



WASHINGTON STATE
MUNICIPAL STORMWATER CONFERENCE
APRIL 5-8, 2021



Funding provided by

The logo features a green, textured outline of the state of Washington on the left. To its right, the text "WASHINGTON STATE" is in a grey, sans-serif font. Below that, "MUNICIPAL" is in a large, bold, blue, sans-serif font. Underneath "MUNICIPAL", "STORMWATER" is in a grey, sans-serif font, and "CONFERENCE" is in a large, bold, blue, sans-serif font. The background has light grey wavy lines at the top and bottom.

WASHINGTON STATE MUNICIPAL STORMWATER CONFERENCE

WELCOME TO THE 2021 WASHINGTON STATE MUNICIPAL STORMWATER CONFERENCE!

After a year of seemingly endless updates, changes, postponements, pivots and re-assessments, the Washington Stormwater Center is pleased that you can join us at 2021 Washington State Municipal Stormwater Conference. This unique conference focuses on addressing high-priority issues and challenges faced by municipal NPDES permittees statewide. While our format differs from prior years, we hope you will find ample opportunity to learn from stormwater managers from around the state.

MuniCon 2021 is held on a virtual platform featuring nine tracks with 60 live or recorded presentations including research, case studies, environmental justice, and O&M from stormwater managers across Washington. Two of our three workshops are set up with interactive training focusing on priority stormwater topics.

As with most conferences, there are many people to recognize for helping make this conference possible—from the Washington Department of Ecology (our funder) to the partners, advisors, presenters, inspirational speakers, and sponsors who have had a large role in putting together this statewide conference.

Thinking forward to MuniCon 2023, we hope to continue to build upon the valuable experience of our stormwater peers. To assist us in developing the next conference that will provide attendees with the greatest benefit please complete the conference survey that will be emailed to you following the conference. We look forward to receiving your ideas and suggestions on how to grow the conference in future years.

Thank you all for your interest and support—and welcome to MuniCon 2021

Laurie Larson-Pugh
*Washington Stormwater Center
Municipal Program & MuniCon Manager*

Schedule of Events

Monday, April 5, 2021

8:00 - 8:30 AM

Keynote and Welcome to MuniCon 2021 | Leaning into Equity
Dr. Anu Taranath, University of Washington

8:30 - 8:40 AM

Break

TRACK 1
STORMWATER PLANNING

TRACK 2
EDUCATION & OUTREACH

TRACK 3
ENVIRONMENTAL JUSTICE

8:40 - 9:10 AM

Reducing Stormwater Impacts from State Highways – A Prioritization Based Approach
Adam Lee & Jess Brown, Herrera; Shannon Peterson, Thurston County

How to Include Ethnic Media in Outreach
Mary Rabourn, King County Stormwater Services Section

Homeless Encampment Purple Bag Pilot Program in Seattle and Tacoma
Shauna Hansen, Brandon Drucker & Aris Efting, City of Tacoma; Dave Hare, Seattle Public Utilities

🕒 5 MIN

9:15 - 9:45 AM

SMAP Basin Scoring Tool
Julie Brandt, Parametrix; Janet Geer, City of Bothell

Reducing Un-scooped Pet Waste by 80% in Neighborhood Parks
Aaron Hussman, City of Kirkland

🕒 5 MIN

9:50 - 10:20 AM

Collaborative Approach to Building Watershed Planning Tools
Christian Nilsen, Geosyntec Consultants; Laura Nokes, City of Tacoma; Todd Hunsdorfer, King County

Stormwater Story Maps – Streamlining Project Outreach
Emelie Crumbaker, Aspect Consulting; Brandi Lubliner & Teizeen Mohamedali, Ecology

Environmental Justice Panel
Shauna Hansen, City of Tacoma Environmental Services Department; Millie Piazza, Ecology; Janell Majewski, Snohomish County

🕒 5 MIN

10:25 - 10:55 AM

King County's Water Quality Benefits Evaluation Toolkit
Carly Geyell, King County

Digital Engagement Can Translate Into Stewardship
Mary Rabourn, King County Stormwater Services Section

🕒 5 MIN

11:00 - 11:30 AM

Embracing Co-Design in Stormwater Planning
John Brosnam, King County Department of Natural Resources

Why Fertilize? Understanding Behaviors to Reduce Pollution
Karen Dubose, Skagit County

Seattle Public Utilities RV Wastewater Pilot
Chris Wilkerson, Seattle Public Utilities

🕒 5 MIN

11:35 - 12:05 PM

Our Green Duwamish Watershed-wide Stormwater Strategy
Todd Hunsdorfer, King County

GSI Technical and Financial Assistance Programs in Puget Sound: Program Models Ripe for Replication
Christie Lovelace, City of Shoreline; Alison Schweitzer, King County

A Trip Down Equity Lane: Identifying and Engaging Overburdened Communities
Chelsea Collinge, Stacy Thomas & Vanessa Bauman, HDR Inc.; Michelle Perdue, Kitsap County

🕒 5 MIN

12:10 - 12:40 PM

Stormwater Planning in Spokane
Marcia Davis, City of Spokane

Nuts & Bolts: Practical Advice to Launch a Storm Drain Art Program
Kym Pleger, Kitsap County

Municipal Engagement of Sovereign Indian Nations in Stormwater Planning
Michael Martinez, Northwest Indian Fisheries Commission

Tuesday, April 6, 2021

8:00 - 8:30 AM **Inspirational Speaker | Keeping the Connection: Utilizing Stormwater Management to Keep Washington Communities Connected to Nature**
Vince McGowen, Ecology

8:30 - 8:40 AM **Break**

TRACK 1 RESEARCH & EFFECTIVENESS STUDIES	TRACK 2 IDDE & SOURCE CONTROL	TRACK 3 OPERATIONS & MAINTENANCE
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8:40 - 9:10 AM	8:40 - 9:10 AM	8:40 - 9:10 AM
<p style="text-align: center;">Biofiltration Media Mixes for Phosphorus Removal from Stormwater Nigel Pickering & Md. Arafat Ali, Washington State University</p>	<p style="text-align: center;">Illicit Connections, Illicit Discharges, and Identifying Sources of Stormwater Pollution Part II: Updated Field Manual, Trainings, and Videos James Packman, Aspect Consulting; Jeanne Dorn, King County Stormwater Services; Rebecca Dugopolski, Herrera</p>	<p style="text-align: center;">Optimal Mulching for GSI Management David Jackson & Derek Hann, Snohomish Conservation District</p>

