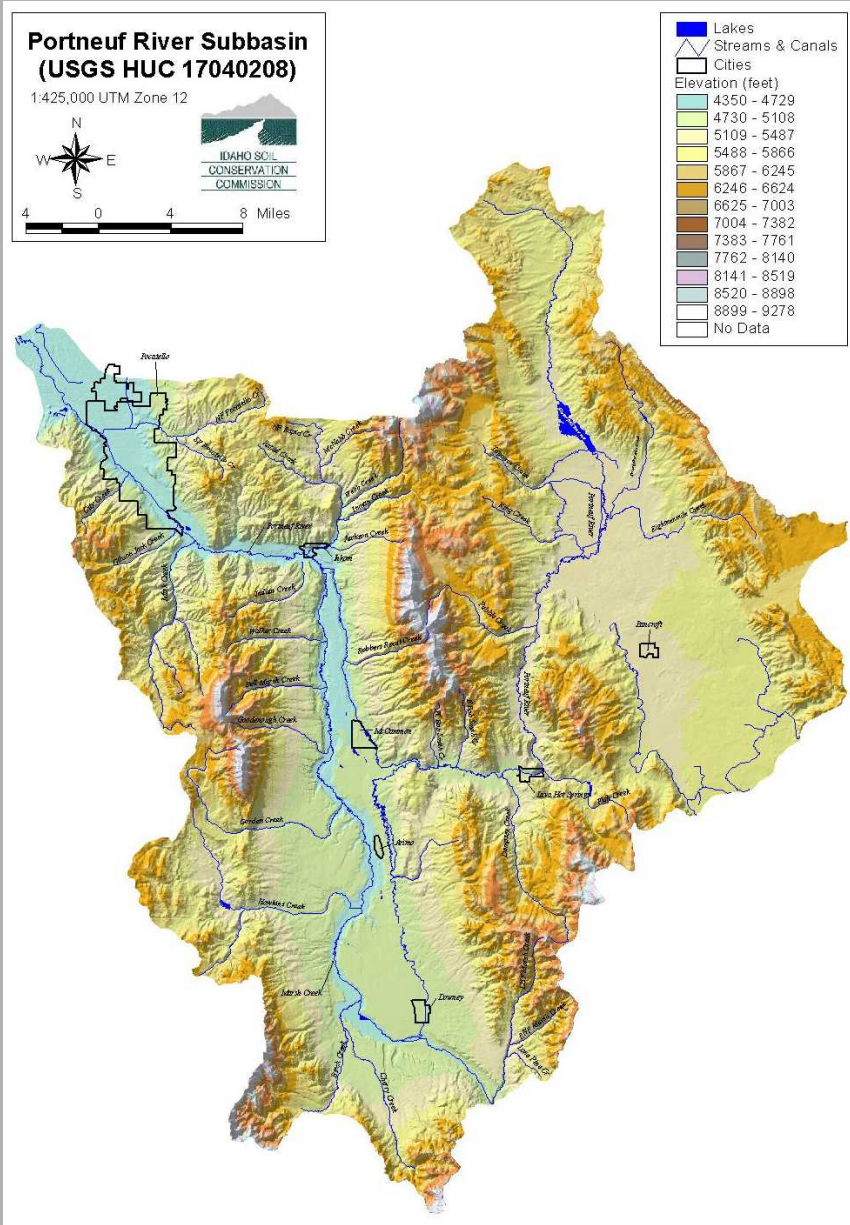


Portneuf River
Watershed Advisory Group
Meeting

19 December 2006



Portneuf River

- Portneuf Watershed 3,350 km²
(1,300 mi² - mixed use--agricultural, urban, industrial)
- River length = 156 km (97 miles)
- Receives < 30cm precipitation
- Discharge in Pocatello

Historical ranges from 1.5 m³/s (50 cfs) to 15.0 m³/s (500cfs)
- Changes in water quality in river associated with land use
- USEPA 303d listing

