



Total Phosphorus Mass Balance Model Sensitivity

Lower Boise River – week of August 20, 2012

U.S. Department of the Interior
U.S. Geological Survey



August Model

Limitations

- GW assumptions
- Biogeochemical processes
- Non-storm event
- Changes upstream \neq changes downstream
- ET

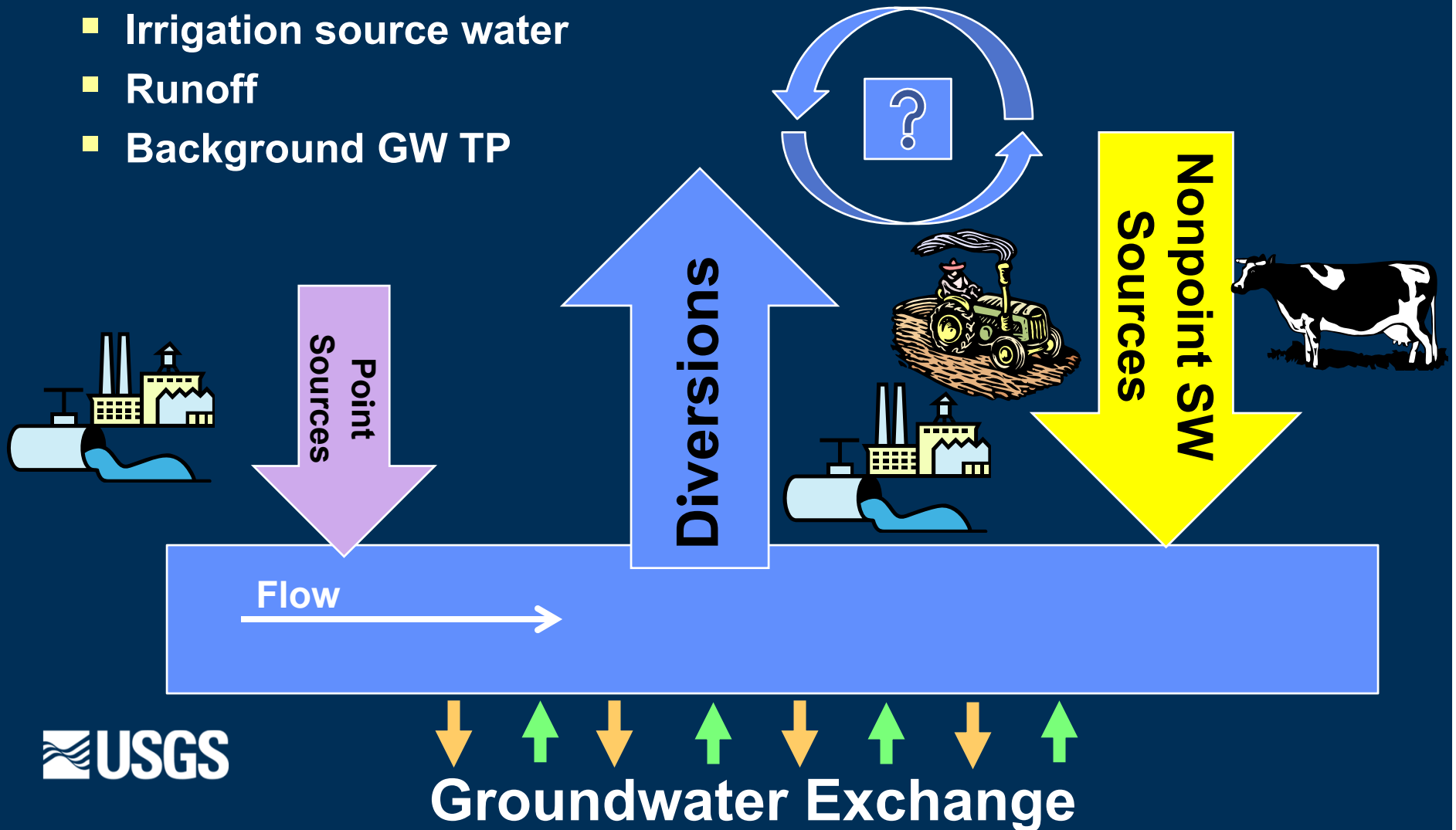
Advantages

- GW gains > Q uncertainty
- Limited uptake / release
- Predictive ~ Measured ($R^2 = .97$)
 - GW ~ 0.25 mg/L blw RM 28.8
- Compliance period
- Irrigation season

The TP mass balance model is useful for understanding sources of unmeasured loads that are otherwise difficult to measure directly.

