Spokane River Regional Toxics Task Force

February 1 Tech Track Data Synthesis Workshop Notes
Facilitated by Lisa Dally Wilson
Meeting Documents: http://srrttf.org/?p=12385

Attendees:

Voting Members and Alternates

Tom Agnew – Liberty Lake Sewer and Water District
Doug Krapas – Inland Empire Paper
Craig Borrenpohl, Alyssa Gersdorf – City of Post Falls
Rob Lindsay – Spokane County
Jeff Donovan, Cadie Olsen, Trey George, Logan Callen – City of Spokane
Vikki Barthels – Spokane Regional Health District (SRHD)
Mike Anderson – City of Coeur d'Alene
Chris Donley – WA State Department of Fish & Wildlife
Holly Davies – WA State Department of Health
Ken Windram – Hayden Area Regional Sewer Board

Advisors

Karl Rains, Jeremy Schmidt, Cheryl Niemi, Bill Fees, Brandee Era-Miller, Sandy Treccani, Will Hobbs, Cathrene Glick, Keith Seiders – Washington State Department of Ecology (Ecology)
Brian Nickel, Gunnar Johnson, Joel Achenbach – Environmental Protection Agency (EPA)
Kristen Lowell – Idaho Department of Environmental Quality

Interested Parties

Dave Dilks – LimnoTech
Ben and Lara Floyd – White Bluffs Consulting (WBC)
Lisa Dally Wilson – Dally Environmental
Monica Ott – Avista
Dr. Lisa Rodenburg – Rutgers University
Mike Petersen
Robert Mott – Mott Consulting
Gary Jones – United Printing Alliance
Doug Austin – Chesapeake Bay Program
Kris Holm

Lisa Dally Wilson went over the agenda and the review of candidate studies to address key unknowns in the Mission Reach which were prioritized on Day 1.

Watershed Wide Management Issues and Candidate Studies – Dave Dilks gave the presentation.

Are we making measurable progress?

Long Term (LT) Effectiveness monitoring – Dave asked if it's important to look at fish up at the State line?

Comments/Questions:

- Dave mentioned how WDFW participation is required for LT fish monitoring to occur. *Chris said WDFW's intent is to help as long as help is needed but there will be a cost*

similar to last time. With the species at State line, they looked at younger aged fish and could do the same with smallmouth bass or they could do a composite to try and find salmonids and back fill with a secondary set of smallmouth bass.

- Are the fish being pulled out hatchery fish? *Chris said no, they are wild origin. There are no hatchery fish at that portion of the river, but Avista puts some in the lower part of the river. Will said we should remove the site rather than try to replace it with a different species and it will be hard to see if it is compatible if you have multiple other sites. Lisa said this is looking at trend assessment so if looking every year and collecting the same composite of species at a specific site, we can see if concentrations decrease there.*
- Brandee said if we are patient and ok with decadal sampling and the current program with Keith, we do collect large scale suckers, but it doesn't fit the short trend line with what is trying to be done with Redband trout.
- Why was Redband trout originally selected and is it most appropriate or would there be value in using other species? *Chris said they were selected because in most of the river it is the native, ubiquitous species. There aren't mountain white fish above the falls except for small population around downtown Spokane. In losing reaches of river they don't exist and Redband are more thermally tolerant. Chris agreed the decadal sampling is fine, but aging suckers accurately can be challenging, and they live a long time. They would want to help support EAP to age the fish and if they are 15-20 years old it may be a misleading sample. Chris suggested younger fish may be better.*
- Keith said sucker fish could be 20-30 years old in the range we get and it's tough to get the age right and don't age them until after compositing and analysis. It's probably not good to age them before compositing. With suckers and decadal monitoring there is a higher level of variability in results due to the mixed age of fish. Keith supports young of the year (YOY) monitoring - using same species, small age and size range. The TF intends to do that every two years.
- Chris asked what do you think small mouth bass would do as a surrogate? What size small mouth are you seeing? We can get it down to one- and two-year-old. *Keith said one concern if they are accumulating PCBs at a concentration that they could discern a trend in future as they are leaner fish. For measuring decreasing trends, you want a good environmental signal. There could be value in including that site and species. Keith recommended adding the small mouth bass in for monitoring and suggested sampling and analyzing TWO different species as separate samples: YOY RBT and YOY SMB.*
- Is anyone presenting in August at the national American Fisheries conference? *Chris said they hadn't considered it, but it has merit.*
- Are Redbands present in Lake Coeur d'Alene, and can you harvest them? *Chris said Post Falls is a barrier to anadromy. All the fish above are different. On occasion fish get past the falls though.*
- The justification for the fish study was to establish baselines now so that if/when we can't discern positive trends in water column, we have a surrogate to transfer over to and an explanation on why we were moving over to fish tissue. The fish analysis is dependent on funding availability and the work of the TF.
- When sampling for fish tissue, how is the amount of PCB that the fish from the hatcheries absorb addressed? While "native" fish can be used for testing, the native fish

