

# **Follow-up to Mass Balance Assessment based on Workshop Feedback**

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# Follow-Up Activities Identified

- Include J-flagged PCB data
- Consider stormwater and CSO loading
- Add Greene St. segment
- Conduct sensitivity to groundwater quality assumption
- Evaluate flows at Nine Mile



# Include J-Flagged PCB Data

- Workshop consensus: J-flagged data should be included in the mass balance assessment
- Update: J-flagged data have been used all along, but not *NJ*-flagged data
  - J flag: Concentration less than quantitation limit
  - NJ flag: Presumptively present at approximate quantity
- Inclusion of NJ flags will have little bearing on results



# Consider Stormwater and CSO Loading

- Original mass balance assessment did not consider stormwater and CSO loading that occurred during the synoptic survey
- City of Spokane provided estimates of loads
  - Measured CSO flows
  - MS4 flows extrapolated from Cochrane basin flows
  - PCB concentrations estimated from historical data



# Stormwater and CSO Loading

|                            | Load (mg) |      |      |       |
|----------------------------|-----------|------|------|-------|
|                            | 8/12      | 8/13 | 8/20 | 8/22  |
| <b>CSO</b>                 |           |      |      |       |
| Greene St. to Spokane Gage | 42.4      |      | 18.4 | 187.6 |
| Spokane Gage to Nine Mile  | 20.1      |      | 1.8  | 13.4  |
| Hangman Creek              |           |      |      | 2.4   |
| <b>MS4</b>                 |           |      |      |       |
| Trent Ave. to Greene St.   |           | 1.1  | 1.2  | 1.9   |
| Greene St. to Spokane Gage |           | 7.0  | 7.4  | 11.5  |
| Spokane Gage to Nine Mile  |           | 26.3 | 27.9 | 43.4  |
| Hangman Creek              |           | 1.74 | 1.84 | 2.87  |

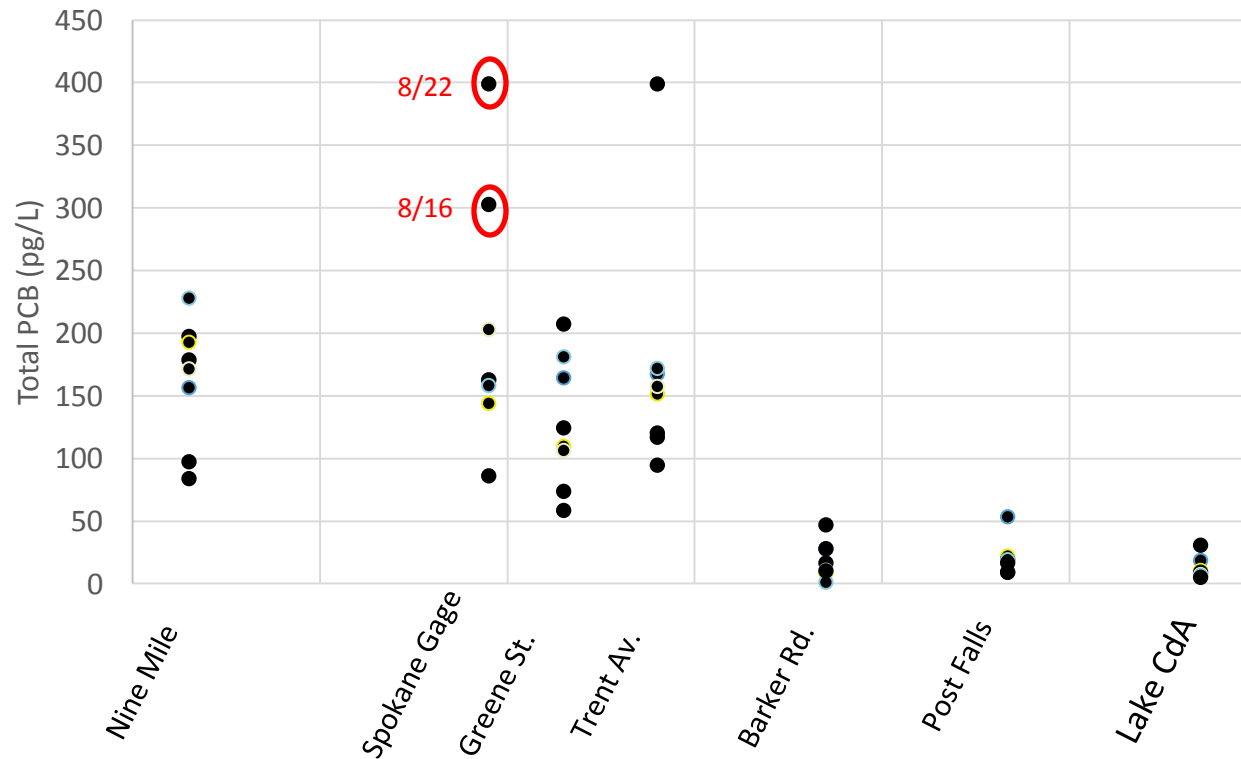


# Stormwater and CSO Loading

- Over 14 day synoptic period, CSO and stormwater contribute less than 10% of observed river loads
  - Incremental load calculation affected by at most 19%
- Doesn't explain elevated PCB concentration observed at Spokane gage
  - Partial explanation, at most