Sensitivity Analysis - August

- Nonpoint sources – most important
 - Irrigation source water
 - Runoff
 - Background GW TP

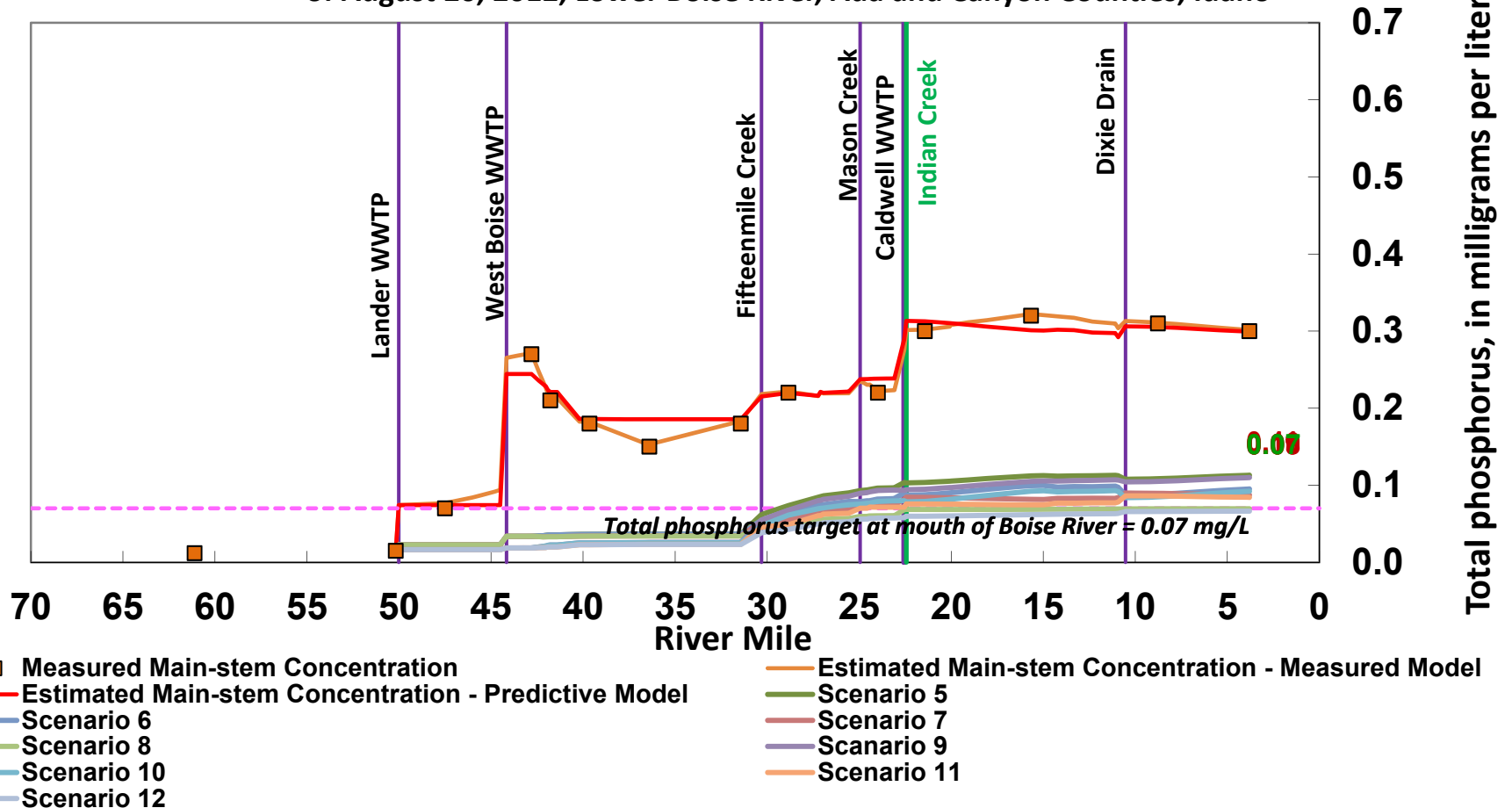


The Math - August

- Point Sources: 1,440 lbs/d
- Diversions: -1,890 lbs/d
- Tributaries (-point source loads): 880 lbs/d
- Unmeasured: 576 lbs/d
 - GW ~ 485 cfs (including unmeasured returns)
 - Biogeochemical
 - ET
 - Positive net balance = 576 lbs/d