can and most likely do eat hatchery fish and the hatchery fish that die will have their PCB made available if they are eaten or decay.

- With future warming trends, should we consider also sampling YOY small mouth bass in the other sections too, not just State line? *Chris said small mouth bass aren't equally distributed across the river and where it's warmer we see more of them. Where it's cooler by Greene St. and lower portion of river there aren't many in there.*
- Lisa summarized that if younger year trout aren't available in enough numbers, we could also collect younger small mouth bass in the one reach up by State line and composite bass for trend analysis in that reach going forward, and others agreed with the approach.
- Is one of the intents of the State line site to provide background conditions information? *Dave said It's a secondary benefit.* Will thought dropping that site won't affect ability to detect trends.
- Dave asked if there is merit in doing a trend assessment at State line? Keith mentioned the USGS groundwater flow model and sensitivity of that is not great. We have to be careful of using SPMDs. It may be worthwhile performing sensitivity analysis of the whole SPMD process and any uncertainty that comes out of this and the whole system may not be sensitive enough to tell us there is a trend. Dave wants to talk to Keith more about this comment and also include Will Hobbs in the discussion.
- Dr. Rodenburg said the CLAM samples had a weirdly high concentration of PCB 7. She thinks this was the contract lab misidentifying PCB 11 as PCB 7, so maybe that is not a CLAM problem but a contract lab problem?
- Brandee asked which CLAM samples were you looking at? It depends on when the samples are taken but the housing of the discs had PCBs in them, and once we identified this as a blank contamination issue, we changed to a different stainless-steel housing. *Dr. Rodenburg said the fact that PCB 11 was non detect was a big red flag.*
- It may be possible to review the CLAM raw data to better evaluate whether congener misidentification was present.
- Will said I suspect they were prior to replacing the housing. It may be an option for replacement and using a stainless holder. It's an active sampling technique so it gives more of a direct measurement. Regarding SPMDs, Dave you are right in just relying on dissolved concentrations. I don't know that you need to calculate total as it introduces more variability. You said the concentrations in water were high, when you processed data how did you treat blank SPMDs? *Dave said they didn't see anything in lab blanks and looked at field blanks per the Ecology SOP. They looked at the mean of field blanks plus three standard deviations which equals limit of quantification; Mean of field blanks plus ten standard deviations equal limit of detection.*
- If we use dissolved only, given the higher-level congeners are typically more associated with particulates, is there any issue or will it impact analysis? *Will said no, it shouldn't. You're modeling the equilibrium behavior of individual compounds based on their weight. The model is accommodating that variation of congeners that exist in the water.*
- Brandee asked - should we discuss another high-volume methodology sampling? It's something that USGS has developed where they separate dissolved and particulate fractions. *It can be discussed later.*

Lisa said when you look at trends from Dr. Rodenburg's PMF analysis (covering 20 years), it highlights importance of fish monitoring at the same time as water column sampling. If we stick with SPMDs, do we rely on dissolved concentrations and supplement with grab samples? We can have more discussion on trial investigation of CLAMs and USGS methodology Brandee mentioned. Dave said the next SPMD work is planned for August/September. Lisa gave the timeline of when things will happen. They will discuss long-term water column sampling methodology at the work group level or a smaller work group discussion.

