



**Combined Meeting of Water System Advisory Committee (WSAC)
And Creeks, Drainage, and Wastewater Advisory Committee (CDWAC)**

**October 21, 2015 Meeting Notes
Seattle Municipal Tower, 700 Fifth Avenue
Room 4901
5:30 pm – 7:30 pm**

Committee Members & CAC Staff	Present?	SPU Staff & Guests	Role
WSAC		Alex Chen	SPU Water Planning and Program Manager
Tom Grant	Y	Jonathan Frodge	SPU Storm Water Scientist
		Madeline Goddard	SPU Drainage and Wastewater Deputy Director
Chelsea Jefferson	N	Michele Kohler	SPU Aquatic Resources Manager
Kelly McCaffrey	Y	Hamilton Anderson	Guest
Kyle Stetler	Y	Andrew Doss	Guest
Rodney Schauf	Y		
CDWAC			
Kendra Aguilar	N		
Marilyn Baylor	N		
Suzie Burke	N		
Chris Clark	Y		
C’Ardiss Gardner Gleser	N		
Schyler Hect	Y		
Patrick Jablonski	Y		
Kaifu Lam	Y		
Seth McKinney	N		
Noel Miller	N		
Devin O’Reilly	Y		
Heidi Fischer, CAC Program Support	Y		
Joan Kersnar, WSAC Acting Policy Liaison	N		
Sheryl Shapiro, CDWAC Policy Liaison and CAC Program Manager	Y		

Regular Business

- Committee Members, SPU staff, and guests introduced themselves.
- CDWAC/WSAC September meeting notes are approved.

Line of Business Updates

Water Line of Business, Alex Chen, Water Planning and Program Manager

- To conserve water, in August SPU asked our customers to voluntarily reduce their water usage by 10%.
 - Customers have exceeded this request and reduced usage by about 12%.
- Rainfall and reservoir storage continue to be below average.
 - Rainfall this summer reached historic lows.
 - Rainfall in August and September was near normal, but in October is at 75% of normal.
 - The forecast for the next ten days is for dry weather.
- Combined reservoir storage is at about 70% of the average for this time of year.
 - Inflows to the Tolt Reservoir are back to average levels.
 - The Tolt Reservoir is in a smaller and tighter basin than the Cedar River Reservoir, so more of the water flows into the reservoir rather than into the ground.
 - But the Cedar Reservoir inflows are still very low.
 - To deal with this, we are preparing to pump more water toward the reservoir.
 - The Cedar River feeds into Chester Morse Lake.
 - We will use the Morse Lake Pump Plant (MLPP) in Chester Morse Lake to pump water over a high spot in the lake, sending it toward Masonry Dam and the Cedar River.
 - A pump is the most cost effective way to move the water, based on life cycle cost.
 - MLPP has been under construction this year. We accelerated the construction schedule so that it would be ready to use this year.
 - We have existing pumps at Morse Lake but they are several decades old and nearing the end of their useful life.
 - They are still functional and we are maintaining them for now so that we have redundancy (both the old pumps and the new pumps are operational).
 - The old pumps are known as PP1 and PP2.
 - SPU bought PP1 used in 1987, and it uses 18 pumps.
 - SPU constructed PP2 in 1992, and it uses 10 pumps.
 - The new pump plant uses 4 fully submersible pumps to do the same job as PP1 and PP2 put together.
 - The pumps are powered by large, on site rental generators.
 - We are preparing to begin pumping in the next few days.

- Thought they are tested regularly to confirm full functionality, the last time SPU used the pumps to manage reservoir storage was in 1987.
- Going forward, we will:
 - Continue daily system operations & monitoring
 - Continue weekly system modeling
 - Continue looking at short-term / several month weather forecast
 - Set system up for winter flood management and spring refill
 - Continue to work collaboratively with Everett and Tacoma to manage water conservation messaging.
- ❖ Committee Member Question: Are the pumps only used when the water levels are low in the reservoir?
 - Answer: Yes. We can go for years without using the pumps. When they are not in use, we use a barge system to float them out to a part of the lake that's less windy. We operate them once a year to make sure they are fully functional.
- ❖ Committee Member Question: Will the old pumps remain as SPU assets?
 - Answer: They are nearing the end of their useful life, but we are still considering what to do with them in the long term.
- ❖ Committee Member Question: What is the capacity of the new pumps relative to the old ones?
 - Answer: The old pumps can pump 220 – 230 million gallons of water per day. That's enough to supply 60 million gallons of water for people and 160 – 170 million gallons of water for fish. The new pumps can pump 240 million gallons per day.
- ❖ Committee Member Question: Have you noticed that the weather forecast has not been very accurate?
 - Answer: Yes. Forecasters have been inconsistent in their accuracy, likely because of the current El Nino weather pattern. This pattern tends to bring less water to Washington and more water to California. The jet stream comes our way from the Pacific, but then splits and moves above and below us. British Columbia is in the path of the jet stream and is getting more rainfall. They are almost back up to their normal reservoir storage levels.
- ❖ Committee Member Comment: I recently attended a talk by Cliff Mass, a University of Washington meteorologist, and he predicts that this winter will bring more precipitation than last winter. He predicts we will get 80% of our normal snowpack, and that the weather will be cooler than last year.
 - Response: 80% of average snowpack is typical of years with Super El Nino weather patterns. Super El Nino years can be dry. However, a blob of warm water in the Pacific is opposing the El Nino effects.

