Bear Creek Watershed Plan
Technical Webinar, Part Two
Meeting Summary
December 12th, 2016

Webinar Total Attendees was 25. That includes King County staff and attendees on the conference line.

Watershed Plan Partners: King County, Snohomish County, City of Redmond, City of Woodinville, and Washington State DOT

Webinar (Online/Phone) Watershed Plan Partners Attendees: Luanne Coachman – King County WLRD; Steven Brady, King County WRLD (presenter); Eric LaFrance – City of Redmond; Andy Rheaume – City of Redmond;, Rick Roberts – City of Woodinville; Elsa Pond – WA State Department of Transportation; Dick Gersib – WA Department of Transportation.

Other Webinar (Online/Phone) Attendees: Paul LaPointe – Homeowner; David Bain – University of Washington; Mary Lou White – Wild Fish Conservancy; Heather Trim – Futurewise; Joan Nolan – WA State Department of Ecology; Gary Smith – Water Tenders; Brandi Lubliner - WA State Department of Ecology

Attendees in the room: King County WLRD staff: Sevin Bilir, Clare Jonson, Tom Beavers, Scott Stolnack, Jim Simmonds, Josh Kubo, Scott Miller, Mark Wilgus, and Eric Ferguson; Kellogg Consulting: Tamie Kellogg and Linda Glasier - Notetaker

Presenters
   King County WLRD staff: Jeff Burkey, Jen Vanderhoof, Tim Clark, Steven Brady; Kellogg Consulting: Tamie Kellogg-Facilitator

Meeting Purpose and Process: The purpose of the meeting was to share the study findings on the Bear Creek existing conditions and update attendees on the progress to-date. The meeting included:
- A two-hour meeting, attendance either in-person or via webinar
- Four presentations, followed by question and answer sessions
    1. Water Quality Presentation and Q & A
        – Long-term Trends
        – Existing Conditions Water Quality
    2. B-IBI Scores Presentation and Q & A
        – Existing Conditions
        – Metrics & Regressions
    3. Wetland Assessment Presentation and Q & A
        – Existing conditions
        – Changes over last 35 years
        – Areas in need of improvement
    4. Riparian Land Cover Presentation and Q & A
        – Existing Conditions
        – Changes over last 43 years
        – Areas in need of improvement

Meeting Opening

Tamie Kellogg, Facilitator, started the meeting with quick introductions. She reviewed the agenda and shared how staff would address questions during the meeting. She outlined the technical process for connecting to the webinar from remote locations. She noted that they sent out another email with to the link to the meeting materials, in case people were having challenges accessing them.

- Tamie then thanked attendees for coming and walked them through the process of the webinar. She remarked this is the second webinar covering topics on existing conditions from the Bear Creek Basin Plan.
- Sevin Bilir would manage the online process of the webinar to receive questions and comments.

Jeff Burkey, Project Manager, King County Department of Natural Resources and Parks, offered introductory remarks about background and the anticipated process for completing the basin plan.

Presentations & Discussion

1. **Project Update**, **Jeff Burkey** talked about work to characterize the basin and discussed the progress DNRP is making to begin developing the modeling. Jeff discussed how the characterizing and modeling will contribute to the basin plan. Jeff explained the different partners in the Bear Creek Watershed Plan and distinguished that this is a different plan than the Little Bear Creek Plan, currently underway by Snohomish County.
   - Partners include: King County, Snohomish County, City of Redmond, City of Woodinville, and Washington State Department of Transportation

