DATE: March 2, 2020

TO: Clean Water Services Advisory Commission Members and Interested Parties

FROM: Mark Jockers, Government & Public Affairs Director

SUBJECT: **REMINDER OF AND INFORMATION FOR MARCH 11, 2020, CWAC MEETING**

This is a reminder of the Clean Water Services Advisory Commission (CWAC) meeting scheduled for **Wednesday, March 11, 2020,** at the District's main office, 2550 SW Hillsboro Highway. The CWAC meeting packet will be mailed to Commission members on March 2 and posted to the CWAC section of Clean Water Services' website.

Dinner will be served for CWAC members at 5:30 p.m. **Please call or send an email to Stephanie Morrison (morrisons@cleanwaterservices.org; 503.681.5143) by March 5 if you are unable to attend** so food is not ordered for you.

Enclosures in this packet include:

- March 11 Meeting Agenda
- January 8 Meeting Notes

Clean Water Services Advisory Commission

March 11, 2020

AGENDA

6:30 p.m. **Welcome & Introductions**

6:35 p.m. **Review/Approval of Meeting Notes of January 8, 2020**

6:40 p.m. **Sub-Basin Planning Implementation & Prioritization**

Staff will provide an update to CWAC regarding sub-basin planning prioritization as a follow-up to the presentation given during the November meeting.

- Chris Faulkner, Water Resources Program Manager

Requested action: *Informational*

**Invitation for public comment*

7:00 p.m. **Pretreatment Ordinance Update**

The Environmental Services program provides a wide range of environmental response and regulatory services and protects the publicly owned treatment works. Updating the pretreatment ordinance ensures that the implementation of the federal and local pretreatment program is transparent to customers, stakeholders and regulators.

- Bob Baumgartner, Regulatory Affairs Director
- Joy Ramirez, Environmental Services Supervisor

Requested action: *Informational*

**Invitation for public comment*

7:45 p.m. **Announcements**

8:00 p.m. **Adjourn**

Next Meeting: April 8, 2020

Clean Water Services
Clean Water Advisory Commission
January 8, 2020 | Meeting Notes

Attendance

Attending the meeting from CWAC:

- Tony Weller (Homebuilder-Developer), Commission Chair
- Mike McKillip (District 3/Rogers), Commission Vice Chair
- Molly Brown (District 2/Treece)
- Andy Duyck (District 4/Willey)
- Nafisa Fai (District 1/Schouten)
- Lori Hennings (Environmental)
- Art Larrance (At-Large/Harrington)
- Stu Peterson (Business)
- Terry Song (Business)
- David Waffle (Cities/nonvoting)
- Diane Taniguchi-Dennis (Clean Water Services Chief Executive Officer (nonvoting)

Absent:

- John Jackson (Agriculture)
- Matt Wellner (Homebuilder-Developer)

Attending the meeting from Clean Water Services:

- Mark Jockers, Government & Public Affairs Director
- Kathleen Leader, Chief Financial Officer
- Ken Williamson, Research & Innovation Center Director
- Joy Ramirez, Environmental Services Supervisor
- Stephanie Morrison, Office Manager
- Jody Newcomer, Technical Editor & Communications Specialist

Attending the meeting from the public:

- Dale Feik

1. Call to Order

Tony Weller called the meeting to order at 6:30 pm in the Tualatin Room at the Clean Water Services (CWS) Administration Building Complex in Hillsboro, Oregon.

The CWS Board of Directors appointed two people to the Commission on Dec. 3, 2019 — Terry Song as Business Representative and Mike McKillip as the District 3 Representative. Recruitment continues for one of the Agriculture Representative positions. Kris Balliet recently stepped down as executive director of the Tualatin Riverkeepers, which means she is no longer eligible to serve as an Environmental Representative. CWS will seek guidance from the Board about how fill the vacant position.

2. Previous Meeting Notes

Mr. Waffle asked for a clarification to the notes from the last meeting, November 20, 2019. The notes were approved.

3. Public comment

Mr. Feik reviewed the Nov. 20, 2019, minutes and commented on PFAS/PFOA. He cited the movie "Dark Waters" and the related book "Exposure: Poisoned Water, Corporate Greed and One Lawyer's Twenty-Year Battle Against DuPont." He's concerned about the semiconductor industry in Washington County.

