

An aerial photograph of Spokane, Washington, showing the Spokane River and Lake Spokane. The river flows through the city, with several bridges crossing it. The lake is a large body of water in the center. The city buildings and streets are visible in the background. The text is overlaid on the image in a blue, serif font.

Spokane River / Lake Spokane Water Quality Improvement Plan for Dissolved Oxygen

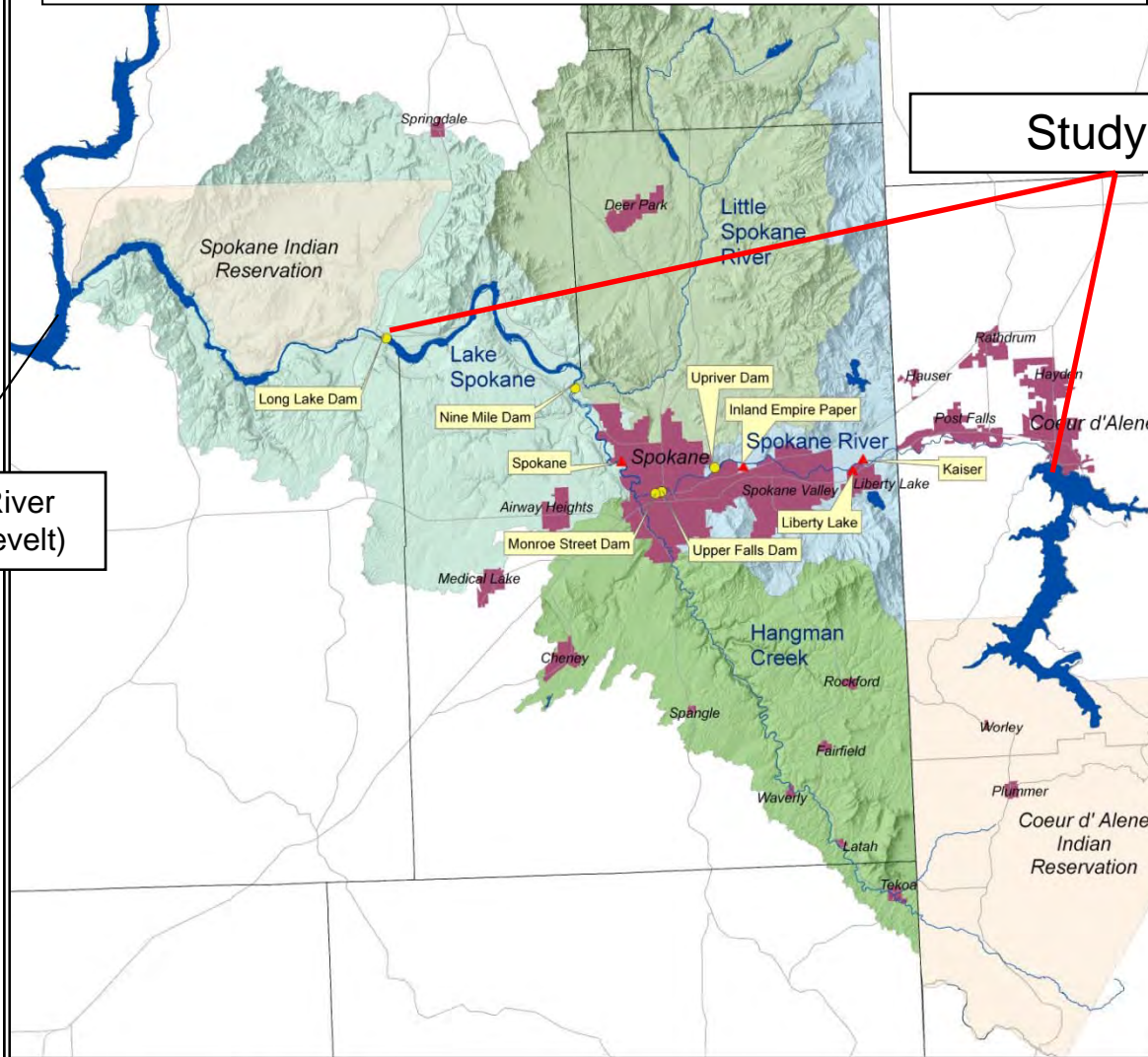
David Moore
Washington State Department of Ecology
Water Quality Program



