

Spokane River Dissolved Oxygen TMDL 2016 Annual Meeting



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TMDL Schedule



2010

- Spokane Dissolved Oxygen TMDL Approved
- Ag Watershed Enhancement Program in Hangman Watershed Begins (AWEP)

2011

- WA NPDES Permits Effective
- Clean Fertilizers, Healthier Lakes and Rivers Law Signed
- Spokane County Regional Water Reclamation Facility comes online

2012

- Avista's Dissolved Oxygen Water Quality Attainment Plan Approved

2014

- ID NPDES Permits Effective
- WA stormwater permits reissued with TMDL actions

2016

- WA NPDES Permits Re-Issued with Interim Limits
- Greater Spokane Regional Conservation Partnership Program Begins

2018-
2021

- WA Plants Implement Tertiary Treatment, Fine-tune Technology, and Implement Tool Box Options

2021

- WA NPDES Permits Re-issued with TMDL WLAs
- Earliest Date for 10-Year Assessment to Begin

Implementation Measures

Nonpoint Source Efforts

- Hangman Creek TMDL
- Annual Cropping and Grazing Assessments
- Priority Watershed for Grants and Loans
- Little Spokane River TMDL
- Ambient Monitoring
- Municipal Phase II Stormwater Permit
- Deep-Coulee Creek Monitoring
- Lake Spokane Groundwater Monitoring
- Regional Conservation Partnership
- Regional Phosphorus Fertilizer & Dishwasher soap Ban
- Septic Tank Removal

Point Source Reductions

- Chemically Enhanced Primary Treatment
- BMPs and Optimization
- Technology Research, Selection and Installation
- CSO Removal and Integrated Planning

Avista's WQ Responsibility

- 401 Certification Implementation
- Water Quality Attainment Plan
- Lake Spokane Shoreline Implementation
- Research Phosphorus Reduction Strategies
- Monitoring
- Wetland Enhancement & Mitigation

WA NPDES PERMITS

Municipal NPDES Permit Schedule

DISCHARGER	FACTUAL REVIEW	PUBLIC COMMENT PERIOD	ANTICIPATED ISSUANCE
City of Spokane	June 10 th – June 25 th	June 30 th – August 15 th	September 2016
LLSWD	June 10 th – June 25 th	June 30 th – August 15 th	September 2016
Spokane County	July 2016	Sept/October 2016	November 2016



DO TMDL Compliance

- City of Spokane - NLT
 - Membrane Selection June 2016
 - Start Construction Fall 2016
 - I/O Mid 2019
- LLSWD – Phase II Upgrade
 - Membrane Procurement Complete
 - Started Construction June 2016
 - I/O March 2018

March 1, 2021



Toxics in NPDES Permits

- Continued SRRTTF Involvement
 - Includes Completion Comprehensive Plan by 12/16
- Focus on the next permit cycle on implementation
 - BMP Implementation Plan
 - Define toxics reductions activities
 - Continued source reduction
 - Influent/Effluent Characterization
 - Comprehensive Plan as a reference
- Measurable Progress Focus
 - Implementation activities
 - Measured reductions of toxics inputs
 - Environmental results



Industrial NPDES Permit Schedule

DISCHARGER	FACTUAL REVIEW	PUBLIC COMMENT PERIOD	ANTICIPATED ISSUANCE
Kaiser	June 10 th – June 25 th	June 30 th – August 15 th	September 2016
Inland Empire Paper	July	August – September	November 2016



DO TMDL Compliance

- Kaiser
 - Technology Selection (chemical or membrane) July 2016
 - Engineering Report January 2017
 - Operational January 2019
 - Meet Limits July 2021
- Inland Empire Paper
 - Engineering Report November 2016
 - Operational November 2018
 - Meet Limits November 2021





Current and Potential Tool Box Uses

Current Toolbox Items (approved/pending)

- Static Pollutant Equivalency
 - 2011 loading scenario, multiple dischargers
 - 2015 loading scenario Inland Empire Paper
- Total Phosphorus in intake water
 - Pollutant continuity between supply water and river
 - Once through non-contact cooling water
 - Credit towards meeting final water quality based effluent limit



Current Toolbox Items (approved/pending)

- Ortho-Phosphorus to total phosphorus ratio
 - Approved study plan for Inland Empire Paper



Potential Toolbox Items

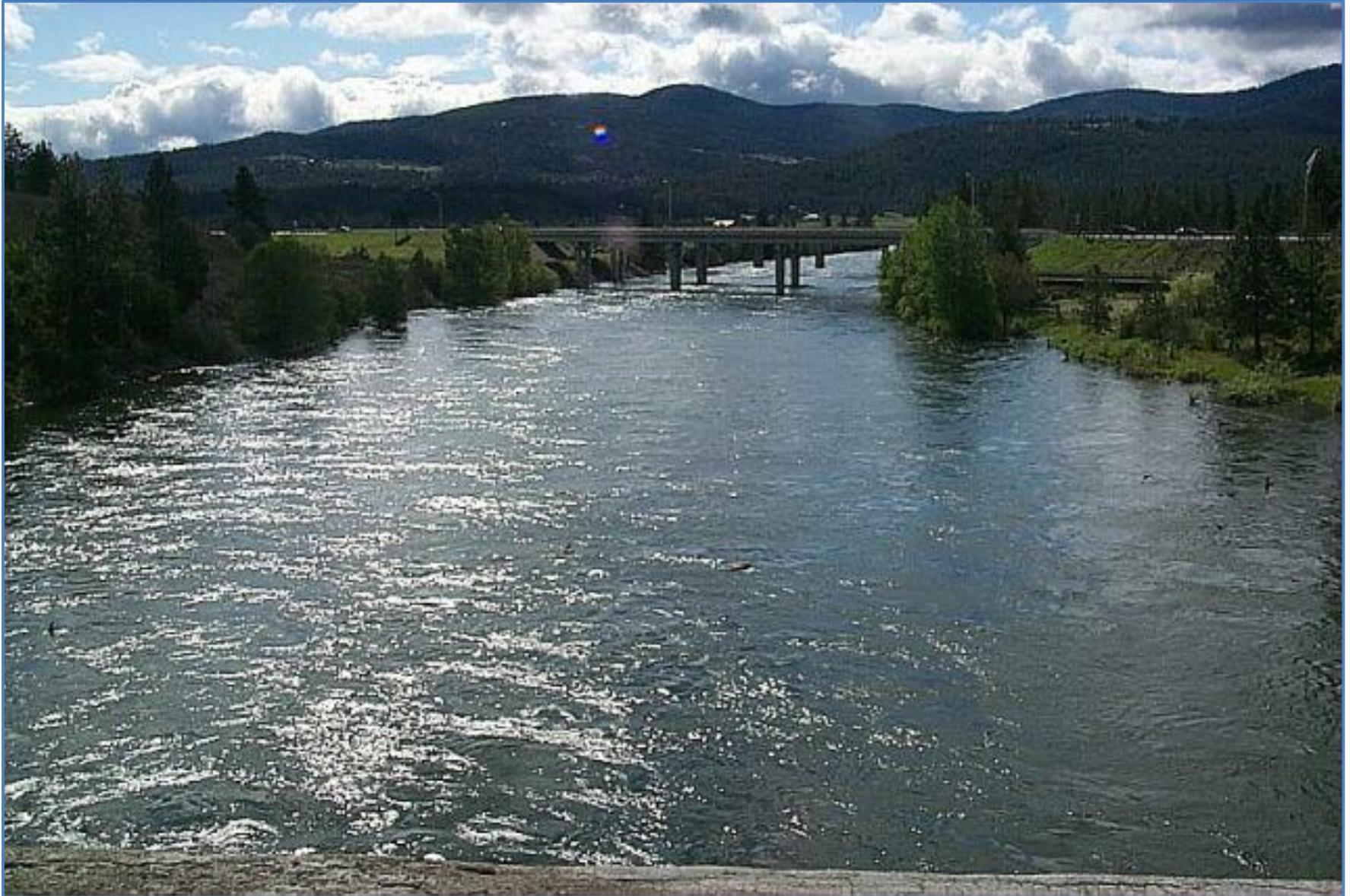
Approval Process

- Formal review steps with multiple agencies
- Requires formal definition
- Requires formal proposal
- Requires submittal of modeling and other data/technical information