Dr. Williamson said CWS sampled a selection of industrial dischargers. There were no excessive concentrations of any perfluorinated compounds, but there were a few sources that were elevated above background. CWS has been open with the Board about the results. The concentrations from semiconductor industries are quite low. CWS found one high sample at the Durham facility and is still trying to identify the source.

Mr. Feik appreciates the effort to control chemicals at the source. Dr. Williamson said industries have been very cooperative and supportive of the effort.

Mr. Feik asked if there are issues related to Willamette water. Dr. Williamson said no and said there is no issue of potential serious toxicity in Washington County.

Ms. Taniguchi-Dennis said CWS is also working with landfills to address leachate coming off rainfall figure out a solution. We're taking the issue very seriously.

4. Election of Chair and Vice Chair

Mr. Duyck nominated Mr. Weller to continue as Chair. Ms. Fai seconded. Mr. Weller asked for additional nominations. There were none; nominations were closed. Mr. Weller was reelected as Chair.

Mr. Duyck nominated Mr. McKillip to continue as Vice Chair. Ms. Brown seconded. Mr. Weller asked for additional nominations. There were none; nominations were closed. Mr. McKillip was reelected as Vice Chair.

5. Confirmation of Budget Committee Members

Clean Water Services' Budget Committee is made up of the five Board of Directors and five citizens from CWAC who reside within Washington County. The Board appoints CWAC members to three-year terms. Ms. Hennings, Mr. Weller and Mr. Waffle are continuing Budget Committee members; there are two vacancies. Ms. Hennings moved to recommend Ms. Brown and Mr. McKillip for reappointment. Mr. Duyck seconded. Motion passed.

6. Research & Innovation Center Briefing

Clean Water Services is establishing a Research & Innovation Center to promote collaboration regarding water sector technology that benefits water quality in the Tualatin River Watershed. Dr. Williamson, the Research & Innovation Center director, highlighted a few successful projects and some upcoming projects. He said the goals of the innovation program are to optimize plant operations and restorative activities, develop innovative technologies, verify operational data and reduce risk of regulatory noncompliance.

SUCCESSFUL PROJECTS

1. **Biological phosphorus removal:** In 2018-19, Peter Schauer and Adrienne Menniti led a project to monitor biological phosphorus removal. Dr. Williamson described the process. When blips occur, alum is added to the tertiary process, which spreads aluminum throughout the treatment process.

   CWS expects an aluminum standard will be set for the treatment facilities in the next few years. When alum is added to the treatment process to address the blips in biological phosphorus, we sometimes exceed the standard we expect will be set. That scenario was a driver for the research.

   Researchers measured residual phosphorus uptake rates and found the rates correlate well with upset conditions. They developed an automated process to quantify the rates, and were then able to predict upsets. This process will be adopted at utilities across the country.

2. **Impact of phosphorus discharge to the Tualatin River without alum treatment:** Leila Barker, Clinton Cheney, Bob Baumgartner, Scott Mansell, Ken Williamson and Raj Kapur studied the impact of phosphorus discharges to the Tualatin River without alum treatment.

   The starting question: Can we live without alum? Would there be a problem if CWS didn't use alum and only used biological phosphorus removal?

   Last summer CWS turned off alum treatment at the plants for almost three weeks and monitored the effects in the river. Without alum, researchers saw slight increases in phosphorus in the river, which was expected. Researchers also measured chlorophyll a and studied algal species. There were no significant increases of algae in the river. The results are very close to what was predicted in water quality models.

   CWS is applying for permission from DEQ to run the entire 2020 summer without alum.

   The effluent aluminum concentration is 500-700 parts per billion when alum is used. It's less than 200 ppb without alum. Researchers are hopeful this research will show CWS can eliminate alum treatment with no adverse effects. It will also save money.

KEY PROJECTS IN 2020

Optimize plant operations and restoration

1. **Economics of water reuse:** This project would send Class A reuse water, which can be used for agriculture, water features and groundwater recharge, to TVID in exchange for water from Hagg Lake. This approach could increase water from Hagg by about 20 percent and is a very important for the CWS long-term temperature management plan.
2. **Evaluation of RAS Fermentation:** CWS is going to build an anaerobic side stream fermenter at Durham. Fermentation of return activated sludge generates volatile fatty acids, which serve as a carbon source for biological phosphorus removal. Durham will be one of the first plants in the U.S. to have an anaerobic side stream fermenter. It could be a solution to stabilizing biological phosphorus removal.
3. **Enhancing Wetland Establishment:** CWS and partners put in more than 1 million plants at the 90-acre Fernhill wetlands. An upcoming project is Wapato, which is 900

acres. How do you optimize plantings to improve chances of survival, reduce pesticides and lower costs?