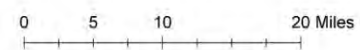
Spokane River Watershed

Study Area

Columbia River
(Lake Roosevelt)



- Legend**
- ▲ Dischargers
 - Avista's dams
 - Cities
 - Reservations
 - Hangman Watershed
 - Little Spokane Watershed
 - Lower Spokane Watershed
 - Middle Spokane Watershed









The Seattle Times

Tuesday, September 29, 2009 a

Ecology: avoid Lake Spokane toxic algae blooms

The Washington Ecology Department is warning residents near Lake Spokane to keep children and animals away from the water because of blooms of toxic blue-green algae.

The Associated Press

SPOKANE, Wash. —

The Washington Ecology Department is warning residents near Lake Spokane to keep children and animals away from the water because of blooms of toxic blue-green algae.

DO TMDL

- Low Dissolved Oxygen – Below state water quality standards. Low levels harm the fish, other aquatic life..
- Nutrients – Excess carbon, ammonia, and especially phosphorus lead to algae blooms and dissolved oxygen shortages.
- Dams can create conditions to amplify these problems.

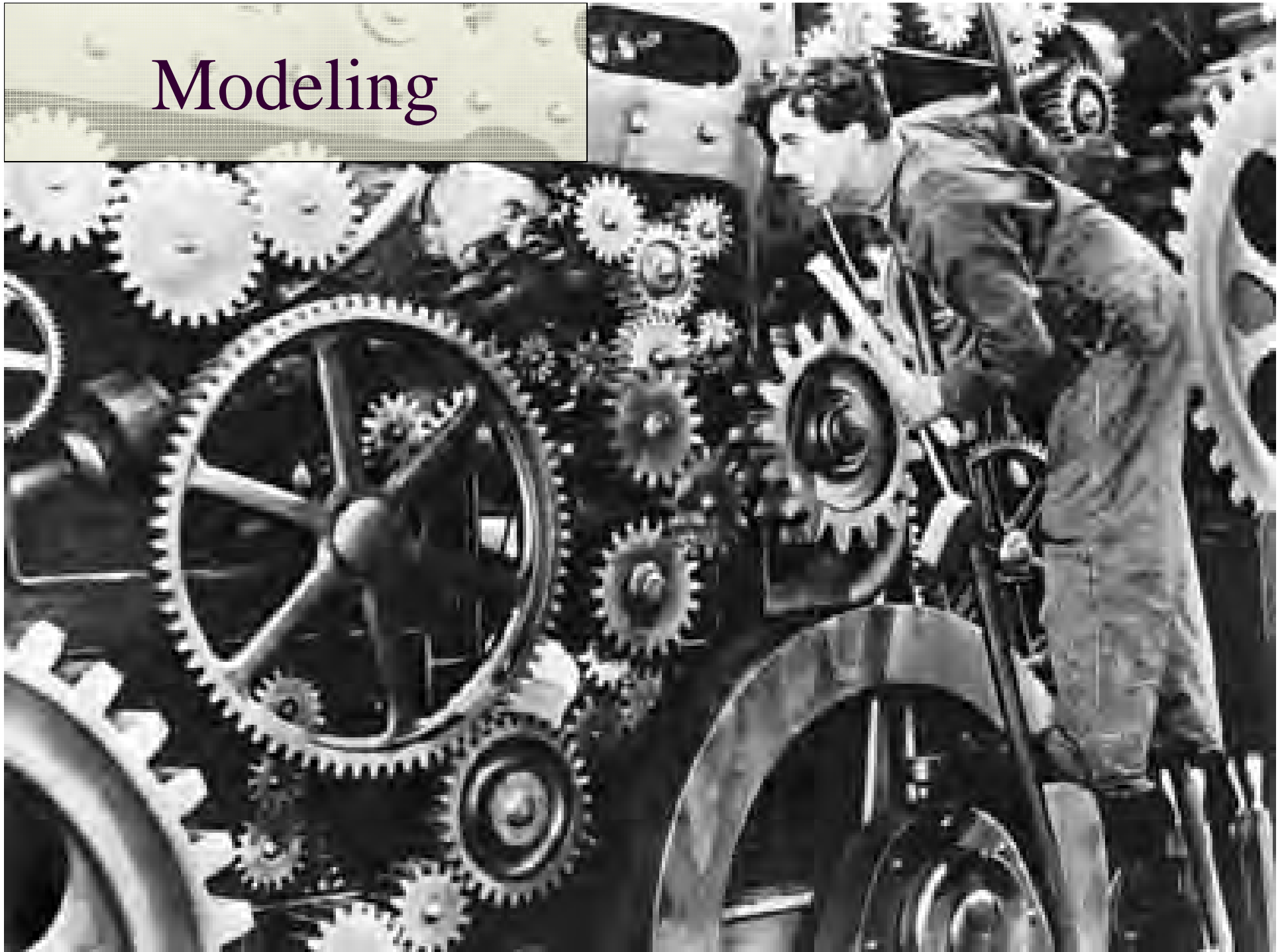
Lake Spokane 2001: Photo by Ecology

Nutrient Sources

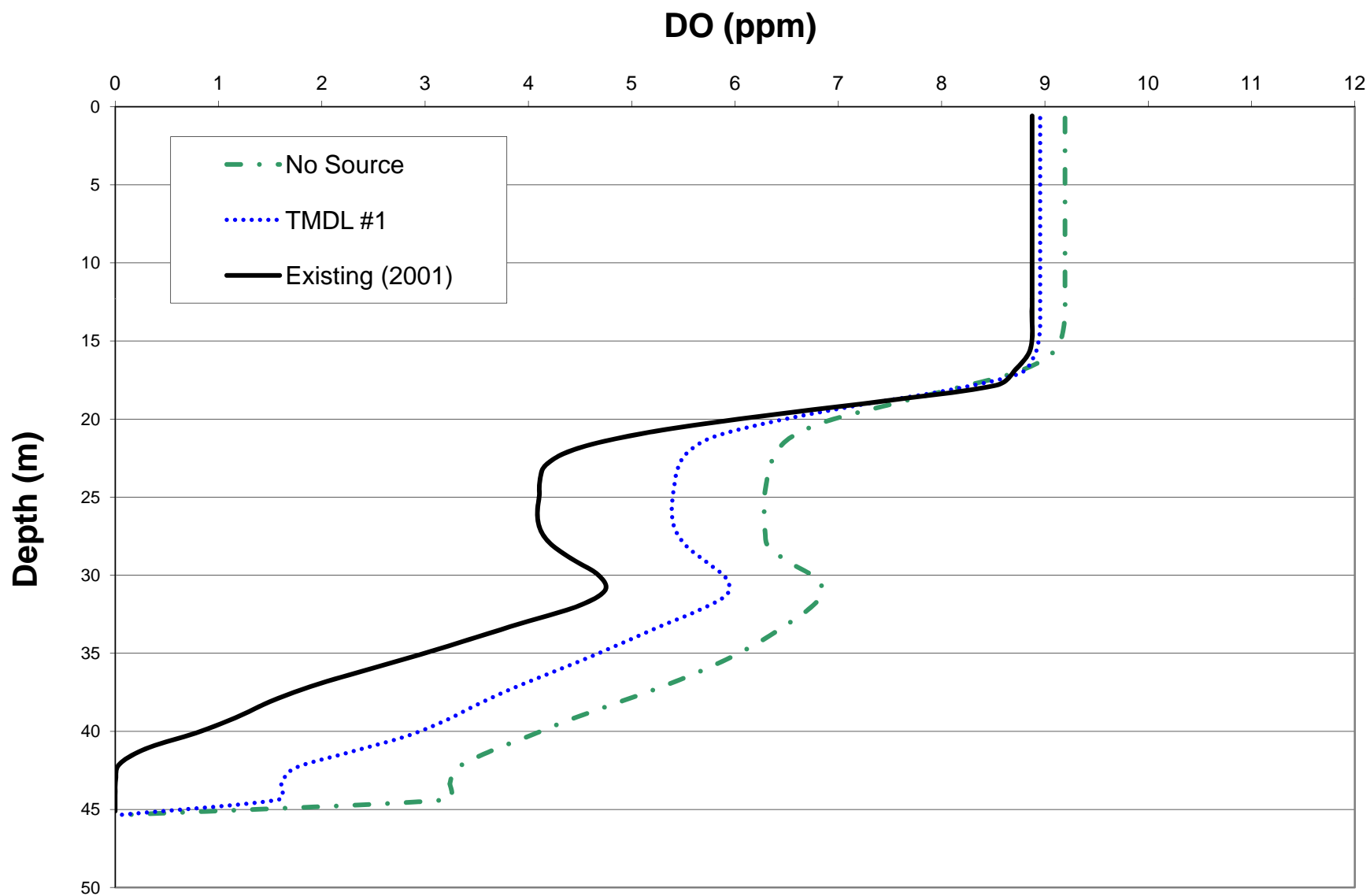
- Permitted Municipal and Industrial Wastewater Treatment Plants (aka “Point Sources,” “Dischargers”)
 - City of Spokane
 - Liberty Lake Sewer and Water District
 - Spokane County
 - Inland Empire Paper Co.
 - Kaiser Aluminum
- Nonpoint sources
 - Septic systems
 - Stormwater runoff
 - Agricultural runoff / erosion
- Naturally occurring
 - Spokane / Rathdrum Aquifer
 - Tributary contributions



