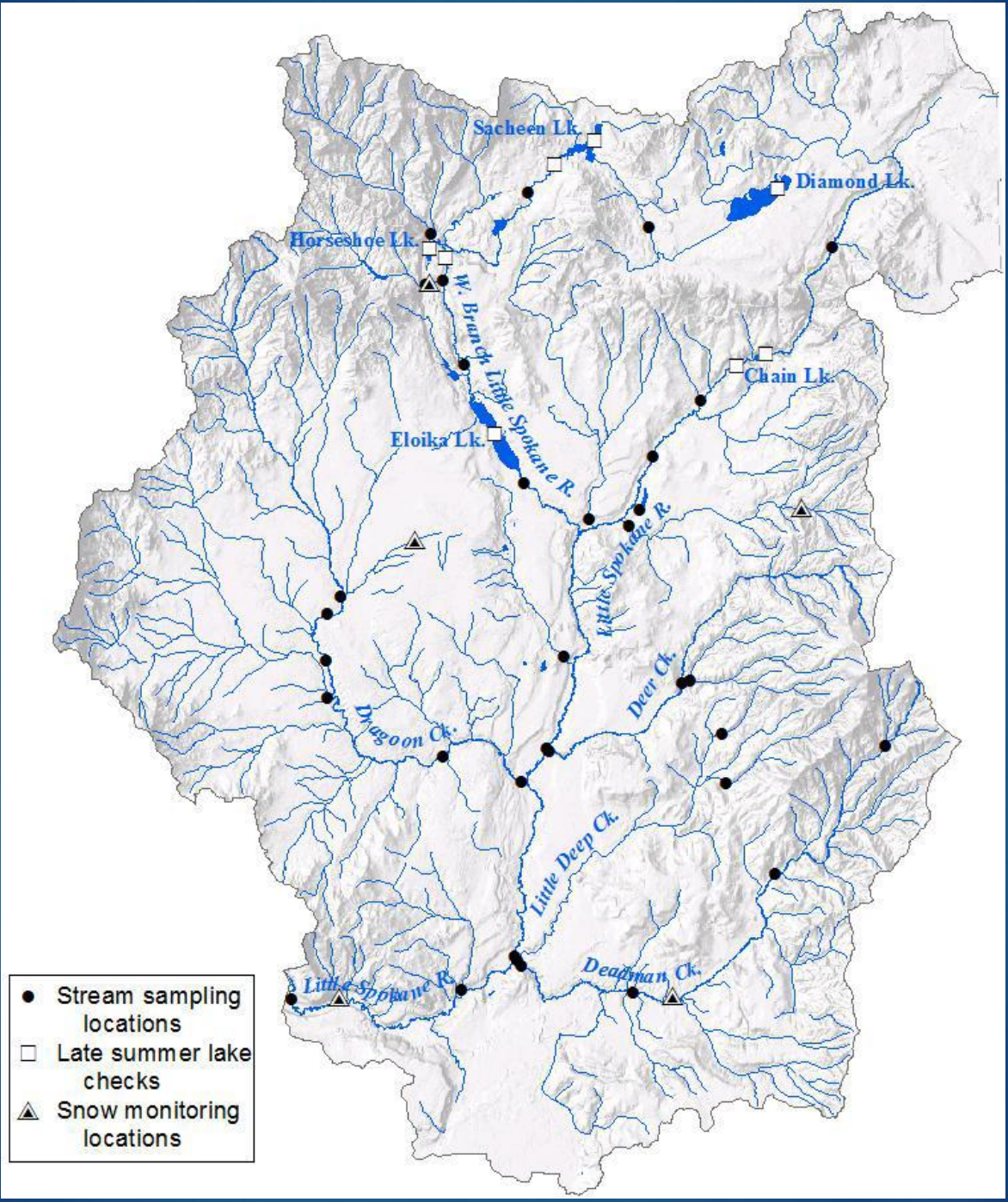
- ▶ Fecal coliform, temperature, and turbidity TMDL completed and approved in 2012.
 - ▶ Primarily a nonpoint source TMDL
 - ▶ In implementation phase
- ▶ Developing TMDL for dissolved oxygen & pH listings
 - ▶ 22 listings throughout Little Spokane Watershed
 - ▶ *DO one-day minimum shall not fall below 9.5 mg/L. When due to natural conditions, then cumulative human-caused activities no decrease of more than 0.2 mg/L.*
 - ▶ *pH must be kept within the range of 6.5 to 8.5*
 - ▶ Some data collection 2010
 - ▶ Initiated model development late 2013