Do currently undefined sources exist?

a. **Selective low flow water column synoptic sampling**
b. **Sampling to define non-point source loading during high river flows**
c. **Monitoring upriver/upgradient of Kaiser**
d. **Assessment of potential for stormwater transport via drywells**

- Was any sludge from the SIP (Spokane Industrial Park) WWTP land applied in that general area? Dave provided link for Ecology report discussing PCBs in sludge at SIP: https://apps.ecology.wa.gov/publications/documents/95310.pdf
- Robert Mott observed it appears now it goes to a wastewater treatment plant rather than the river.
- Bill said a lot of the cleanup was done out at the industrial park, and it would require a dive into the TCP filing system to see what data they have. *Dave said they will do more monitoring at Mirabeau and if it is a significant source, the TF will look more closely at this.*
- Brandee said the EPA Tetra Tech report estimated the load: Mirabeau was 12.0 mg/day. In contrast, Tetra Tech estimated the groundwater plume from the Kaiser site during August to be 353 mg/day. *Dave said that was a mid-point number of a very large range. It looks like something is coming in up there but not as big as what is coming from Kaiser groundwater.*
- Jeremy said regarding the SIP, Avista may have records of operational history of the wastewater treatment plant.

Dave asked if the TF should do additional biofilm and water column sampling at Mirabeau?

- Doug asked is there enough information for Dr. Rodenburg to do PMF analysis of upgradient PCB source in comparison to fingerprint for Kaiser to differentiate and determine significance of that source? I believe there are data in wells upgradient of Kaiser and data Kaiser has from their known plume. Could you differentiate an upstream fingerprint and be able to determine source? *Dr. Rodenburg said she would have to look at specific wells (4,5,10 and 11) and see if they were included in data set, she was given. Dave said there is a sample that shows a spike in well 5 but the source is coming in sporadically.* Doug asked Dave about using downstream data where there may be more hits. *Dave said the signal you see in river downstream is similar to Kaiser and he is not sure how to handle this. Dr. Rodenburg doubted there is enough data to do PMF, but the group could look at aroclor patterns.*

- Brandee said they gave all the data to TetraTech to do this, and she will forward their report.
- Jeremy said they have EPA Method 1668 data for those upgradient wells, and they continue to be sampled semi-annually.
- Lisa said given the intermittent nature of hits to upgradient wells, is it possible, that at times, groundwater flow direction changes seasonally, and is it possible flow is north to south at times and may be picking something up at Mirabeau? *Dave said Kaiser wells are capturing what's coming in upgradient of their facility.* Is it possible there are additional wells that are associated with the industrial park before Kaiser's upgradient wells? *Bill said he's not aware of any monitoring wells. The big one is the old navy gravel pit, which had contaminated soils.*
- Doug said - the sludge from SIP oxidation ditch, I assume it's associated with wastewater treatment? *Yes.* An oxidation ditch is secondary treatment. Where did that information come from? *Dave said an Ecology report. My recollection is there was a WWTP associated with this industrial park and having a hit of that magnitude is significant and there had to be a high source coming from someone at the park.*
- Cathrene said on the left bank along Mirabeau there is a significant basalt outcrop. The city did a recon there last August as it is a gaining reach. Ecology will be sampling that area for nutrients. There is a significant groundwater inflow there.
- Shall we do a data evaluation of Tetra Tech information on what is known outside of Kaiser?

Lisa added items to the list from the discussion above. Dave asked if another synoptic survey should be done covering USGS Gage to Nine Mile? Lisa asked how large of a load would it need to be? Dave said if it's Kaiser sized then we would be able to identify it. It would need to be a large load. Don't want to base all of our assessment on a single mass balance assessment.

Comments/Questions:

- Do we need to define what is a significant load? With tertiary treatment most are less than 10 mg per day. *Dave said he meant discernable. Lisa asked what size load is discernable? Dave said it may vary between reaches.*
- Dr Rodenburg said we need more data. We have to think about the cost-effective way to get more. I don't think another synoptic survey will give us a discernable source. We need more water column data for this specific reach.

Dave asked if anyone sees merit in doing another synoptic survey between Plante's Ferry and USGS Gage?

- It's a long segment.
- Brian mentioned the cosine similarity calculations his intern did. In addition to the mission reach, she looked at a stormwater outfall at Ralph Street and compared it to the nearby biofilm station. The stormwater was very similar to the biofilm: Sigma > 0.93. Ralph street is one block east/upstream of Greene St.
- Dave said synoptic sampling tailored to other things and not solely a MB assessment is an idea.

Dave asked about looking at dry wells upstream of the city and whether we look at potential of the dry well PCBs to reach the river?