Portneuf River



Lava Hot Springs

Mike's Place



Portneuf River



Edson Fichter Nature Area

Ft. Hall Mine Bridge

Portneuf River



Fremont Bridge

Batise Road



Portneuf River



Siphon Bridge

USGS Tyhee Gage

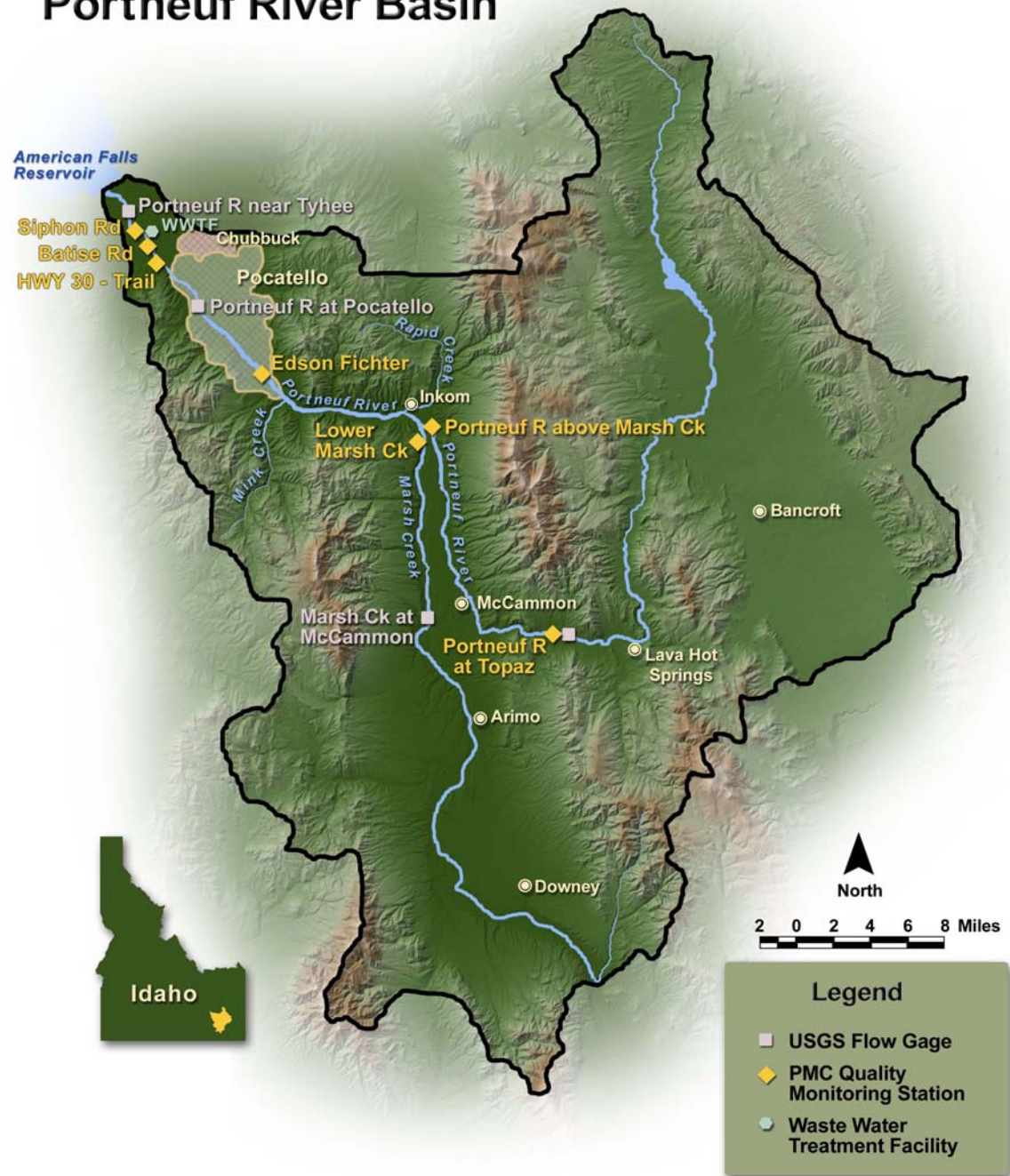


Portneuf River Monitoring

- Water Quality Monitoring
 - Conventional Sampling
 - Continuous Monitoring
- Discharge Monitoring
 - USGS gaging stations
 - PRMP gaging stations and regular discharge measurements



Portneuf River Basin



List of Analytes from Monthly Sampling Activities

Analysis
Total Alkalinity bicarbonate, carbonate
Chloride
Nitrogen, ammonia
Nitrogen, nitrate + nitrite
Nitrogen, total Kjeldahl
Nitrogen, filter total Kjeldahl
Phosphorus, orthophosphorus
Phosphorus, total
Sulfate
Solids, total dissolved
Solids, total suspended
Turbidity

Continuous Monitoring with YSI 6920 Multi-parameter Monitoring Equipment: Sonde

Temperature ($^{\circ}\text{C}$)

Specific Conductance
($\text{mS}/\text{cm sec}$)

Dissolved Oxygen (%)

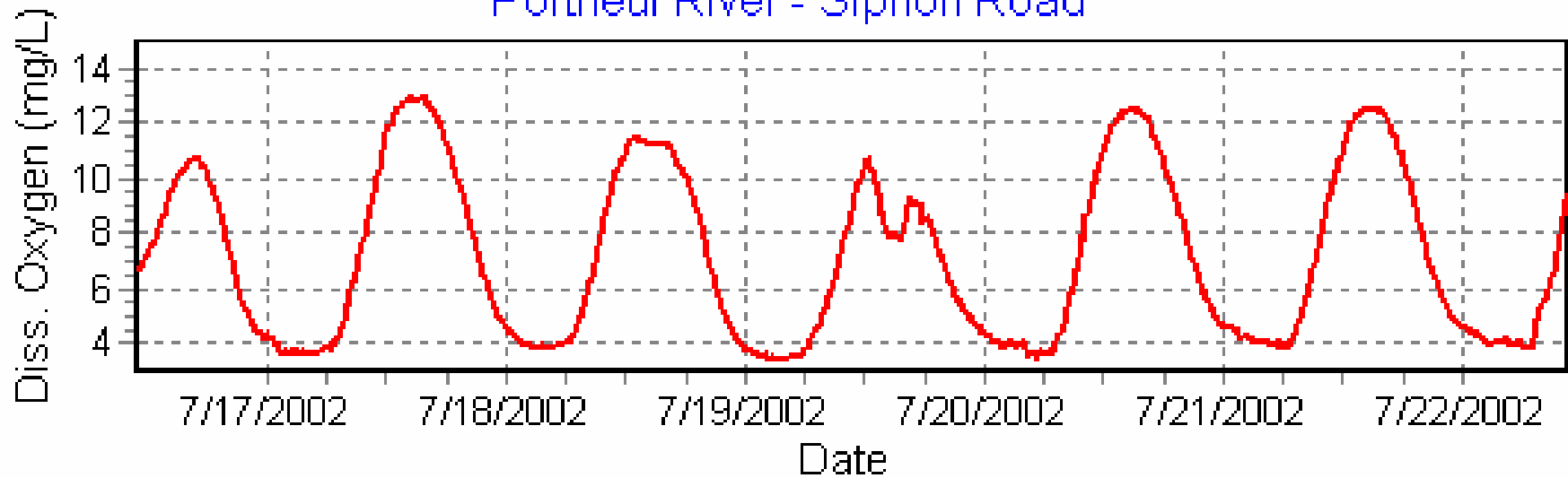
Dissolved Oxygen (mg/L)