New innovative technologies

1. **Rainfall adjustment for climate change.** What is the intensity and duration of a rain storm? Both are changing. We need that information to design effective storage ponds. CWS has invested a lot in new stormwater models. A group at University at Washington developed models that can be localized. It will provide the revised rainfall frequency and depth information every year so organizations can update their storm design. Better data leads to better designs and lower costs. CWS will collaborate with the City of Portland and Clackamas to share the costs of the data.
2. **Enhanced use of sensors for environmental monitoring.** CWS uses sensors for environmental monitoring such as pH, temperature, dissolved oxygen, ammonia, nitrates, etc. A typical sensor, or sonde, is about $5,000. CWS staff is working with a consulting firm to build a do-it-yourself monitor at a cost of about $140-$200 apiece. CWS hopes to install hundreds throughout the watershed. The sondes will be placed in the main stem, tributaries, water resource recovery facilities and the conveyance system and researchers will study how well they work, how reliable they are, how robust they are.
3. **Use of environmental DNA (e-DNA) to assess environmental health.** Every living organism in a watershed sheds DNA and it shows up in the water. Scientists can track bacteria, zooplankton, fish, frogs, birds, beavers, elk and it's possible to assess the environmental health of the water body. Researchers want to know if the environmental health in small watersheds is improving with restoration.

   Ms. Taniguchi-Dennis said if we're going to spend $1 billion for environmental protection and compliance, we want to make sure it makes a difference. Utilities across the country are considering this question. If the environment is not improving, we need to figure out why.

Verify operational data

1. **Alternative disinfection methods:** This project will be funded by Water Research Foundation. The use of chlorine disinfection leads to the production of disinfection byproducts, which can exceed our water quality standards. Performic acid is a promising alternative and doesn't produce disinfection byproducts. Researchers will test to see how well it kills pathogens, whether it produces toxic products, reliability, resiliency and cost. It's a collaboration with four or five organizations around the country.
2. **Optimizing stormwater treatment using Aquifer Storage and Recovery (ASR):** This is a cooperative project with the City of Beaverton with funding from Oregon Water Resources Departments. Beaverton has two aquifer storage and recovery wells that go one mile deep into basalt. Beaverton wants to treat stormwater and inject it into the wells. Since it would mix with groundwater, stormwater used for ASR must be treated to drinking water standards. What is the optimal treatment method for treating stormwater? The goal is to store the treated stormwater, then use it in the summer for irrigation and stream restoration. Dr. Williamson also wants to build a stormwater treatment test facility.

Mr. Weller said drinking water people have been doing this for awhile. They put water in the ground in the winter, then use it in the summer to augment drinking supplies. The key is putting clean water into the ground and account for chemical reactions.

It's expensive to use tap water for irrigation. Mr. Waffle said Beaverton is developing a separate utility for irrigation.

Reduce regulatory risk

1. **Impact of restoration on Dairy-McKay subbasin:** There have been about 50 restoration projects in the subbasin and there's data going back to 1970. This is a cooperative study with various groups to see if restoration projects made a difference. CWS is focusing on water quality and temperature modeling and addressing the influence of tile drainage.

   In the 1950s, the conservation district installed tile drains, or perforated pipes, to get water out of the soils. Water in these areas has high concentrations of nitrates and temperatures that are about 6 or 7 degrees lower than the stream.

   Mr. Duyck said almost every farm field in Washington County has tile. Without the tile, the valley would be a series of marshes.

2. **Assessment of carbon sequestration from restoration:** CWS adds carbon to soils during restoration projects. If carbon storage could be marketed for $15/ton for carbon offsets, Wapato has the potential for $1 million a year. This could be a key indicator of ecological uplift.

3. **Characterizations of FG and NTS effluents:** Forest Grove effluent must meet "the basin rule" — 10 mg/L BOD, 10 mg/L TSS — or "equivalent." No one has defined "equivalent."

   CWS has a hard time meeting the 10-10 standard in Forest Grove discharge, but the discharge doesn't go to the Tualatin River, it goes to the Natural Treatment System for about five days for tertiary treatment.

   The goal of the project is to demonstrate that treatment through the Natural Treatment System is equivalent to the intent of the 10/10 standard. Otherwise, CWS will have to spend about $2 million on a filter system for the treatment plant.