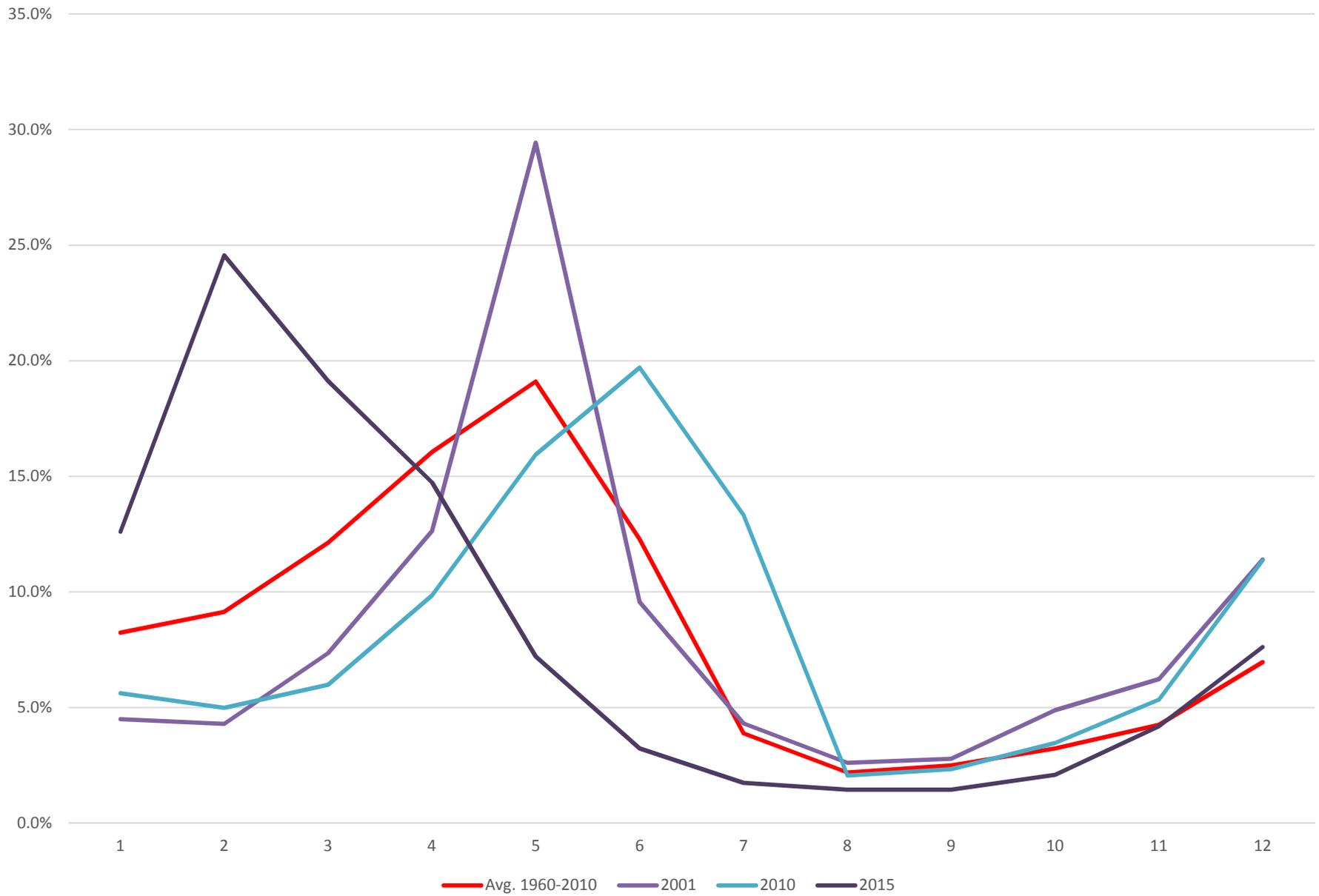


MONITORING

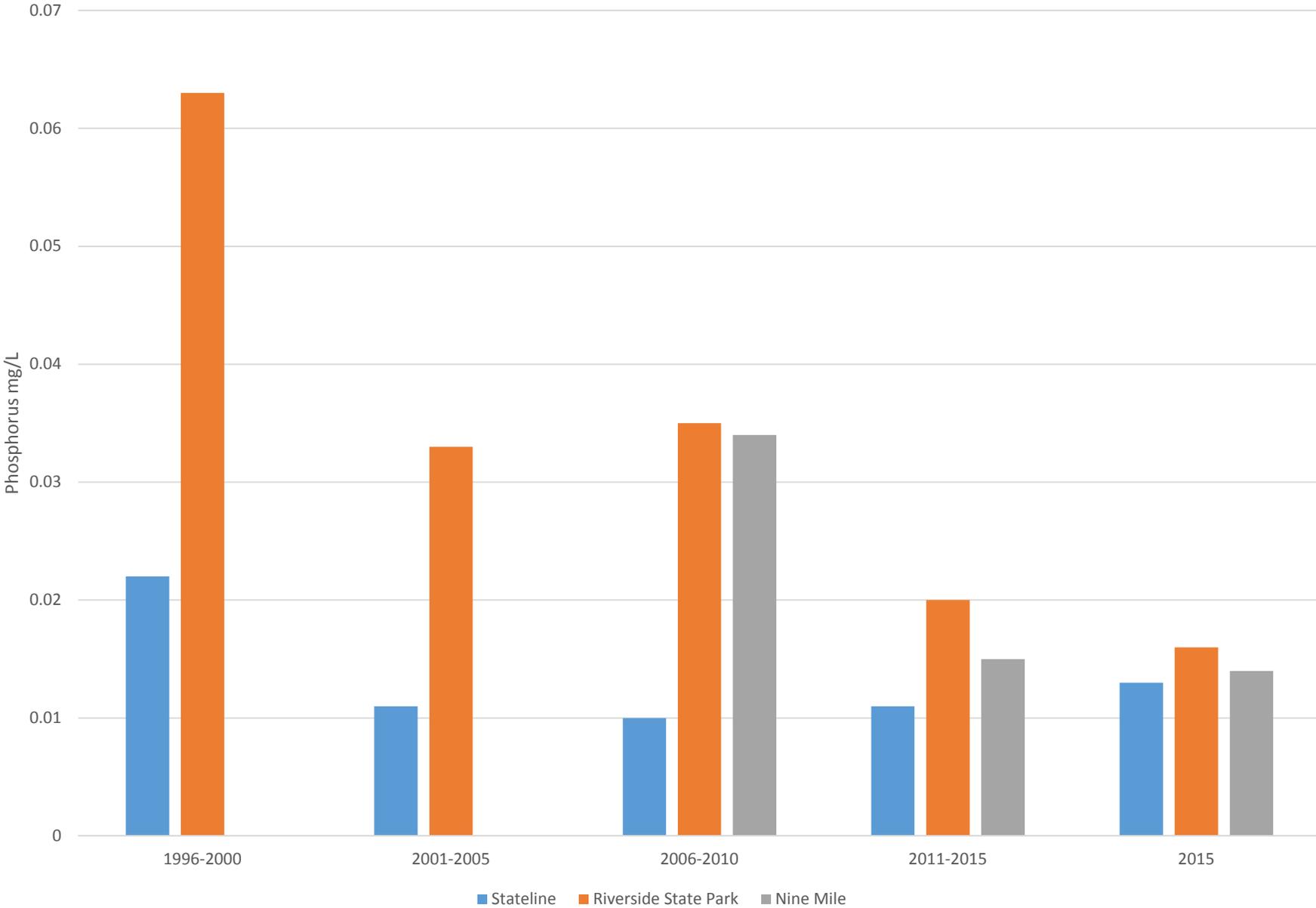
Spokane River Basin Monitoring



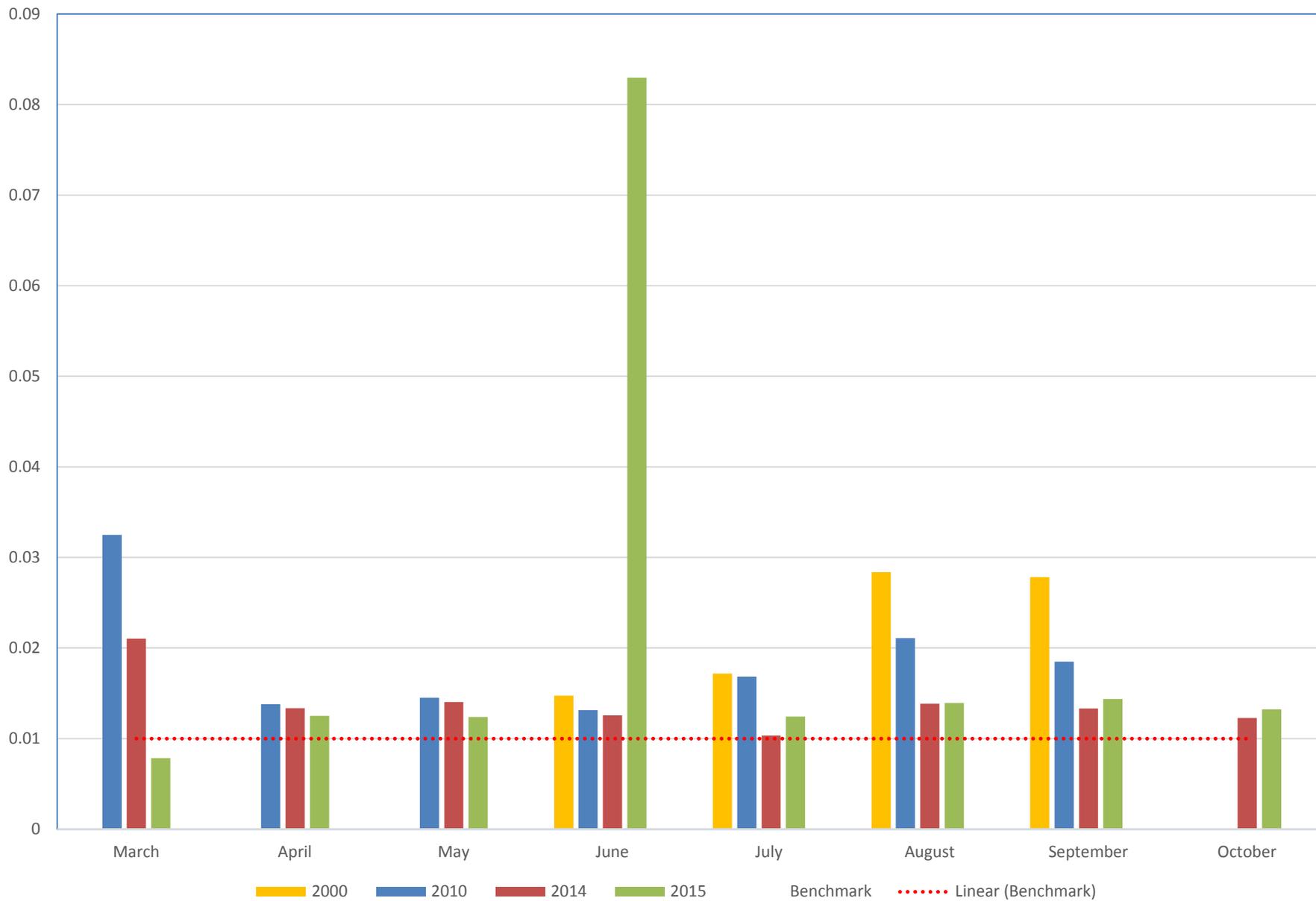