pH

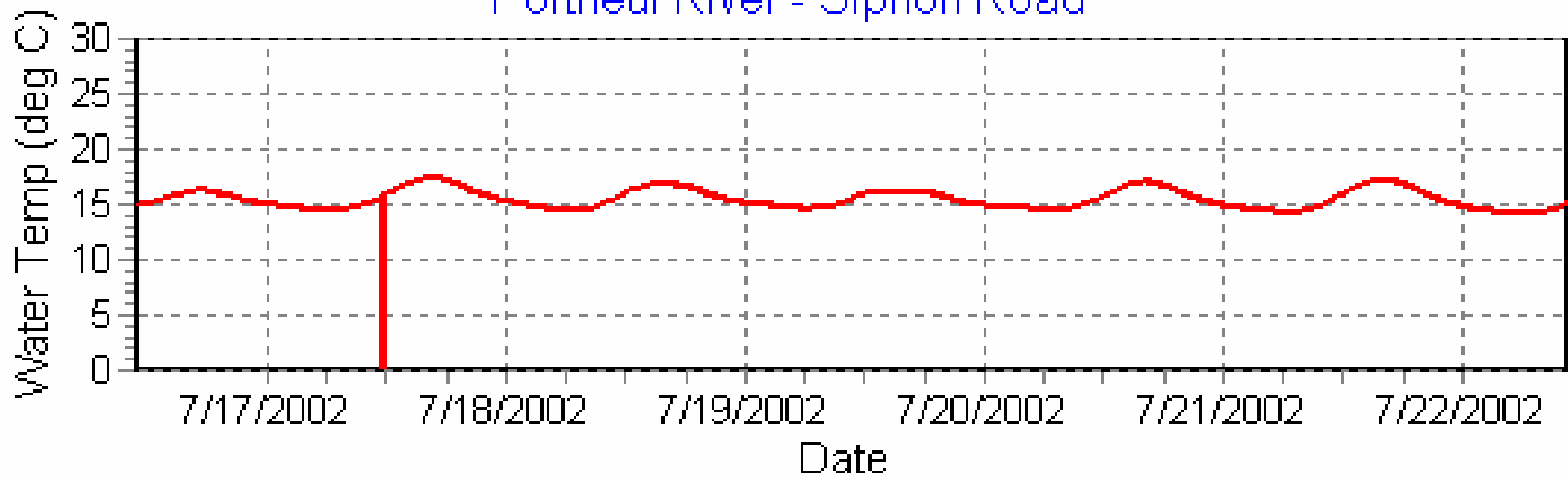
Turbidity (NTU)



Portneuf River - Siphon Road



Portneuf River - Siphon Road



www.portneufriver.org or www.rcresearch.com

Note: for discussion purposes only

Load and Waste Load Calculations

- Load estimates require:
 - Discharge
 - Concentration of analyte/constituent

discharge (volume/unit time) x analyte concentration (mass/volume) = constituent load (mass/ unit time)

Example Load Calculation

At Portneuf River at Edson Fichter Nature Area on 25
February 2004:

$$153 \text{ cfs} \times 0.54 \text{ (mg/L NO}_2 + \text{NO}_3) = 444 \text{ lbs NO}_2 + \text{NO}_3 / \text{day}$$