Little Spokane River

- ▶ Dissolved oxygen & pH model developed and calibrated for main stem Little Spokane below Chain Lake (QUAL2Kw)
 - ▶ Good model fit and representation
 - ▶ DO & pH impairment in LSR is not P or N limited (Preliminary findings subject to change)
 - ▶ Upper watershed natural P levels in groundwater too high to limit algal growth
 - ▶ Excess anthropogenic nitrate would require 90-98% reductions to limit algal growth
 - ▶ Reducing temperature and limiting sunlight to the stream will have greatest impact on impairments
 - ▶ Hatchery impact to LSR not significantly impacting in watershed DO or pH
 - ▶ Hatchery phosphorus WLA will be determined by the load allocation at the mouth of LSR for the big Spokane River DO TMDL

Little Spokane River

- ▶ Watershed Model
 - ▶ Exploring use of a watershed (landscape model) to distribute Spokane LA throughout the watershed.
 - ▶ Additional data collection for model (Data collect Feb 2015 to Feb 2016)
 - ▶ Continuous stream flow
 - ▶ Channel measurements
 - ▶ Continuous temperature
 - ▶ Suite of nutrients
 - ▶ Limited lake sampling to understand nutrient sink/source relationship



- Stream sampling locations
- Late summer lake checks
- ▲ Snow monitoring locations

Little Spokane River

- ▶ Schedule
 - ▶ Feb 2015 to Feb 2016 – Field work
 - ▶ 2016 - Watershed model development, calibration, and incorporation with in-stream QUAL2Kw model
 - ▶ Late 2016 – early 2017 – Implementation Plan development
 - ▶ Mid 2017 – target for draft TMDL

Hangman Creek

- ▶ Fecal coliform, temperature, turbidity (sediment) approved in 2009
- ▶ Implementation Plan completed 2011
- ▶ Resurrected Hangman Bi-State Group in late 2013
 - ▶ Sharing, planning, and coordinating implementation activities
 - ▶ Idaho, Washington, Coeur d'Alene Tribe, Conservation Districts, Nonprofits, etc.
- ▶ Applying for Regional Conservation Partnership Program (RCPP)
 - ▶ Federal funding from Natural Resources Conservation Service (NRCS)
 - ▶ Requires 1:1 match
 - ▶ For implementing agricultural and forest programs in target watershed to address resource concerns
 - ▶ Will include Little Spokane, Spokane, and Hangman watersheds (including Idaho and tribal portion)

Hangman Creek

- ▶ Dissolved oxygen and pH TMDL
 - ▶ 9 DO and pH listings
 - ▶ Some data collected but additional is needed
 - ▶ Preliminary review suggests some impairments may be due to nitrogen rather than phosphorus
- ▶ Correlation between sediment and phosphorus so implementation to address turbidity also benefits phosphorus
- ▶ Due to natural flashy flow regime there are some challenges applying existing water quality standards to Hangman Creek

Hangman Creek

Should this stream (Hangman Creek) be expected to maintain the same water quality in both flow conditions?