🕒 5 MIN

9:15 - 9:45 AM	9:15 - 9:45 AM	9:15 - 9:45 AM
<p style="text-align: center;">Wenatchee Mobile Contactor Effectiveness Study Results Jessica Shaw, City of Wenatchee</p>	<p style="text-align: center;">Regional Spill Hotline Feasibility Study Rebecca Dugopolski & Jenn Schmidt, Herrera; Todd Hunsdorfer, King County</p>	<p style="text-align: center;">Washington State Funded Stormwater Retrofits – Looking Back David Mora & Heather Bearnese-Loza, Ecology</p>

🕒 5 MIN

9:50 - 10:20 AM	9:50 - 10:20 AM	9:50 - 10:20 AM
<p style="text-align: center;">Street Sweeping vs. Catch Basin Cleaning Study Aimee Navickis-Brasch & Taylor Hoffman-Ballard, Osborn Consulting; Jon Morrow, City of Ellensburg</p>	<p style="text-align: center;">A Phase II Permittee Perspective on IDDE Program Implementation: Case Studies and Lessons Learned Paul Marrinan, City of Puyallup; Angela Vincent, Ecology</p>	<p style="text-align: center;">Drones as a Tool for Stormwater Projects Kelsey Mach, Landau Associates, Inc.; Matt Balder, Thurston County</p>

🕒 5 MIN

10:25 - 10:55 AM	10:25 - 10:55 AM	10:25 - 10:55 AM
<p style="text-align: center;">Stormwater Compliance and Monitoring on a Floating Bridge Paul Fendt & Gordon MacDonald, Parametrix</p>	<p style="text-align: center;">Business Inspection Group (BIG) Report as a Resource for SS.C.8 Requirements Susan McCleary, City of Olympia; Tally Greulich, City of Remond; Heidi Zarghami, City of Lacey</p>	<p style="text-align: center;">The Organic Evolution of a Multi-Departmental Municipal O&M Program Trey (James) George, City of Spokane; Taylor Hoffman-Ballard, Osborn Consulting</p>

🕒 5 MIN

11:00 - 11:30 AM	11:00 - 11:30 AM	11:00 - 11:30 AM
<p style="text-align: center;">Stormwater Action Monitoring: Receiving Water Status and Trends Monitoring Moving Forward Keunyea Song, Ecology</p>	<p style="text-align: center;">Phase II Source Control Program & Inspection Diana Halar, City of Lakewood</p>	<p style="text-align: center;">Maintenance of Natural Systems in an Urban Environment Don McQuilliams, City of Bellevue</p>

🕒 5 MIN

11:35 - 12:05 PM	11:35 - 12:05 PM	11:35 - 12:05 PM
<p style="text-align: center;">Redmond Paired Watershed Study: Overview and Key Findings Through Year 4 of Implementation John Lenth, Herrera; Jessica Atlakson, City of Redmond</p>	<p style="text-align: center;">Discussion: What do the ISGP and the MS4 Permit Source Control Requirement Mean for Your Jurisdiction? Evan Dobrowski & Colleen Griffith, Ecology</p>	<p style="text-align: center;">Regulated Stormwater Facility O&M Program: Phase I and Phase II Approaches Will Gibson, Snohomish County; Nels Rasmussen, City of Arlington</p>

🕒 5 MIN

12:10 - 12:40 PM	12:10 - 12:40 PM	12:10 - 12:40 PM
<p style="text-align: center;">Acute Cerebrovascular Effects in Juvenile Coho Salmon Exposed to Roadway Runoff Stephaine Blair, WSU</p>	<p style="text-align: center;">Business Inspection during COVID Arthur Lee, Snohomish County; Kevin Brennan, City of Tacoma; Erik Lust & Angela Peterson, City of Seattle</p>	<p style="text-align: center;">Stormwater Infiltration at Seattle-Tacoma International Airport Tom Atkins, Aspect Consulting</p>

🕒 5 MIN

12:40 - 1:10 PM	12:40 - 1:10 PM	12:40 - 1:10 PM
<p style="text-align: center;">Anti-Ozonants Used in Tire Rubber Craig Manahan, Ecology</p>		<p style="text-align: center;"><i>No Session</i></p>

Wednesday, April 7, 2021

8:00 - 8:30 AM	Inspirational Speaker Where the Rubber Meets the Road: Tire Chemicals in the Toxicology of Stormwater Jen McIntyre, Washington State University		
8:30 - 8:40 AM	Break		
	TRACK 1 PERMITTING & REGULATION	TRACK 2 PERMIT ENHANCEMENT	TRACK 3 GREEN STORMWATER INFRASTRUCTURE DESIGN
8:40 - 9:10 AM	Geotechnical Plan Review Can Save the Day! Jennifer Saltonstall, Associated Earth Sciences, Inc.	Integrating Salmon-Safe and the NPDES Permit Autumn Salmack & John Featherstone, City of Shoreline; Bryan Berkompas, Aspect Consulting	Biofiltration Using Smart Configuration and Controls Ben Fuentes, Kennedy/Jenks Consultants
🕒 5 MIN			
9:15 - 9:45 AM	History of Structural SW Controls Emma Trew hitt, Ecology	Global Solutions to Local Stormwater Challenges Jane Dewell, Port of Seattle; Stefano Mazzilli, Pure Blue	Biomass Production on Vegetated Filter Strips Hisham El-Hussein, Richard Gustafson, Heidi Gough & Renata Bura, University of Washington
🕒 5 MIN			
9:50 - 10:20 AM	Structural Stormwater Controls (SSC) Science Review and Synthesis Aimee Navickis-Brasch & Maria Peraki, Osborn Consulting	The On-going Saga of TAPE and STEPP Doug Howie, Ecology; Carla Milesi, University of Washington	Asset Management Software Francesca White & MaKenna Lindberg, Osborn Consulting
🕒 5 MIN			
10:25 - 10:55 AM		National Perspectives on the Stormwater and MS4/Sector Seth Brown, NMSA	Using Real Time Controls in Infiltration Dan Garipey, Tetra Tech
🕒 5 MIN			
11:00 - 11:30 AM	Retrospective: Development of the MS4 Permit & Regulations Bill Moore, Ecology (retired); Bill Leif, Snohomish County; Anne Dettelbach, City of Redmond	Inspection Process Improvement Jess Eakens & Morgan Maupin, Ecology	Making Detention Facility Smarter: A Continuous Monitoring Active Control (CMAC) Pilot Project in Redmond, WA Peter Holte, City of Remond; Josh Van Wie, Osborn Consulting; Matthew Rea, OptiRTC
🕒 5 MIN			
11:35 - 12:05 PM		Solutions to Stormwater Rate Challenges Tage Aaker, FCS Group	Right of Way GSI Installations: Lessons Learned David Jackson & Derek Hann, Snohomish Conservation District
🕒 5 MIN			
12:10 - 12:40 PM	UIC vs NPDES Regulatory Framework Design Considerations, Inspection Requirements Doug Howie, Ecology; Martin Nelson, City of Kennewick	Treatment of Organic Stormwater Pollutants by Bioretention Soil Media Amended With Biochar and Fungi Chelsea Mitchell, Washington State University	Gateway to the City of Ellensburg Stormwater Retrofit Project Jon Morrow, City of Ellensburg; Kaela Mansfield & Megan Ehlebracht, Osborn Consulting

