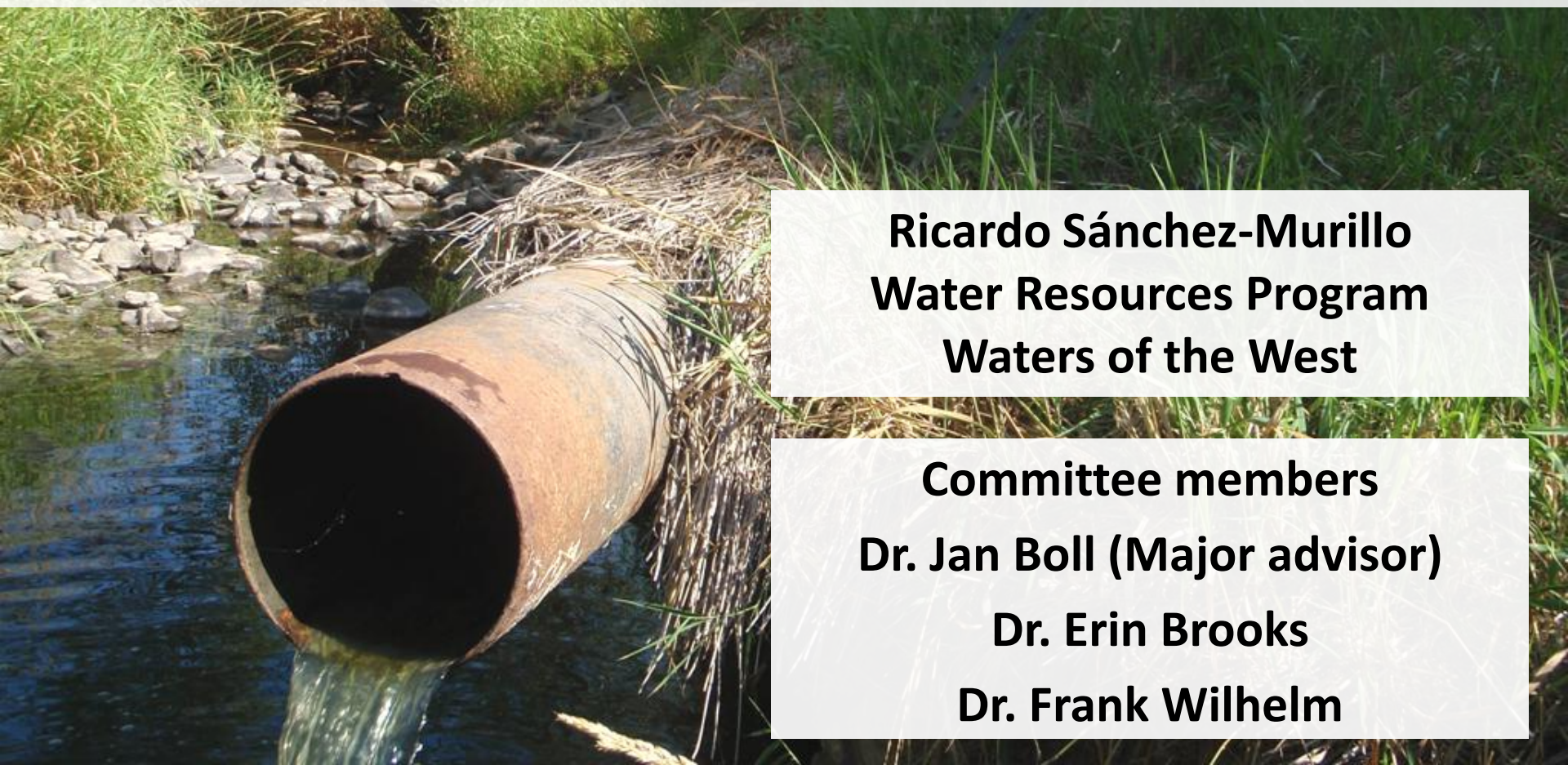


Clean-water Paradox: Impacts of the Troy Wastewater Treatment Plant on Steelhead (*O. mykiss*) Habitat in the West Fork Little Bear Creek drainage

