TECHNICAL ADVISORY COMMITTEE MEETING #15

Wednesday, May 12, 2021, 9:00 a.m. – 11:00 a.m.

Via WebEx

TAC MEETING PARTICIPANTS

- Jeff Burkey, King County
- Elly Hale, EPA
- Will Hobbs, Ecology Environmental Assessment Program
- Jessica Huybregts, Ecology Water Quality Program
- Kristen Kerns, US Army Corps of Engineers
- Bo Li, Ecology Water Quality Program
- Cleo Neculae, Ecology Water Quality Program
- Elsa Pond, Washington State Department Of Transportation
- James Rasmussen, Duwamish River Cleanup Coalition
- Pete Rude, City of Seattle/Seattle Public Utilities
- Blair Scott, King County Stormwater Services
- Kevin Schock, King County
- Jeff Stern, King County
- Anthony Wenke, Ecology Toxic Cleanup Program
- Debra Williston, King County WTD
- Yi Xiong, Ecology Water Quality Program
- Gretchen Onstad, Ecology Water Quality Program
- Jing Liu, Ecology Toxics Cleanup Program
- Kelsey Ketcheson, Ecology Toxics Cleanup Program
- Kevin Buckley, Seattle Public Utilities
- Laura Wishik, City of Seattle
- Li Ma, Ecology Toxics Cleanup Program
- Priscilla Tomlinson, Ecology Toxics Cleanup Program
- Rick Thomas, Ecology Toxics Cleanup Program
- Shawn Gilbertson, City of Kent
- Vicki Sutton, Ecology Toxics Cleanup Program
- Sandra Matthews, Ecology Toxics Cleanup Program

WELCOME AND INTRODUCTIONS

Cleo Neculae, TMDL Lead for the Green/Duwamish watershed with Ecology's NWRO, welcomed everyone and let the group in a round of introductions. She provided an overview of the agenda for the day, which included an update of the HSPF model calibration, an overview of the dashboard Ecology created to display some of the results of the model calibration, a discussion of management scenarios, and a presentation on HSPF model calibration.

PROJECT UPDATE

Bo Li, Ecology Water Quality Program engineer and lead of the PLA project, shared a presentation of a project overview, timeline, and next steps. Bo discussed:

- What has been done so far in terms of developing and updating the modeling QAPP, data analysis, and watershed modeling
    - The hydrodynamic and sediment calibration of HSPF has been completed.
- So far, in 2021, the team has worked on calibration and developing management scenarios to be modeled based on Ecology's source control strategies
- Next steps include the development of a receiving water model and of a food web model, and running the models based on the management scenarios.
- PLA has secured funding for HSPF support and is in the process of securing support and funding for the EFDC (receiving water) model

Next, Jeff Burkey, modeler with King County Science, provided an update on the HSPF model set-up.

- Model calibration is complete but parameter adjustment will continue to increase model confidence
- The watershed included in the model was subdivided into ten subbasins.
- Data on age of development (pre- and post-1980) for high- and low-density development and industrial/commercial land use were presented by subbasin.
- The original 83 rainfall zones were consolidated into 30 zones to accommodate model limitations on how many HRUs (hydrologic response units) it can process.
- Adjustments have resulted in revisions of assumptions for parameters, including pervious and impervious surfaces of different types of land use/land cover in the study area.

PRELIMINARY LOAD COMPARISON

Bo presented the Tableau dashboard that shows a breakdown of annual loads and loading rates (lbs/acre/year) by parameter by watershed. Data included in the dashboard cover the six parameters of focus for the PLA: arsenic, copper, DEHP (phthalates), total PAHs, total PCBs, and zinc. The same data were also broken down by pathway (stormwater/washoff, stormwater/air deposition, interflow, and groundwater) and by 14 land use categories. The dashboard also includes heat maps for each parameter by load and loading rates.