Thursday, April 8, 2021

	TRACK 1 EDUCATION & OUTREACH	TRACK 2 STORMWATER MANAGEMENT ACTION PLANS	TRACK 3 ILLICIT CONNECTION & ILLEGAL DISCHARGE (IC-ID)
8:40 - 9:10 AM		SMAP Overview and Guidance Abbey Stockwell, Ecology	
		🕒 5 MIN	
9:15 - 9:45 AM	15 Strategies for Communicating Science and Data to Non-Scientists Cathy Angell, Cathy Angell Communications	Puget Sound Watershed Characterization Tool Colin Hume, Ecology	
9:50 - 10:20 AM			IDDE/IC-ID Field Screening and Source Tracing Guidance Workshop King County, Aspect Consulting & Herrera
	🕒 10 MIN	🕒 10 MIN	
10:30 - 11:00 AM	Lucky Dumpster Laurie Devereaux, City of Bellevue	Plans on Plans: Incorporating SMAP into Comprehensive Planning Elizabeth Lowell, HDR Inc.; Michelle Perdue, Kitsap County; Phil Struck, Struck Environmental	
	🕒 5 MIN	🕒 5 MIN	
11:05 - 11:35 AM	People First: How to Create Inclusive Marketing Efforts that Engage Overburdened Communities Crystal Borde, Vanguard Communications	Developing a Fundable SMAP Grant Application Jessica Schwing, Ecology	
11:35 - 12:10 PM			
	🕒 10 MIN		
12:20 - 1:20 PM	Survey Best Management Practices for Informing and Evaluating Behavior Change Campaigns Jennifer Tabanico, Action Research Inc.	<i>No Session</i>	<i>No Session</i>
1:20 PM	MuniCon 2021 Concludes		



KEYNOTE AND WELCOME TO MUNICON 2021

8:00 - 8:30 AM

Keynote and Welcome to MuniCon 2021 |

Anu Taranath, University of Washington Seattle

ANU TARANATH Dr. Anu Taranath brings both passion and expertise to her work as a speaker, facilitator, author and educator. A University of Washington professor for the past 20 years, she teaches about race, gender, equity, and global literatures. As a racial equity consultant, she offers coaching, training, facilitation and other types of partnerships. Her book *Beyond Guilt Trips: Mindful Travel in an Unequal World* was named a Finalist for four book awards including the Washington State Book Award. Included in Fodor's Travel's "13 Books to Inspire Your Travels" and Oprah Magazine's "Best 26 Travel Books of All Times," Dr. Anu and her book have been profiled in YES!, AFAR, Bitch, Mindful and National Geographic magazines, as well as the "Travel with Rick Steves" radio program. Please visit www.anutaranath.com for more on Dr. Anu and her work.

What does equity mean to the stormwater community? To serve all of our constituents well, we'll need a framework to understand how our lives are both similar to and different from one another. We will speak about "overburdened and underserved" communities, ask questions about the implications of this framing, and learn how to grow our awareness to approach social and environmental justice. Join Dr. Anu for a lively conversation on how to bring a more intentional and thoughtful equity lens to our daily work.

TRACK 1 | STORMWATER PLANNING

8:40 - 9:10 AM

Reducing Stormwater Impacts from State Highways—A Prioritization Based Approach

Adam Lee & Jess Brown, Herrera; Shannon Peterson, Thurston County

ADAM LEE Adam has over twelve years of professional experience working on stormwater projects throughout the Northwest, with an emphasis on low-impact design. Additional areas of experience include ecological restoration, water resources, environmental permitting, demolition, water, sewer, and road and utility design.

JESS BROWN Jess joined the Herrera team over six years ago after receiving his M.S. in Civil and Environmental Engineering. He supports a variety of stormwater planning, design and monitoring projects for municipal and private clients.

SHANNON PETERSON Shannon is currently a Utility Planner with the Water Resources Division of Thurston County Public Works. Shannon has been with Thurston County for the last 12 years and have worked in water resources for over 17 years. Her primary focus has been on stormwater management and NPDES permit compliance, GIS stormwater infrastructure mapping, and asset management for water and sewer utilities.

Municipalities collecting stormwater utility fees from WSDOT under RCW 90.03.525 are now required to develop a plan for how funds will be used to address impacts of stormwater runoff from WSDOT facilities. To assist Thurston County in meeting this requirement, Herrera developed a GIS-based analysis to address the challenge of identifying priority areas within a large geographic area. We used a prioritization matrix to further identify retrofit opportunities. The highest-scoring projects were selected for conceptual design. The work has been endorsed by WSDOT and could be used by other jurisdictions to justify and prioritize the use of WSDOT utility fees.

9:15 - 9:45 AM

SMAP Basin Scoring Tool

Julie Brandt, Parametrix; Janet Geer, City of Bothell

JULIE BRANDT Julie is a senior water resources engineer in her 20th year at Parametrix. She specializes in watershed planning, NPDES compliance, municipal and industrial stormwater management, flood studies, NEPA/SEPA assessments, and hydrologic/hydraulic modeling. Julie has a certificate in LID from WA Ecology, is a Certified Erosion and Sediment Control Lead (CESCL), and is a former environmental inspector and enforcement agent for the U.S. EPA.