Photo credit: Jonathon Fox



Photo credit: Spokesman.com



Shallow/stagnant/receding from canopy/higher temperatures



High flow/aeration/cool temperatures

Hangman Creek

- ▶ Exploring policy options for better matching criteria to a stream's natural conditions
 - ▶ Develop seasonal site-specific criteria to protect and regulate water quality in accordance with restoration to the stream's natural condition
 - ▶ Seasonal criteria would be incorporated into rule rather than relying on the TMDL reference to a stream's natural condition
 - ▶ Provides increased regulatory assurance
 - ▶ In line with guidance EPA released in February 2015
 - ▶ *"Framework for Defining and Documenting Natural Conditions for Development of Site-Specific Natural Background Water Quality Criteria for Temperature, Dissolved Oxygen and pH to Protect Aquatic Life Uses: Interim Document"*
 - ▶ Not a use attainability analysis

Questions?



2015 Livestock Grazing and Cropping Surveys



Lake Spokane Study

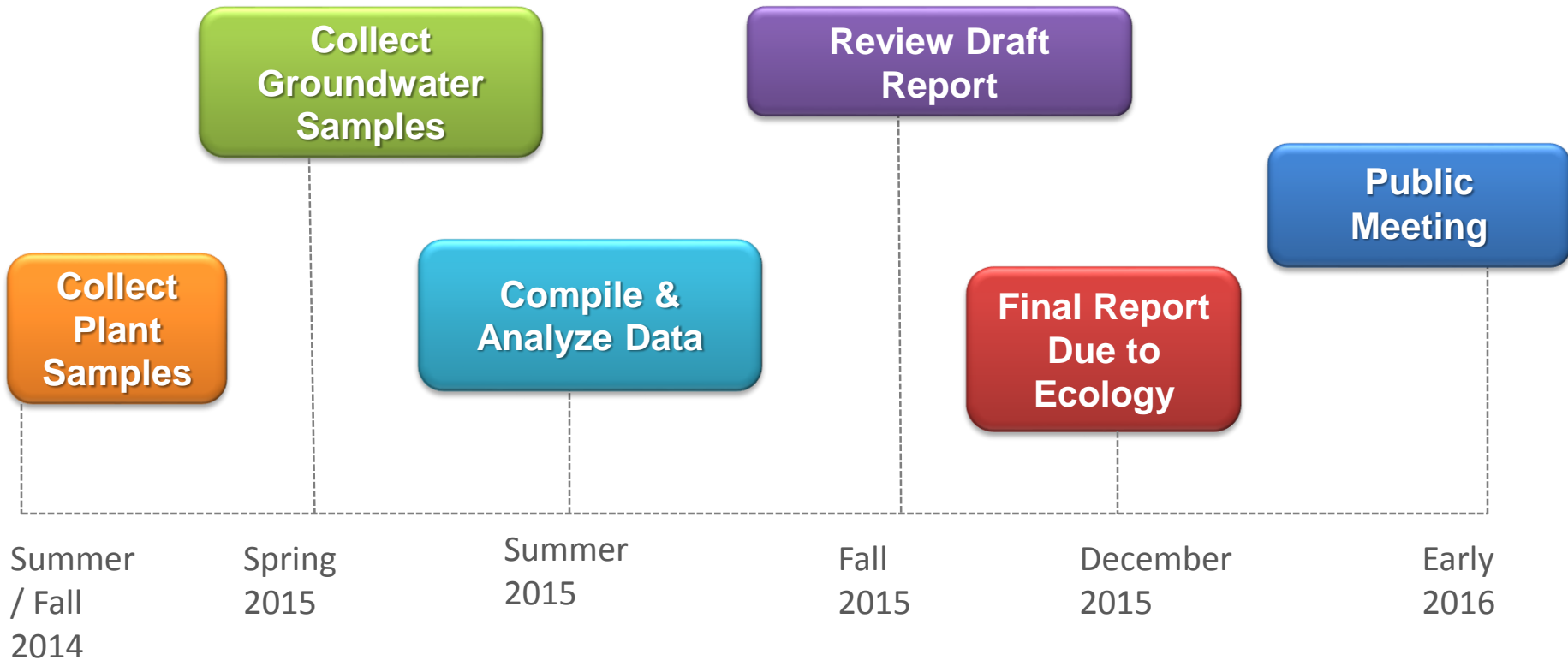
Cooperative Study



Three Components



Study Timeline



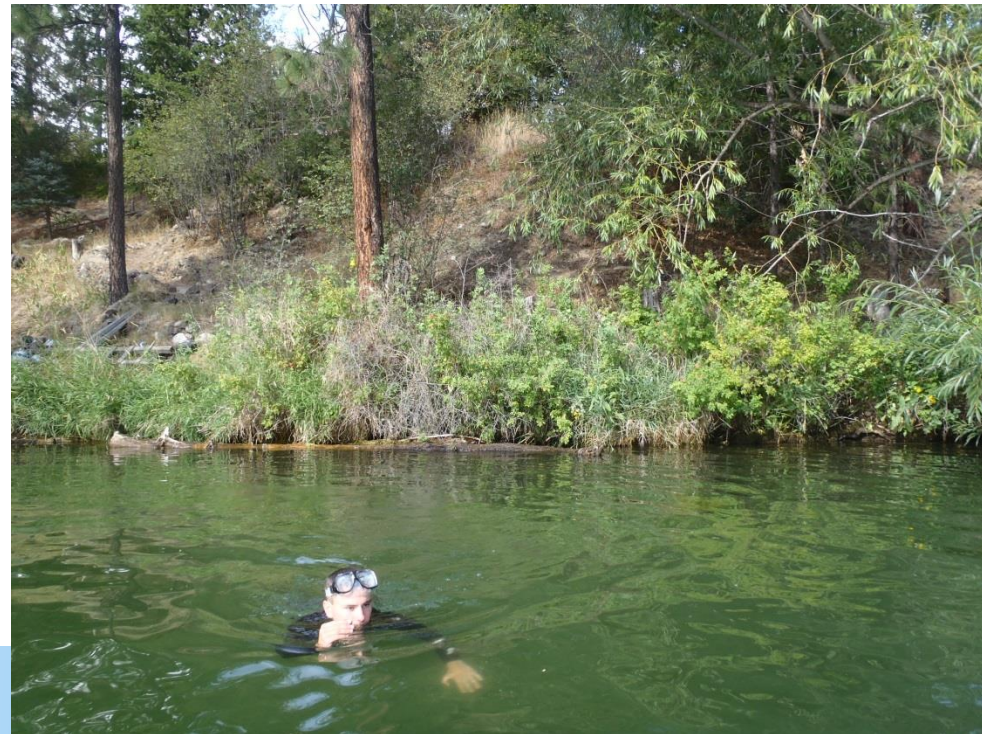
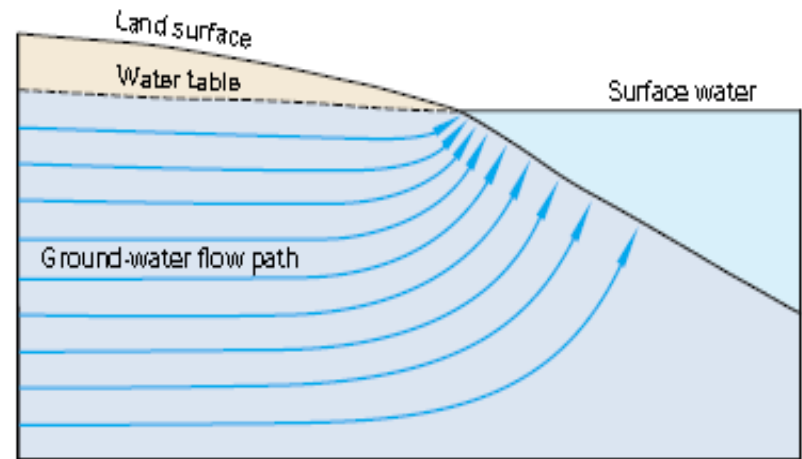
Why Suncrest?