4. **Measurement of inhibition for local limits regulation:** Industrial dischargers put things in the water system that inhibit biological processes at treatment plants. CWS sets local limits to try to control the discharges. Researchers are trying to develop a system to measure inhibitions for all our processes and CWS hopes to develop a protocol with which it can empirically determine inhibitory concentrations.

Questions and comments related to the Research & Innovation Center briefing are in Appendix A.

7. Growing Up Research Results

A summary report of the Growing Up public/private partnership research project was released in October 2019. The report provides an updated socioeconomic and demographic profile of Washington County residents and CWS customers. Growing Up is the result of nearly 18 months of socioeconomic trend analysis, extensive opinion research and a series of community discussions that provide a window into the experiences, values and beliefs of residents of our growing community. Mr. Jockers, Government & Public Affairs Director, provide an overview of the survey results.

The research project was convened by CWS. The Vision Action Network and Westside Economic Alliance are sponsors. Funders are CWS, Washington County, Tualatin Soil and Water Conservation District, Intel and PGE.

Washington County commissioners did a community attitudes survey in 1990, which served as a benchmark for the Growing Up study. Some research was based on socioeconomic and social mobility research done by John Tapogna of ECONorthwest. We also did qualitative and quantitative work — survey work and focus group work — with DHM Research and Coalition of Communities of Color

In general, people like living here, but there are issues, especially around housing, traffic and crowded neighborhoods. Can people afford to live here?

Compared to 1990, Washington County is more ethnically mixed and better educated. Graduation rates are higher, income rates are higher. A study that tracked people born in 1980 to 2012 showed that Washington County performs better than two thirds of counties in the country. If a person is born poor in Washington County, they're more likely to get further ahead than two thirds of the country. The Growing Up effort explored some of the determining factors in that research.

Generally, they found economic integration—households of different incomes in close geographic proximity—to be a major driver of mobility. Washington County performed well on this metric as well as other characteristics that aid social mobility including lower income inequality, relatively low crime, low high school drop-out rates and low incidences of single-parent households. People enjoy living in fast-growing economy. The area has been a good place for families. Residents value the diversity of race, ethnicity and religion, but issues are popping up. People are worried about the future – housing costs, crowded neighborhoods, traffic. Fifty-eight percent no longer believe people can afford to own a home and raise a family.

We're doing a lot right, but we need to recognize that Washington County is at an inflection point. What can we do?

- Encourage policy makers to be more clear that they understand the pain points. Recognize efforts that are working well.
- Build on what works to connect new voices in new ways.
- Prioritize policies – more neighborhoods more mixed by race and income, open supportive decision processes that are more supportive, open and effective. How do we reduce commute times? How do we protect what works for schools?

Questions and comments related to the Growing Up research results are in Appendix B.

8. Public comment

Perfluorinated compounds: Mr. Feik is concerned about sending water from Rock Creek to use for irrigation because of the presence of perfluorinated compounds.

Local limits: Mr. Feik is pleased that CWS implements local limits to help protect public health. Aluminum and ammonia are concerns.

CWI: Clean Water Institute is separate from Clean Water Services. Who gets the benefit from research: CWI or CWS and how is the benefit being used?

Ms. Taniguchi-Dennis explained that CWS conducts research to seek solutions to challenges in the Tualatin River and new ways to achieve ecological uplift within the basin. At times, we create something significant to the water industry and we can establish intellectual property. In those cases, CWS creates a partnership with CWI in order to create greater opportunities to partner with private entities who may struggle to align with the financial or open-source operations of a government entity. As a nonprofit organization, CWI is better able to engage partnerships that might not otherwise be possible. For example, CWI partnered with Ostara to market WASSTRIP, the intellectual property developed to recover phosphorus from the water as it passed through our treatment plants. Ostara markets the WASSTRIP technology and CWI received royalty payments for use of the patented technology.

CWS ratepayers get the benefit of the application of our research within the basin, and they benefit from the intellectual property revenue that fuels additional research and development.

CWS is interested in the possibility of generating revenue from the carbon market and may find that CWI can forge partnership paths that CWS cannot. If people buy trees and invest in our programs to offset their carbon footprint, it will benefit our ratepayers.

Field Tiles: Mr. Feik is concerned about significant natural resource areas because we need them to keep species from going extinct. Mr. Duyck said he has a map from 1852 that shows good farmland and where all the swamps are. The county was covered with swamps. Mr. Wellner said the group has talked about creating a map that shows restoration areas and habitat linkage.