- Understand use of this tool for basin/catchment prioritization in stormwater planning
- Be able to compare this tool against other available prototypes to determine the best fit for your jurisdiction
- Hear data analysis and screening lessons learned that are applicable to basin prioritization efforts in general

This session will present the Basin Scoring Tool—a cost-effective, open-source, GIS/spreadsheet model that scores, ranks, and compares the long-term planning needs of jurisdictional watersheds. The Basin Scoring Tool establishes a baseline watershed score and forecasts level of improvement for regulatory updates, land management, and capital project scenarios. The City of Bothell's Stormwater Management Action Planning (SMAP) Interdisciplinary Team is using this model to address the NPDES Phase II Watershed Prioritization and SMAP requirements for the City's basins. Presenters will discuss the model functions and example scenarios to evaluate watersheds, select high-priority basins, and forecast effectiveness of long-term planning actions.

9:50 - 10:20 AM

Collaborative Approach to Building Watershed Planning Tools.

Christian Nilsen, Geosyntec Consultants; Todd Hunsdorfer, King County; Laura Nokes, City of Tacoma

CHRISTIAN NILSEN *Christian Nilsen manages the Western Washington Surface Water Practice at Geosyntec Consultants. He has developed novel tools that combine stormwater models with remote sensing and machine learning approaches to help agencies make informed decisions about stormwater watershed management. Christian is a member of the Puget Sound Partnership's Toxics in Fish Workgroup and serves as a technical advisor to the Governor's Southern Resident Killer Whale Task Force.*

TODD HUNSDORFER *For over a decade Todd has worked on a variety of stormwater management programs. He has extensive experience managing stormwater education and outreach programs, administering infrastructure operations and maintenance programs, TMDL implementation, and commercial and construction code compliance programs. At King County he manages several regional watershed-based stormwater initiatives including Our Green Duwamish, a watershed wide, collaborative, stormwater strategy.*

LAURA NOKES *Laura Nokes is an Engineer at City of Tacoma and has been involved with multiple stormwater and wastewater projects over the last 15 years. This work includes leading stormwater and sediment monitoring projects, conducting source control investigations, developing sampling plans, and assisting with database development and implementation for City programs. Currently she is PM of developing Tacoma's Watershed Management Plan and Heatmap tool.*

Stormwater agencies are facing new permit requirements for stormwater planning that present significant staff effort. In Puget Sound, several agencies are collaborating to develop a shared, open-source set of mapping tools for comprehensive watershed planning. These tools can be used to protect local waters by meeting SMAP permit compliance goals and strategically prioritizing areas most in need of targeted stormwater management actions.

King County and the City of Tacoma are working to further develop these tools and make them available to the larger stormwater community. Collaboration with NPDES permittees and other stakeholders will guide the tool development and decision-support framework.

10:25 - 10:55 AM

King County's Water Quality Benefits Evaluation Toolkit

Carly Greyell, King County

CARLY GREYELL *Carly Greyell has worked as an ecotoxicologist in King County's Water and Land Resources Division since 2013. During this time, she has worked on projects related to stormwater treatment effectiveness, priority pollutant pathways, source control, and providing decision makers with a scientific basis for clean water strategic planning.*

- Learn about how the WQBE Toolkit is being developed and what questions it can help answer.
- Hear about what has been learned so far and explore opportunities for future collaboration.

King County is developing the Water Quality Benefits Evaluation (WQBE) Toolkit, which will provide transparent, consistent methods for evaluating benefits of potential water quality investments in terms of estimated pollutant load reductions and improved outcomes for a suite of ecological and human health endpoints. The WQBE Toolkit will be used to support several King County strategic planning efforts to help identify cost-effective investments to improve water quality outcomes.

11:00 - 11:30 AM

Embracing Co-Design in Stormwater Planning

John Brosnan, King County Department of Natural Resources

JOHN BROSNAN *John Brosnan is the Strategic Planning Manager for King County Stormwater Services and leads the Strategy, Policy and Performance Unit (SPPU). SPPU was created in 2019 to develop stormwater management strategy and policy, strategic planning and communications, new watershed management strategies, and green infrastructure approaches. John brings over 20 years of professional experience leading collaborative strategic plan development for regional-scale water and habitat protection efforts.*

- Review and understand the different phases of the Community Engagement Continuum and the benefit of co-design in stormwater planning
- Understand how building social infrastructure translates to more effective partner engagement and durable outcomes in stormwater planning

King County is reimagining its approach to supporting regional stormwater planning efforts. This new way of doing business centers on collective impact and supporting our partners — by leveraging convening capacity, collaboratively co-designing shared outcomes, and supporting our partners' in water quality management and meeting regulatory requirements. The presentation will explore these new approaches through the lens of recent initiatives, including the Our Green Duwamish coalition, the Stormwater Investment Plan, and the Clean Water Healthy Habitats plan. In examining these efforts, we will distinguish how these outcomes are more science-driven, durable, and effective than previous efforts to date.

11:35 - 12:05 PM

Our Green Duwamish Watershed Wide Stormwater Strategy

Todd Hunsdorfer, King County

TODD HUNSDORFER For over a decade Todd has worked on a variety of stormwater management programs. He has extensive experience managing stormwater education and outreach programs, administering infrastructure operations and maintenance programs, TMDL implementation, and commercial and construction code compliance programs. At King County he manages several regional watershed-based stormwater initiatives including Our Green Duwamish, a watershed wide, collaborative, stormwater strategy.

- **Interjurisdictional Coordination**

Our Green Duwamish is a watershed-based collaborative effort to improve stormwater quality and quantity in the Green Duwamish watershed. This diverse group of partners has been working together since 2015 to manage stormwater runoff in an effort to enhance the environment, human health, and the economy. We have recently co-designed a five-year Implementation Plan to track progress towards our watershed-level stormwater management goals and a Mapping Tool to help Phase II municipal NPDES permittees achieve compliance with their Stormwater Management Action Planning permit requirements. We are excited to share with the MuniCon audience.