- Most populated area along Lake Spokane
 - > 1300 on-site septic systems
- Identified need in the Spokane Watershed Nonpoint Phosphorus Reduction Plan
- Help determine how on-site septic systems may contribute nutrients to the lake



Nitrogen in Aquatic Vegetation

- Plants take up nitrogen from groundwater discharging in the root zone
- Plants affected by nitrogen from septic systems have higher $N^{15} : N^{14}$ ratios
- Plants integrate N^{15} & N^{14} in the proportions available over time
- Measure nitrogen isotope ratio in aquatic plant tissue collected along shoreline



117°38'0"W

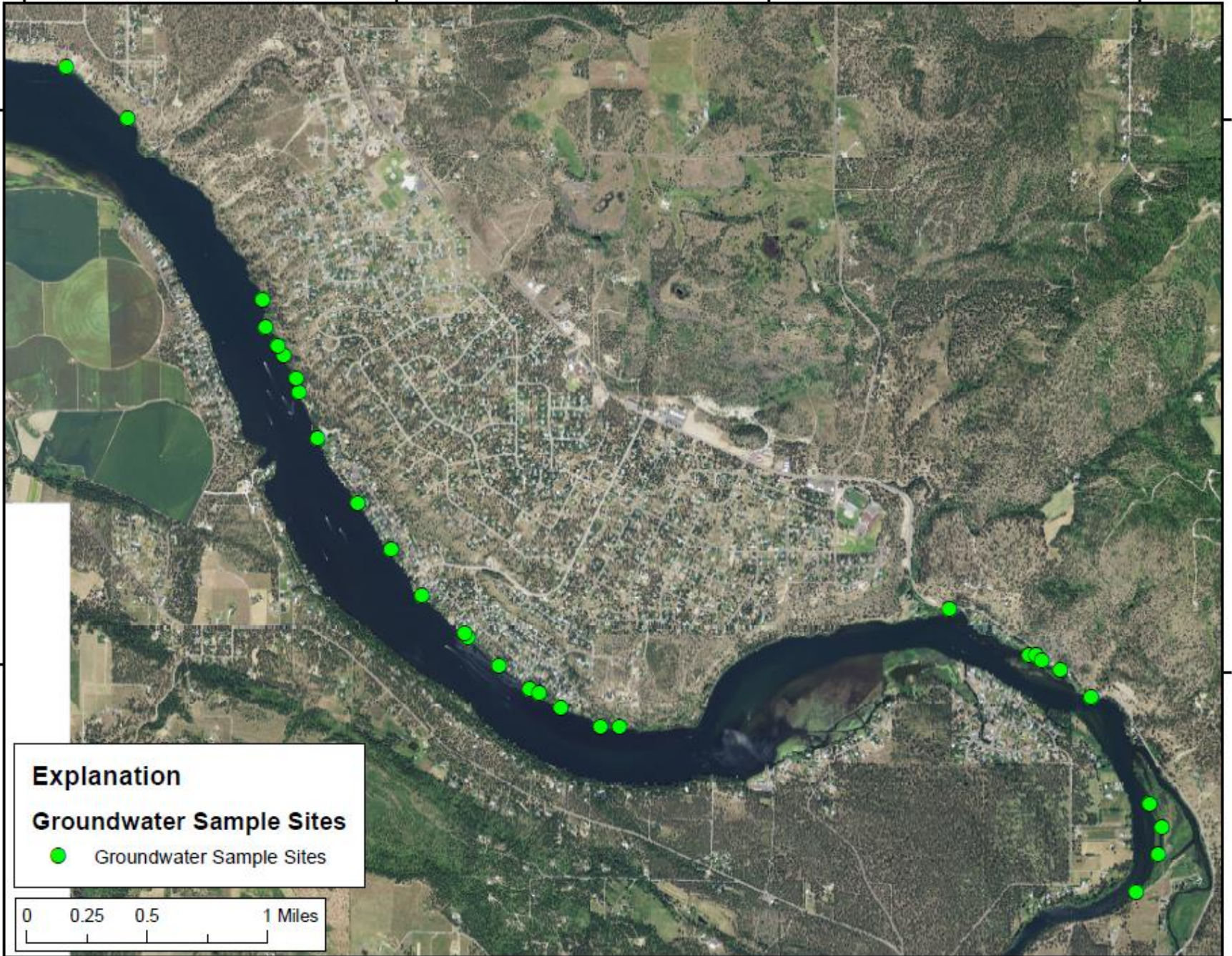
117°36'0"W

117°34'0"W

117°32'0"W

47°50'0"N

47°48'0"N



Explanation