Loads are typically reported on a daily, annual, or
semi-annual basis

Load Estimates

- Based on monthly sampling
- Does not capture short events

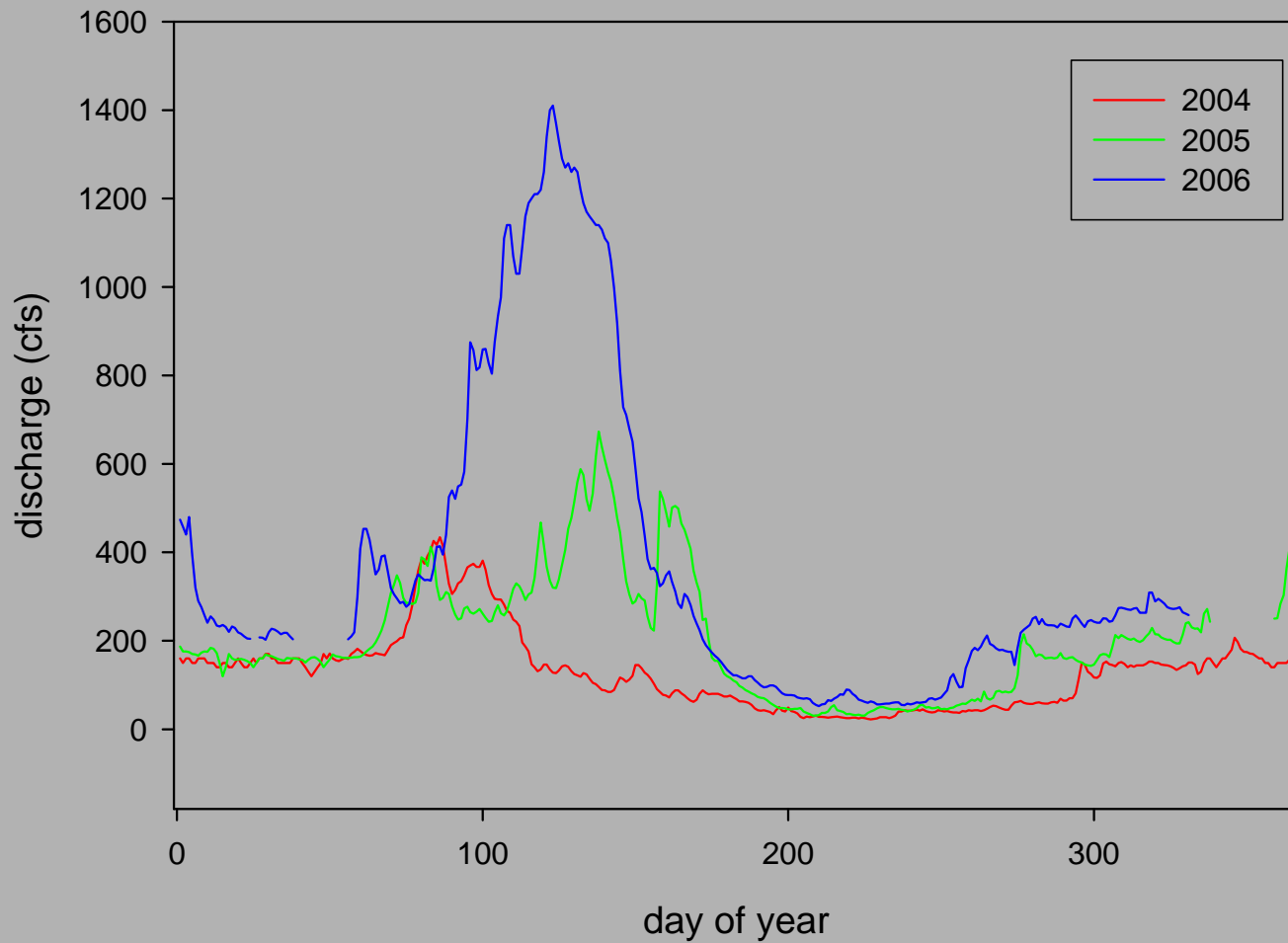
Portneuf River at Edson Fichter Nature Area

Estimated Annual Load (lbs)	2004	2005	2006
TSS	~12,474,000	~23,926,000	~73,323,000
NO₃ + NO₂	~109,000	~161,000	~281,000
Total P	~20,000	~38,000	~103,000

