

## **TECHNICAL ADVISORY COMMITTEE MEETING #10**

12424 42nd Ave South, Tukwila, WA 98168

November 1, 2017

### **TAC PARTICIPANTS**

- Kevin Buckley, Seattle Public Utilities
- Ben Cope, USEPA Office of Environmental Review and Assessment
- Allison Crowley, Seattle City Light
- Mike Perfetti, City of Tukwila
- Shawn Gilbertson, City of Kent
- Matt Goehring, WRIA 9 Watershed Forum
- Greg Pelletier, Ecology Environmental Assessment Program
- Elsa Pond, WSDOT
- James Rasmussen, Duwamish River Cleanup Coalition
- Pete Rude, Seattle Public Utilities
- Blair Scott, King County DNRP/WLRD/SWS
- Jeff Stern, King County DNR/WTD
- Chris Townsend, King County DNR/WTD

### **ADDITIONAL MEETING PARTICIPANTS**

- Becky Chu, USEPA CERCLA
- Jenee Colton, King County DNRP/WLRD/STS
- Curtis DeGasperi, King County DNRP/WLRD/STS
- Mike Ehlebracht, Hart Crowser
- Justin Hansen, TIG Environmental
- Tarang Khangaonkar, PNNL
- Katie Kuhla, Ecology Toxics Cleanup Program
- Bo Li, Ecology Water Quality Program
- Laurie Mann, USEPA Office of Water
- Rachel McCrea, Ecology Water Quality Program
- Cleo Neculae, Ecology Water Quality Program
- Bruce Nairn, King County DNR/WTD
- Joan Nolan, Ecology Water Quality Program
- Kevin Schock, King County DNR/WTD
- Tracy Stanton, Urban Waters Partnership
- Justin Twenter, Seattle Public Utilities
- Ben Wilkinson, WSDOT
- Williston, King County DNRP/WLRD/STS
- Iris Winstanley, Leidos
- Yi Xiong, Ecology Water Quality Program

## WELCOME AND INTRODUCTIONS

Joan Nolan, Ecology Water Quality Program facilitator, welcomed everyone and led the group in a round of introductions. She provided a brief reminder of Technical Advisory Committee (TAC) Pollutant Loading Assessment (PLA) goals and roles, and an overview of the agenda for the day.

## MANAGEMENT SCENARIOS

Rachel McCrea, Ecology Water Quality Program, presented how the PLA will develop a watershed-based computerized “model” to help people understand what is polluting the river and where it comes from. This tool and future monitoring data will provide information to support cleanup and water quality decision-making in the Green/Duwamish watershed. This will be used to develop specific questions that the modelers can wrap their heads around – translating regulatory or management questions into modeling questions.

Rachel noted some changes in the modeling team including Ecology divesting from Tetra Tech and hiring Yi Xiong to do modeling, and that Bo Li would later give an update on the modeling team.

Rachel introduced the initial set of scenario modeling questions including those related to reducing ongoing pollution in watershed to inform cleanup decision making looking at media-specific data, regulatory tools, control actions, and geographic differences. Rachel gave an examples of a question that could be asked; what does long term monitoring look like? Or what BMPs or water quality implementation tools can we use?

Rachel then walked through an example using stepwise process on the sample question: What % of the LDW pollutant load is from: CSOs, bed sediments, LDW stormwater runoff, various watershed flows, Elliott Bay, other? To answer this question, Ecology will use an existing model(s) to conduct a screening analysis to help us understand which pollutant transport pathways have a greater impact than others on the modeled outcome.

Next what are planned actions such as sediment cleanup and CSO control actions? If a pathway source assessment finds standards are not met after planning actions implementation, then how do we address impairment? At this point Ecology would next prioritize pathways looking at the percentage of remaining pollutant load and ask which pathway has the most impact on sediments, how much pollution reduction will help meet standards, what level of treatment is needed to meet standards, and what is the highest achievable attainable use? An adaptive use of modeling tool would be used.

To answer an example on stormwater management some questions would need to be asked: what aspect of stormwater do we want to ask about? Does the model’s predictive ability improve if air deposition/solids/seasonal first flush in stormwater runoff are addressed? Will additional studies be needed to answer the question? Which are the most important questions? It will be an adaptive process.

Finally, Rachel asked which pathways into the LDW should be screened. How do we distinguish between pathway and source of pollution? As an example atmospheric deposition is an ongoing source of pollution in urban areas.

### Questions from the audience (here and elsewhere in bullets):

- James Rasmussen (DRCC HAG) asked if we have air deposition data.
  - Rachel said yes, but no information on source.
- Jeff Stern (King County) said the model doesn’t tell you what you don’t tell it to do. Unless you already know the answer, a model can’t tell you how important of a factor the runoff coefficient is, for example.