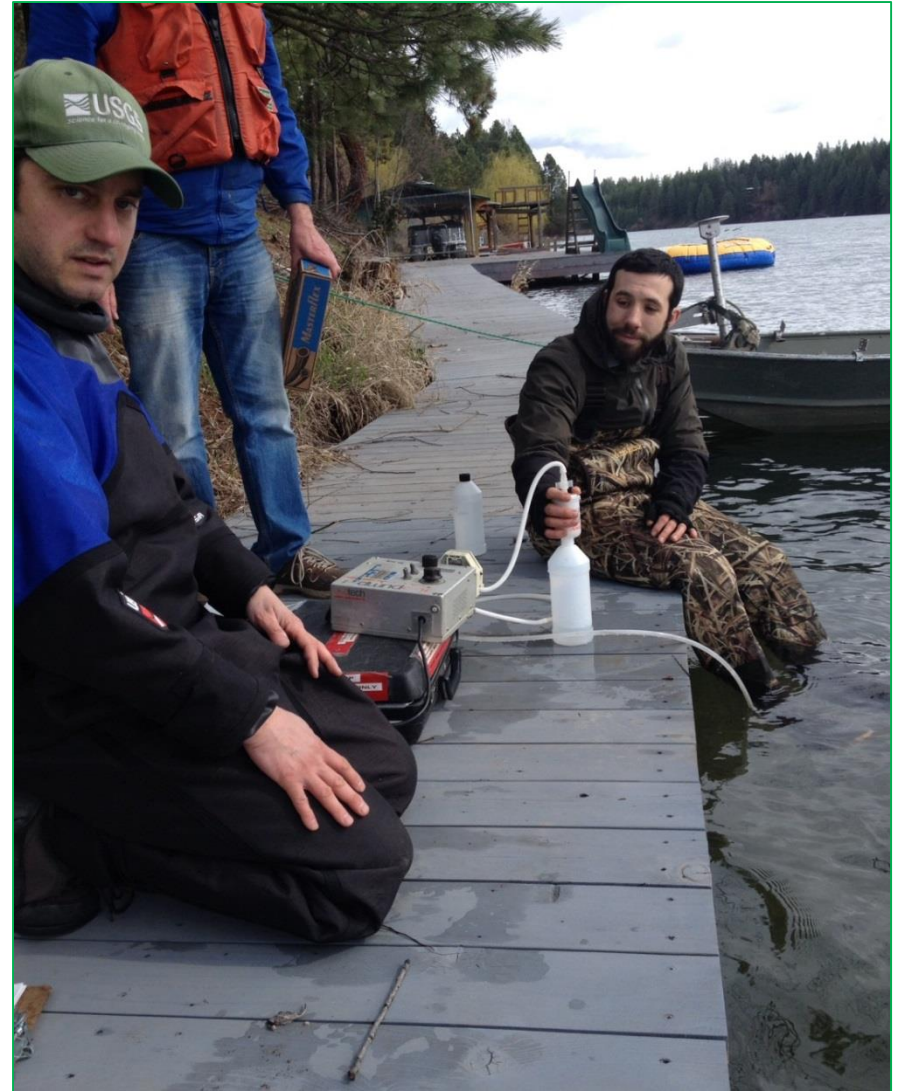
Groundwater Sample Sites

● Groundwater Sample Sites

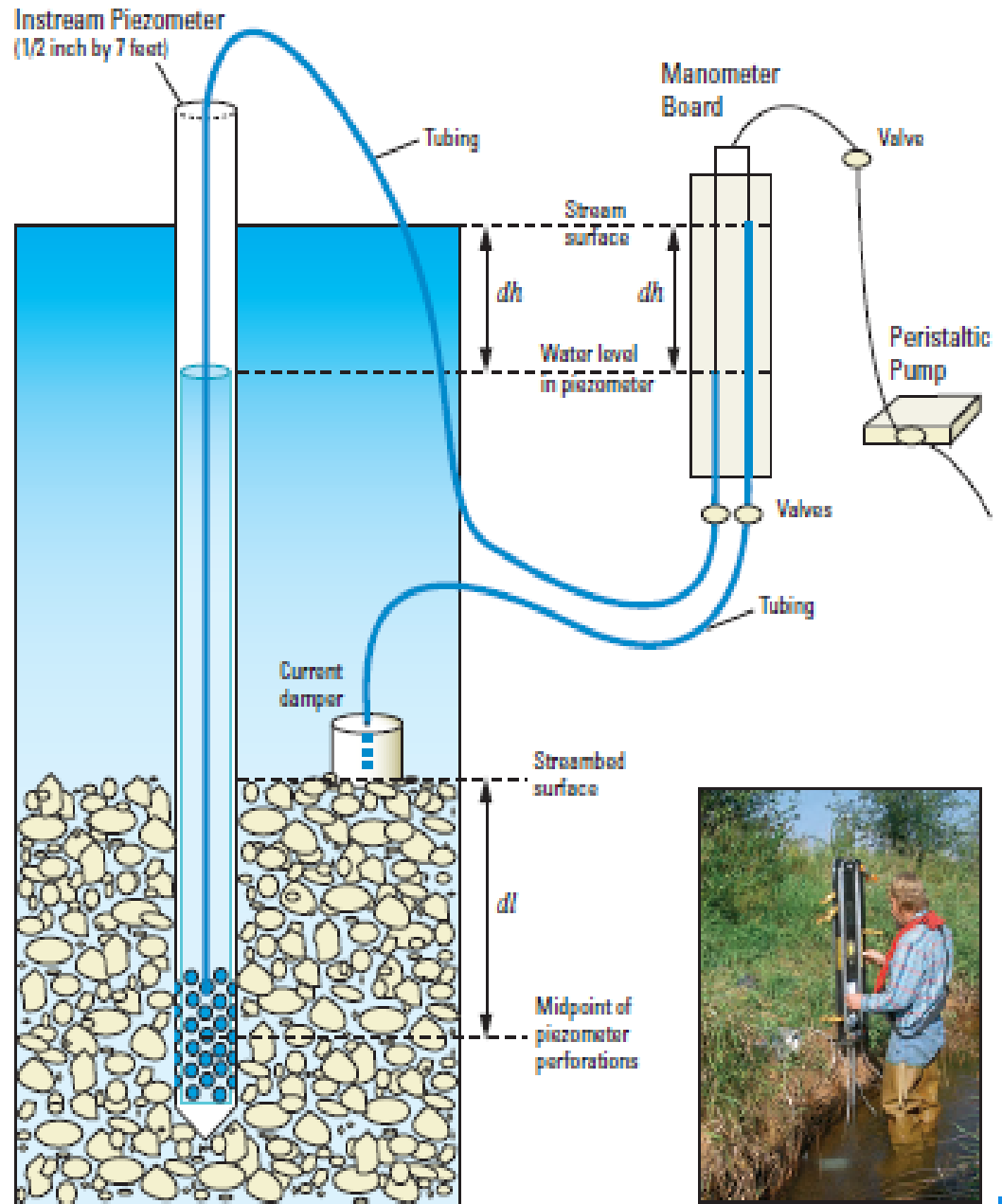
0 0.25 0.5 1 Miles

Groundwater measurements

- Groundwater sampled for:
 - Nitrate
 - Ammonia
 - Phosphate
 - Dissolved oxygen
 - Specific conductance
 - Nitrogen isotope ratio
- Hydraulic gradient measured with a manometer board