Spokane River Flow by Month



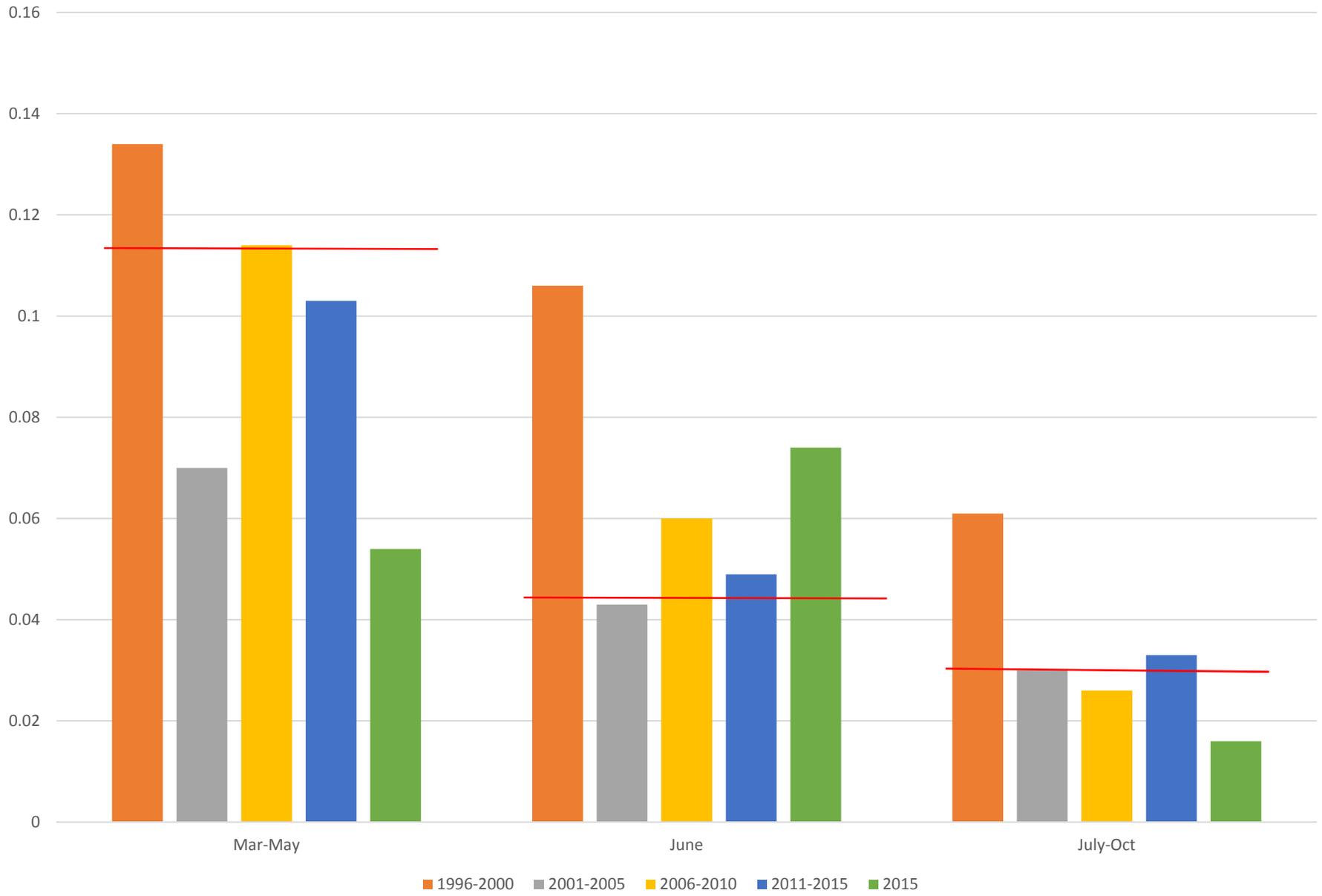
Spokane River Phosphorus



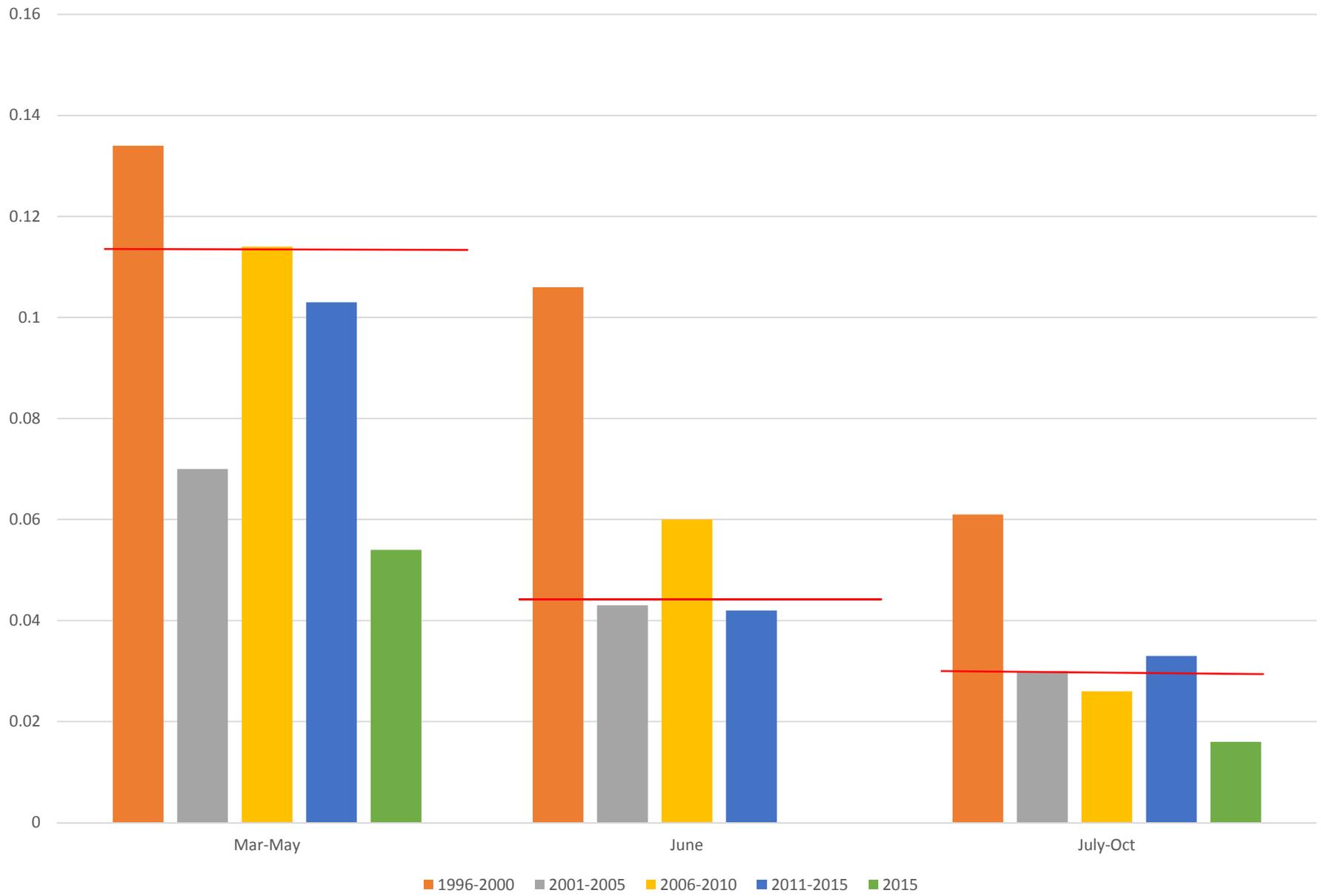
Riverine Assessment Point Volume Weighed Total Phosphorus