2. **Presentation: Water Quality, Tim Clark**
   - Introduction: Tim explained data sources, parameters of historical data, and their limitations. He also discussed current conditions in Bear Creek. He also provided trend results for bacteria, temperatures, nutrients, fecal coliform, dissolved oxygen, total suspended solids and metals.
   - Long Term Monitoring in Bear Creek Watershed: On-going monitoring is happening at Bear, Evans, and Cottage Lake Creeks. Evans Creek and lower Bear Creek sites are included in the data sets and analysis about historic trends.
   - Current Conditions: 13 sites are sampled for water quality, and the parameters for the analysis were presented. Five long-term monitoring sites and existing data for the last 40 years are included in trends and parameter monitoring. Trend results:
     - Water temperatures are increasing, and dissolved oxygen and nutrients are decreasing.
     - Nutrients are decreasing over time, with different results at the various monitoring sites. Decreasing phosphorus trends were found at all the sites, and nitrogen trends were found at some of the monitoring sites.
     - Fecal coliforms: While a steady decrease in fecal coliform counts over time is noted, fecal levels are still above state standards.
     - Temperature and dissolved oxygen levels are getting worse. Violations of state standards for temperatures and dissolved oxygen are happening with increased frequency and magnitude.
   - Current conditions continued:
     - Temperature: Temperature levels were violated throughout the watershed in 2016, with lethal or sub-lethal temperatures for salmonids. Most places in Bear Creek had high violation concerns.
     - Water Quality/Dissolved Oxygen: High frequency of dissolved oxygen exceedances are found throughout the watershed. The state standard is based on a one-day minimum.

Grab samples were taken and are likely not to reflect the daily minimum. Therefor the observed number of violations is likely an underestimate.

- Water Quality/Fecal Coliform: Levels of fecal coliform are often in violation of the state standard, with especially high levels during storms.
- Water Quality /Total Suspended Solids: Five sites throughout the watershed were found to have high total suspended solids during the sampling period.
- Water Quality/Metals: Coal and Mackey creeks were above the acute standard for copper during several of the sampled storm events.

- What's driving long-term trends? A variety of factors that may include:
    - land use change (farmland to urban),
    - rules for bacterial TMDL, implemented in 2012,
    - enhanced stream stewardship, and
    - more effective land use regulations.
- The question remains, "why are water temperature and dissolved oxygen violations continuing to increase, in spite of these efforts?"
    - Urbanization over time: County parcel records show a high development period in the watershed basin occurring between 1976 and the early 1990's.. Riparian deforestation and the increase in impervious surfaces associated with urbanization can contribute to increased stream temperature as shade is removed and the input of cool, ground water is reduced.
- Conclusion: Basin Plan can identify project solutions for decreasing human health risk (bacteria) and protecting aquatic life (temperature, dissolved oxygen, TSS).

Q & A - Water Quality
- **Paul LaPointe**: Have similar warming trends been seen in other water bodies in the region? Are you factoring climate change into this plan?
    o Tim Clark: We have seen similar trends in other local bodies of water, including Lake Washington, Lake Union, and Elliott Bay. Climate change is likely to be a contributing factor to the observed long-term increases in water temperature.

- **Andy Rheaume**: The area for the planned study is downstream of Cottage Lake Creek and above Bear Creek, correct?
    o Jeff Burkey – Correct. Existing information above Cottage Lake and within Evans creek are not included. It is possible that one of the recommendations in this Watershed plan may be to include those areas for further analyses..

3. **Presentation: Patterns of Stream Macroinvertebrate Diversity, Steven Brady**
- Streams: A wide variety of stream types were presented, with a focus on shallow stream beds. An enormous variety of macroinvertebrates live in and near these types of streams.

- B-IBI definition: Benthic Index of Biotic Integrity

    - Biotic Integrity: The biotic integrity of a stream can be interpreted by its ability to support diversity
    - Benthic Macroinvertebrates (aka bugs living in the stream) – Represent an integrated response. Talked about the water flow rates and the stream ecosystems as well as the impacts of elevated stream velocity resulting from increased flow rates as one contributing influence on B-IBI scores.

- Invertebrates: Invertebrates can act as indicators for current conditions in stream and water quality standards. One example of a significant impact to the quality of stormwater runoff happens when runoff enters a stream directly from roadway surfaces versus runoff first filtered through vegetated swales, stormwater ponds, etc.