Scenario Results: 5 to 12

Total Phosphorus Concentration Estimates and Measured Main-stem Concentrations, Week of August 20, 2012, Lower Boise River, Ada and Canyon Counties, Idaho



Provisional Results

Summary

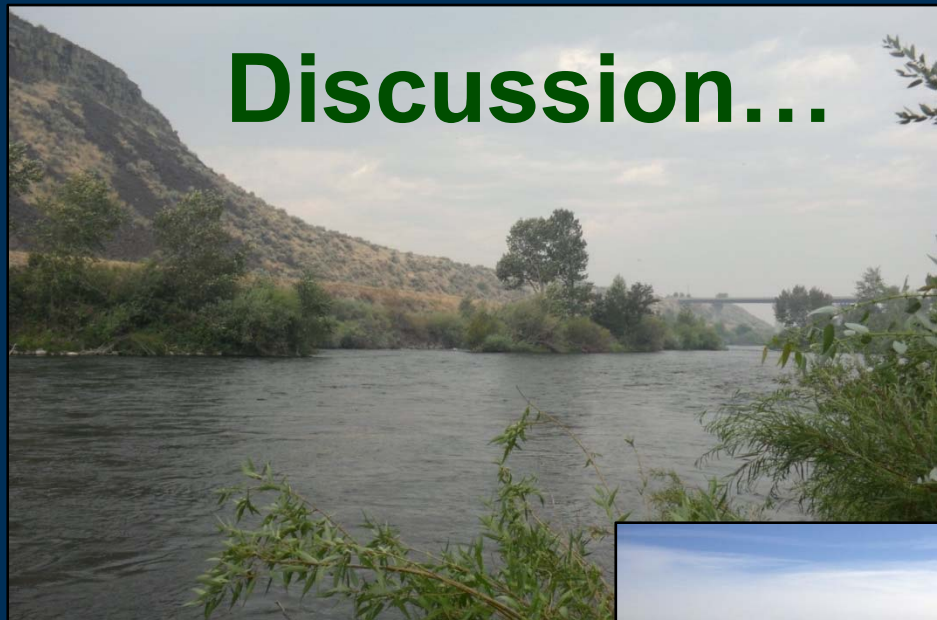
Scenario 8

- Point Sources = 0.30 mg/L, nonpoint = 0.07 mg/L
- Mouth ~0.069 mg/L
- 85% Load Reduction
- Phyllis Canal ~0.03 mg/L
- Riverside Canal ~0.06 mg/L

Scenario 12

- All = 0.07 mg/L
- Mouth ~0.066
- 91% Load Reduction
- Phyllis Canal ~0.02 mg/L
- Riverside Canal ~0.06 mg/L

Discussion...



The Math – Non-irrigation Season

October 29, 2012

- Point Sources: 1,050 lbs/d
- Diversions: -0 lbs/d
- Tributaries (-point source loads): 456 lbs/d
- Unmeasured: -67 lbs/d
 - Biogeochemical
 - GW ~ 91 cfs (including unmeasured returns)
 - ET
 - **Negative net balance**