9. Announcements

- 50 years ago on Feb. 3, 1970, voters approved the Unified Sewerage Agency. We'll have events all year to mark the anniversary.
- CWS received approval from DEQ to use high purity water with commercial brewers. Staff will work with Art Larrance and the Oregon Brewers Festival this summer to feature beer made with high purity water.
- CWS was invited to join the Leading Utilities of the World. The network's members represent some of the best water utilities in the world and benefit from collaboration and knowledge sharing on industry topics.
- Ms. Taniguchi-Dennis received the 2019 Water Finance & Management Award.
- The next meeting is Feb. 12, 2020.

10. Adjournment

Mr. Weller adjourned the meeting at 8:36 pm.

(Meeting notes compiled by Jody Newcomer.)

Appendix A
Questions and comments regarding the Research & Innovation Center.

Biological phosphorus removal

Q: What do you do when the rates predict an upset?
A: You start to analyze all the factors, consider all scenarios and adjust accordingly.

Impact of phosphorus discharge to the Tualatin River without alum treatment

Q: Do you do it in the summer because of lower flows?
A: Water quality issues are only a concern in the summer.

Q: Is this temperature driven?
A: Some is temperature-driven. We think the algae in the river are sunlight-limited. They're not limited by phosphorous. There wasn't much sunlight last summer during the study period. We hope to get more sunlight in the 2020 study period.

Economics of water reuse

Q: How is water reuse water from Rock Creek different from the Durham reuse water that's used on golf courses?
A: It's exactly the same.

Use of environmental DNA (e-DNA) to assess environmental health

Q: How does it get quantified?
A: They collect data from a known source and compare to the new data.

Q: You have to account for roughness and how quickly is passes through.
A: Yes, but DNA is very stable. It washes out, but there's a continual source of organisms.

Q: We also need to know which approach works better.
A: Yes. The information will help us make a business case that what we're doing is far superior to what others are required to do.

Q: Where does money come for this?
A: Ratepayers.

Q: PGE is required to spend money on environmental improvements. Does PGE give any of its money on these programs, to research?
A: We don't know.

Q: How do they know the analysis is right? The sequences are right? If data shows 12 elk, how do we know it's not 120 elk?

A: We're not dealing with that kind of precision. The data will show whether the number of salmon in the stream is increasing or decreasing.

Measurement of inhibition for local limits regulation:

Q: Does local limit mean: water coming out of Intel needs to be this?

A: Yes.

Appendix B
Questions and comments regarding the Growing Up study.

Q: It's interesting how positives and negatives are interpreted. College degree holders is listed as a positive, but one third of college degree holders actually get jobs in their degree. The others just take on more debt. I don't see it as a positive.

A: College debt is a huge debt, even for those people with good jobs. That issue came up again and again.

Q: Crowded neighborhoods concern me, and the lack of parking. I don't see anything being done because Metro and the other entities say it has to be this density. It's set up to make people tense.

A: Crowding issues are density issues and don't always align with policy issues.

Q: You talked about the notion of being housing burdened, meaning people spend more than 30% of their income on rent. There's also the combination factor of cost of housing plus the cost of transportation.

A: They amplify one another. There are 27 new people in Washington County every day. Eleven are born at the hospital, 16 are moving here. They need houses, they need roads – there are a lot of needs.

Q: Did you have a chance to connect with native American community?

A: Coalition of Communities of Color took the lead on connecting with communities of color. We have great data on customers going back to 1988, which is older whiter residents. We have a hard time reaching other communities, younger and people of color. We're working to reach them.

Q: Is the county already not livable for certain communities?

Q: The main thing driving migration on the West Coast is housing affordability. It used to be employment.

A: Some say Portland is last affordable city on the West Coast. It's relative.

Q: By whose standards?

A: For every 100 people, there are 23 housing units being built. As long as that's the norm, the market will dictate housing costs and they'll continue to stay out of reach for many people. You can't reverse the costs until you reverse the supply and demand.