- Urbanization diminishes diversity: An increase in urbanization is shown to diminish the diversity of macroinvertebrates over time.

- B-IBI: Referenced the 10 metrics that are utilized to evaluate B –IBI on a scale from 1-100.

- B-IBI condition categories: A range of condition categories were discussed, ranging from very poor to excellent.

- Creek sampling: Various groups of individuals when trained properly can conduct stream samplings by collecting macroinvertebrates in designated sections. Researchers can then determine the types and composite the macroinvertebrates in the study area to characterize the health of the stream system

- Data sources from PSSB: A variety of partners have contributed to this database over the past 20 years, creating a database of significant value (http://pugetsoundstreambenthos.org/default.aspx).

- B-IBI has broader relevance and context: Puget Sound Partnership Vital Signs Indicators include use of B-IBI as a measure of health..

- B-IBI increasing over time: Researchers are seeing an upward trend in scores, although not at a rate that corresponds to the amount of work that has been done to-date.

- Urbanization degrades B-IBI: A snapshot of years 2005, 2010 and 2015 demonstrated year-to-year variation, including vertical variation in locations with low levels of nearby development.

- B-IBI Current Conditions: Current conditions were presented, with evaluations designated as poor, fair, and good (no sites with excellent scores were found). Those data appear to show an equal area and condition for each designation type.

- B-IBI is dynamic: The Bear Creek area data were presented, specifically for the years 2005, 2010 and 2015. Current scores averaged from 2013 -2015 were also discussed.

- Urban development increased in study area: Information was presented from 1996 to 2011 that shows an increase in development in the urban areas in the defined study area.

- Flashiness definition: Flashiness describes high and fast stream flow events. Flashiness is a natural phenomenon following rainy periods, but the intensity and frequency of flashy events typically increase in more urbanized areas. This is because surface water from rain moves relatively quickly across impervious surfaces and into streams. Thus, rather than moving relatively slowly through the ground, water arriving in urban areas is quickly transported to streams where it quickly increases flows.
  - Urbanization increase flashiness: The growth of urbanization is closely tied to flashiness, which increases the impact on stream flows.
  - Flashiness degrades B-IBI: Flashiness is proven to have a significant negative effect on B-IBI measures in effected rivers.

- B-IBI improved in some sites: Long-term data sets were provided, showing information from 1995 to 2015. These data provide researchers with detailed information essential for workable solutions.

- B-IBI stable/deteriorated in other sites: Detailed information highlighting changes in B-IBI data over time was presented.

Q & A - Macroinvertebrate Diversity
- **Mary Lou White**: Are you looking at the micro-invertebrates?
    - Steven Brady: No, we are following a protocol that defines macroinvertebrates as those invertebrates that are visible to the naked eye.

- **Mary Lou White**: Maybe you want to include these signs? As they could impact the macro-invertebrates?
    - Steven Brady: It could be a good idea. The B-IBI is a fairly coarse analysis that provides a good first assessment of potential degradation. A more refined approach would certainly be to look at the full composition of species present in a sample rather than just the overall score.

- **Mary Lou White:** What habitat studies are going into the plan?
    - Steven Brady: We have been collecting habitat level information, for example large woody debris, stream flow, sediment size, and GIS data of land cover. We have yet to analyze the influence of large woody debris, however we have considered the more dominant drives of B-IBI including urbanization and stream flashiness.

- **Paul LaPointe**: Have you done it or are planning to do a regression (logistics) or multi-variate regression analysis?
    - Steven Brady: Not yet. However, we will have multi-variate regressions in the report.

- **Unidentified questioner:** How does understanding things like low oxygen in undeveloped streams help us understand what is happening in more impacted streams?
    - Steven Brady: It could be just a natural variation in that area. You can build a beautiful habitat and still not have the species or the diversity you might want or expect to see. It might suggest that we are missing some explanation for why we are getting low scores. It might be that that site had an event, and there might be some local extinction.