- ❖ Committee Member Comment: I understand that our current dry weather is the result of natural variability, and not global warming (yet). High pressure and lower winds resulted in less mixing in the Pacific Ocean, which made the water warmer.
- Response: Alex agrees.

Drainage and Wastewater Line of Business: Storm Preparation, Madeline Goddard, Drainage and Wastewater Director

- We are moving into storm season and are making preparations to prevent and mitigate flooding.
 - We have an incident command system in place that includes the safety, operations, communications, logistics, planning, and engineering departments, and Madeline as Incident Commander.
 - We are getting the word out to our customers about how to prevent and mitigate flooding with our Take Winter by Storm Campaign (TakeWinterByStorm.org).
 - We also have a lot of information on our own Seattle.gov website, which we just updated.
 - This includes tips to reduce flooding, what to do if you live by a creek, how your side sewer may be affected by storms, and what to do just before a storm.
 - We also have information about
 - The use and disposal of sandbags
 - Free sandbags available
 - Create a temporary flood barrier using sandbags. During autumn and winter SPU provides up to 25 sandbags to households or businesses in flood-prone areas. Check the supply each season.
 - Landslides
 - What to do during a rain storm
 - Snow and ice storms
 - When the power goes out
 - Keeping leaves, debris and snow out of drains
 - Consider adopting your local storm drains.
 - By keeping the drains in your neighborhood clear of all debris you can prevent flooding. Clear your drain only if it is safe. If the drain is still clogged after you've removed the debris, call our drainage problem hotline at (206) 386-1800 to report it.
 - SPU is taking action to minimize flooding.
 - We are increasing street sweeping as part of the Strategic Business Plan (SBP).
 - We've added street sweeping routes to clean up fallen leaves in known hot spots.
 - This helps to avoid blocked drainage inlets and leaf loaded mainlines.
 - We sweep 484 miles per year.

- The Seattle Department of Transportation (SDOT) handles street sweeper vehicle maintenance, GPS, and hauls the temporary leaf bins.
- We want to prevent flooding backups in critical areas like the hospital.
- When the Henderson North CSO Reduction Project is completed, drainage in the Southeast Seattle Seward Park and Martha Washington Park areas will improve and we will be able to remove Baker Tank (a big construction tank).
- Keep in mind that sometimes we have to clean up debris that causes flooding on the road, and this can impact traffic.
 - We recently had to close some lanes on the West Seattle Bridge for this purpose.
- We have standby crews ready to address flooding backups.
 - In the past we had crews volunteer for standby duty, but now have assigned standby crews.
- We've confirmed that our pumps and sensors are operational and our diesel generators are ready to go
- We've upgraded our Supervisory Control and Data Acquisition (SCADA) system, which controls the transmission and distribution of water throughout the greater Seattle metropolitan region.
- We've also arranged for there to be more than one person answering phones in storms to process work orders.
 - We are trying to develop more backup for customer service on the phones during a storm.
- We're also streamlining media contact during storm/emergency response.
 - We don't want our crews stopping work to update the media, so they will carry contact information cards to hand out to the media. The media can use that information to contact SPU's communication department and get answers.
- We're also working with Alert Seattle, a great new notification system that can communicate with people by text and email as well as phone.
 - 11,000 people have signed up for this system so far.
 - The system allows us to send communications to particular neighborhoods.
 - Madeline recommends signing up; visit <http://alert.seattle.gov/>

Fish and Temperature, Michele Koehler, Aquatic Resources Manager

- There have been a lot of media reports about fish deaths in the Columbia River. Most of these deaths are due to high temperatures.
 - Oregon and Washington officials recently closed many recreational and commercial fishing spots.
 - The United States Fish and Wildlife Service trucked salmon 100 miles from a hatchery in central Oregon to a cooler part of the Columbia River.
 - Salmon like temperatures of 18 degrees Celsius or cooler.