The model can help with a sensitivity analysis by isolating each factor. Jeff asked what data do you need and why and how does it help you with a better model? It can only do so much with data. For example, if we ask what's coming out of the bed and we don't know, the model can only answer that question based on the assumptions we have already put in.

- Rachel responded that it's a "chicken and egg" question.
- Jeff Stern (King County) answered that his concern is that we spend money and effort and we'll find that we were looking in the wrong place.
- Debora Williston (King County) suggested that we need to see what data we have and look at each pathway.
  - Bo said that we are doing a screening analysis to analyze what we know so far and prioritize. We are scheduled to do an empirical loading assessment after we compile the water quality data. We need to start with something small that can guide us.
  - Ben Cope (EPA) said that we overemphasize the model over the empirical side. Each pathway is a project. We can look at the inputs to the model as an organizing tool. It is a long term, iterative exercise.
- Jeff Stern (King County) said that the first question should be looking at all pathways. We play with the model the way it is set up. For the screening analysis, we need to focus on all pathways and the model will tell you which one is more sensitive.
  - Rachel responded that is the purpose, finding out which pathways are the most important. We are trying to go deeper than just pointing to one pathway. We need to answer the small pieces earlier.
  - Bo added that another purpose of Rachel's presentation is to present the step by step for management scenario. What are the regulatory Qs we need to ask?
- Kevin Buckley (SPU) asked about what we presume that the CSO load is.
  - Rachel responded that we can restate this question to ask what happens when we do these improvements. What's remaining? That's when you include CSOs into the model.
- Kevin added that we can do that if you assume you're in compliance.
  - Rachel responded that tool (the model) can inform about that too.
- Debora Williston (King County) asked what the endpoints of the project are.
  - Rachel responded that the end goals are CWA endpoints.
- James Rasmussen (DRCC) asked about the source control for the beginning of the work and sufficiency.
  - Rachel answered that the project is not set up to answer that but empirical loading will be done.
- Tracy Stanton (Urban Waters Partnership) asked whether the intent of the project is to focus on the cleanup or existing sources.
  - Rachel answered they both are.

## **UPDATE ON WATERSHED MODELING APPROACH / NEXT STEPS**

Bo Li, Ecology Water Quality Program, talked about transitioning from the LSPC model to the HSPF model. Bo distributed a handout on the Pros and Cons of LSPC v. HSPF. Bo gave an overview of the pros and cons of each model and added that by March 2018 the hydro part of the model will be completed and that Ecology's hydrologist will manage the model.

Bo gave a status update on where the PLA is at with regard to the LSPC model and noted that the LSPC model is not ready yet. Bo noted that because LSPC was developed by TetraTech and is not publicly available, Ecology cannot know how LSPC will evolve in the future and adaptively manage the model. Therefore we are building our own model in house using the publically available HSPF. The advantage of HSPF is that training is available and many throughout the scientific community are familiar with HSPF. At this point Tetra Tech's contract is short term but they while they are still under contract, they will be able to help with a transition to HSPF.

- An unidentified questioner asked if Bo was talking about pollutant transformation thru environment.
  - Bo said yes.

Bo continued by presenting on three problems with HSPF:

- 1) Allows only 3 particle sizes. We need to understand if we need more categories.
- 2) HSPF has a limit on how many pollutants it can run simultaneously.
- 3) We need time to convert LSPC to HSPF.

#### **Questions from the audience:**

- James Rasmussen asked how the two models compare in running time.
  - Bo answered that LSPC in general runs faster than HSPC but the more pollutants we add, the slower it runs. The question is, though, do we need to run the model with so many pollutants? Even though LSPC has the capacity for more pollutants, we may not need it. The modeling can be done in batches.
- Kevin Schock (King County) asked how we determine when something important needs to be in the model. What is the difference between using 3 and 6 particle sizes? He stated that it's important to be able to answer the questions about particle sizes before we use the model.
  - Bo stated that the TetraTech contract is ending in March, so we have limited time to use their expertise and need to make decisions about transferring the model as soon as possible.
- Kevin Schock said that they found they can run their model with 3 particle sizes and can share documentation about it with us. They also found that they need to include only certain sized particles in their model. The guiding question is what sticks in the system. If the particle sticks, it's a problem and it should be included in the model. If it doesn't, you don't need it. You take the equations and scale them to find out. You don't need a model for that. He also suggested using scaling analysis.
  - Yi stated that we use the receiving water model to break it down.
- James Rasmussen (DRCC) asked about Tetra Tech's assessment of model limitations that the firm was willing to live with. What were the conditions that TetraTech was insisting on using under the existing limiting conditions?
  - Ben Cope (EPA) explained that proprietary ownership of the model code has different levels. The code was developed in house by TetraTech. There are different levels of proprietary ownership and TetraTech has an intermediate level. We can't get the code but we can run the model.
  - Rachel added that TetraTech did not build toxics kinetics at all. The project team was not aware of this and TetraTech did not disclose it in the QAPP. Building toxics kinetics will require code development which currently we don't have enough expertise in house to develop it.