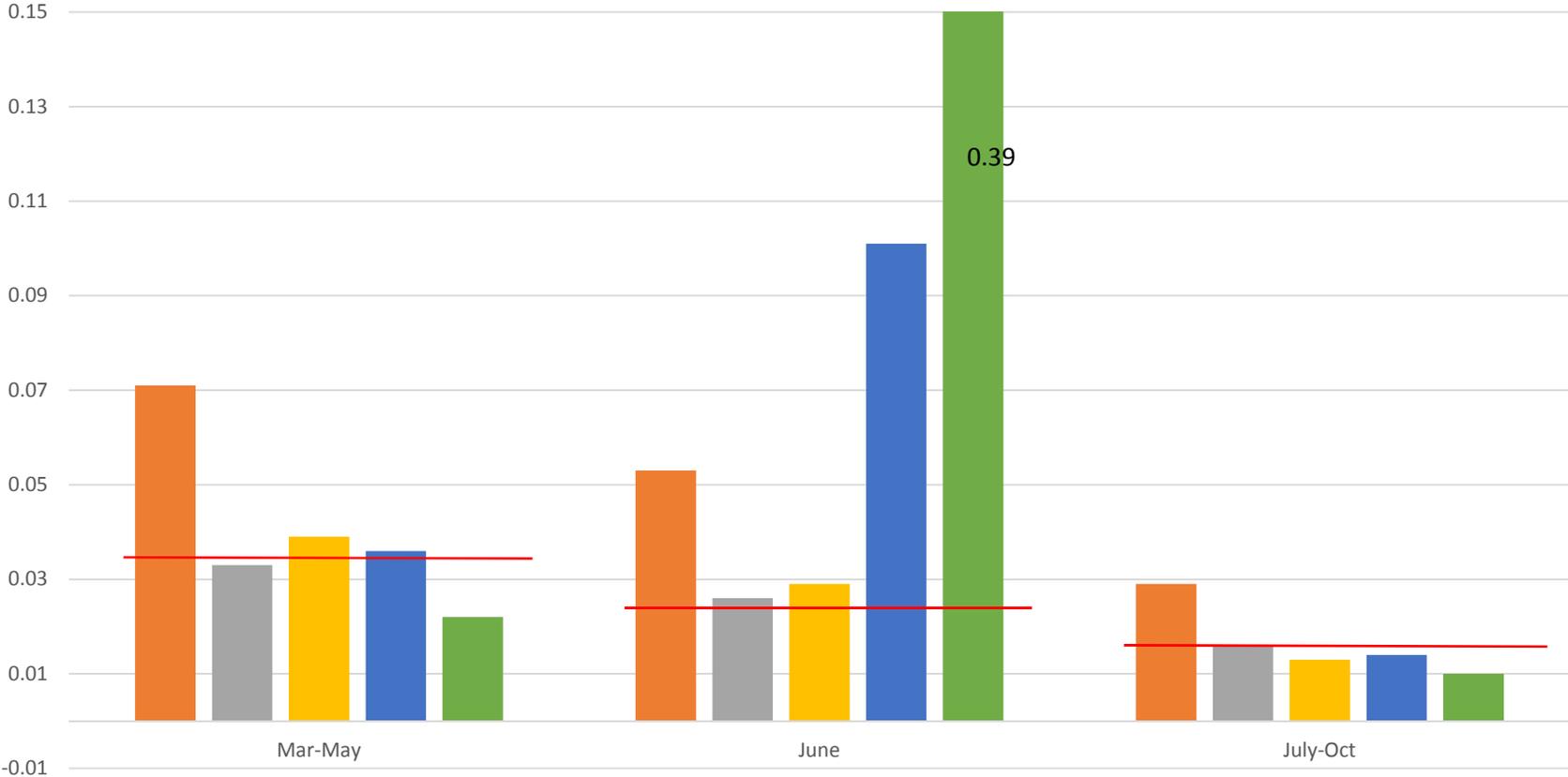
Hangman Creek Phosphorus



Hangman Creek Phosphorus

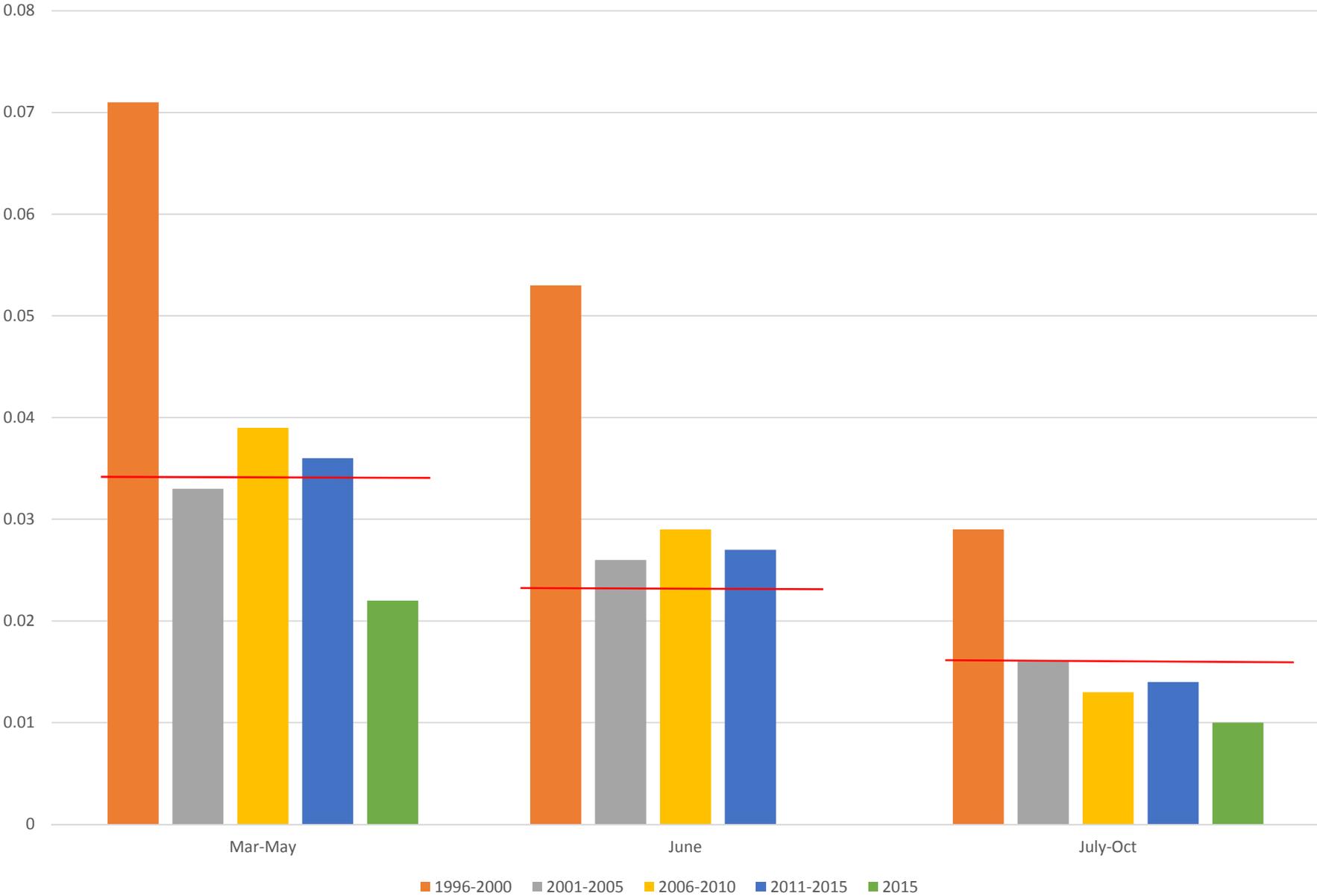


Little Spokane River Phosphorus

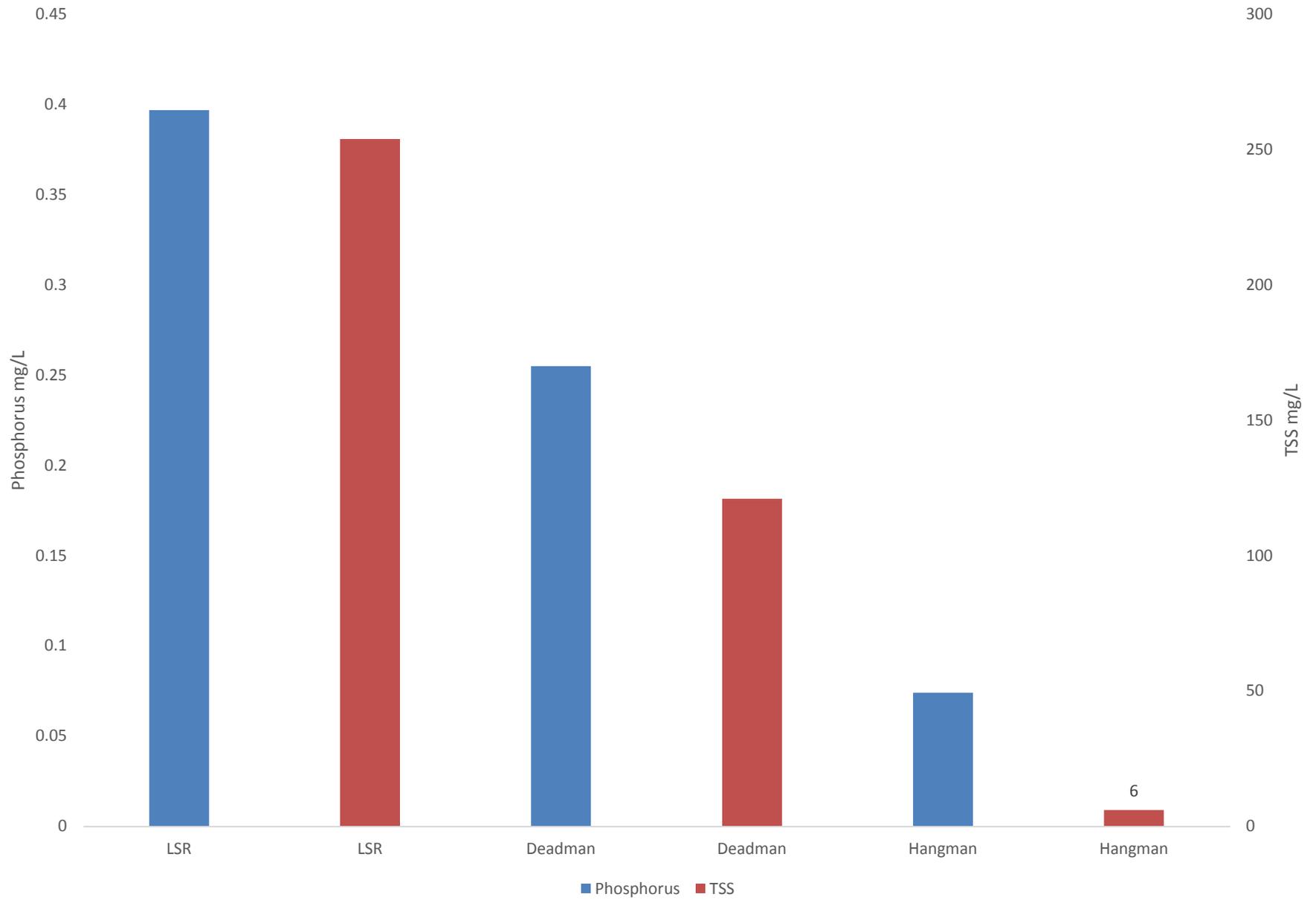


1996-2000 2001-2005 2006-2010 2011-2015 2015

Little Spokane River Phosphorus



June Tributary samples

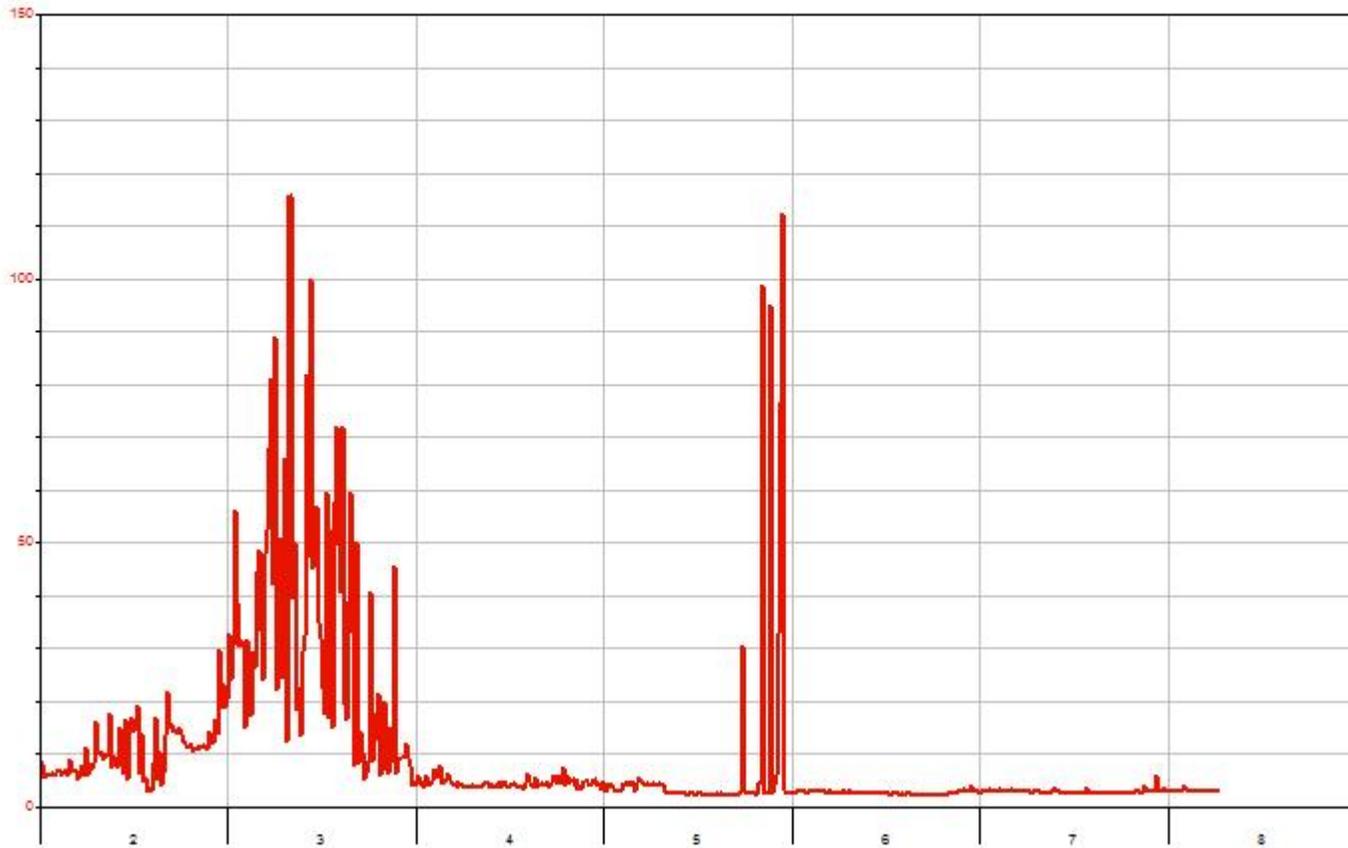


Washington State Dept. of Ecology

HYPLOT V133 Output 06/08/2016

Period 7 Day 06/02/2016 to 06/09/2016 2016

— 01N080	Bertrand Cr nr mouth	810.00	Turbidity (Median)		AT
○ 01N080	Bertrand Cr nr mouth	844.10	SSC	Grab sample lab result	QC
○ 01N080	Bertrand Cr nr mouth	2030.10	Turbidity (NTU)	Grab sample lab result	QC