4. **Presentation: Assessment of Bear Creek Watershed Wetlands, Jen Vanderhoof**
   - Introduction: Jen summarized the importance of wetlands and their many benefits to the Bear Creek watershed.
   - Relied on GIS data for the analysis. Discussed the multiple data sources and variability in how and when they were created.
   - The wetland datasets were merged to have one map showing all mapped wetlands and get an idea of how much area is covered by wetlands.
   - Results of data merge: 340 mapped wetlands in the study area.
   - Are we losing wetland areas? A subset of the King County Wetland Inventory was used for the change analysis because the original dataset was confirmed by in-person, on-the-ground verification.
   - Changes analysis: The change analysis included comparing 54 wetlands from the KCWI originally mapped in 1981 or 1990 with 2015 aerial imagery.

- 2015, compared to baseline, results: The analysis showed that 20%, or 11 out of the 54, wetlands have been visibly altered compared to the baseline.

- Errors of omission: A historical look at the regulatory environment shows the first regulations to protect wetlands were passed in King County in 1979. Any wetlands filled prior to 1979 would not have been mapped and may not be identifiable now. Therefore, it is almost certain wetlands in the watershed have been lost historically, and their function lost along with them.

- Urbanization & wetlands: The information presented shows when the watershed was being built out in relation to wetland protections and the KCWI mapping.

- Wetlands analysis summary slide; Noted the importance of wetlands in watershed hydrology and ecology and their benefits.

Q & A - Assessment of Bear Creek Watershed Wetlands
- **Dick Gersib:** Thanks for the presentation. Your work really is a great. Depending on where our wetlands are, we were using stereo pairs and trying to get a picture of the systems and where to restore. Do you see a way to use this information in the flashiness factor and restoration?
  - Jen Vanderhoof: Really good question. I hadn't really thought about that yet, but let's talk after this meeting.

- **Mary Lou White**: On the ground, we see a lot more wetlands, and we see that they are not as functional as before.
  - Jen Vanderhoof: It is fairly common knowledge that our wetland data is lacking in knowing where wetlands are, and how functional they are.

- **Tom Beavers**: Did you look at the amount or % of wetlands that are in public ownership now or that have rights to a conservation plan. We are purchasing areas for protection even now.
  - Jen Vanderhoof: We haven't looked at the public owned wetlands yet, but we will be in the next phase in this watershed planning process.

5. **Presentation: Riparian Assessment, Jen Vanderhoof**
- The importance of riparian areas: Discussed the definition of riparian areas and the benefits they provide.

- The objectives of the study are to report on current conditions and look at changes over time.

- How wide a riparian corridor to study? The various regulatory parameters and context were discussed. The final decision was to use a 400ft corridor, or 200 ft on each side of the stream center line.

- Which streams? The riparian study area included 46.7 miles of confirmed or potential salmonid (including cutthroat trout) habitat, even if currently blocked by man-made barrier.

- Data challenges: because of the small scale or errors in available land cover datasets, a new dataset was created for this analysis.

- Used the Washington State Department of Fish and Wildlife (WDFW) data sets as the foundation for the forest and impervious data, then hand-drew the following land cover classes: Shrub, Pasture, Water, Non-forested Wetlands, Potential Beaver Dam and Other. Errors in forest and impervious were corrected during the process of adding the other land covers.