- Rob said we have overlapping regulatory programs and there are stormwater NPDES permits and agencies, and they aren't participating in today's workshop. I'm curious about this loading but my concern is we have these regulatory programs that don't connect, and the numbers don't align. Is Ecology going to regulate stormwater or are we just collecting information to look at that goes nowhere? We are here as dischargers because there is a regulatory touchpoint and there isn't one on stormwater right now.
- Mike P. said a couple years ago Lands Council partnered with the city to do a swale test and it was effective as it trapped 57% of PCBs that flowed through. It could be mitigated with adding carbon and we could look at areas like Mission Reach. It could be easier to mitigate at this point than after it's already in the groundwater.
- Brian said I agree that stormwater is easier to mitigate than groundwater or surface water, but it is illegal under TSCA to have exposed sources of PCBs in excess of 50 parts/million. The biggest problem is we have divested enforcement, but it has been enforced in some areas. There is a possibility of removing the sources before they have a chance to get into stormwater. Groups like this can be helpful in identifying where those programs can help.
- Karl said the more evidence that is found on the stormwater front, the easier it is for agency to do follow up actions. Ecology can discuss. If the TF finds something stormwater related that is not under purview of someone at the table, it doesn't mean nothing will happen. The more data we have the easier it is for us to pursue additional action
- Trey said there are mechanisms to address sources through toxics program. If PCBs had a TMDL it would be in our permit like phosphorous is.
- Rob said Spokane County is committed to the process, and we support the collection of information. I don't mean to suggest information would go into a black hole. We have our opinion stormwater is a source and we support this. These regulatory touchpoints we all deal with create inconsistencies.
- Brandee said a dry well study could be beneficial to the Spokane work but also to others who are interested in possible contamination from dry wells. I'm assuming there isn't much in the literature about this.
- See slide 7 http://srrttf.org/wp-content/uploads/2021/03/PCB-Cos-Similarity-Presentation.pdf
- Kristen said there is an adjunct professor at Gonzaga University that has done stormwater research with PCBs in Spokane. Her name is Aimme Navackis-Brasch. Cadie mentioned that the city does a lot of work with her.
- Could this information be found in literature searches? *Dave said they need soil samples and Trey thought this information may be available.*
- Lisa suggested doing a phased approach and starting with a low-level effort to assess potential of drywells to contribute PCBs to the River using existing data.

Dave asked if anyone thought conducting mass balance at high flow should be considered?

- Dr. Rodenburg said there is not a lot of high flow data, which is a problem. The concentrations of PCBs will be low at high flow. We need to think about doing some sort of passive sampling at high flow or much larger samples.

From what pathways are fish receiving the majority of their PCBs?

a. Fish (RRT) bioaccumulation

Dave asked how people feel about doing a bioaccumulation assessment?

- Jeremy said I'm curious what type of sampling work would be needed for sediment assessment, and does it include biofilm concentrations to adjacent groundwater concentrations coming into the river? *Yes.* Doing that first would be best to see results and then from there we can make a decision about doing more?
- At least the MR has sediment.
- It would be a sediment source assessment looking at sediment and groundwater. Where? *Dave said at MR, but it would need to be done up and down the system.*
- Will said If you think the main food source is larvae with the invertebrate population in river, I'm not sure those two groups of larvae are using bed sediments as their habitat. They move around rocks and under, but they are not sitting in sediment. If going after link between sediments and prey items for fish it deserves more thinking about the food-chain cycle.
- Dave asked if there is any merit in doing if getting it from elevated biofilm? *Will said looking at the link between whatever is coming through groundwater source and bioconcentrating on if start with bottom level components it could help and let bioaccumulation component evolve.*
- Lisa said if this is a phased approach, the first step would be looking at both potential groundwater inputs which may be with piezometers as well as sediment data to support future bioaccumulation model and other things that could come later. We may need to make some adjustments to candidate studies.
- Mike A. said I question the value of a bioaccumulation model, and would it benefit us in identifying sources? If we could tie it into groundwater, I can see it, but I have trouble grasping benefit of it unless tied into groundwater.
- Dave said we have to know where the sediment contamination is coming from and a source that can be remediated.
- If the groundwater and sediment sampling occurred first; consider sampling biofilm at the same time, then could collect data that could be remediated. The group could determine then if it made sense to move forward with bioaccumulation.
- Brandee said we are interested how PCBs are getting into fish, with the higher concentrations in other matrices in MR we assume the fish are accumulating from the food chain and it makes sense to study further.
- For the food web study, how readily will you know what various species eat in river? *We don't know any right now said Chris. A food web study like this is very expensive.*
- What is the certainty with these food web studies? *Chris said you can get a definitive study if you spend the money and there is higher certainty with a higher sample size. You would probably have three different reaches to look at. Doug said we should focus*

on other things and not go down this path right now. Chris said if you were going to focus on MR that would shrink down the cost.