March 4, 2013

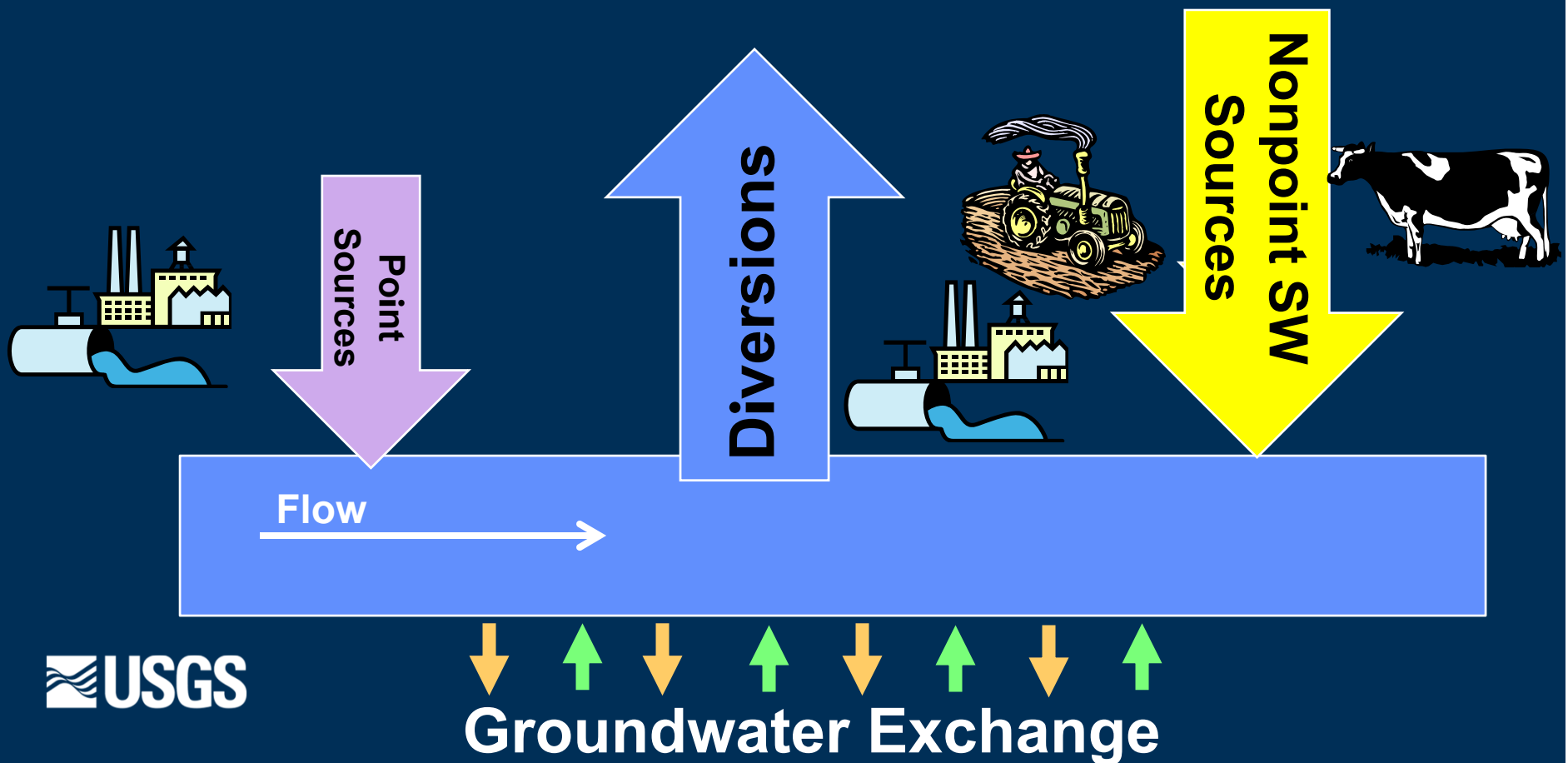
- Point Sources: 1,220 lbs/d
- Diversions: -0 lbs/d
- Tributaries (point sources removed): 255 lbs/d
- Unmeasured: 154 lbs/d
 - Biogeochemical
 - GW ~ 174 cfs (including unmeasured returns)
 - ET
 - **Positive net balance**