12:10 PM - 12:40 PM

Stormwater Planning in Spokane

Marcia Davis, City of Spokane

MARCIA DAVIS Marcia Davis is a professional engineer working on capital programming for the City of Spokane. She has worked on scope, schedule and funding of the City's CSO program as well as MS4 separation projects for the past 15 years. Marcia supervises a high-talented staff in planning, programming, and funding stormwater projects, including Sharp Avenue. A large part of her work includes coordinating with other departments and integrating projects. Her current work includes 20-year and long-range planning for stormwater, water and sewer utilities of the city.

The City of Spokane embarked on 20-year capital facility planning in 2018, as the second step to Link-Spokane, the City's tagline for the process of "linking" infrastructure. The past three years have been full of discovery and during that time the City has decided on a method to move forward with these planning efforts. With the help of GHD, the City has developed a plan of action for decision making of capital projects, maintenance, operation, and new development. The City is starting the process using Multiple Object Decision Analysis as a basis. Yet to come is communications and outreach needed to select and evaluate criteria. This presentation will explore setting goals, integration, and the decision making process.

TRACK 2 | EDUCATION & OUTREACH

8:40 - 9:10 AM

How to Include Ethnic Media in Outreach

Mary Rabourn, King County Stormwater Services Section

MARY RABOURN Mary Rabourn is impassioned about sharing environmental information that is relevant, timely, and in a fun form that is useful. Doing communications for King County's Stormwater Services Section offers all that and more. Our shared environmental challenges allow Rabourn to work together with great people across the region, tackling climate change, pollution, health disparities and racial justice.

Can working with ethnic media build relationships and reach communities? What are considerations for working with community partners that are also in the media business? Get a short introduction to ethnic and community media from the COVID-19 outreach, some lessons learned and tips to consider in your outreach to nontraditional communities. In working with underserved and under resourced communities, what do you need to think about bringing to the relationship? How does this offer a different equity perspective? How much does it cost? Let's learn from the COVID-19 response challenges to reach audiences rarely engaged in environmental work.

9:15 - 9:45 AM

Reducing Un-scooped Pet Waste by 80% in Neighborhood Parks

Aaron Hussmann, City of Kirkland

AARON HUSSMANN Aaron Hussmann is an Education and Outreach Specialist for the City of Kirkland Storm & Surface Water Division. His career is dedicated to educating people about and connecting them to our land, air, water, plants, and wildlife. He has a passion for creating data-driven education and outreach efforts and for distilling complex scientific topics down to levels easily understood by stakeholders, citizens, and students.

Un-scooped pet waste in parks was reduced 80% through simple education and outreach. The City of Kirkland ran an effective and affordable campaign in 2019 to evaluate the impacts of pet waste on water quality, conduct a targeted outreach campaign, and evaluate whether outreach efforts led to measurable changes in bacteria levels in a local creek. Using brightly colored flags and signage, City staff marked all locations of un-scooped dog waste in two parks over the course of three weeks. This visible display paired with outreach efforts led to an 80% reduction in un-scooped dog waste lasting at least six months after outreach efforts had ceased.

9:50 - 10:20 AM

Stormwater Story Maps—Streamlining Project Outreach

Emelie Crumbaker, Aspect Consulting; Brandi Lubliner & Teizeen Mohamedali, Ecology

EMELIE CRUMBAKER Emelie is a GIS Project Manager at Aspect Consulting supporting various municipal and industrial stormwater project and permit needs with on-call GIS support and GIS road-mapping. She also collaborates on spatial analysis and cartographical needs for water resources, infrastructure, environmental, and data projects. Emelie is inspired by the intersection between science and storytelling.

BRANDI LUBLINER Brandi is the Stormwater Action Monitoring (SAM) Coordinator. SAM brings together municipal stormwater permittees to collaborate on monitoring needs under the Western Washington municipal stormwater permits.

TEIZEEN MOHAMEDALI Teizeen Mohamedali currently works as an Environmental Engineer within the Environmental Assessment Program at the Washington State Department of Ecology. She participates in research, data analysis, and scientific studies related to water quality and hydrologic modeling, and more specifically, conducting Total Maximum Daily Load studies. She is passionate about incorporating creative methods to communicate complex science into her work, including visual graphics and cartography/GIS.

- How to use story maps to engage the public on stormwater issues and projects
- Who needs to be involved and how much time does it take
- Highlights and lessons learned when developing story maps

Engaging the public on stormwater projects is not only rewarding, it's also an important pathway to inclusion. The stories we tell can engage the community at every stage of challenging stormwater projects. But how do we best share these often complex stories remotely? This presentation will highlight three different stormwater storymaps and will discuss how the format can be used in remote outreach campaigns to reach a diverse audience, create awareness, and tell the story of stormwater.

10:25 - 10:55 AM

Digital Engagement Can Translate into Stewardship

Mary Rabourn, King County Stormwater Services Section

MARY RABOURN Mary Rabourn is impassioned about sharing environmental information that is relevant, timely, and in a fun form that is useful. Doing communications for King County's Stormwater Services Section offers all that and more. Our shared environmental challenges allow Rabourn to work together with great people across the region, tackling climate change, pollution, health disparities and racial justice.

Can a regional campaign like Puget Sound Starts Here help residents engage with environmental actions and stewardship in local cities? With few resources, time or staff there are smart tactics to consider. A small investment in digital engagement can get folks to your resources. Learn from our strategy to take advantage of regional assets like Puget Sound Starts Here, Natural Yard Care, Resource Reservoir, Dogdoogity, Don't Drip and Drive and social media (three Facebook pages, one in Spanish, Instagram, blog). How can this model offer an annual boost to your website or a year-round approach that brings residents, visitors, nonprofits and businesses to your clean water opportunities? These lessons apply wherever there is digital engagement.

11:00 - 11:30 AM

Why Fertilize? Understanding Behaviors to Reduce Pollution

Karen DuBose, Skagit County

KAREN DUBOSE *Karen is Skagit County's Pollution Identification and Correction Coordinator, and manages Skagit County's popular PoopSmart social marketing campaign. She has a background in water resources policy and management, and survey research.*

Phase 2 NPDES permits include social marketing as part of the outreach requirement. In 2020, Skagit County surveyed residents around a local lake to learn more about their lawn care attitudes and practices in preparation for a social marketing campaign to reduce pollution from lawn care practices. In this presentation, we will share how we developed our study, the results, and how those results compare to similar studies around the world.