Questions and Discussion

Extra

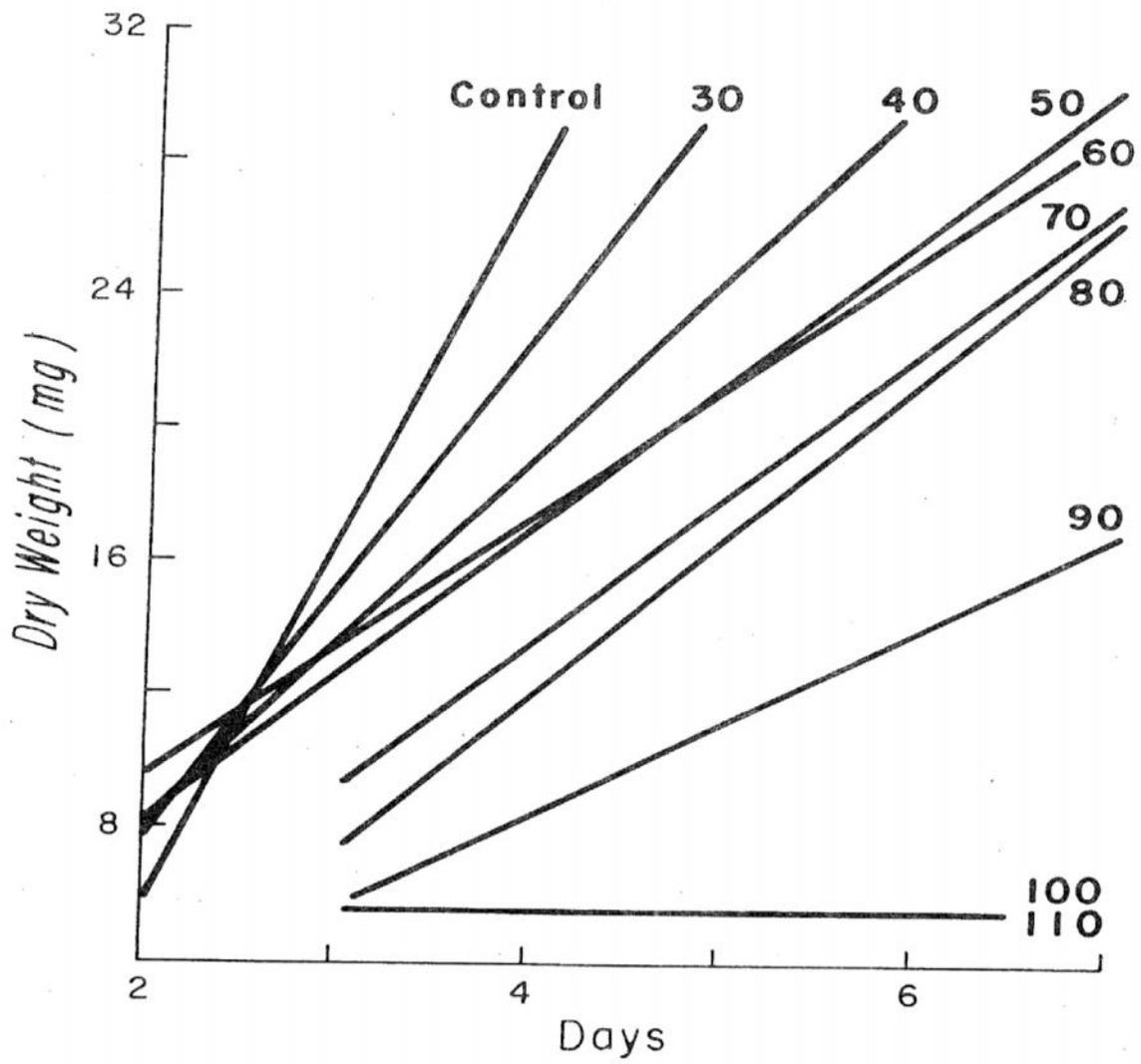
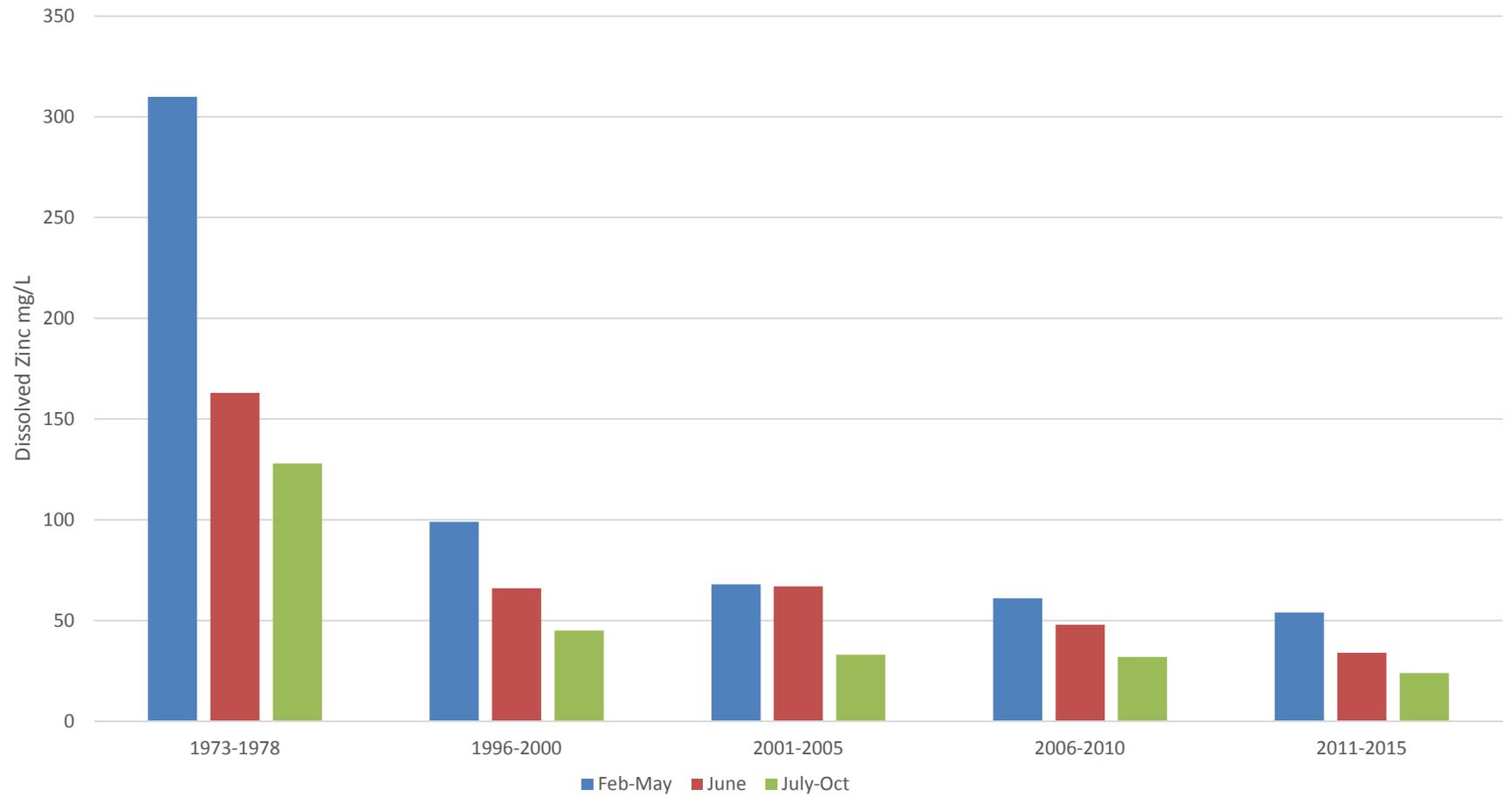


Figure 36. Growth Rates of *Selenastrum capricornutum* Treated With Zinc ($\mu\text{g/l}$). (Bartlett et al., 1973.)