- Bo stated that the project team initially wanted to keep using the LSPC model. However, after realizing the code is not available and the toxics kinetic is not built in yet, the project team decided to switch back to HSPC.
  - Greg Pelletier (ECY) added that the remaining budget would not have allowed us to build the toxics kinetics. Bo agreed.
- James Rasmussen (DRCC) stated that the TAC made the decision in the beginning of the project to go with LSPC. DRCC concerned about the change and how to communicate it to community.
  - Rachel answered that TetraTech didn't disclose that they didn't have enough budget to do the toxics.
- James Rasmussen stated that an option that had not been discussed was to find an outside way to fund TetraTech to get the project done.
  - Rachel answered that Ecology looked at other options internally, but unfortunately, the answer was no.
  - Bo added that we don't feel like we are losing too much by not having TetraTech involved. TetraTech felt there wasn't a big difference between the two models. We have a strong team locally and would be wise to use it.
- James Rasmussen insisted that his question of how and why there was no further funding for TetraTech was not answered.
  - Rachel explained that it was the steering committee's decision. We have the funds for staff to do the work but not for contract.
- James Rasmussen asked if we brought anyone in to discuss outside funding.
  - Rachel answered that James must be thinking about a particular person but she doesn't know who he is referring to.
- James Rasmussen stated that there is a need in the state for the LDW cleanup and its success, so funding for TetraTech should have been identified. There are funding sources outside of federal and state sources.
- Jeff Stern (king County) said that one of the problems Ecology is facing going with TetraTech is having an executable product that we can't play with it afterwards because TetraTech owns the code, so the code can't be improved in the future.
  - Rachel added that we need this capability since we are interested in adaptive management.
  - Greg Pelletier (ECY) added that the lack of access to the code can be a fatal flaw.
  - Bo said Ecology made a decision to use local team and so we realized it's better to use HSPF.
- James Rasmussen said he has to be able to describe this to the community. "We talked to the community about TetraTech and its technical expertise. Now it's a muddy answer and now we're cobbling together a team and it makes it hard to present it."
  - Greg Pelletier explained that we're not locked out of TetraTech and we can still use their expertise and can use HSPF.
  - Rachel addressed James that she hears his concern about the model and understand his concern about how to communicate this to his community.
  - Greg added that the HSPF transition is easy, and converting it back to LSPC, if needed, would be fairly easy too.
  - Bo continued by introducing the Project Team, which included modelers from other agencies, and the Database Development team. Both report to an Internal Advisory committee.

Bo then presented the Project team structure and introduced Yi Xiong, Ecology's new HSPF modeler out of NWRO. Bo explained the current project timeline, including the update for the hydro part in HSPF. She said that the QAPP will need to be updated to include toxics modeling and the receiving model approach is expected by June 2018.

Bo mentioned other steps in the timeline, including an update for the database and the screening analysis, and this work will be done in parallel with Rachel's work on model scenarios. The work on receiving water model is expected to continue through 2021. At that point management scenarios will be evaluated. Finally Bo mentioned at the benefit of working in-house is that do not have to depend on soft money /contract work.

#### **Questions from the Audience:**

- Jeff Stern (King County) asked about the 2017 hydro update in the project timeline.
  - Bo answered that it is the result of an Auburn comment. We wanted to make sure we included their concerns. We are not sure if it will be a big change yet, but wanted to leave enough time for modeling team to address it.

#### **SALISH SEA MODEL**

Tarang Khanganonkar (PNNL) gave a presentation on the Salish Sea Model. He said it is a receiving water model. It is an unstructured model. Structured models are not appropriate for the Salish Sea, so they started looking for unstructured models. University of Washington had a model for the Puget Sound, while other groups have modeled other parts.

Salish Sea needs one model that simulates it as a whole. The model is focused on dissolved oxygen (DO) in the Puget Sound. How much nutrient pollution can it assimilate before it becomes anoxic? Selected FVCOM for Hydro and CEQUAL ICM for water quality, the latter having been used in Chesapeake Bay.

FVCOM has mass conservation. It is an unstructured grid model, uses triangular elements that model shoreline well. It can be split into smaller triangles for the shore without disturbing the scale far from the shore. It is a finite volume model. Salish Sea has a plume, so they needed to change boundary conditions. The current model works well with a boundary that stretches outside. Grids far out are about 30 km long, so they don't use too much data.

Inputs to model are surface, nonpoint flows, including stormwater, and point sources, such as WWTP flows.

- Pete Rude (SPU) asked about a figure showing the simulated value on top of measured data and wanted to check they were both represented in the graph.
  - Tarang answered yes, both are shown in the graph and represent data for one station. Basin wide error is less than 1 psu.