11:35 - 12:05 PM

GSI Technical and Financial Assistance Programs in Puget Sound: Program Models Ripe for Replication

Christie Lovelace, City of Shoreline; Alison Schweitzer, King County

CHRISTIE LOVELACE *Christie Lovelace is the Surface Water Programs Specialist for the City of Shoreline. She is passionate about building resilient communities and restoring environmental resources through effective community engagement.*

ALISON SCHWEITZER *As a program/project manager within Stormwater Services at King County, Alison Schweitzer facilitates many internal and external collaborative planning efforts and supports a variety of stormwater management programs. Alison is passionate about listening intently to everyone's unique stories, asking questions to better understand perspectives, and finding ways to improve the way we work together.*

Several jurisdictions and conservation districts within Western Washington currently have GSI assistance programs, however, many jurisdictions and some conservation districts do not. The STORM GSI work group seeks to identify the barriers to developing a GSI assistance program; highlight examples of how agencies addressed those barriers to create a GSI assistance program; and provide recommendations for creating equitable, collaborative, and engaging GSI assistance programs.

Across Puget Sound, agencies are developing Green Stormwater Infrastructure (GSI) assistance programs to support private property retrofits. Many program models have emerged, offering strategies to overcome both institutional and program participation barriers. The Stormwater Outreach for Regional Municipalities (STORM) GSI workgroup interviewed 13 Puget Sound jurisdictions and conservation districts to catalog the various program models, program management fundamentals, outreach and promotion strategies, equity and inclusion approaches, and program evaluation methods. This presentation shares highlights from this review. Complete findings from this research are being synthesized into a guidebook intended to support agencies interested in developing their own GSI assistance programs.

12:10 PM - 12:40 PM

Nuts & Bolts: Practical Advice to Launch A Storm Drain Art Program Learned

Kym Pleger, Kitsap County

KYM PLEGER *Kym is an education and outreach coordinator for Kitsap County's Stormwater Division, where she is responsible for leading the division's communications and marketing. She coordinates the West Sound Stormwater Outreach Group (WSSOG) and is developing a natural yard care social marketing campaign. Kym has over 20 years of experience in communications, marketing and fundraising for various governmental and nonprofit organizations. She also has a certificate in project management. Kym enjoys kayaking, CrossFit, gardening and chasing after her three dogs.*

Participants will learn practical steps needed to launch storm drain art project, from conducting a contest and selecting artists, to site preparation. Helpful tips such as the types of materials used will also be shared.

8:40 - 9:45 AM

Homeless Encampment Purple Bag Pilot Program

Shauna Hansen, Brandon Drucker & Aris Efting, City of Tacoma Environmental Services; David Hare, Seattle Public Utilities

SHAUNA HANSEN Shauna Hansen is a Professional Engineer with the City of Tacoma's Watershed Planning Team. She has over 15 years of experience working with the City on elements of the Stormwater Management Program including plan review, stormwater modeling, watershed planning and community outreach and is serving as an Equity Representative for the Environmental Services Department working on the Racial Equity Action Plan.

BRANDON DRUCKER Brandon Drucker is a Restoration Ecologist with the City of Tacoma's Passive Open Space program. His experience centers on ecological restoration, habitat assessment, and environmental research in the public sector. He plans restoration of urban natural areas, directs 2 Washington Conservation Corps crews, and manages a native plant nursery facility for the City.

ARIS EFTING Aris Efting is a Restoration Ecologist with the City of Tacoma Passive Open Space program. Her background includes over a decade of watershed and surface water research and restoration, along with developing TMDL nutrient standards in the Midwest used by the EPA. She applies this knowledge to urban forest and wetland restoration efforts in Tacoma, with a focus on steep slopes.

DAVID HARE David Hare is a Senior Planning and Development Specialist for Seattle Public Utilities and is a subject matter expert on homeless encampment management, mitigation and remediation. David developed and manages Seattle's encampment trash program which serves 30 homeless encampments and the City's RV Remediation program. With over 20 years experience with NPDES David also manages cleanup and relocation services for encampments impacting NPDES compliance.

- Learn about a case study on how Surface Water Utility can pilot homeless encampment garbage pick-up services.
- Identify key challenges and lessons learned from Tacoma's experience.

Encampments occur on over 75% of open space restoration sites in Tacoma. Associated impacts often include erosion, vegetation damage, and water pollution from improperly disposed human waste and garbage. The purple bag pilot project involves voluntary bagging of unwanted items by unsheltered individuals living at encampments and weekly garbage collection by a third party contractor. Environmental Services and Homeless Outreach Team staff coordinated to distribute purple bags weekly while also continuing conversations about housing assistance and support services. After 10 weeks, over 15,560 lbs of garbage has been removed from the encampment site.

SPU provides solid waste collection services to 30 unsanctioned homeless encampments through our purple bag program. The program collects over 20 tons per month of solid waste from homeless encampments and includes weekly outreach services that educate those living unsheltered how to use the program and how access other social services.

Lessons learned: 1.) Coordinated program implementation with Homeless Outreach Program was key. Regularly occurring conversations with individuals living at encampments during the period of the pilot project while delivering sanitation supplies provided additional opportunities to identify needs and offer assistance beyond garbage pick-up services. 2.) The purple bags were used by individuals to keep their camps safe and clean until they are able to take advantage of shelter/housing opportunities that fit their needs. Participation rates and purple bag use was high. 3.) Additional benefits of site visits included several individuals moving to shelter/housing situations.

9:50 - 10:55 AM

Environmental Justice Panel

Shauna Hansen, City of Tacoma Environmental Services; Millie Piazza, Ecology; Janell Majewski, Snohomish County

SHAUNA HANSEN Shauna Hansen is a Professional Engineer with the City of Tacoma's Watershed Planning Team. She has over 15 years of experience working with the City on elements of the Stormwater Management Program including plan review, stormwater modeling, watershed planning and community outreach and is serving as an Equity Representative for the Environmental Services Department working on the Racial Equity Action Plan.

MILLIE PIAZZA Millie Piazza is the Environmental Justice & Title VI Senior Advisor at the Department of Ecology. In this role, she works to integrate environmental justice (EJ) priorities into agency programs, address state EJ challenges, and advance nondiscrimination best practices for Civil Rights compliance. She has broad experience in national and international environmental justice, and currently serves on the National Environmental Justice Advisory Council to EPA, WA Governor's Interagency Council on Health Disparities, and the UW Superfund Research Program External Advisory Board

JANELL MAJEWSKI Janell Majewski works for Snohomish County Conservation and Natural Resources, Surface Water Management. Her role is to lead a team that tracks the health of Snohomish County rivers, lakes and streams, investigates water pollution, and administers the NPDES permit. In 2020, she began working on tools to identify overburdened communities in Snohomish County.