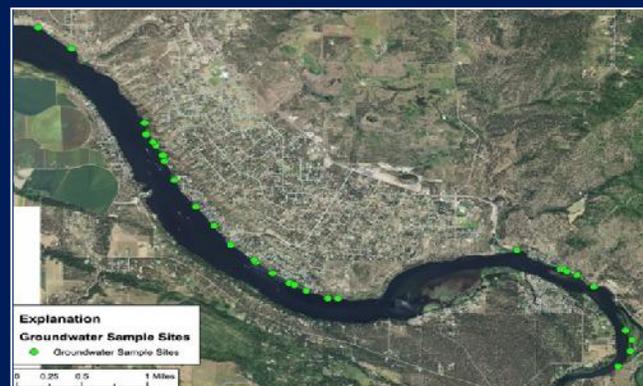
Spokane River @ Stateline





Lake Spokane Groundwater: Findings & Next Steps

Lake Spokane Groundwater Nutrient Study Phase 1 & 2

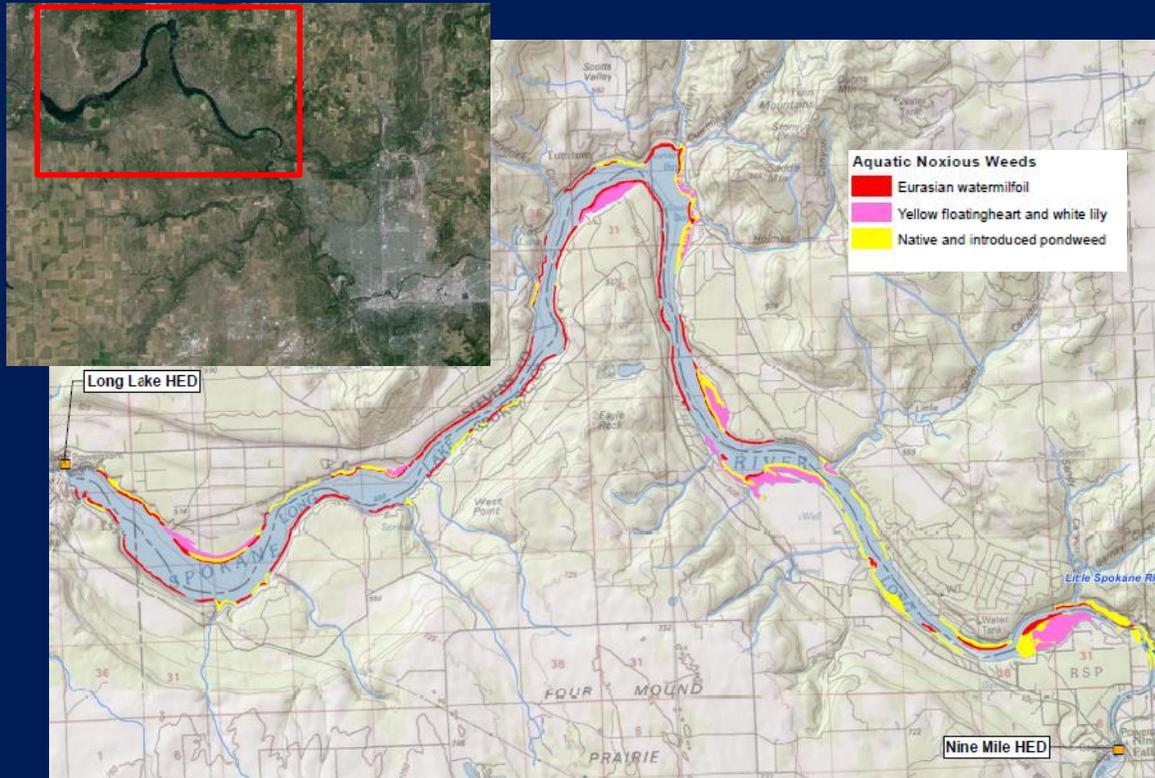


Introduction

Are significant levels of nutrients from groundwater and on-site septic systems (OSS) reaching Lake Spokane?

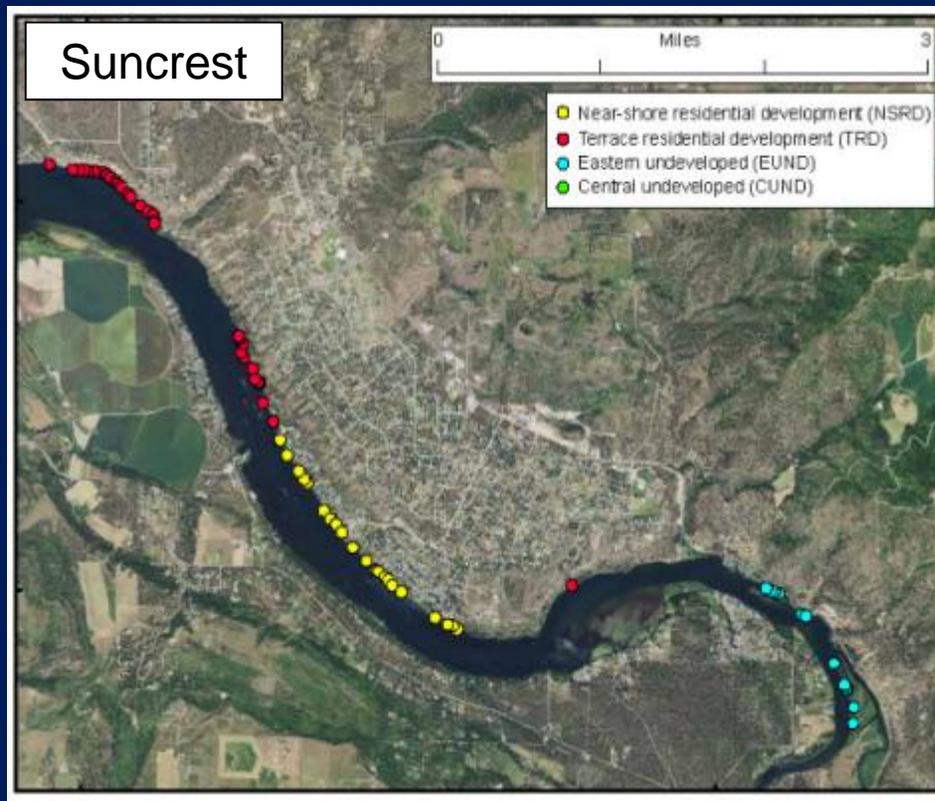
- Answering this question in 2 phases:
 - Phase 1 – completed and report published
 - Survey aquatic plants for ^{15}N analysis
 - Preliminary sampling of shallow groundwater chemistry in Spring 2015
 - Phase 2 – beginning July 2016, expected completion in late 2018
 - Expanded shallow groundwater chemistry sampling
 - Measure groundwater to estimate nutrient loads

Study area: Lake Spokane



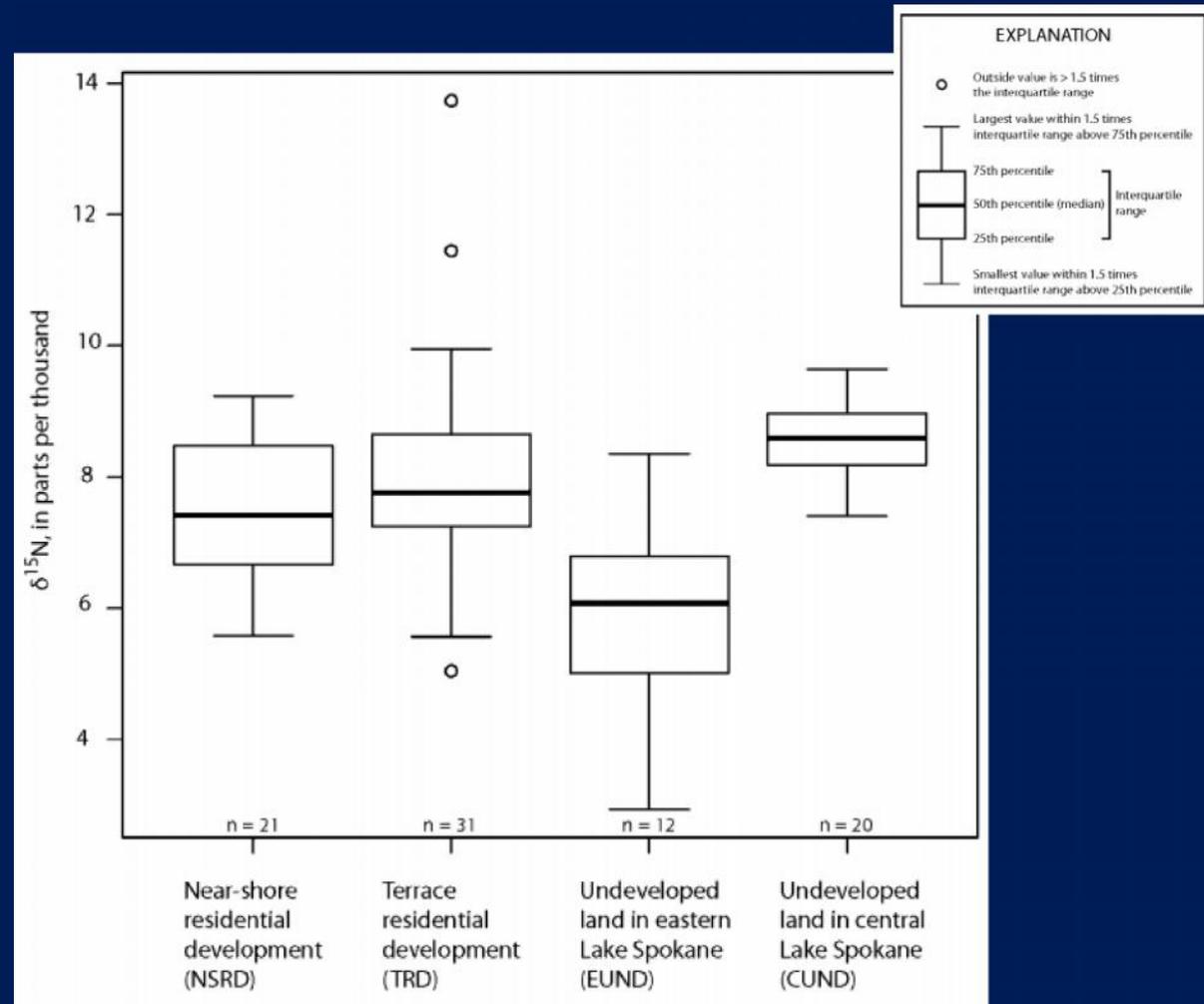
From: Avista, 2012 FERC

Locations of aquatic vegetation samples analyzed for ^{15}N



Results: ^{15}N in aquatic vegetation

- ^{15}N in undeveloped area near Nine Mile Falls (EUND) was significantly less than other land use groups