- Sockeye, chinook, and even sturgeon are impacted by high temperatures.
- The South Fork of the Tolt River flows from one of SPU's two drinking water reservoirs.
 - Salmon travel in the Tolt River.
- In the summer, the water in lakes and reservoirs stratifies. This means that the cold water sinks to the bottom and warm water rises to the top. A thin layer of lukewarm water is in the middle.
 - During stratification, warm upper waters do not mix with cold lower waters.
 - In the winter, more surface disturbances (like rain and storms) mix the water to create a uniform temperature.
- We have an intake tower in the South Fork Tolt which provides water to the reservoir from the river as needed.
 - We use it to help regulate the river's temperature.
 - Sometimes we take the cooler water through this intake into the reservoir.
 - But this summer, we knew the hot temperatures might be a problem for fish, so we left enough cooler water so that the temperatures in the South Fork Tolt stayed just under 17.5 degrees Celsius.
 - The South Fork Tolt runs in an area with more land use types than the forested North Fork of the Tolt.
- The Cedar River flows from another one of SPU's main reservoirs, Chester Morse Lake.
 - Chinook, sockeye, coho, and steelhead all live in the Cedar River.
 - Chinook and steelhead salmon are listed as threatened.
 - To spawn in the Cedar River, salmon come from Puget Sound into the Ballard Locks, into Lake Union, through the Ship Canal into Lake Washington, and finally, to the Cedar River.
 - This path starts out in an urban setting.
 - We were concerned about the temperatures from the Locks to Lake Washington.
 - Salmon can handle higher temps at short intervals.
 - High temperatures throughout a water system can cause sub-lethal impacts.
 - Then further stressors like parasites, disease or handling can become an issue.
 - At 23 degrees Celsius salmon can experience serious problems.
 - Temperatures over 25 degrees Celsius can be lethal.
 - The Muckleshoot Tribe and the Washington State Department of Fish and Wildlife counted the returning salmon headed for the Cedar River when they entered at the Ballard Locks.
 - Chinook salmon counts were below 50% of the average for this time of year, and sockeye counts were at approximately 20% of their ten year average.
 - When the sockeye entered the Locks near the end of June, temperatures were about 21.5 degrees Celsius, which is just below the lethal zone. Over the next month, temperatures rose several times above 23 degrees Celsius into the lethal zone, and many sockeye died before they could spawn.
 - 2014 was a similar story, when 1/3 of sockeye females died before spawning.

- When the Chinook salmon entered the Locks at the beginning of August, temperatures were still 23 degrees Celsius. They slowly dropped, but stayed in the sub-lethal zone until near the end of September.
 - Chinook had low/normal rates of pre-spawning mortality.
 - Once fish get to Lake Washington, they can access the colder water in the lake's lower layers.
 - Then they get to the Cedar River.
 - The Upper Cedar River had low temperatures all summer. The lower Cedar River had high temperatures in the early summer – June and July.
 - But by September when the fish arrived, temperatures in the lower river had cooled.
 - When the river flows are low like they have been, the water responds more quickly to air temperature changes.
 - The Upper Cedar is in a very forested area, which helps to keep it cool. It is also fed by some groundwater seepage from the reservoir upstream.
 - Managing salmon in an urbanized stream is challenging.
- ❖ Committee Member Question: How can we lower temperatures in the Ship Canal?
 - Answer: People are debating this issue. It's a big investment, and would cost a lot of money.
 - ❖ Committee Member Question: How long are salmon exposed to the Ship Canal?
 - Answer: According to Muckleshoot biologists, this year some sockeye stayed for 30 or more days, circling helplessly in the high temperatures. Chinook had worse conditions, and most stayed for about a week.
 - ❖ Committee Member Question: What is the maximum exposure window?
 - Answer: This isn't clear. There have been detailed lab studies, but they are unable to account for all of the additional factors in the natural environment.
 - ❖ Committee Member Question: With regard to the intake tower on the Tolt River, we can use it to save up cold water if needed?
 - Answer: The intake tower isn't designed for that, but we can and do use it for that purpose sometimes. We don't have a lot of flexibility in this area, and we did have to use some cold water this summer.
 - ❖ Committee Member Comment: I've heard about efforts to ship salmon from the Locks to Lake Washington.