- Blair Scott to Jeff Burkey: How did you make the decision to use the 1980 threshold for development? Does that point reflect a change in regulations?
    - Jeff B.: Pre-1980 there were more PCBs in buildings and less afterwards. We are using age of development as a proxy for how much PCB is being generated from buildings and also to represent leaky pipes.

- Bo: This set-up allows us to develop a management scenario based on building material removal.
- In the chat, it was also noted that PCB manufacturing in the U.S. was banned in 1979.

- Debra Williston: Can you walk us through the graphs? Are they preliminary data? The graphs make it look like load rates are more important than loadings. It would help to have more definitions so we can interpret the data.
  - Bo: The dashboard refers to the data as preliminary because we are not fully done with the calibration but we have confidence in the data.
    - The dashboard allows people to point out something that doesn't make sense. For example, flow can explain the larger loading in the Middle Green.
    - Also, air deposition from stormwater is a significant contributor of PBCs in the Duwamish.
    - Data come from studies and were used in the calibration.
    - If you see anything interesting or that doesn't make sense, let us know.
    - Differences in load rates based on area and flows may be more interesting.
  - Jeff B: if we focus on mitigation strategies and the sources are more concentrated, the maps on the left showing total loads may be more helpful, but if the sources are more distributed, use the maps on the right.
    - For air deposition, you want to start with what you know first and then fill in the unknowns.
    - Differentiation can still be refined.
  - Bo: if you click on a pie slice, it gives you the load for the particular pathway.
- Jeff Stern: confused about how you calculated the inputs because they are not sources, they're pathways. What background information fills in the sources? Also worried about double-counting for air deposition because land use is affecting the air deposition, which then affects the runoff from that land use. Should you be subtracting out the washoff?
  - Bo: I don't believe there is double-counting. In the model, the output result for stormwater counts both the load contributed through wash off and the load contributed from air deposition. To separate the loads for each, I turned off the air deposition in the model and generated the output for the loads contributed from wash off only. Then I can calculate the part that is contributed from air deposition. In other words, the model treats them as two different things through two different pathways.
  - Jeff S: Still not convinced you answered the question. You need to calibrate it. How did you account for that in the model?

- Bo: We calibrated the total.
- Yi: We fixed (didn't change) the air deposition values (3 zones for the entire watershed) from real data. For sediment-associated washoff, we set up initial values from soil concentration or used average/median suspended solids concentrations and then adjusted/calibrated those (within a certain range) to stream water column suspended particulate toxic concentration (in mass toxic/mass sediment) in the model to ensure the total was reasonable for calibration. Also, we considered spatial patterns and differences among those subwatersheds. The assumption is the adsorption/desorption rates is not that fast.
- Jeff S: Are you calibrating to total in water or runoff?
- Yi: We didn't touch air deposition in calibration. Then we figured concentration in sediment. It's arbitrary because we fixed the air deposition value.
- Jeff B: Partitioning is important. Atmospheric loading was measured at a few points. The residual is generated by land use to make up for the difference. We are still evaluating how to proportion between air dep and build-up from land use.
- Jeff S: Is air deposition the main source that's generating the load?
- Jeff B: those tools (dashboard) give you an idea of that. There is also groundwater contribution. Atmospheric pollutants fall on the ground and then wash off based on calibration to make up the missing mass, we have via interflow and groundwater loadings.

- James Rasmussen: You are not going from ridge line to ridge line but stormwater is going into the Duwamish. Why is the area from Mount Baker to the Lower Duwamish not represented here?
  - Jeff B: If it's under CSOs, we don't show it here. But if there are areas not covered by CSO, we need to revise it. WQBE (Water Quality Benefit Evaluation) is trying to assess the delineation based on what's going into the Duwamish but it's very difficult. If you think we missed areas, let us know.
  - Post-meeting note from Jessica: The area referenced by James is in the combined system.