2020 Research and Innovation Program

Kenneth Williamson, Ph.D., P.E.
Director of Research and Innovation

Clean Water Services

New Chemistry Sets for Christmas

Goals of Innovation Program

- Optimize plant operations and restoration
- Develop and adopt new innovative technologies
- Verify operational data for employment of new technologies
- Reduce risk of regulatory noncompliance

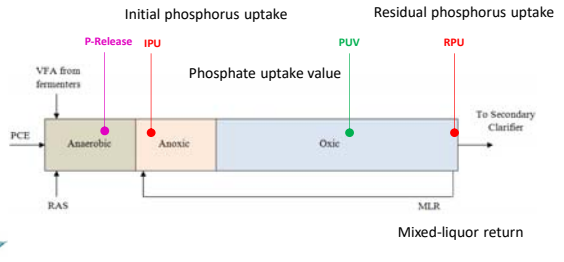
A Couple of 2018-19 Projects

- Monitoring Biological Phosphorus Removal
  - Peter Schauer, Adrienne Menniti, Water Resource Recovery (formerly Wastewater Treatment Department)
- Impact of Phosphorus Discharge to the Tualatin River without Alum Treatment
  - Clinton Cheney, Leila Barker, Bob Baumgartner, Raj Kapur, Scott Mansell, Ken Williamson, Regulatory Affairs and Research and Innovation

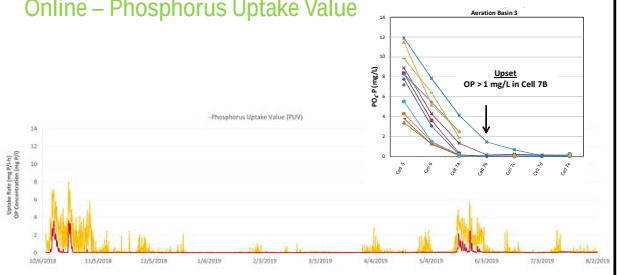
Monitoring Biological Phosphorus Removal

Durham Secondary Clarifier Ortho-phosphate Effluent

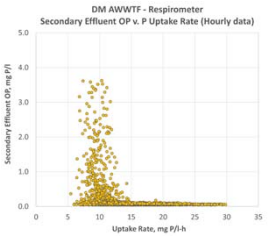
Biological Phosphorus Removal Reactors



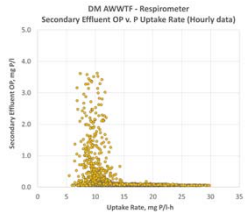
Online – Phosphorus Uptake Value

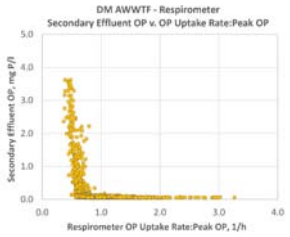


Online – Phosphorus Uptake Respirometer



Online – Ratio of Release to Uptake Rate

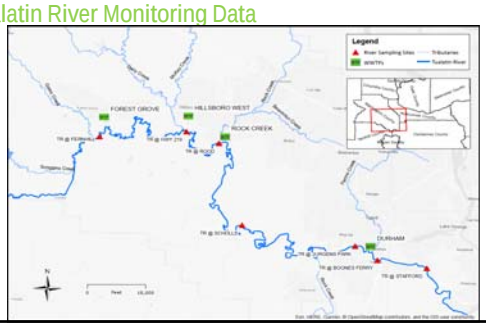




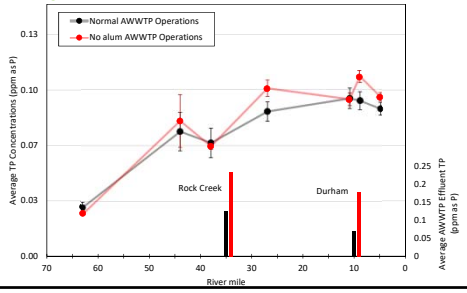
Phosphorus Management on Tualatin River

- TMDL set desired phosphorus level in the river at approximately background, phosphorus was assumed to be the driver for pH and high DO issues
- Rock Creek- 0.10 mg/L monthly medium
- Durham-0.11 mg/L monthly medium
- FG-bubble load for all three plants (lbs/day)

Tualatin River Monitoring Data

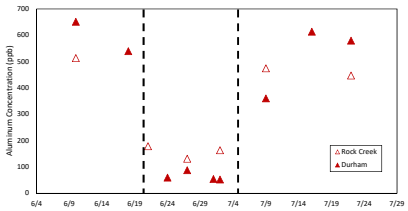


2019 Average TP Concentrations in the Tualatin River



Plant Effluent Aluminum Concentrations

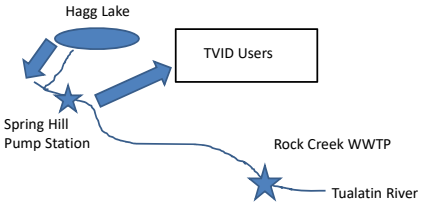
- Aluminum concentrations near chronic standard during alum use (500 – 700 ppb)
  - Well below chronic standard (<200 ppb) without alum use