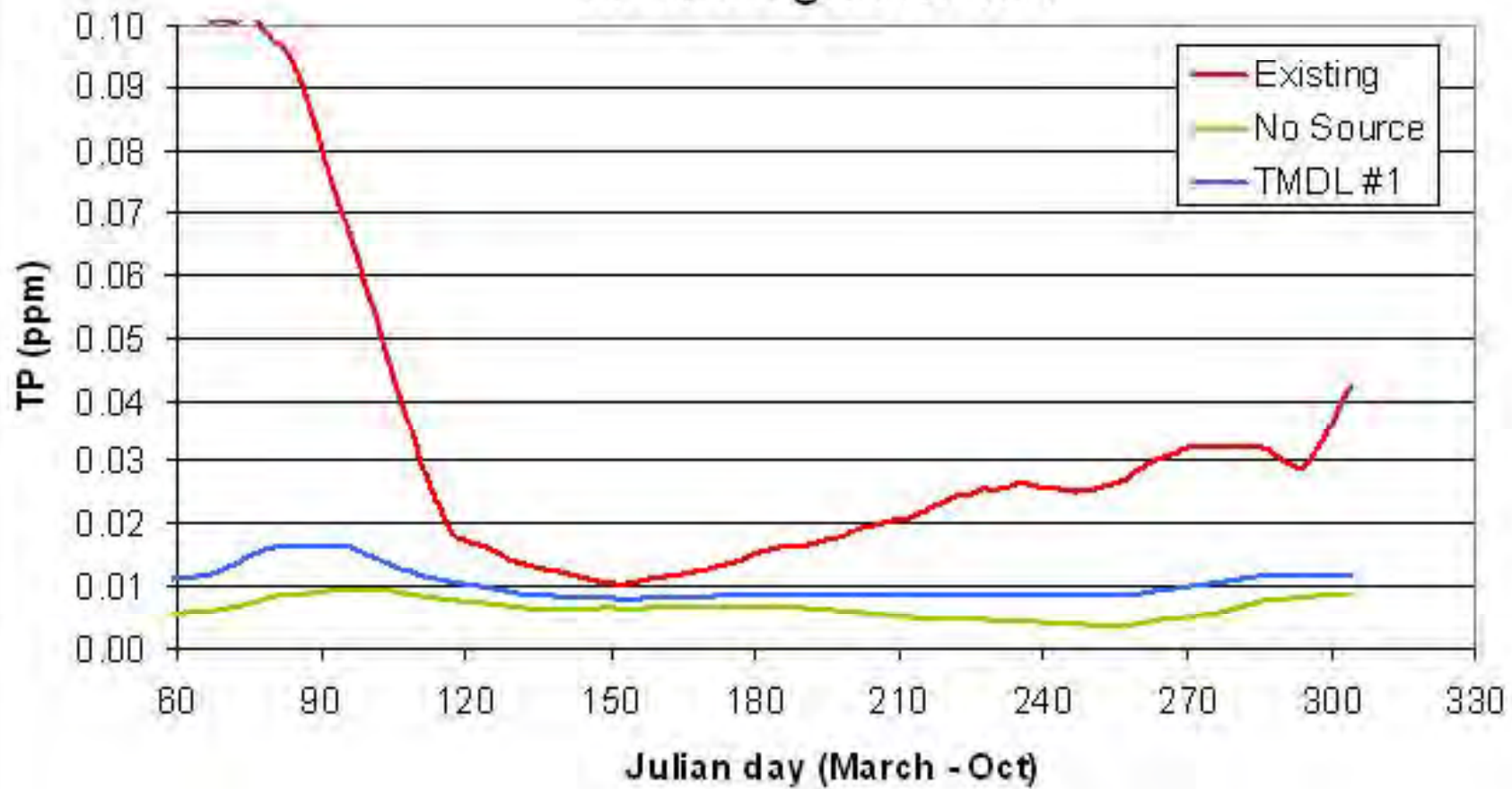
Modeling



Dissolved Oxygen at Long Lake Dam Oct 22

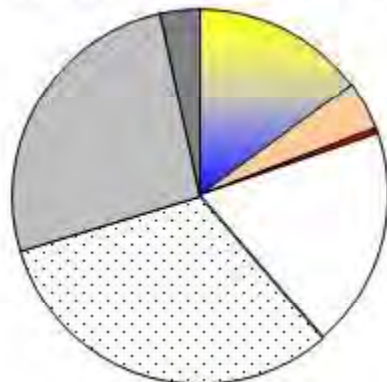