- Is it worthwhile looking at the gut content of the Redband trout to confirm their diet or is this already known? *Brandee said gut contents were examined in the original source assessment. I need to look at it again to see what the assessment concluded.*
- Dr. Rodenburg said I believe it's correct as concentrations in water column go down when the fish get PCBs more from food as seen in Hudson River and she saw a hint of this in PMF modeling and raw data.

Next Steps – Lisa Dally Wilson led the discussion

1. **Summation of knowns/unknowns**

- WDFW will participate in fish sampling like before
- We can add similar age small mouth bass at State line.
- Will be continuing with SPMDs but relying on dissolved numbers and supplement with grab samples collected for other purposes
- TTWG will continue to look into long-term water column sampling options with CLAM and USGS high volume sampling methodology. Brandee provided - For later discussion on USGS method: https://www.usgs.gov/news/technical-announcement/new-usgs-field-method-breakthrough-contaminant-analysis-water-samples

2. **Review of candidate studies to address key issues –** Lisa reviewed the candidate studies and added in suggestions from the meeting and from the following comments.

- Rob said there is not much data from USGS downstream of Nine Mile. Is there any interest in collecting data downstream from Nine Mile that would incorporate the little Spokane? *Lisa said it could be added although outside the TF study area right now.*
- Karl said expanding the study area further downstream should be discussed and considered.
- Brandee said upper Lake Spokane is area where PCBs and fish tissue are high so when ready that is a good place to look.
- Lisa said expanding the physical scope of project to include areas downstream of Nine Mile Dam I thought was a further discussion of TF first.
- Ben said the TF is looking to the TTWG to see what that would look like and think we should address it.
- Cadie said if anyone were watching right now outside this process, they would say the scope is a question for the regulatory agency and not anyone else. Clarification by Cadie Olsen at 2/16/22 TTWG meeting – 'Given the regulatory aspect of the PCB TMDL, in my opinion, the decision to expand the research area (downstream of 9-Mile Dam) resides with Ecology and not the Task Force'.
- Ben said to characterize it as an action that was discussed but not take action on and Lisa suggested it be discussed at TF level with EPA help as well.
- As far as number 9, if we do a study would it be just expanding on MR studies? *Lisa said yes this would likely be moved to MR.*
- Elaborate on number 8 with dry wells. *Lisa reiterated that first phase would use existing information to model potential for stormwater with PCBs.*

- There is value here, but it isn't a small level of effort. Dry wells designed for stormwater are a second phase for stormwater to go into. *Cadie said what are we going to do with this if we don't have stormwater at the table from a regulatory standpoint? Trey said the city is required to input BMP swales where practical and there are little basins where stormwater is discharged to the river, but they are getting fewer. City wastewater and stormwater have requirements and our permits cover this.*
- When we talked about this in the past it was in context of historically installed dry wells that don't have pretreatment and if roads aren't widened or changed, etc. nothing will ever happen with some of them. It is still worth looking at. There are some treatment methods that could result in grant money being used.
- There is information on the soils in our region and we can do calculations with information that is available.
- Is Ecology toxics program speaking for the stormwater program? *Karl said Jeremy is sharing his knowledge of drywells.*
- Jeremy said I was offering guidance as a professional experienced in regional stormwater management. I then offered that "we don't know where it may lead, but perhaps some grant funding could come along down the road to retrofit drywells receiving stormwater from large contributing areas"
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The participants took a straw poll identifying the top two actions they would recommend, and then selected their next three actions. They selected from the list of actions provided at the end of these notes. There were 19 participants for these first polls. After the straw polls were taken, Ben shared that number 9 was first with number 8 in second place and number 5 in third place. Participants then picked their next top three from a second poll. Numbers 5, 9 and 1 were the top three and the rest followed with 4, 6, 2, 7 and 3 and 8.