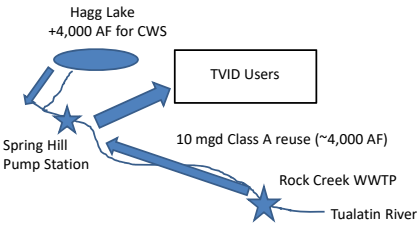
Optimize Plant Operations and Restoration

- Economics of Water Reuse
- Evaluation of RAS Fermentation
- Enhancing Wetland Establishment

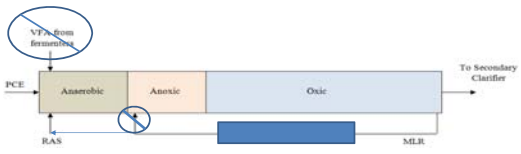
Economics of Water Reuse



Economics of Water Reuse



Evaluation of RAS Fermentation to Achieve Stable BPR



Anaerobic Side Stream Fermenter
(RAS to VFAs for BPR)

Enhancing Wetland Establishment

- Large or small (plug) plantings?
  - Survival
  - Size and coverage after 5 years
  - Less pesticides
  - Cost

Wapato- 900 acres
Stream shading- 2 to 3 miles/yr

New Innovative Technologies

- Rainfall Adjustments for Climate Change
- Enhanced Use of Sensors for Environmental Monitoring
- Environmental DNA

Rainfall Adjustment for Climate Change

- Rainfall is being impacted by climate change
  - Intensity
  - Duration

Invested in improved stormwater models (TRUST, HSPF), need good input values for design storms

Revised rainfall frequency/depth information for the 9 rain gauges used for surface water modeling, including gauges at 3 pump stations (Banks, Butternut, and Lower Tualatin), a Portland station (Bonny Slope) and 5 NOAA stations.

Enhanced Use of Sensors for Environmental Monitoring

- Sondes
  - pH, temperature, DO, ammonia, nitrates, conductivity, ortho-phosphorus, turbidity (COD, BOD, TSS-???)
  - Main stem, tributaries, WWTPs, conveyance system
  - DIY approach reduced costs, need to determine precision, accuracy, reliability, robustness

Arduino for water quality monitoring?

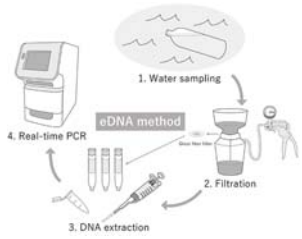
- Open-source data-loggers & radios

EnviroDIY Mayfly Microprocessor & Datalogger $60 + Accessories (vary depending on need) $30-90 + Cell Phone or Radio Modules $30-60

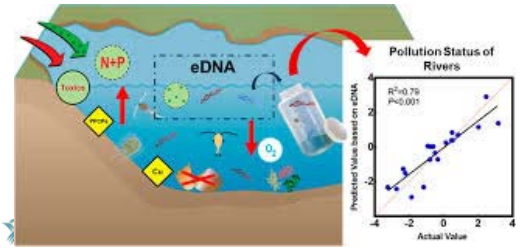
Based on Arduino platform

Total = $140-$220

Use of Environmental DNA (e-DNA) to Assess Environmental Health



Use of Environmental DNA (e-DNA) to Assess Environmental Health

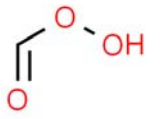


Verify Operational Data

- Alternative Disinfection
- Stormwater Injection

Alternative Disinfection Methods

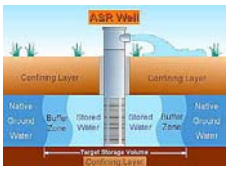
- Chlorine disinfection leads to production of disinfection byproducts (DBPs)
- Ferrate, iodine, performic acid
- Test for pathogen inactivation, toxicity, DBP formation, reliability, resiliency, feasibility of full-scale implementation, and cost.