# Stormwater and CSO Effect on Elevated Concentrations at Spokane Gage?



- 8/16 data point not associated with CSO or stormwater
- 8/22 data point can't be explained by daily average load



# Addition of Greene St. Segment

- Groundwater model results provided by Spokane County allowed the Trent to Spokane Gage reach to be divided into two reaches
  - Do results signify another unknown load?

| River Reach                 | Unknown Load (mg/day) |               |
|-----------------------------|-----------------------|---------------|
|                             | W/o Greene St.        | W/ Greene St. |
| Coeur d'Alene to Post Falls | -                     | -             |
| Post Falls to Barker Road   | 1.3                   | 1.3           |
| Barker Road to Trent Avenue | 166                   | 166           |
| Trent Avenue to Greene St.  | -                     | -110          |
| Greene St. to Spokane Gage  | -                     | 104           |
| Spokane Gage to Nine Mile   | -                     | -             |





# Sensitivity to Groundwater Quality Assumption

- Mass balance assessment assumed that groundwater lost from an upstream reach re-entered in the next downstream reach at the same concentration at which it left

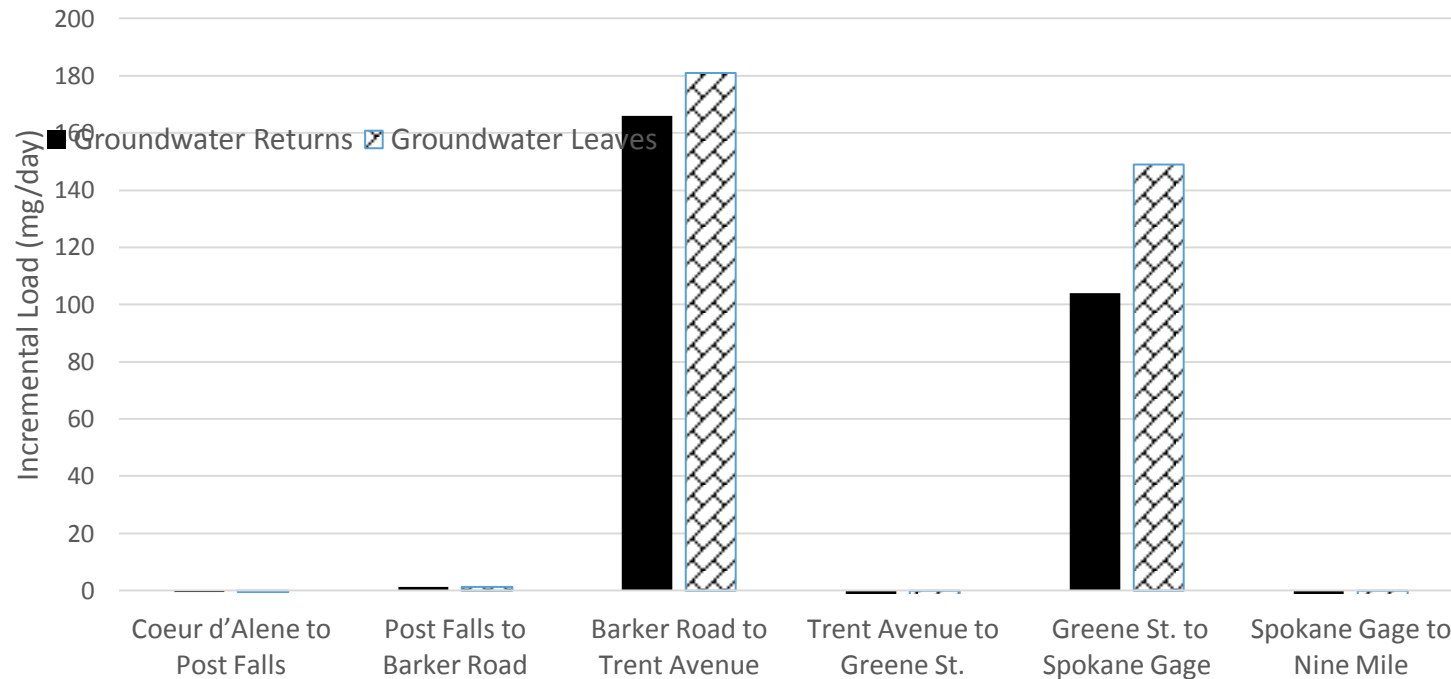


# Sensitivity to Groundwater Quality Assumption

- Sensitivity analysis conducted assuming that lost groundwater is permanently lost, and replaced by clean groundwater
  - Range of results from the two methods should bound the true answer



# Best Estimate of Unknown Loads



# Evaluate Flows at Nine Mile

- Questions were raised at the workshop regarding the accuracy of the flows assumed at Nine Mile
  - Reported flows lower than expected
  - Higher flows could explain calculated negative incremental load in last reach
- Avista has been contacted to confirm (or update) assumed flows



# Conclusions

- J-flagged data had been included all along
- Consideration of stormwater and CSO loads doesn't affect conclusions
- Addition of Greene St. reach poses a question
  - Additional “unknown” source, or artifact?
- Results aren't overly sensitive to assumptions regarding groundwater flow