Note: for discussion purposes only

Comparison of Annual Hydrograph

USGS Pocatello at Carson St Gage



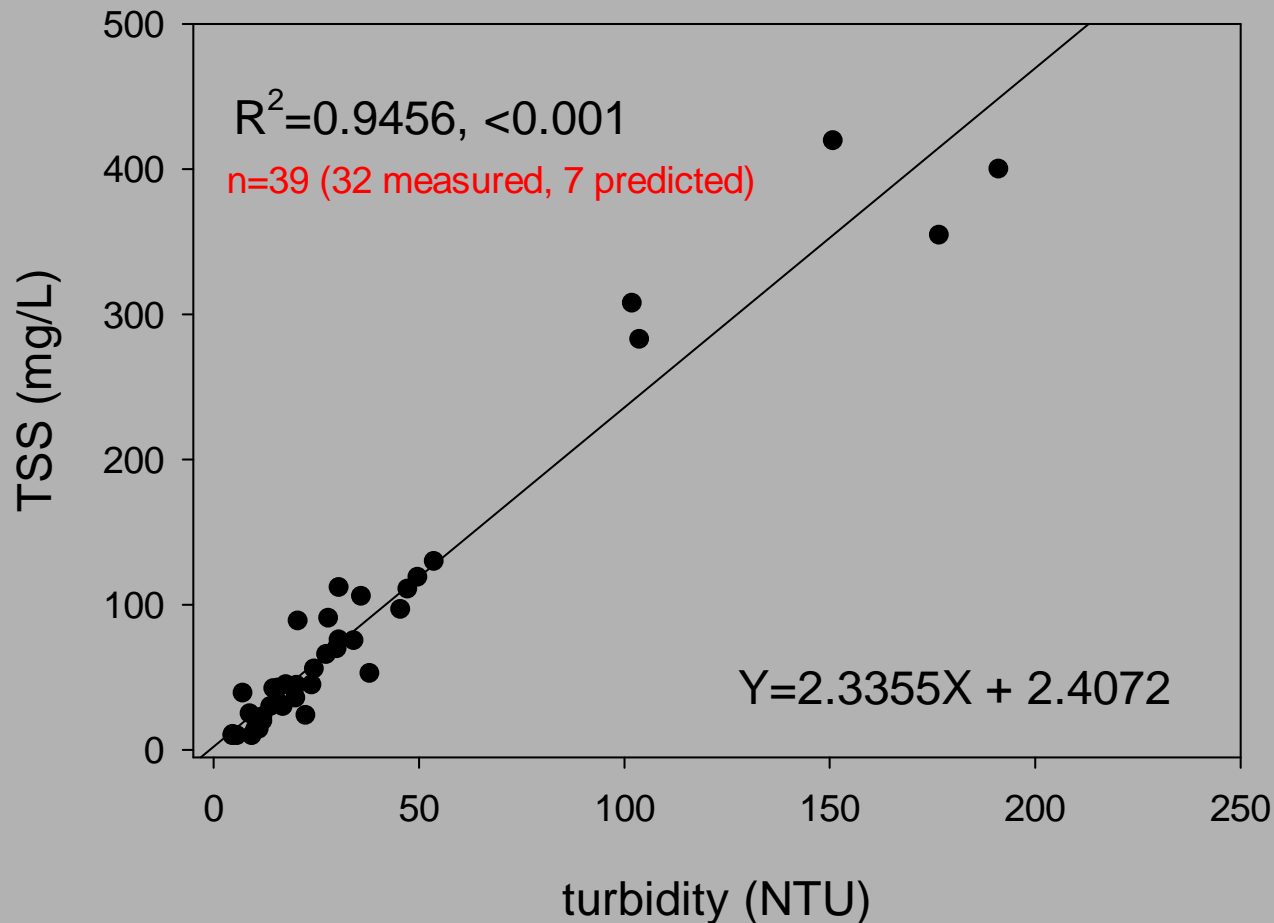
Note: for discussion purposes only

Load Estimates

- ***Continuous surrogate concentrations*** (Wall et al. 2005; Christensen et al. 2000) enable use of continuously measured constituents to predict concentrations
- Requires predictive models using regression analysis (Christensen et al. 2000)

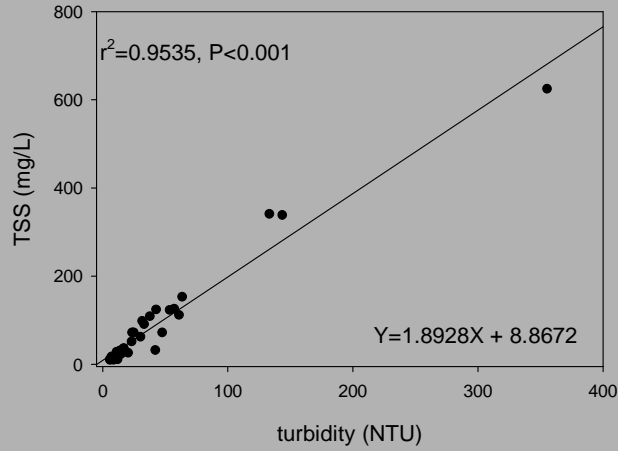
Regression Analysis: TSS on turbidity (NTU)