Performic Acid

Optimizing Stormwater Treatment using ASR

- Cooperative project with City of Beaverton and OWRD
- Treat stormwater for ASR injection (DW quality)
- Use stored water for summer irrigation and stream restoration
- Develop optimal treatment methods



Reduce regulatory risk

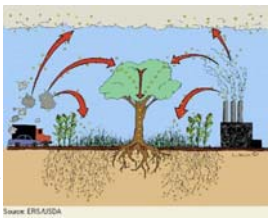
- Dairy-McKay Restoration Activities
- Carbon Sequestration
- Characterization of FG and NTS Effluents
- Inhibition Measurements

Impact of Restoration on Dairy-McKay Sub-basin

- Effects of restoration
- Cooperative study with ODEQ, TRWC, TSWCD, ODA, and OWEB
- WQ and temperature modeling
- Address the influence of tile drainage

Assessment of Carbon Sequestration from Restoration

- Carbon in soil increases from tree planting, restoration, and biosolids application (2 to 10 tonnes/acre-yr)
- Potential key indicator of ecological uplift
- Carbon storage could ultimately be marketed (~$15/tonne)

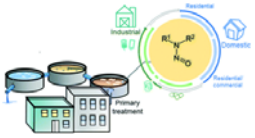


Characterization of FG and NTS Effluents

- Effluent requirements at FG are under “the basin rule,” 10 mg/L BOD, 10 mg/L TSS or “equivalent”
- FG secondary effluent goes to NTS for “tertiary” treatment
- Demonstrate that treatment through Fernhill wetlands is “equivalent” to the intent of the 10/10 standard

Measurement of Inhibition for Local Limits Regulation

- WWTPs can be inhibited by industrial discharges
- Inhibition can be to heterotrophic, nitrifying and/or anaerobic organisms
- Controlled by setting “local limits”
- Need to empirically determine inhibitory concentrations



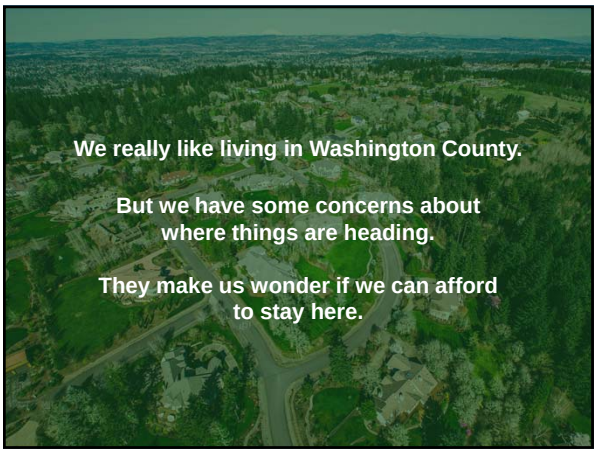
The philosophy of the CWS research program…….

Life is about not knowing, having to change, taking the moment and making the best of it, without knowing what's going to happen next.

Gilda Radner

Not knowing when the dawn will come I open every door.

Emily Dickinson

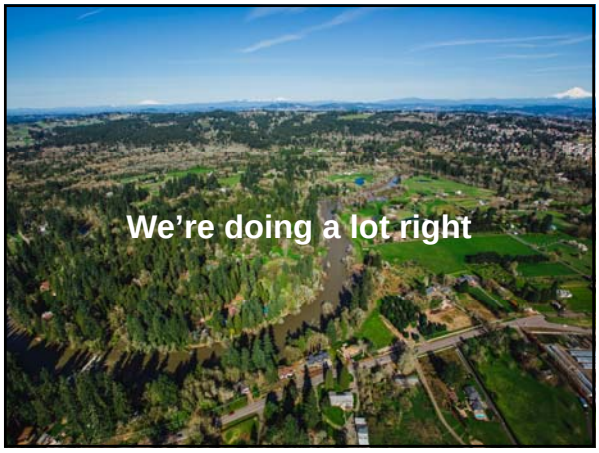


Better than 2/3 of American counties

+ (Relatively) integrated
+ Lower income inequality
+ Low crime, dropouts and single parents
+ (Relatively) short commutes

Our survey and focus groups are clear

"You're always just on the edge of being able to afford what you're living in"



What can we do?

+ Acknowledge the pain, tell me what you're already doing

+ Engage more voices and perspectives

+ Promote economic integration

1

Build on what works to connect new voices in new ways

- Beaverton BOLD
- County Civic Leaders program
- Centro de Prosperidad
- Thrives
- Paseos Verdes

2

More neighborhoods more mixed up by race and income

Decision processes more supportive, open, and effective

Protect what works for kids

Our next steps

www.growingupwashco.org

Questions? Advice?