Manometer Board



Lake Spokane Study



If there IS an impact:

- additional study to measure how many nutrients enter the lake
- Then assess potential actions to prevent excess nutrients

If there is NOT an impact:

- Study other areas along the lake



More Information

Ecology's Website:

Water Quality Monitoring on Lake Spokane at Suncrest

http://www.ecy.wa.gov/programs/wq/tmdl/spokaneriver/dissolved_oxygen/LkSpokanewqmonitoring.html

USGS Website:

Lake Spokane Nutrients

<http://wa.water.usgs.gov/projects/lakespokane/>





Update on Funding Proposals

Ecology WQ Program FY 2016

Spokane Basin

- 20 applications
- 17 proposed for funding
 - 2 wastewater
 - 14 stormwater
 - 4 nonpoint source
- > 25 million in proposed funding

Statewide

- 227 applications
 - > 107 million in grants
 - ~ 253 million in loans



Proposed Wastewater Facility Funding

Applicant	Project Title	SRF Loan	SRF Forgivable Principal Loan	TOTAL Funding
Liberty Lake Sewer & Water District	Water Reclamation Facility Upgrades, Phase 2	\$15,123,251	\$29,749	\$15,153,000
Sacheen Lake Water & Sewer District	Sacheen Lake Phase II Collection System Extension for Mountain View	\$853,500	\$37,500	\$891,000
Totals:		\$15,976,751	\$67,249	\$16,044,000

Proposed Stormwater Funding

Applicant	Project Title	SW Grant
Spokane city of	Trent Avenue Stormwater Retrofit	\$189,750
Spokane city of	RPWRF LID	\$347,625
Spokane city of	Pettet Drive MS4 Elimination	\$450,000
Spokane city of	East Sprague Stormwater Retrofits	\$601,500
Spokane city of	Monroe/Lincoln Stormwater Project	\$749,250
Spokane city of	Havana Street Stormwater Improvements	\$761,550
Spokane city of	Sharp Avenue Stormwater Improvement Project	\$1,492,500
Spokane County - Stormwater Utility	Country Homes - Wall to Division Stormwater Retrofit	\$427,278
Spokane County - Stormwater Utility	Market Street - Francis to Lincoln Stormwater Retrofit	\$666,750
Spokane Valley city of	Outfall Elimination Project	\$0
Spokane Valley city of	Sweeping Program Effectiveness Study	\$0
Spokane Valley city of	Spokane Valley Regional Decant Facility, Phase III	\$300,000
Spokane Valley city of	Drywell Retrofit with Pavement Preservation	\$682,500
Spokane Valley city of	Sprague, University to Park Stormwater Improvements	\$1,500,000
Totals:		\$8,168,703

Proposed 319 funding

Applicant	Project Title	Section 319 Grant
The Lands Council	Riparian Restoration & Stormwater Education in the Hangman Creek Watershed	\$208,000
		Totals: \$208,000

Proposed Centennial Clean Water Funding

Applicant	Project Title	Centennial Grant
Spokane city of	Spokane Gorge Restoration	\$250,000
Spokane Conservation District	Spokane NPS Reduction Implementation and BMP Database Project	\$250,000
Stevens County Conservation District	Lake Spokane Phosphorus Input II	\$250,000
Totals		\$750,000



10 Year Assessment



Questions and Discussion

**Break
Time!**