Provisional Results

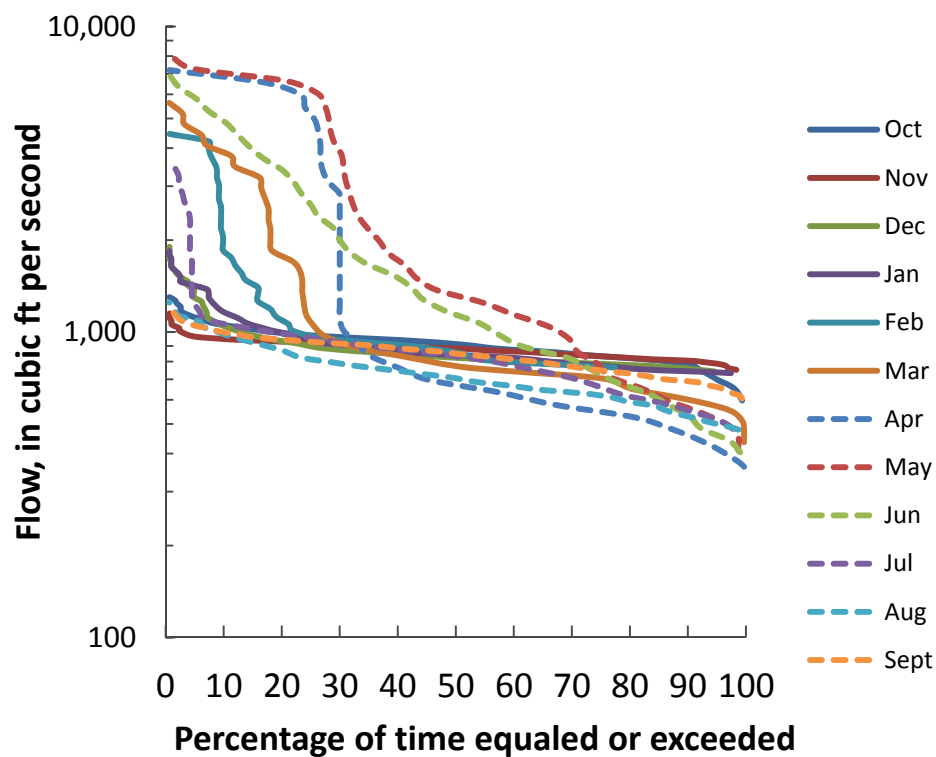
Sensitivity – October, March

- October – point & nonpoint important
- March – point sources important

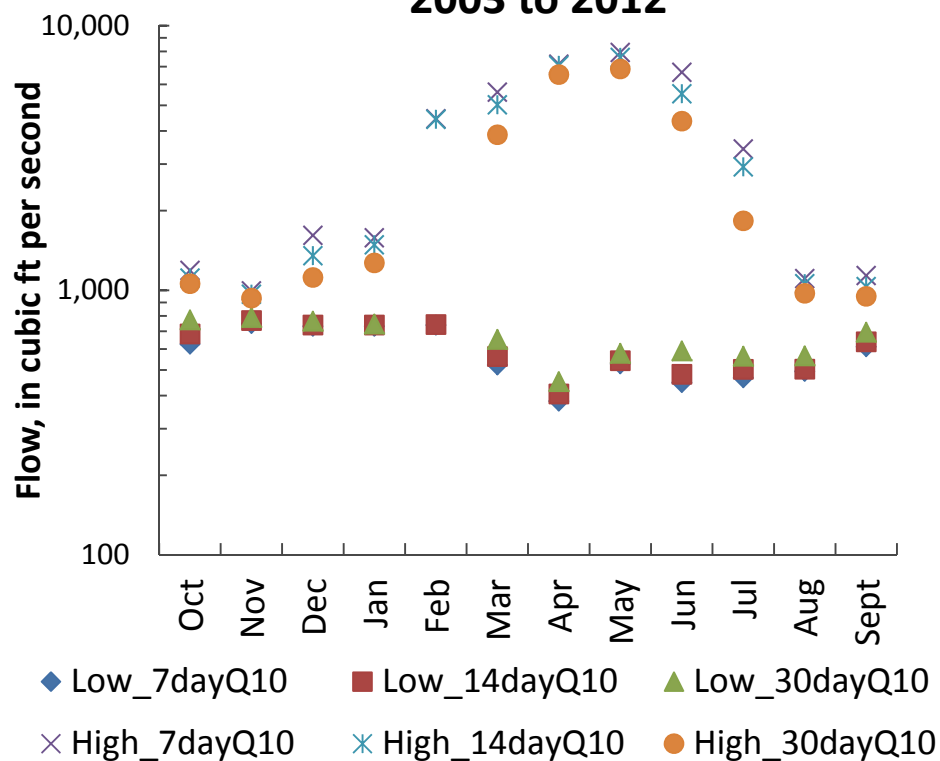


Flow Duration and Recurrence

Monthly Flow Duration Curves
Boise River Near Parma
2003 to 2012



10-year recurrence interval for N-day
high and low flows
Boise River Near Parma
2003 to 2012



The Math