- [Learn about Tacoma's equity tools.](#)

Tacoma has a new interactive mapping tool to highlight disparities in access to opportunity among neighborhoods and identify where services do not meet community needs. The tool uses 20 indicators based on the City's Strategic Plan goals around Accessibility, Economy, Education and Livability. City staff are using this GIS analysis tool to better distribute resources and services in ways that minimize existing inequities and maximize access opportunity. Tacoma's Environmental Services Department has also developed an Equity Toolkit which uses the Equity Index and community engagement to help staff analyze existing programs and projects, identify gaps in service and make modifications to address and eliminate these disparities and provide better service to the whole community.

11:00 - 11:30 AM

Seattle Public Utilities RV Wastewater Pilot

Chris Wilkerson, Seattle Public Utilities

CHRIS WILKERSON Chris Wilkerson has dedicated his career to protecting the health of Washington State residents and the quality of their environment. He has served as a spill responder at the state and local level, a hazardous waste and environmental compliance inspector, and is now focused on creating waste management solutions for the homeless population through his work with Seattle Public Utilities

Beginning in January 2020, Seattle Public Utilities (SPU) initiated a pilot program intended to address risks to the MS4 from discharges of wastewater from recreational vehicles parked on the streets of Seattle. This presentation will discuss the justification for the program and the status of the RV community prior to our intervention, the tactics and methodology of the program including outreach, health and safety, our partnership with non-profit advocacy groups, and septic hauling, and briefly analyze program impact and costs. We will also look ahead to our planned future efforts and potential alternative methods of service delivery.

11:35 - 12:05 PM

A Trip Down Equity Lane: Identifying and Engaging Overburdened Communities

Chelsea Collinge, Stacy Thomas & Vanessa Bauma, HDR Inc.; Michelle Perdue, Kitsap County

CHELSEA COLLINGE Chelsea's familiarity with large, complex infrastructure projects drove her passion for data-driven decision making. Particularly to push project teams to pay closer attention to the people they are, and more importantly are not reaching. Working in step with her GIS counterparts, Chelsea analyzes complex data sets to understand where public engagement is failing, and why.

STACY THOMAS Stacy is the business class leader for Strategic Communications for Oregon and SW Washington, and oversees the communications for water, resources and transportation projects. She brings over 15 years of experience providing public clients with communications and stakeholder engagements strategies.

VANESSA BAUMA Vanessa is a Senior GIS Analyst with HDR with 16 years of experience providing GIS data management and mapping support for planning projects across the nation. Vanessa also specializes in strategic communications, with an emphasis on leveraging the power of spatial data to reach targeted audiences-in particular, overburdened and at-risk populations. Her project experience ranges from regional transportation studies to utility and stormwater plans, erosion and groundwater studies, airport master plans, social and political risk assessments, environmental justice reports, and large-scale environmental impact statements. The combination of her technical and communications experience adds a holistic set of skills to the planning team. Vanessa is a certified GIS professional (GISP).

MICHELLE PERDUE Michelle has over 14 years of experience in municipal stormwater management and environmental communications, with a focus on delivering critical community outcomes like flood protection, improved surface water quality, efficient regulation of development, well-planned watersheds, and effective and empathetic customer service. Her work at Kitsap County, in harmony with the Clean Water Kitsap partnership, has included nationally-recognized projects and programs that reduce flooding, prevent pollution, and restore fish habitat; ensuring that our shellfish beds, streams, and water bodies remain functional for the humans and wildlife that depend on them. Prior to joining Kitsap County, Michelle was the Municipal NPDES Stormwater Permit Manager for the City of Moses Lake, Washington.

- Public Engagement, Equity Tools, Permit Requirements, etc.

Don't check the box. Expand it. Kitsap County did this by leveraging big data and even bigger ideas to reach all community members, particularly those traditionally left behind. This session provides an overview of Kitsap County's tool and dives into the equitable communication strategies that make sense for the communities we strive to improve.

12:10 PM - 12:40 PM

Municipal Engagement of Sovereign Indian Nations in Stormwater Planning

Mike Martinez, Northwest Indian Fisheries Commission

MIKE MARTINEZ Michael Martinez is a Habitat Policy Analyst at the Northwest Indian Fisheries Commission (NWIFC), focused on water resources in western Washington. Martinez has a background serving in state and federal government natural resources agencies, and a history of collaboration with local jurisdictions. He holds a bachelor's degree in natural resources policy and planning, a master's degree in environmental studies, and a master's degree in environmental law. Before joining the NWIFC staff, he served as a judicial law clerk for the Honorable Debra Stephens, Associate Justice at the Washington Supreme Court. Martinez is based at the NWIFC headquarters in Olympia.

- To remind municipal stormwater permittees of obligations of the state and its subdivisions to Indian tribes under treaties with the United States.
- To remind municipal stormwater permittees of obligations to engage tribes when prioritizing catchments for planning, retrofits, and land treatments to manage stormwater.
- To provide suggestions for municipal engagement of sovereign Indian nations in stormwater planning.

The presentation will introduce or remind participants of the constitutional legal obligations for the state and its subdivisions to honor the rights of Indian tribes reserved through treaties with the United States, including the right to harvest fish at usual and accustomed areas. The presentation will introduce or remind participants of the permit requirements to engage tribes when prioritizing catchments for planning, retrofits, and land treatments to manage stormwater. Ensuing discussion will consider strategies for municipal engagement of sovereign tribal governments in stormwater planning.



INSPIRATIONAL SPEAKER

8:00 - 8:30 AM

Keeping the Connection: Utilizing Stormwater Management to Keep Washington Communities Connected to Nature

Vince McGowan, Department of Ecology

VINCE MCGOWAN *Vince McGowan leads the Water Quality Program at the Washington State Department of Ecology. He is a professional engineer with over twenty years of experience working in environmental regulation. He began his career as a consultant at a civil engineering firm then moved to Washington and started working in local government focused on stormwater management. He has spent the last ten years supporting water quality protection at Ecology. He took on the Water Quality Program Manager role in April of this year, after previously managing the permitting section within the program.*

- Think of new ways your work connects communities to nature
- Share examples of communities choosing the right management tools for their situation

Washington's leadership in stormwater management means that we not only have cleaner water and better habitat, but also more enjoyable outdoor spaces for people. This is not a coincidence, it is the critical job performed by stormwater experts all across the state, choosing the right tools for each unique stormwater challenge. You are helping our growing state keep the connection between our built environment and nature.