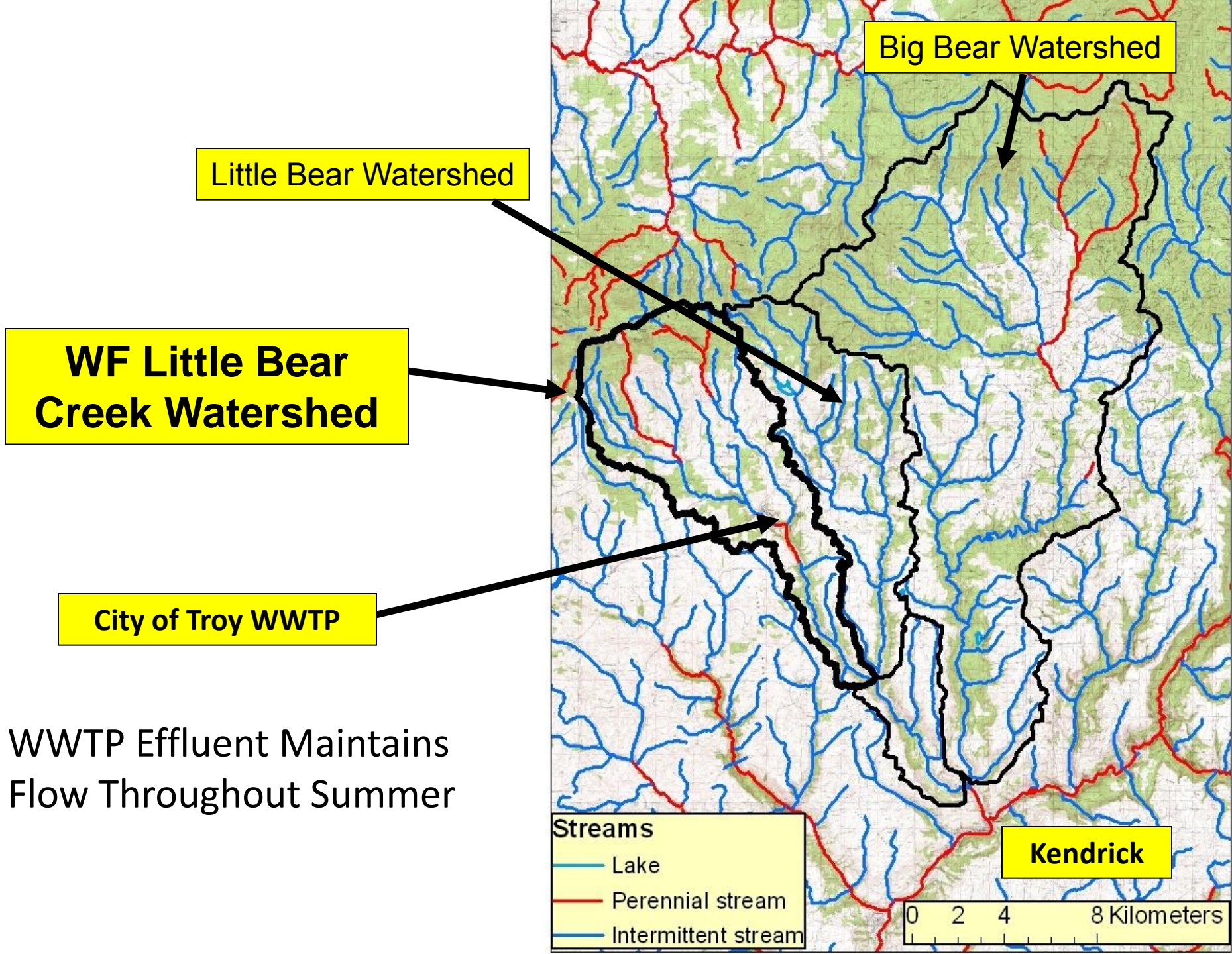


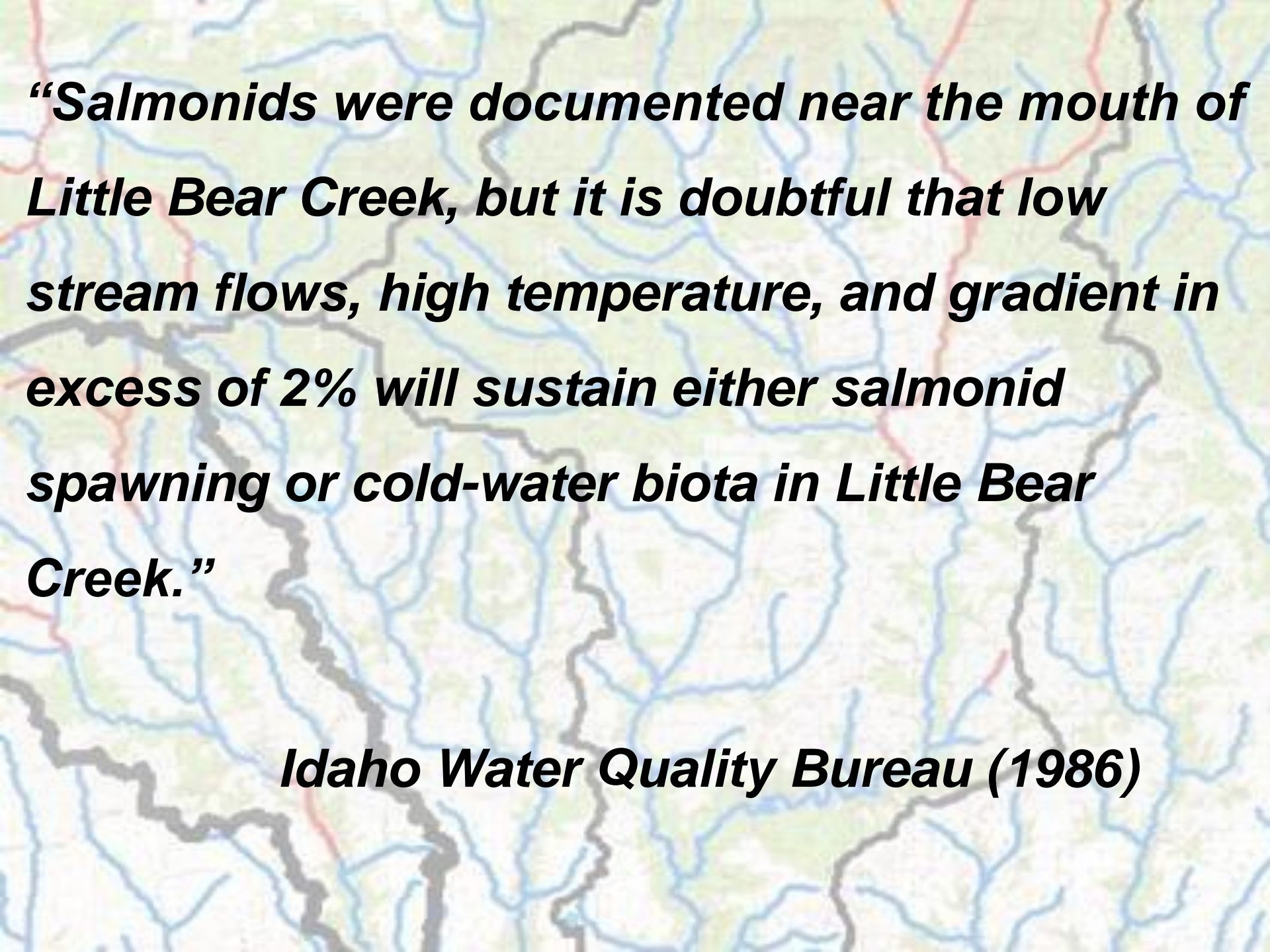
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Water Resources Program
Waters of the West**

**Committee members
Dr. Jan Boll (Major advisor)
Dr. Erin Brooks
Dr. Frank Wilhelm**

Potlatch River Basin (PRB)

- PRB supports a strong, wild, A-run steelhead population
- Steelhead habitat threatened by:
 - **low flows**
 - **high summer temperature**
 - **lack of riparian habitat**
 - **high sediment loads**
 - **low density of instream structures (Bowersox, 2008)**





“Salmonids were documented near the mouth of Little Bear Creek, but it is doubtful that low stream flows, high temperature, and gradient in excess of 2% will sustain either salmonid spawning or cold-water biota in Little Bear Creek.”

Idaho Water Quality Bureau (1986)

A photograph showing a person's hands holding a steelhead trout horizontally. A ruler is placed below the fish to provide a scale. The fish is silvery with dark spots. The background is slightly blurred, showing some green vegetation and a white container.

Surveys of *O. mykiss* indicate:

- The WFLB creek consistently supports some of highest concentrations (13.2 fish/100 m²) of Age-0 and Age-1 steelhead in the entire PRB.**

(Bowersox and Brindza, 2006; Bowersox and Schriever, 2007;
Bowersox, 2008)

- **City of Troy WWTP discharges excessive nutrients to the WFLB resulting in low downstream DO during critical summer rearing months (IASCD, 2010; Potlatch TMDL, 2008).**