Locating Human Sewage Sources in a Small Urban Stream Using temperature/Conductivity Dataloggers, Jonathan Frodge, Storm Water Scientist

- Jonathan is a limnologist (a person who studies inland water systems like Puget Sound, lakes, rivers, creeks, and marshes).
- Thornton Creek Watershed is the largest watershed inside the city of Seattle.
 - The north fork of the Thornton Creek is in very good condition.
 - However, we have 35 – 40 years of fairly continuous data collected near the mouth of the creek showing high bacteria levels.
 - Because of this, Matthews Beach (which is at the mouth of the creek) is frequently closed.
 - The surrounding land in the north and south forks has about the same level of urbanization, so we believe infrastructure problems in the south fork area are causing the high bacteria levels.
 - We have a number of hypotheses about where the bacteria is coming from:
 - 1) Non-point sources (diffuse sources, like street pollution collected by rainwater runoff)
 - 2) King County sanitary conveyance system
 - 3) SPU storm drainage
 - 4) SPU sanitary collector system
 - 5) Homeless encampments or RV dumping
 - 6) Private side sewers
- Since 2013, SPU has been conducting studies of Thornton Creek Watershed focused on measuring levels of the bacteria E. coli.
 - Fecal coliform is the standard indicator of bacteria levels in water, but E. coli is a better indicator of human waste than fecal coliform.
 - We looked for increases in bacteria levels downstream compared to upstream.
 - We're working to improve water quality upstream first, so that later downstream efforts can be effective.
 - One major source of the bacteria appears to be dog waste.
 - As a result of these studies so far:
 - We prioritized areas along the creek based on high levels of E.coli.
 - We selected pipe assets to evaluate based on high and/or re-occurring downstream to upstream E.coli counts.
 - This study continues, and we plan to adaptively re-prioritize sub-basins based on in-stream sampling and on environmental risk. We will collect higher density E.coli samples targeting side drainages and pipe crossings, and work to correct infrastructure problems as they are identified.
 - As part of these studies, we also worked with the city of Kirkland and the King County Department of Natural Resources and Parks on a study where sniffer dogs were employed to identify sources of sewage in creeks.

- Unfortunately, results yielded too many false positives to make this technique viable.
- Now SPU is doing additional studies in the Thornton Creek Watershed with King County's Department of Natural Resources and Parks to find sewage leaks.
 - We are again looking for high bacteria levels, this time specifically *Bacteroides thetaiotamicron* (*Bacteroides*), which is the most prevalent bacteria found in the human gut. Again the goal is to identify failing sewer infrastructure that we can fix to improve water quality.
 - Because *Bacteroides* is specific to humans, it is an even better indicator of human sewage than E. coli.
 - We frequently do not see a good correlation between E.coli and *Bacteroides* when testing water samples. However, we think they would be closely correlated when sampling is done close to a source of human sewage.
 - In addition to sampling for *Bacteroides*, we also used equipment called data loggers to test the creek's temperature and conductivity at frequent intervals at high population density sites along Little Brook Creek (part of the Thornton Creek Watershed).
 - The data loggers are about the size of a cigar and can continuously record the creek's temperature and conductivity.
 - Testing equipment sometimes gets stolen or damaged, so we have to be careful to secure it.
 - We check the temperature because sewage is warmer (in winter) than local creeks. If sewage is discharged into the creek, the temperature should temporarily rise.
 - Conductivity is an expression of the water's capacity to conduct electric current.
 - Distilled or deionized water will conduct virtually no electricity at all and will therefore have a conductivity reading of zero.
 - The more dissolved ions you have, the higher the conductivity.
 - We check conductivity because Seattle's creeks generally have a low conductivity measure of 200 micro mhos. But when other solutions are discharged into the creeks (like sewage, which has a conductivity measure of 400-700, or chemicals that have a higher conductivity measure than the creek), the conductivity temporarily rises.
 - If we see a pattern of both rising temperature and conductivity at specific testing sites, it suggests that something is being pumped into the creek in that area. We can then focus the search area for failing infrastructure there.