MANAGEMENT SCENARIOS

Cleo opened up this section of the meeting discussing the framework under which the management scenarios were developed. Since not all impairments in the Lower Duwamish will be addressed by sediment cleanup, the PLA will help us understand where the hot spots are and how to prioritize addressing them to improve water quality. The management scenarios are examples of possible actions and the model helps us understand their possible effectiveness.

Bo followed up and described the management scenarios the PLA will consider. They are grouped under three main categories:

1. Stormwater management:
    a. Enhanced stormwater conveyance maintenance (for solids reduction)
    b. Watershed-specific storm solids reduction targets (e.g., watershed-wide TSS Effluent limit of 10 mg/L vs. 30 mg/L)
    c. Start of pipe/within pipe implementation: Structural/engineered treatment BMPs (basic treatment vs. enhanced treatment and PCB-specific treatment; e.g., media filtration)
    d. End of pipe implementation: Widespread installation of infiltration BMPs (e.g., rain gardens, permeable pavement, bioretention)
2. Removal of sources stored in infrastructure:
    a. Comprehensive removal of PCBs from infrastructure and building materials (e.g., removal/disposal of PCB-containing transformers, caulking, paint, and other exposed sources, throughout watershed)
    b. Removal of PAH-containing building supplies (creosote-treated pilings, railway ties, utility poles) throughout watershed
3. Upland site cleanup:
    a. Comprehensive upland contaminated site cleanup throughout watershed, with a focus on sites with LDW risk drivers (PCBs, PAHs, dioxin/furans, arsenic)

For each strategy, Bo described data availability, potential significance of contribution, difficulty to model, if there are any modeling assumptions or limitations specific to the strategy, or whether it can be represented with the model or using a sensitivity analysis.

After Bo's presentation, the participants were invited into breakout sessions to answer three questions:

1. Any other scenarios that are missing from the table?
2. What would you prioritize and why?
3. What challenges can you identify with these strategies?

Summaries from each group:

Group 1—Participants: Bo, Jeff Stern, Jeff Burkey, Gretchen Onstad, Sandra Matthews

- Impact from transportation. The management scenario proposed by Jeff Stern is: will the reduced traffic impact the load contribution from the watershed? This could inform the management if the increased remote work will benefit the environment.

- Air deposition study from the Puget Sound Clean Air. Gretchen brought up the air deposition study conducted by Puget Sound Clean Air Agency. There might be some useful information for the air deposition module for the model.
- Building material removal for PAH removal. Jeff Stern commented that since there is PAH everywhere, removal of building materials containing PAH might not reduce the load significantly enough.
- How to predict sources and use the model to prioritize areas might be very challenging as indicated by Jeff Stern.

Group 2—Participants: Elly Hale, Blair Scott, Rick Thomas, Priscilla Tomlinson, Deb Williston

- Priority of management scenarios may differ depending on the contaminant. PCBs are very important and widespread. Building materials containing PCBs are important source.
- Missing management scenario of stormwater retrofits/upgrades: Lots of infrastructure in industrial Seattle is aged and outdated. Focus on areas of the watershed where development preceded stormwater regulation. Old stormwater infrastructure generally coincides with older buildings that may include PCBs in building materials. Retrofits could include BMPs, green infrastructure, purchase of land for stormwater retention, treatment. Controlling stormwater pathway is probably easier, faster and more effective than trying to address PCBs in building materials one by one. Sometimes the PCBs in building material aren't actually getting into stormwater.
- PCBs in building materials. Key time for intervention is when redevelopment is underway. Demolition or upgrades can mobilize the PCBs. Use SEPA checklist or city permit process to identify buildings that need testing or appropriate controls/waste management (Ecology already reviews for proximity to MTCA sites).
- Need a system to flag, inventory, and track buildings likely to have PCBs in materials.
- Need to establish regulations and educate developers/facility owners and local government about importance of appropriate management and of NOT recycling contaminated concrete.
- Building materials don't always have to be addressed through wholesale removal – sometimes encapsulation can buy time.
- Tighter land use regulations are needed. [this topic was cut off by end of breakout session]
- Need more brainstorming and follow-up discussion

Group 3—Participants: James Rasmussen, Li Ma, Kristen Kerns, Vicki, and Cleo Neculae

- James Rasmussen: Going street by street can help calibrate the CSO area. Take into account differences among areas. For example, Rainer Valley is very developed and has a lot of impervious surfaces. Also, how will the wet weather treatment facility at 4th and Michigan impact stormwater once it is in operation?