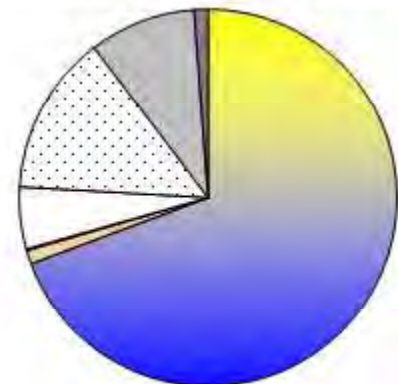


TMDL Scenario #1: TP at Segment 154

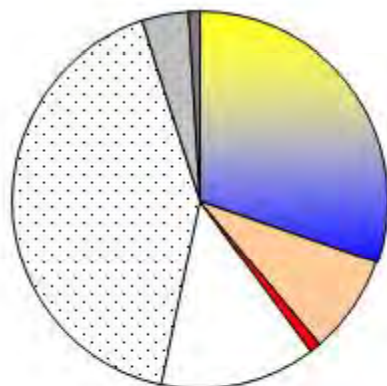
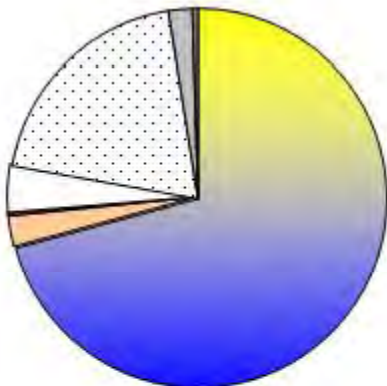