Portneuf River at Edson Fichter Nature Area

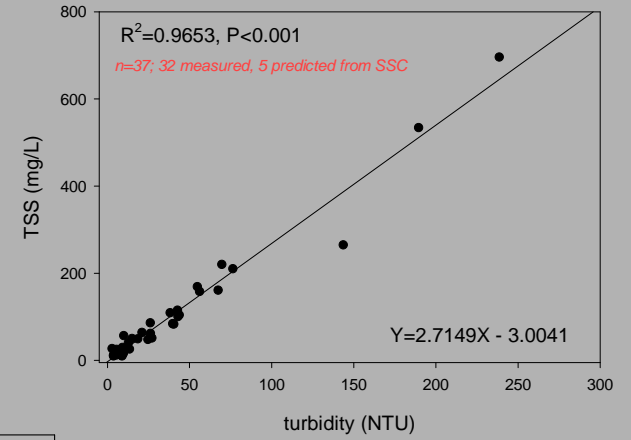


Note: for discussion purposes only

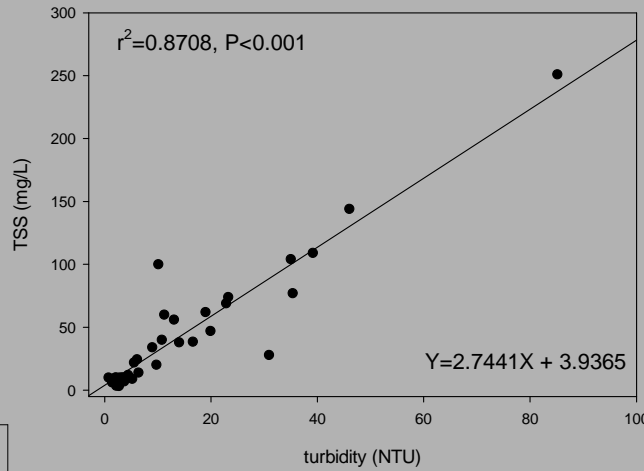
Portneuf River at Batisse Rd



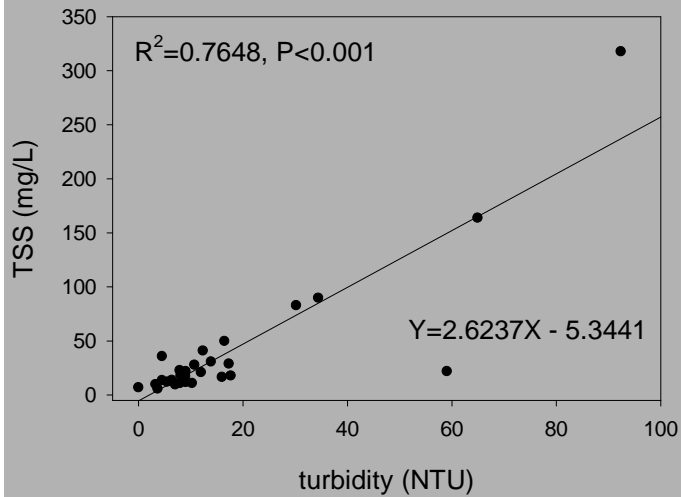
Marsh Creek



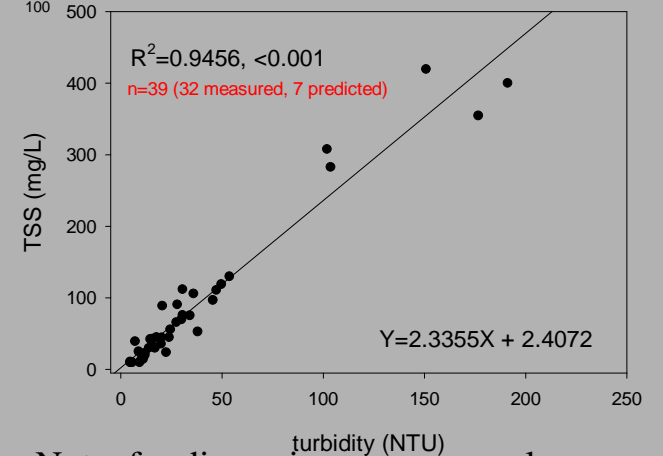
Portneuf River at Siphon Rd



Portneuf River at Topaz



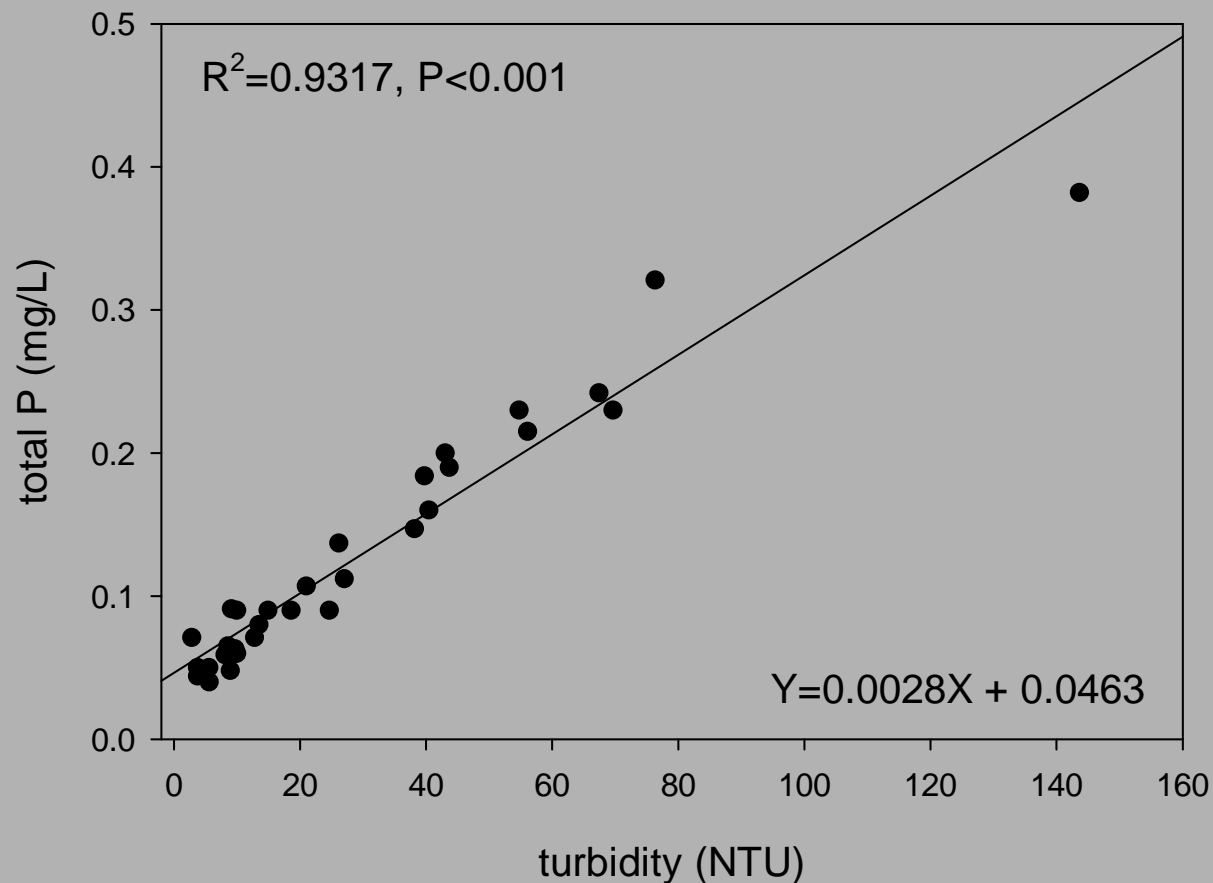
Portneuf River at EFNA



Note: for discussion purposes only

Regression Analysis: total phosphorus (mg/L) on turbidity (NTU)