Tarang added that the model can reproduce currents, temperature, and a 3D output. The model can do averaging for the top and bottom layers. It needs to take into account eddies, like the Juan de Fuca eddy.

The model also needs to take into account how much water comes into Salish Sea and how much comes out. The model can predict water movement and uses vertical circulation cells. Admiralty Inlet water draws down and recirculates the water. Almost 60% of the surface outflow stays in the inlet between embracing cells.

Tarang asked if it is possible that some of the toxics coming in accumulate. This would mean that even if incoming water meets standards, the accumulation can drive the receiving water above standards.

Tarang then presented on the biogeochemical model. He discussed the sediment diagenesis component-loads of organic matter in the PS and explained that oxygen levels may decrease due to decaying algae. He concluded that the model is working in a way that makes sense and so they were able to reproduce hypoxia in in the Puget Sound using the model.

He also mentioned the issue of ocean acidification, which can be modeled using a carbonate chemistry module. This will allow them to look into the issue of resilience, e.g. can eel grass be used as a resilience tool?

## **DISCUSSION OF RECEIVING WATER MODELING APPROACH**

Ben Cope (EPA) followed Tarang with a presentation. He stated that the Salish Sea model has not been used for toxics but they have been adding modules successfully to the model. He went over the benefits of using an unstructured grid and stated that there is local capacity to develop and run the model as an alternative to the EFDC model. There is capacity for EFDC too. Computing benefits include speed and parallelized code. Potential mutual benefits stem from the fact that the project may drive the addition of toxics in, which means that later we can evaluate other things. Challenges come from the fact that the model includes no toxics but we want to look into adding it with funding from somewhere else. This means, though, that there will be a course change and change in QAPP. There could also be transaction costs because outside consultants will likely not be familiar with the Salish Sea Model. He needs to check with the Puget Sound program.

### **Questions from the audience:**

- Pete Rude (SPU) asked what the receiving water will do for particulates.
  - Ben Cope answered that there will be no change but a challenge overall.
- Kevin Schock asked if the model has a sediment transport component.
  - Yi asked if the SSM models waves and Tarang answered that they can add a wave component. It's not something they have used but it is available from UMass.
  - Rachel said she was not happy about transitioning to a new model initially but then thought if we are going to spend money to model the LDW estuary, why not use the Salish Sea Model? If it can be done successfully for the Duwamish, maybe it can allow us to ask other questions, like climate change, fish, or model somewhere else, Port Gardner, Eliot Bay.
- Kevin Schock asked about watershed loads and how much of a load comes from Green River? He added that if you try to figure out what's important, you don't need the model.
  - Greg agreed that we need empirical estimates of loading and that you can do that without a model.
  - Bo stated that the next steps are to evaluate the pros and cons of the Salish Sea model, as well as other alternatives. We will present a recommendation at the next TAC meeting.
- Jeff Stern (King County) said that, the Salish Sea model aside, he would like to see info of development vs other options (EFDC vs. new model), that take into account project timing and cost. What do we gain from the perspective of this project? Do we need a watershed model or have an input into the receiving model? Where do we put the inputs?

- Ben Cope (EPA) said we need to write a proposal. In addition to timing and cost, we need to consider the technical benefits.
- James Rasmussen asked if we can widen the focus of the benefits for salmon recovery, US Army Corps projects, like dikes. He asked if the Salish Sea model can predict how to best do habitat restoration on dikes. He added that we need to look at benefits more widely.
  - Rachel said that we have time to make this decision. We would not be the sole funders. If WRIA 9 may have other uses for the model, we need to know.
  - Bo added that we can compare different models but we're also waiting for EPA.
- James Rasmussen asked by when the TAC needs to know if we want to use SSM because they need to talk to lots of people. Rachel answered about March.
  - Bo said that when we have enough info to make decisions, we will call another meeting probably in late spring.

## WRAP UP

Joan Nolan asked if there are any strong opinions about WebEx or in-person meetings. Rachel McCrea said that WebEx could be an option for people who can't make it to the meeting. Ecology will send emails to everyone with questions.

Joan mentioned early spring as a ballpark date for HSPF sediment modeling, screening analysis, and technical memo; and late spring for the next TAC meeting.

Joan mentioned that presentations and meeting notes and other project information may be found on website:

<https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-improvement/Total-Maximum-Daily-Load-process/Directory-of-improvement-projects/Green-Duwamish-Watershed-PLA>

Rachel mentioned Ecology's website is to be changed in the near future and advised everyone to save existing pages they think have the most important content.

## NEXT STEPS

No specific next steps were discussed. Bo Li covered the timeline during her presentation, and Joan Nolan gave the audience a heads up on when we expected to check in with the TAC next during Wrap Up.