2001 Anthropogenic Loadings

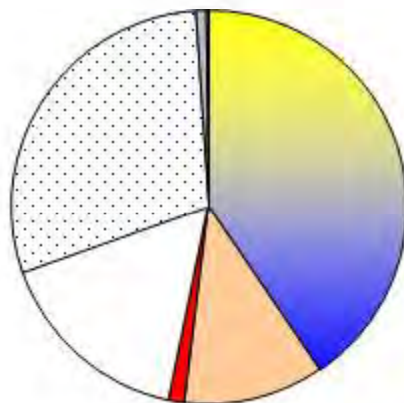
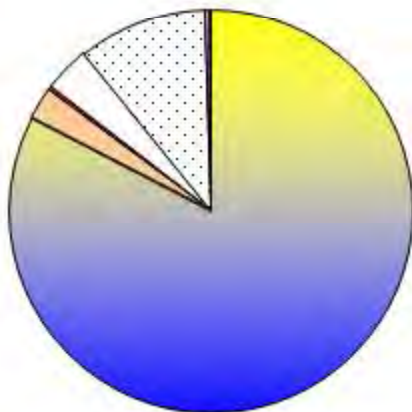
TMDL Scenario #1 Loadings



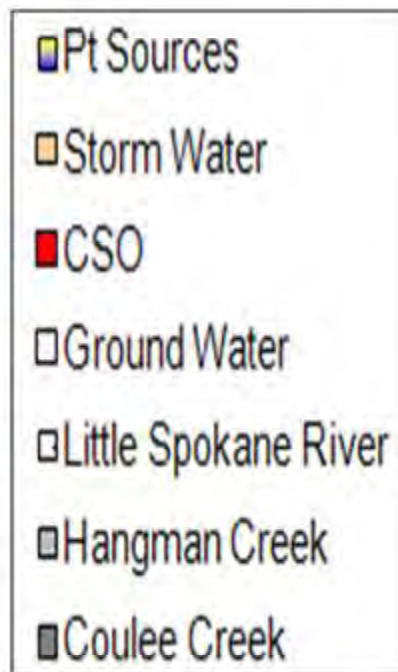
March - May



June



July - October



Point Sources Requirements

■ Discharger permits

➤ Reduce phosphorus by ~90% by 2020 (wasteload allocations)

■ Current P in discharge at one point source:

- ~0.45 mg/L P (June – October average)

■ TMDL:

- 0.036 mg/L P (March – October)

1. **Advanced wastewater treatment**

2. **Offset tools**

Additional [potential] tools for compliance

- Alternate season limits
- Ortho phosphate
- Bioavailable phosphorus
- Bubble permit
- NPS Trading – stormwater best bet
- Nutrient equivalency

Modeling / Validation necessary for all



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Nonpoint Source Reduction Needs and Dam Responsibility

- Reduce tributary loading by 40 – 50%; May to October (load allocations)
 - TMDLs for Hangman / Little Spokane River
 - Nutrient trading? – Long shot
- Reduce stormwater loading – permits
- Reduce septic systems
- Conserve / reuse water and ban phosphates
- Avista water quality attainment plan
 - Focus on nonpoint sources in Lake Spokane

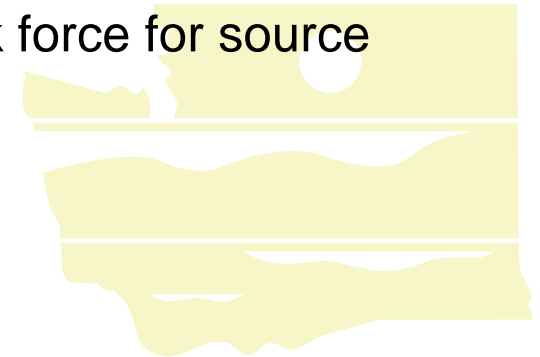
Timeline

- TMDL effort initiated 1998
- TMDL approved May 2010
- Advisory Committee Meetings 2010-2011
- Permits issued Spring / Summer 2011
- Underway:
 - Monitoring
 - Regional Nonpoint Source Study
 - Selection of treatment technology



What's next?

- DO TMDL – Implementation accounting over 10 years
- Toxics –
 - Metals – lead, zinc, cadmium
 - Mining legacy, EPA superfund
 - Flame retardants (PBDEs)
 - Very high in Spokane River fish, no standard
 - PCBs –
 - permit conditions for performance limit, task force for source control
 - Dioxins / furans



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