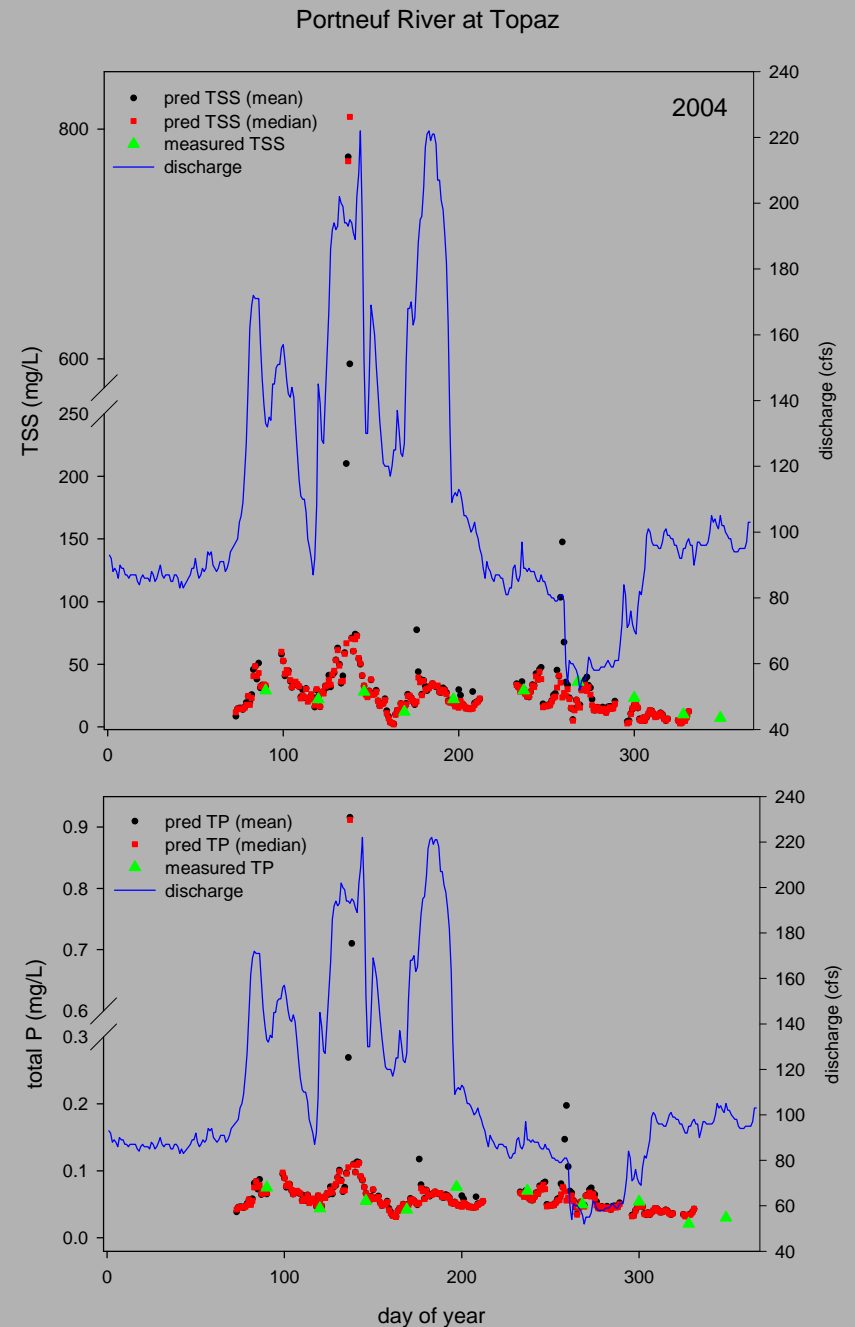
Portneuf River at Edson Fichter Nature Area



Note: for discussion purposes only

Predicting continuous concentrations of TSS and total P

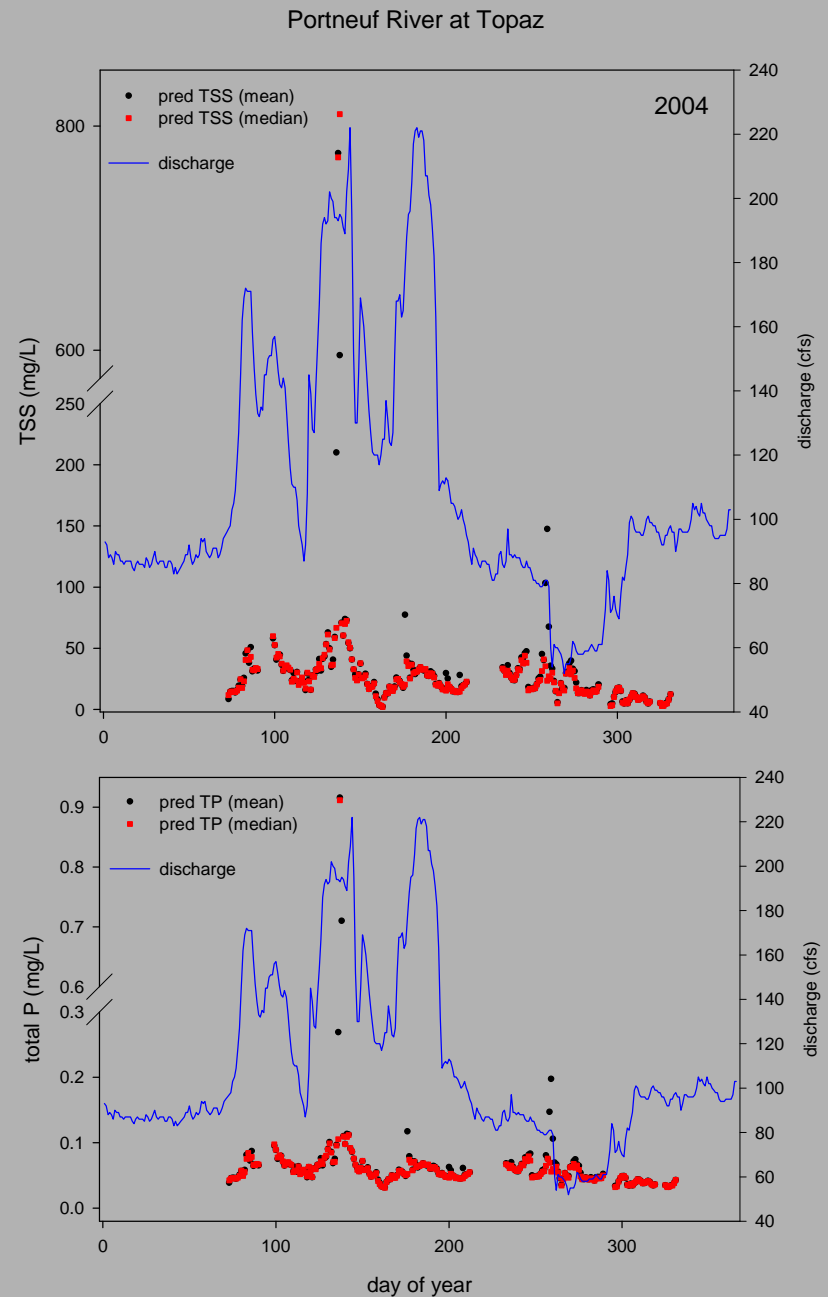
- Comparing predicted versus measured concentrations
- Evaluate daily summary statistics (mean versus median) values