Comments/Questions:

- When we pass this recommendation on, we should publicly document the poll's sample set: i.e., 30% regulated community, 50% regulatory agencies, 20% consultants who will benefit from the work, 5% national industry reps. or whatever it turns out to be. It's important who we asked. I ask that all who participate identify what organization they are from, and another person agreed.
- My understanding is that this is a straw poll. An official recommendation will be made by the TTWG, and the official decision will be by the TF.
- Does it matter if not a voting member? *Lisa said anyone who has listened may participate in the poll.*
- Brandee suggested redoing the poll and having just the top 5 on it.
- Will we have the sample sets included? *Ben said yes, we can put down who was participating by categories for the poll.*

Ben shared the results from the top 5 selections as 9, 5, 1, 8 and 2, 3, 4. Twenty two people participated in the informal straw poll and their names and affiliations are included here: Brandee Era-Miller (Ecology), Craig Borrenpohl and Alyssa Gersdorf (City of Post Falls), Doug Krapas (Inland Empire Paper), Bill Fees (Ecology), Vikki Barthels (Spokane Regional Health District), Dr. Lisa Rodenburg (Rutgers University), Cadie Olsen (City of Spokane), Rob Lindsay

(Spokane County), Brian Nickel (EPA), Will Hobbs (Ecology), Logan Callen (City of Spokane), Trey George (City of Spokane), Sandra Treccani (Ecology), Dave Dilks (LimnoTech), Jeff Donovan (City of Spokane), Jeremy Schmidt (Ecology), Lisa Dally Wilson (Dally Environmental), Holly Davies (WA State Dept. of Health), Mike Anderson (City of Coeur d'Alene), Karl Rains (Ecology), and Ken Windram (Hayden Area Regional Sewer Board)

Lisa closed the meeting by saying that a small group will take the projects from MR and further discuss before taking to the TTWG along with the projects discussed today. Five people volunteered yesterday to be involved in putting schedules and responsibilities around the information. There is some groundwater hydrology work that will be looked at and we will also be looking at groundwater/surface water data at Hamilton Street area and will incorporate that work. Rob said they will be collecting the data and sharing it openly. The data loggers are in except for one. They were unable to access one well due to snow and ice. The stage measurement device is in as well to measure river stage.

Watershed-Wide Next Steps/Candidate Studies

Straw poll order: #9, #5, 1, 8,2,3/4, 6 - Note comment that some Mission Reach projects may exceed importance of some Watershed projects. Colors below indicate priority with green being first, blue being second and yellow being third levels of priority.

Undefined Sources: Dry Weather/Low Flow

- Groundwater PCB Load at Mirabeau
    1. Additional biofilm monitoring with higher spatial resolution
    2. Additional water column sampling at Mirabeau
    3. Explore historic land use at SIP, evaluate data to see if we can differentiate a signal (e.g., see past Ecology studies)
- Dry Weather Source Downstream of USGS Gage
    4. Synoptic survey to support mass balance assessment (split long reach into several segments) – Consider Synoptic Survey for purposes other than mass balance (more data is necessary for this area)
    - Consider collecting data further downstream below Nine Mile to upper Lake Spokane - include LSR inputs [Placeholder – No action]
- Groundwater/Other Interactions between Plante's Ferry and USGS Gage
    5. Further our understanding of groundwater hydrology
    6. Synoptic survey with greater spatial resolution (possibly combine with #4 above) – consider synoptic survey for purposes other than mass balance (more data is necessary for this area)

Undefined Sources: Wet Weather/High Flow

- High-Flow Mobilization of PCB Sources
    7. High flow synoptic survey (may need to use passive sampling, or take larger volume samples in order to see a signal)
- Groundwater Loading of Infiltrated Stormwater – Historically installed DRY WELLs ('old style')

8. Infiltrated Stormwater – DRY WELLS – Initial assessment with existing data to determine potential effect of high contributing area historic dry wells
    - Later potential studies
        - Mass balance on dry well itself
        - Tracer study
        - Groundwater monitoring
        - Review how long it takes dry wells to drain
        - Review capacity of soils in the vadose zone to trap PCBs

Bioaccumulation/Understanding How Fish get their PCBs: Mission Focus?

9. GW/Sediment sampling – Tailor Mission Reach sampling to potentially support future bioaccumulation modeling. (Sample to determine the cause of elevated benthic concentrations).

   Measure PCB in groundwater source and sediment source (consider also sampling biofilm) – ensure data collected will also support a future Bioaccumulation model. WHERE – Mission Reach has sediment
    - Later stages of potential bioaccumulation assessment
        - Macroinvertebrate sampling
        - Food web study
        - Benthic source assessment/Fate and Transport model.