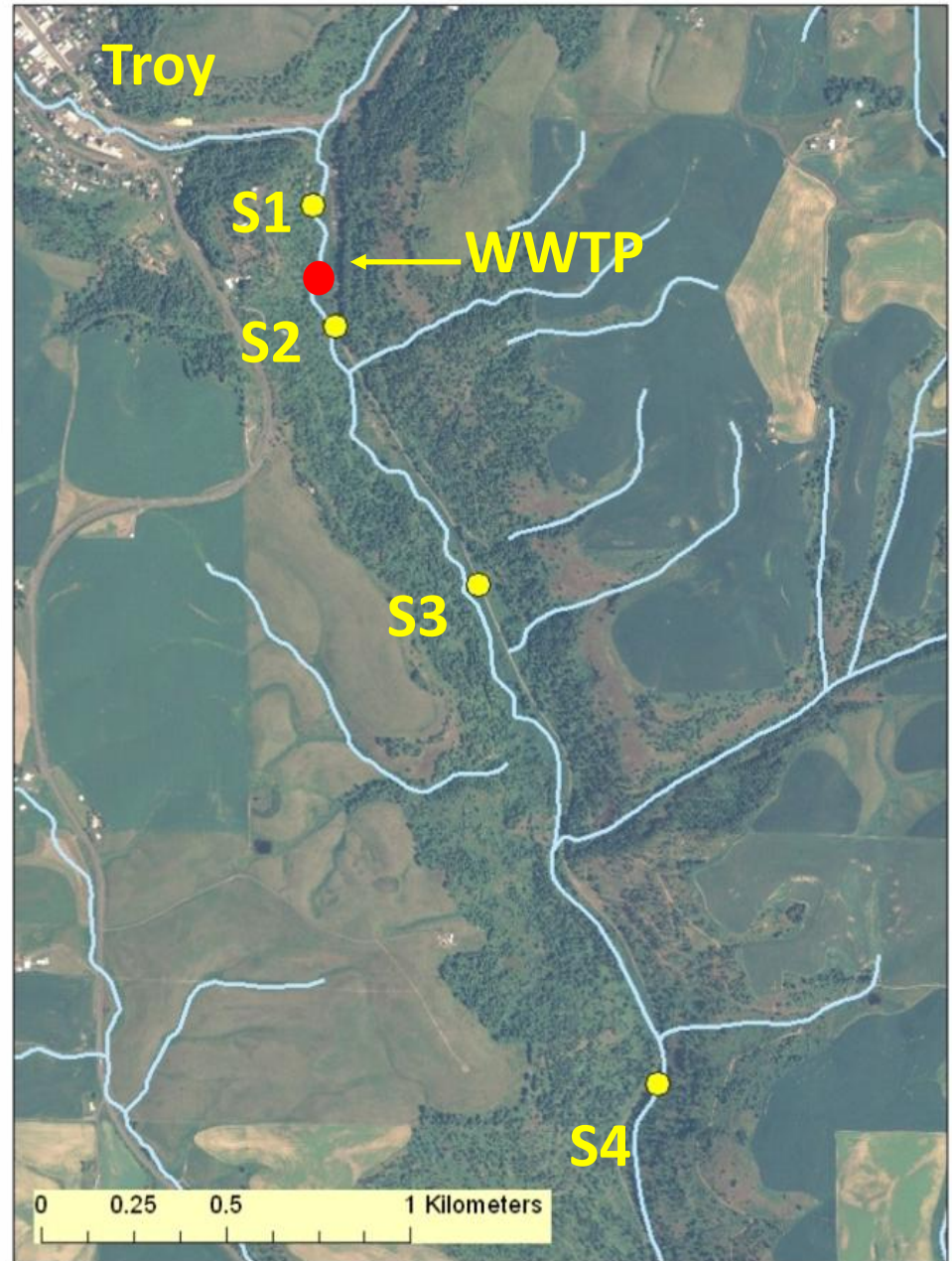


Is the City of Troy effluent a net benefit or detriment to steelhead habitat?