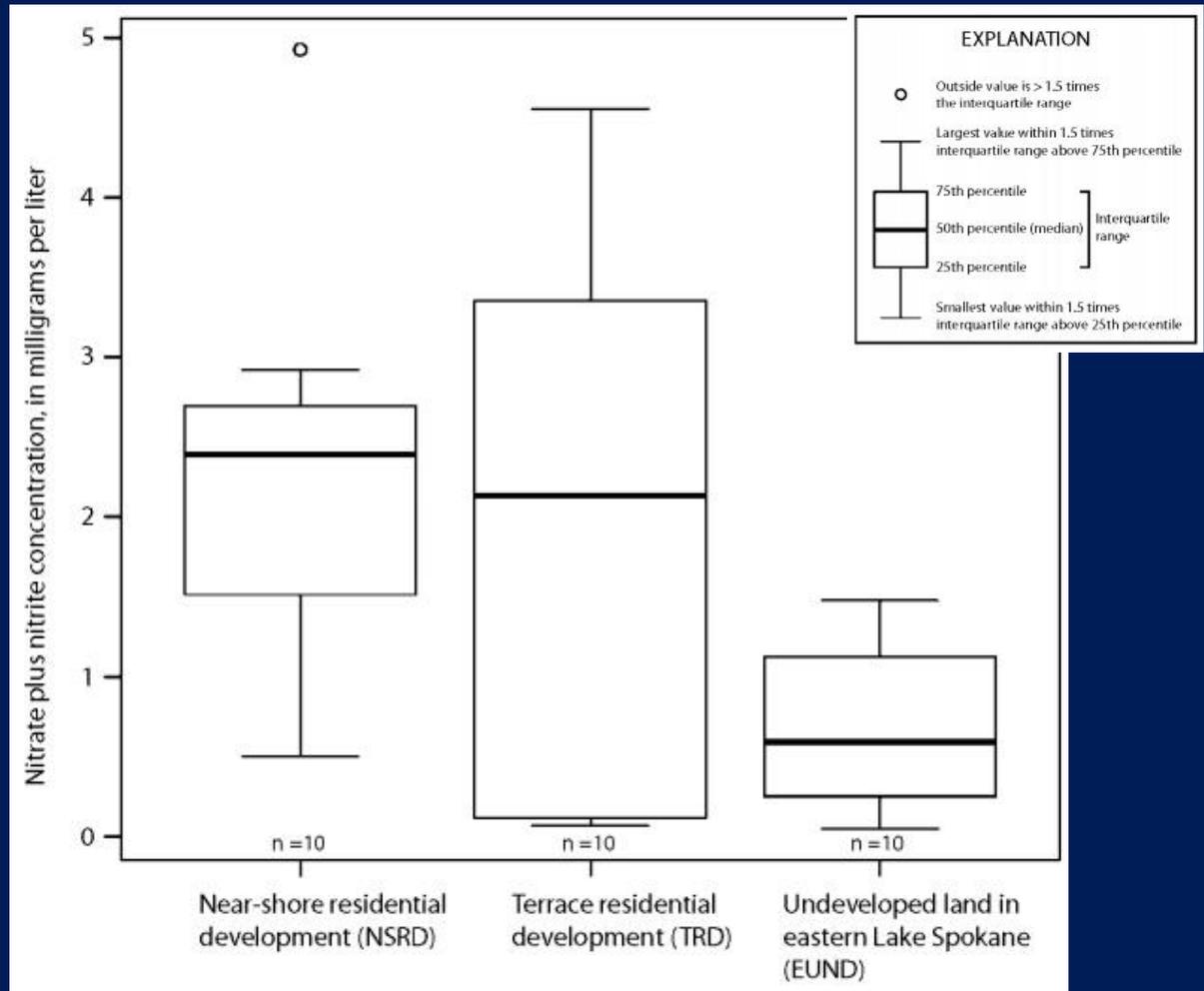


Sampling of Shallow Groundwater



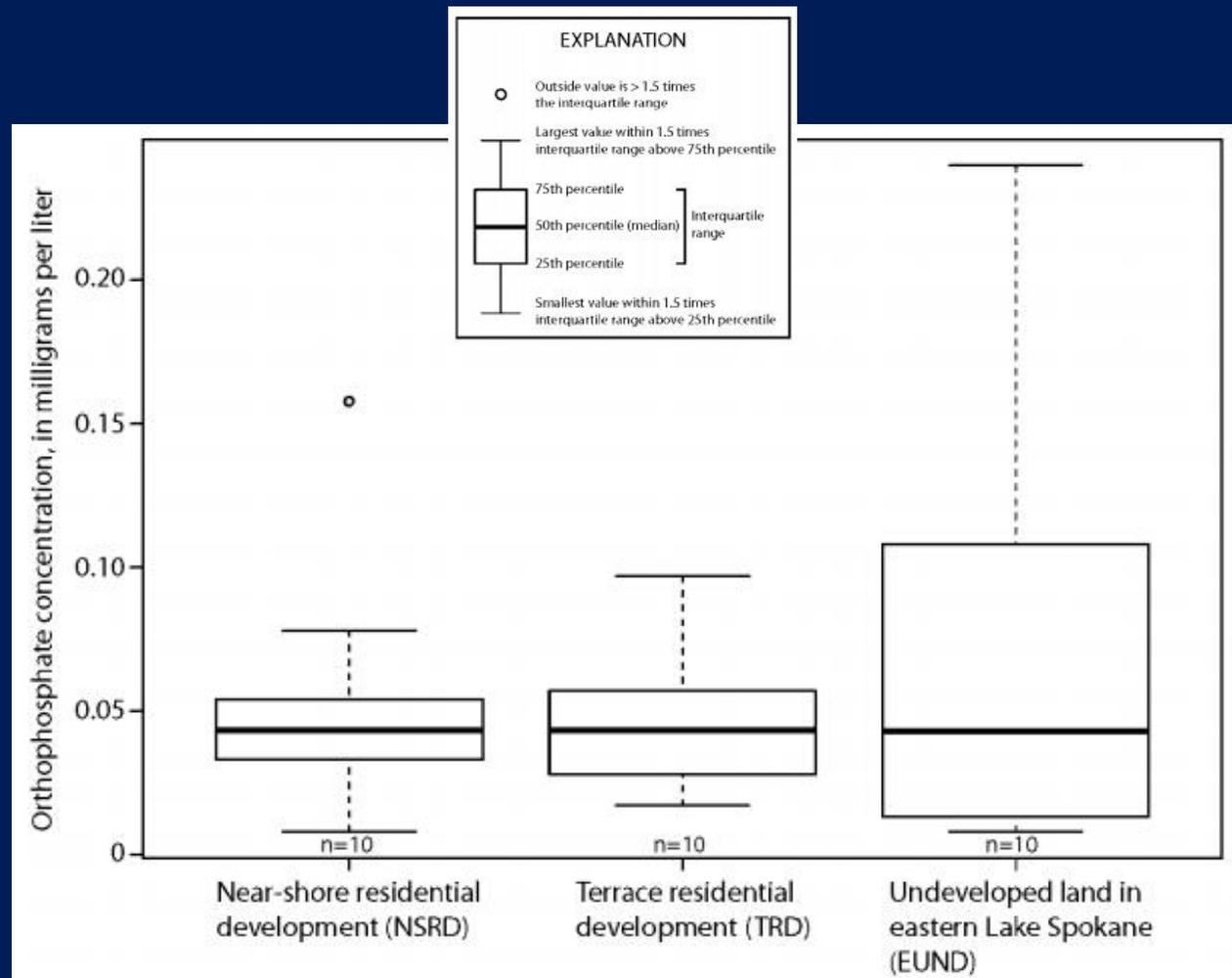
Results: Nitrate plus nitrite in groundwater

- Undeveloped (EUND) < Nearshore (NSRD) p-value <0.001
- Other populations were not statistically different from each other



Results: Orthophosphate in groundwater

- No statistical difference between landcovers



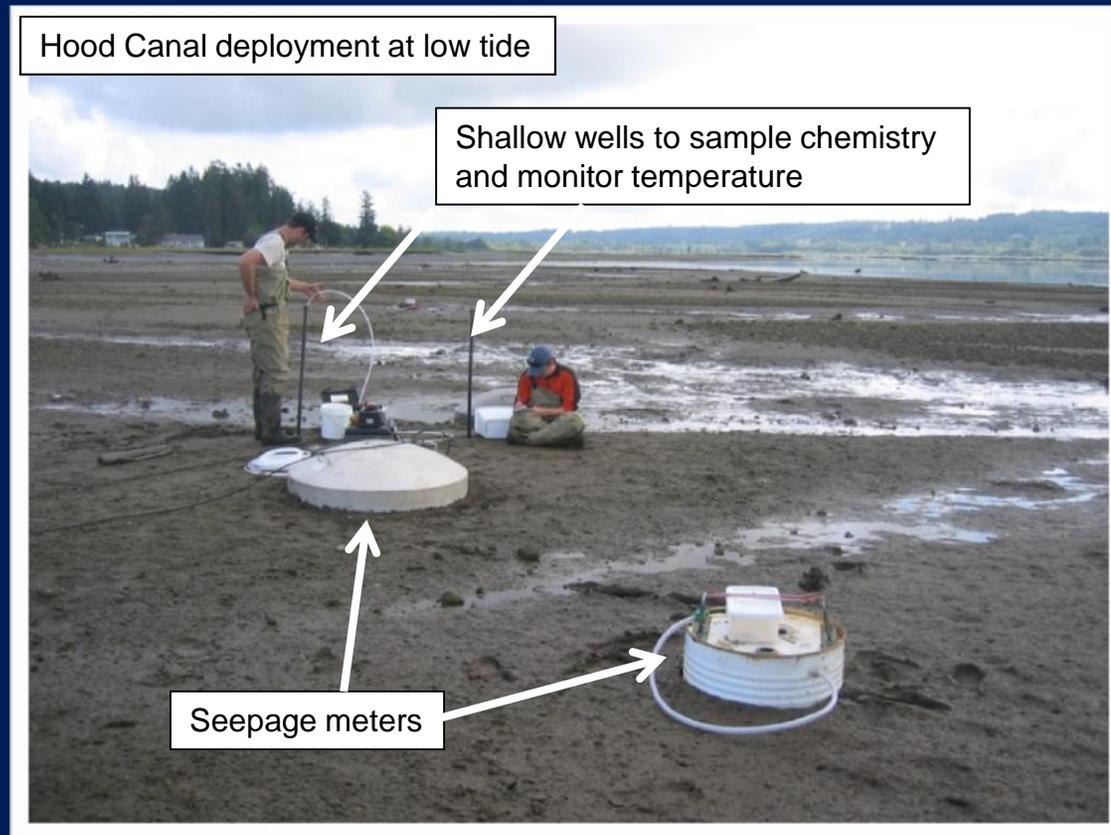
Phase 1 Summary

- Lower ^{15}N at undeveloped area near Nine Mile Falls selected as undeveloped land for subsequent GW sampling
- Nitrogen: GW samples downgradient from near-shore residential development were elevated compared to undeveloped land
- Phosphorus: GW samples at undeveloped land were not statistically different from samples downgradient from the two developed areas
- Seasonal variation in nutrient concentrations and nutrient loads from GW remain unquantified