Note: for discussion purposes only

Predicting daily **LOADS** of TSS and total P

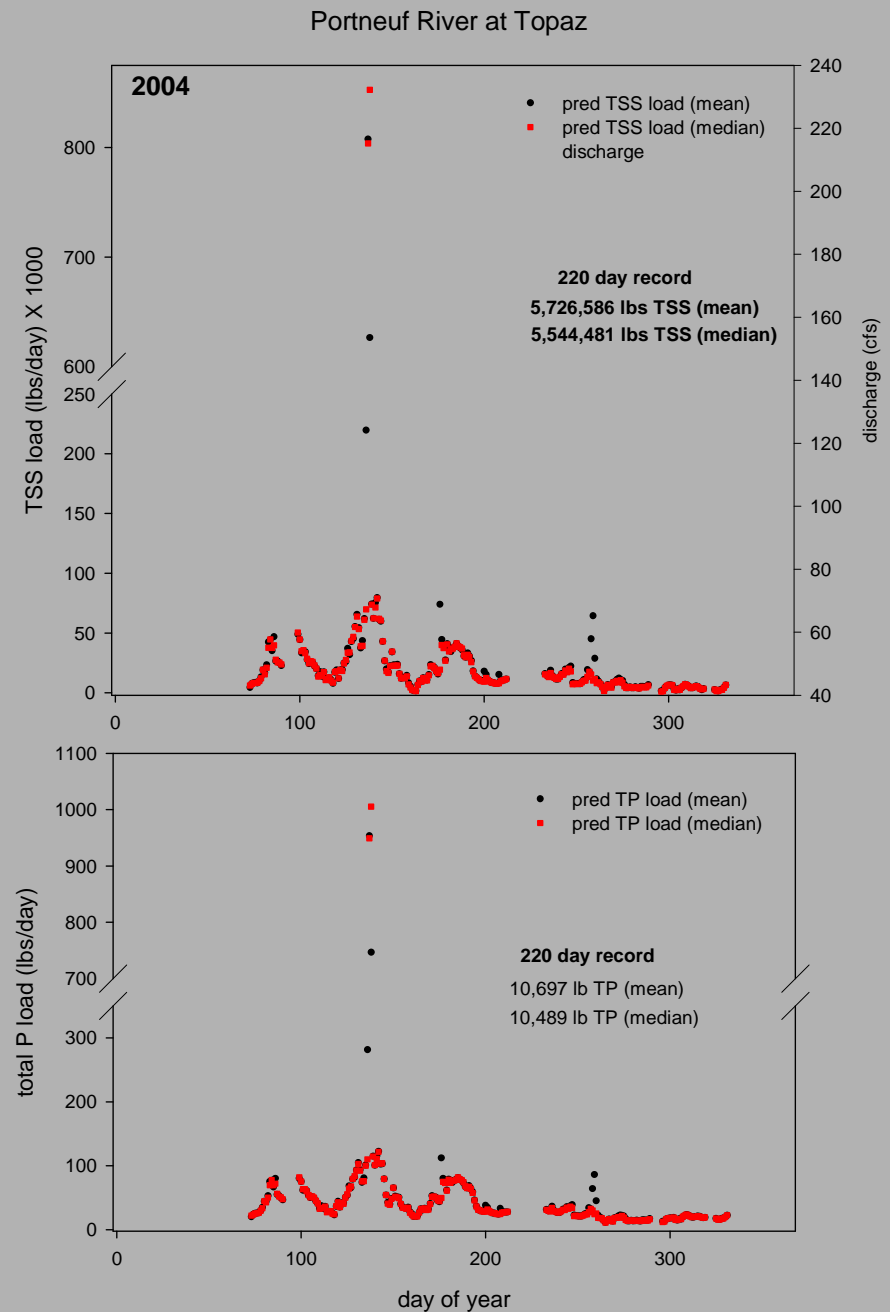
Loads estimated using
simultaneous flow and
concentration data



Note: for discussion purposes only

Predicting daily loads of TSS and total P

- Currently examining ways to estimate daily loads when turbidity record is not available (i.e. fill in the gaps)



Note: for discussion purposes only

Questions??

Ask Greg