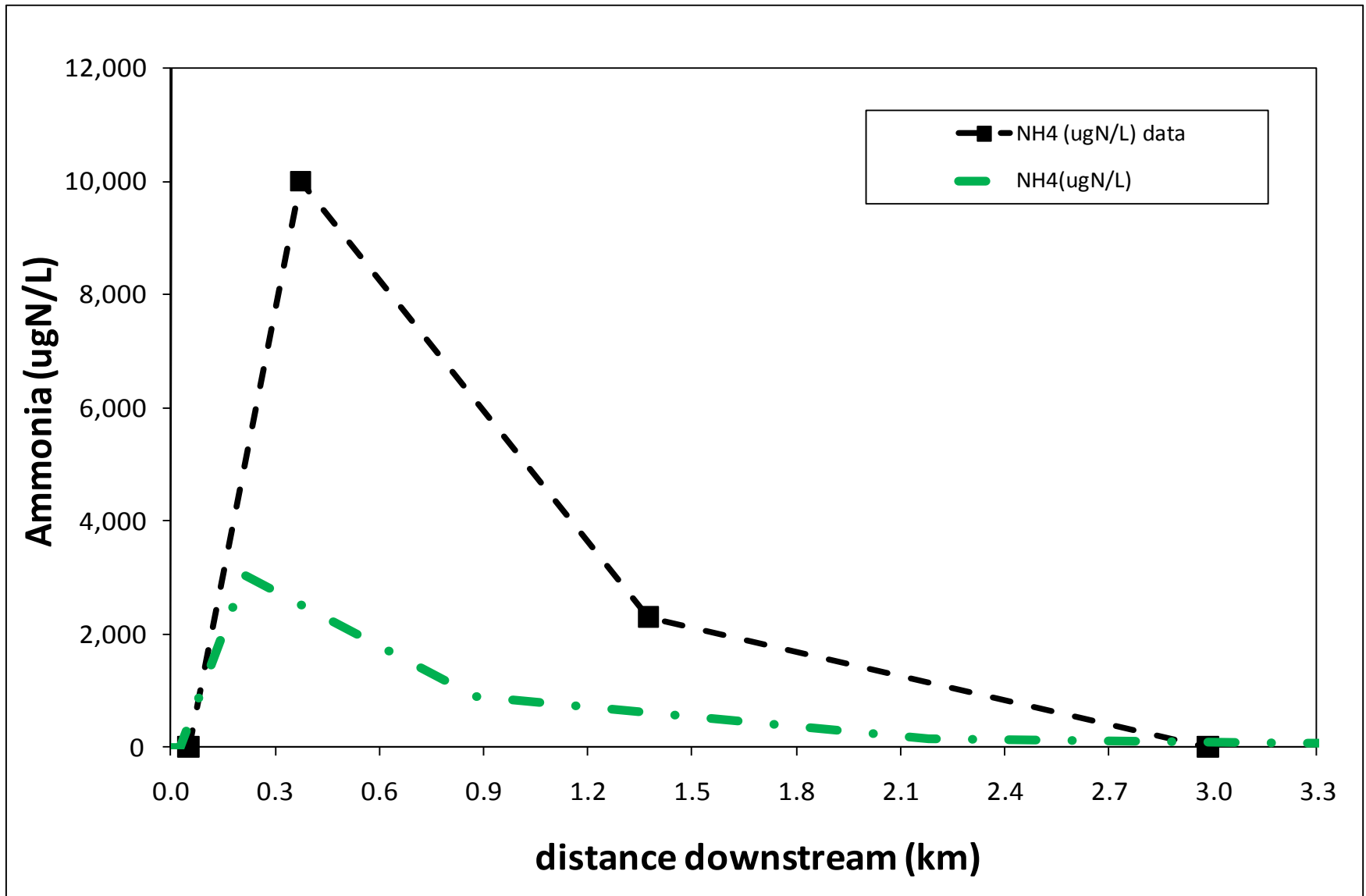


Monitoring Stations

- **Station 1** – 100 m upstream of the WWTP
- **Station 2** – 200 m
- **Station 3** – 1.3 km
- **Station 4** – 2.5 km
- **Control site (LBC)**



Flow addition (250%, 0.367 cfs)



Institutional/Legal Framework

- CWA versus ESA: Clean Water Paradox
- Water quality policies: big cities/small towns, cultural eutrophication/cultural oligotrophication
 - *how low must the concentration be to avoid undesirable primary productivity?*
 - ***how high must the concentration be to sustain or enhance aquatic species such as salmon juveniles?***

Conclusions

- DO levels within the WFLB were mainly affected by rapid nitrification between the discharge point and S3; DO levels recovered by 1.5 km.
- Ammonia toxicity can be an issue within WFLB.
- **Fish surveys during 2009 and 2010 confirmed that juveniles are present all summer between S4 and the discharge point.**

Conclusions

- Removing the effluent of the WWTP will result in a net loss of the steelhead habitat.
- To reduce severe DO sags and high ammonia concentrations 75% of total N load should be removed.
- **Flow addition: During extreme conditions an addition of 0.368 cfs was needed to increase DO levels above 6.0 mg/L.**

Conclusions

- **Decisions should be made to benefit the ecosystem rather than driven by single point of view.**