Phase 2 Approach

- Focus on a range of upgradient residential development similar to Phase 1
- Sample shallow groundwater for nutrients year-round for 2 years to look at seasonal changes
- Estimate groundwater discharge to calculate nutrient load using multiple field methods
- Stevens County CD to collect groundwater samples from PUD's drinking water wells

Seepage meter measurements



Publication and Project Website

- Gendaszek, A.S., Cox, S.E., and Spanjer, A.R., 2016, Preliminary characterization of nitrogen and phosphorus in groundwater discharging to Lake Spokane, northeastern Washington, using stable nitrogen isotopes: U.S. Geological Survey Open-File Report 2016-1029, 22 p., <http://dx.doi.org/10.3133/ofr20161029>
- <http://wa.water.usgs.gov/projects/lakespokane/>





Literature Search & Project Request Updates

FY 2016 EAP Proposals



Coulee Creek



Deep/Coulee Creek
Watershed



Little Spokane River



Literature Review



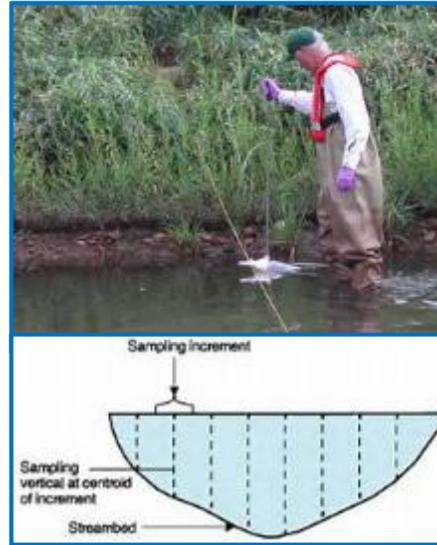
FY 2017 EAP Proposals



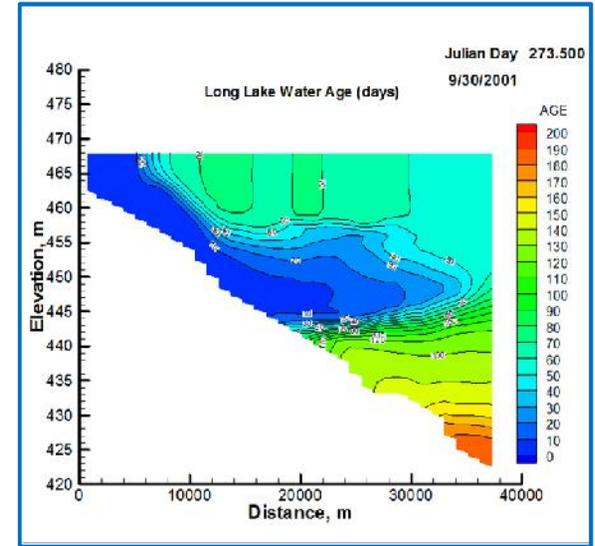
Nine Mile Dam



Sediment Study



Sediment Loading Assessment

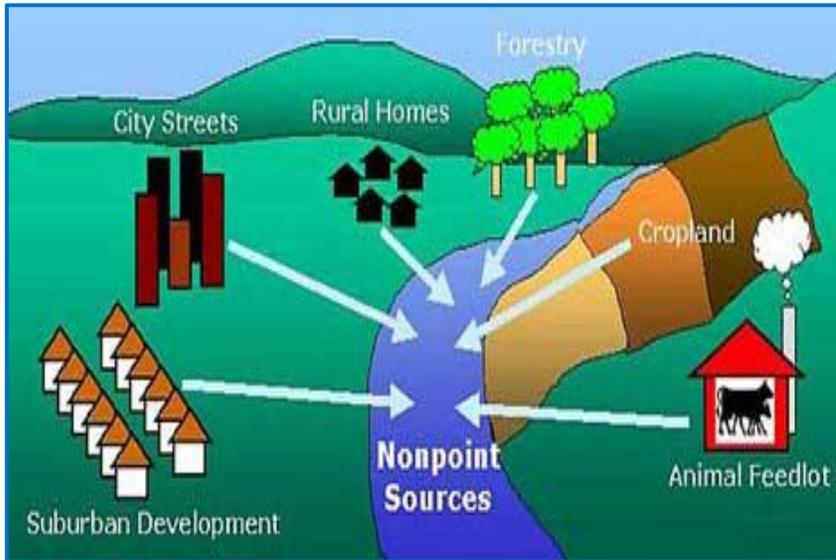


Modeling & Technical Support





Workgroup Updates



Nonpoint Source Workgroup



Monitoring Workgroup





Questions and Discussion

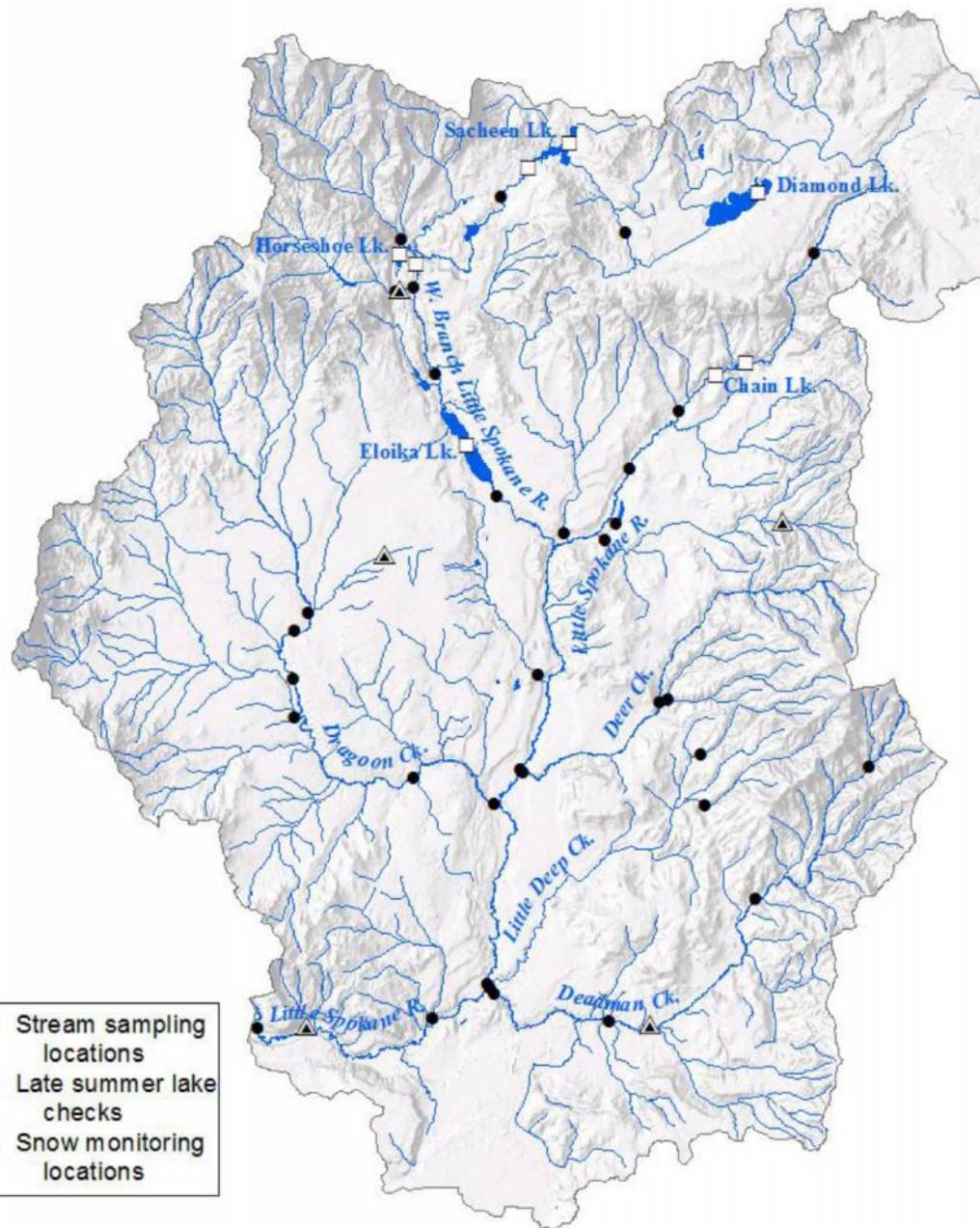
Tributary TMDLs

Status of TMDL development on Little Spokane River and
Hangman Creek

Spokane DO TMDL Annual Meeting/June 16, 2016

Little Spokane River

- Developing TMDL for dissolved oxygen and pH listings (22 listings)
- Data collection in 2010
- Additional data collection Winter 2015 to Spring 2016
 - Continuous stream flow
 - Channel measurements
 - Diel dissolved oxygen and pH data throughout watershed
 - Suite of nutrients
 - Limited lake sampling to understand nutrient sink/source relationship



Little Spokane River

- Currently reviewing and verifying data (QC)
- Entering data into Environmental Information Management database (EIM)
- QUAL2Kw development and calibration
- Mass-balance loading assessment of phosphorus throughout watershed
 - Visually show which tributaries and reaches contribute the most phosphorus
 - Use to partition allocation at the mouth throughout the watershed
- Time of travel – show relative time it takes for water at various locations to reach the mouth (example: West Branch Little Spokane has significant nutrient sinks due to lake-river-lake system)

Schedule

- Goal is to have significant technical work completed Fall/Winter 2016
- Draft technical report and implementation plan in early 2017
- Implementation plan will also address parameters covered by the previous TMDL (2012).
 - Bacteria
 - Temperature
 - Turbidity

Hangman Creek DO & pH

- Preliminary data collection Spring 2016
 - Method comparison to determine the need to use integrated depth sampling vs. grab sampling.
 - Collection via canoe towing hydrolab in PVC protection
 - Channel depth collection to support model development. Significantly improves model calibration.
 - Conductivity data to determine areas of groundwater influence.
- Initiating full scale data collection needed for dissolved oxygen and pH TMDL development in 2017.
- Data collection will continue into 2018 to capture early runoff period.



Hangman Watershed Implementation

- Resurrected the “Hangman Bi-State group”
- Group decided to apply for funding from NRCS to focus agricultural and forestry best management practices in the watershed
- Expanded the partnership to cover the entire “Greater Spokane River Watershed”
- \$7.7 million awarded
- More details to come in Walt’s presentation



Open Discussion,
Feedback, &
Topics for Quarterly Meeting