- Presented a variety of ways that the 400-ft wide corridor information can be used to estimate other areas, possibly fulfilling a variety of data needs.
- Land Cover in 165-ft buffer was presented as an example in a pie chart. 47% of the land cover was trees/forest, and 6% was impervious.
- Attributes: Presented the detailed information as to how the land cover data is attributed. Key attributes are presence of invasive species and lack of stream shade.
- History of forest changes: photos ranging from1936 to 2015 illustrated the changes in land cover on the same portion of land.
- Limited data for change analysis: Aerial infrared photos from 1972 were used to create a land cover dataset to compare to the new 2015 data.
- 1972 land cover: The 1972 infrared photos were taken at a lower resolution, so different land cover classes had to be used than in the 2015 classification.
- Changes over past 43 years: Comparing 1972 to now. Details of this perspective were shown in a table format. 22% less riparian trees than in 1972.
- Urbanization and riparian land cover: A detailed bar chart illustrated when development occurred in relation to timing of change analysis as well as when regulatory protections were put in place in 1990 and 2005.

Q & A - Riparian Assessment
- **Gary Smith**: What is the definition of a disturbed area? Are pastures not included?
  - Jen Vanderhoof: Pastures were included separately in their own land cover class, because they were easily discernable in both sets of photos. They certainly are disturbed areas.

- **Unidentified questioner:** 15% are invasive species?
  - Jen Vanderhoof: Shrub, non-forested wetland, and pasture were attributed with whether invasive species were present. In the riparian areas, about 15% of the ground cover had invasive species, which would be either Himalayan blackberry or reed canarygrass, as they are the two species you can see remotely.
- **Mary Lou White**: Good work and thanks.

Tamie Kellogg: Any more questions or comments on Riparian Assessment? If not, let's open it to general questions or comments.

6. **Q & A - General**
- **Paul LaPointe**: Do you feel like there are any holes in the data that you need to fix? Data that we talked about today?
  - Jeff Burkey: The wetland and the riparian data are the most sparse. We have good data; we need to use it appropriately. With water quality measures, we have 13 years of data and we feel good about it. And with the B-IBI data, we have a lot of that type information as well.

- **Unidentified questioner**: So you are good with the data?

- o Jeff Burkey: We also have collected data from the past year and a half, as well as historical data that goes back as far as we can find it. We use data from certain areas that relates to the scope of our study area for planning purposes.

- **Paul LaPointe**: Is the data available to the general public?
  - o Jeff Burkey: Yes, of course. The B-IBI data is open to the public, and even though some of the other data isn't super easy to find, it is available. And the current reports are going through our internal review process and will be posted onto the website soon.
  - o Jen Vanderhoof: My data is on my computer, and I haven't yet posted it publicly.

- **Paul LaPointe**: Is the Water Quality data available?
  - o Tim Clark: Those data are available on the King County website.

- **Mary Lou White**: Is the fish data from the first webinar available and from which layer?
  - o Josh Kubo: Yes, the presentation on Fish Habitat and Fish Use is posted on the website. We do not have a fish layer (rather spreadsheet data) and used WDFW salmon distribution layers for site selection. Update: we will be creating an existing conditions and relative sub-basin area fish abundance layer.

Meeting Wrap up

Tamie Kellogg: The presentation materials were sent to you via email before the meeting today. The website for Bear Creek will be updated with today's presentations by next week. Presentations from the first webinar data will also be up there for those of you that weren't able to make to our last meeting.

Jeff Burkey: If you haven't signed up for the email list yet, please do so. We will be sending out a survey about how well the webinar worked for you today.

Tim Clark: For the long-term King County streams monitoring data, click on the Google map option on the Bear Creek? website or just get hold of me using the email address in your packet.

Tamie Kellogg: Any other general questions?

Jeff Burkey: We will put today's information into a workshop model which we will hold in mid-March. We don't have a solid date yet, but we know it will be a half-day, in-person meeting. All the credit for making today's meeting happen goes to the partners and their great work. They have been very supportive of the process and all the work.

Tamie Kellogg: Last call for questions. Any more questions? That's a wrap! If you were not able to introduce yourself in the beginning of the meeting, please be sure to send Jeff Burkey an email so that we know you attended.

If attendees had additional questions, they were asked to email these to Jeff and Tamie. A survey to evaluate the effectiveness of the webinar will be sent out as well.