  - You should look at others to see what BMPs they are using. For example, Portland is putting filters in pipes and it seems to be working. Look at the research Washington State University is doing. Also, look at research that UW is doing with floating wetlands at outfall sites.

- Li Ma: How many CSOs are there in the Duwamish and what's their frequency?
- James R: Look into creosote pilings in the upper third of the Lower Duwamish. Are they being used a tie-ups by fishermen? Can they start being replaced? Also, in terms of BMPs, coordinate with Our Green Duwamish on the BMPs you and they are using.
  - How do you communicate to communities what these models are doing and what the PLA is trying to do?

Group 4—Participants: Will Hobbs, Kevin Schock, Shawn Gilbertson

- The management strategies selected seem appropriate. There was a question as to whether 30mg/L upper limit was appropriate (i.e. too high in comparison to permitted TSS limits). More time to consider and provide specific feedback is warranted.
- Concern was expressed about properly testing the management scenarios with the available data. In particular, if you're modeling single point sources (i.e. stormwater outfalls), how do you partition the source if you don't have data?
- Overall, it should be acknowledged that it is very difficult to test management strategies with modeling. This led to a discussion of uncertainty in the modeling among the subbasins. How do you deal with the uncertainty; how do you communicate it; can the uncertainty be used to help prioritize actions or management goals (i.e. targeted studies to fill data gaps).
- It was felt that more time is needed to digest the modeling approach and management strategies.

Group 5—Participants: Jessica Huybregts, Kevin Buckley, Elsa Pond, and Anthony Wenke

- Can we include any strategies to address inputs from the non-built environment (e.g., forest land use)? (see high PCB loads in the Middle Green forested area)
- Can we address sources of airborne PCBs? Could there be something related to control/ enforcement, or focus on actions that lead to increase of PCBs in air such as track out from localized sources?
- CSO inputs (recognized these will be considered in the receiving water model)
- Retrofits – consider MS4 retrofits of roadway surfaces, leading to a certain % TSS reduction

The participants reconvened and the Ecology/EPA group facilitators debriefed the entire group about the discussions they had. Bo suggested that, based on the feedback, another PLA TAC meeting may be organized in the summer after TAC members had a chance to review the information presented in this meeting. Another option is to convene an interested party meeting, which has not been organized in a while.

CALIBRATION RESULTS

Yi Xiong, PLA modeler with Ecology, presented the most recent results of the HSPF model calibration.

- The model simulates 20 years of loads by sub-watershed for the six parameters.
- The calibration targets are expressed in terms of the relative average error for statistical evaluation. A visual evaluation is also performed. Both statistical and visual check-ups are used for toxic concentration calibration.
- Yi presented a table that showed model performance for each parameter plus flow by subwatershed up to this point.
- Next, Yi shared calibration results for arsenic (total and dissolved), total copper, and total PCBs.
- Next steps include:
    - Further optimize model parameters taking into account spatial differences
    - Adjust or modify some coefficients
    - Improve toxic boundary condition at Howard Hansen Dam
    - Apply building age to parametrization
- Debra Williston asked if a write-up of these results can be provided to better review the results.
    - Bo: a write-up will be provided when the calibration is complete. In the meantime, presentation slides will be made available after the meeting.

WRAP-UP

The PLA team will most likely organize another TAC meeting this summer to continue the discussion on management scenarios and the model calibration results.

If anyone has questions before the next meeting, contact Bo Li at bo.li@ecy.wa.gov.