- We are only able to find these patterns of temperature and conductivity spikes by sampling over 24 hour periods. Many of them do not occur during work hours.
 - Using temperature and conductivity to track sewage inputs in addition to bacterial testing (rather than just bacterial testing alone):
 - Avoids the potential confounding bacteria sources of RV dumping and homeless encampments, and
 - Provides more frequent, more immediate and less expensive results than direct bacteria monitoring.
 - Automated bacteria testing (for *E.coli* and *Bacteroides*) can be done if temperature or conductivity anomalies are detected. These results will then be used to determine if the changes in temperature and conductivity are a result of sewage entering the stream segment (which would have high bacteria counts).
- We have already made some positive changes using the results of this study.
 - At Little Brook Park, samples showed the expected natural pattern of temperature and conductivity.
 - However, below Little Brook Natural Area, spikes in conductivity and temperature suggested an increased probability of sewage inputs.
 - We used the temperature/conductivity and bacteria data between upstream and downstream sites to select suspect parcels in the geographic information system (GIS).
 - We identified two apartment complexes with sewage infrastructure problems.
 - One had a cross connection that pumped sewage, rather than storm water, directly into the creek. This has since been corrected.
 - The other site had a clogged sewer line, which has also been corrected.
- While it is difficult to have complete alignment between the data from the temperature/conductivity loggers and the bacteria data, this technique appears to be a viable inexpensive technique for identifying suspect stream segments in smaller streams.
 - This technique could be a great tool all over the country.
- Currently we have only ten data loggers, so we do not have sufficient monitoring equipment to conduct the monitoring at a density sufficient to locate sources simultaneously in all branches of the creek.
 - Data collected simultaneously is of much higher value than haphazardly in one place and then another.
- There are currently two grant proposals to expand this program.
 - One includes SPU on its own working in the Thornton Creek basin.
 - The other would be a coordinated SPU/King County study in Thornton Creek, Juanita Creek, White Center, and Boise Creek.

- ❖ Committee Member Question: Where would the grant money come from?
- Answer: From a King County Waterworks grant.

- ❖ Committee Member Question: The Seattle Parks Department and the Seattle Police Department have lengthy processes for setting up and regulating homeless encampments. Could they give you some data about how sewage is managed?
- Answer: Homeless encampments have increased in number, but even if sewage is not managed correctly there, the discharges are not going result in very significant changes in creek temperature and conductivity when compared to what failing infrastructure will do.

- ❖ Committee Member Question: Is the ultimate goal here related to minimizing the salmon's pre-spawning mortality rate that we discussed in tonight's earlier presentation? Or is it focused on water quality?
- Answer: One of SPU's larger goals is to reduce pre-spawn mortality. We don't want human fecal matter in the streams because of the threat to human health. Other bacteria should be in the water. Things like petroleum by products, tire grit, and heavy metals that get into the water from street pollution swept up in stormwater runoff may be increasing pre-spawn mortality. Simple filters at creek outfalls may be able to reduce pre-spawn mortality by 70%.

- ❖ Committee Member Question: What are your bigger expenses with regard to the studies to identify sewage sources in the creeks?
- Answer: Personnel is the biggest expense. Right now I have one temporary employee and we cannot keep up with the required data analysis. We are generating a large amount of data and need to analyze it to identify and eliminate sewage inputs to the creek. This program can deliver big benefits for relatively little cost.

- ❖ Committee Member Question: Do you work with students, and/or with the University?
- Answer: We are working with one student now and are considering doing more of that.

- ❖ Committee Member Question: Who owns the creek?
- Answer: The bottom of the creek is owned by private individuals, and the state owns the water. While SPU is not directly responsible for water quality in the creek, we are responsible for our municipal stormwater and sewage systems.
Madeline Goddard, SPU Drainage and Wastewater Deputy Director, added that one of SPU's missions is to protect the environment.

CAC Joint Meeting Debrief: postponed until the next meeting due to lack of time

Around the Table

- Sheryl showed a copy of the Aquatic Habitat Matching Grant Program Report from October 2012. This report features information about different restoration projects. Committee Members should contact Sheryl if they would like a hard or e-copy.
- Sheryl reported that discussion at the Joint CAC Meeting in September focused on SPU's web strategic plan and the home page. SPU is also working on a new mobile website. Committee Members can sign up to help test the mobile site. Testing will take place November 2nd and 9th, and each session will last 15 minutes.
- Chris reported that there will be a panel on farming on November 3rd at Pike Brewing Company, as part of the *No Farms, No Food* Program.
- Devin reported that the Green Seattle Partnership is sponsoring Green Seattle Day on November 7th. Volunteers will be planting 800 plants at a local green belt.
- Kyle reported that he saw the salmon running in Renton. There weren't a lot of fish, but he did see some sockeye.
- Sheryl reported that Julie Burman, the regular Policy Liaison for the Water System Advisory Committee is still out on leave.
- Sheryl also noted that the next Joint CAC Meeting will be October 27th, and will be a discussion of the Growth and Equity Analysis of the City's Comprehensive Plan.

7:31, meeting adjourned.