TRACK 1 | RESEARCH & EFFECTIVENESS STUDIES

8:40 - 9:10 AM

Biofiltration Media Mixes for Phosphorus Removal from Stormwater

Nigel Pickering & Md. Arafat Ali, Washington State University

NIGEL PICKERING *Nigel Pickering is a Research Associate Professor at the State of Washington Stormwater Center. He is a Water Resources Engineer with more than 30 years of scientific and engineering experience in water resources management. He has a Ph.D. in Agricultural Engineering from Cornell University and is a Registered Professional Engineer.*

MD. ARAFAT ALI *Md. Arafat Ali is currently pursuing a M.S. in Civil Engineering at Washington State University, Pullman under the supervision of Dr. Nigel Pickering. He graduated from Bangladesh University of Engineering and Technology, Bangladesh in 2017 with a B.S. in Civil Engineering. After completing his M.S., he plans to pursue a Ph.D. in Environmental Engineering.*

Many recent studies have shown that compost-based bioswale and bioretention stormwater systems have poor performance for removing stormwater phosphorus. This project, funded by the Washington Department of Transportation, tested 42 different alternate media materials: nine types of biochars, 11 mineral-based compounds, 12 modified compounds, three raw organic compounds, two types of sand, and three types of compost. Potential phosphorus adsorption was determined using batch adsorption isotherms. The six best materials from the adsorption tests were then assessed in vertical soil columns with various media mixes and layering. The best candidate media mix will then be evaluated in a small-scale bioswale.

9:15 - 9:45 AM

Wenatchee Mobile Contractor Effectiveness Study Results

Jessica Shaw, City of Wenatchee

JESSICA SHAW *Jessica has worked for the City of Wenatchee since 2002 in the water, sewer and stormwater utilities. She is currently a Washington State certified Group 4 Water Distribution Manger, Group 3 Wastewater Treatment Plant Operator, and a Certified Sediment and Erosion Control Lead. She holds a B.S. in chemistry with a minor in mathematics from Pacific Lutheran University.*

- Tips for evaluating the effectiveness of an education and outreach study
- Effectiveness of the Dump Smart Program for carpet cleaners in Eastern WA

In 2010, the Dump Smart Program for mobile contractors was implemented in six eastern Washington Communities. The City of Wenatchee in partnership with six Eastern Washington Permittees completed an effectiveness study to assess the effectiveness of the Dump Smart education and outreach program for carpet cleaners. This presentation will cover the lessons learned from evaluating an education and outreach program and the results of the study.

9:50 - 10:20 AM

Street Sweeping vs. Catch Basin Cleaning Study

Aimee Navickis-Brasch & Taylor Hoffman-Ballard, Osborn Consulting; Jon Morrow, City of Ellensburg

AIMEE NAVICKIS-BRASCH *Aimee Navickis-Brasch, PhD, PE is a Engineering Manager at Osborn Consulting and an adjunct faculty member at Gonzaga University where she teaches Stormwater Management.*

TAYLOR HOFFMAN-BALLARD *Taylor Hoffman-Ballard is a Stormwater Engineer at Osborn Consulting who focuses on research and effectiveness studies, planning, design, and operations and maintenance for stormwater management systems and technologies. She has specialized training through the University of Minnesota Erosion and Stormwater Management Certification Program for inspection and maintenance of stormwater treatment practices and has experience in developing sustainable designs that support long-term operations and maintenance.*

JON MORROW *Jon Morrow is the Stormwater Manager for the City of Ellensburg.*

The City of Ellensburg conducted an effectiveness study focused evaluated whether the frequency of street sweeping significantly influenced sediment accumulation in and transported from catch basins. A two-year paired study was conducted using the same equipment/procedures the City typically uses for these O&M practices. The results were used to recommend a catch basin cleaning schedule based on the frequency of street sweeping in support of achieving permit requirements for catch basin cleaning. This presentation will provide an overview of the study, how the catch basin cleaning schedule was developed, and lessons learned that other permittees could apply to develop similar schedules.

10:25 - 10:55 AM

Stormwater Compliance and Monitoring on a Floating Bridge

Paul Fendt & Gordon MacDonald, Parametrix

PAUL FENDT *Paul Fendt is a Senior Consultant and Water Resources Manager for Parametrix in Seattle with over 30 years of water resources engineering and planning experience managing large-scale watershed, stormwater, flood control, and surface water projects. His project experience includes storm and surface water management planning and policy development, stormwater compliance and permitting, water quality studies, low impact development (LID) design, hydrologic and hydraulic modeling, stream restoration, floodplain studies and mapping, and subject matter expert review.*

GORDON MACDONALD *Gordon MacDonald is a senior consultant and project manager with a BS in Civil Engineering. He is also a credentialed DBIA professional. Over the past 32 years he has gained experience in transportation and other infrastructure projects. His design-build experience includes leading teams to prepare technical requirements for DB procurement. Gordon has been co-located in DB offices on three separate projects where he served as a WSDOT Representative in a design oversight role.*

The SR520 bridge across Lake Washington was replaced with a new floating bridge in April 2016. Treating stormwater from the new bridge required innovative analyses. The AKART approach approved by Ecology is a three-component treatment train that includes high-efficiency sweeping.

WSDOT embarked on a three-year monitoring program and collected data to determine stormwater-discharge concentrations. The findings and learning objectives of the monitoring program include: 1) conditions that result in the highest and lowest runoff concentrations; 2) demonstrating the use of AKART for selecting BMPs in unique settings; 3) using mixing zones for stormwater discharges; 4) high-efficiency sweeping performance on high-volume highways; and 5) achieving discharge compliance.

11:00 - 11:30 AM

Stormwater Action Monitoring: Receiving Water Status and Trends Monitoring Moving Forward

Keunyea Song, Ecology

KEUNYEA SONG *PhD in biogeochemistry and Environmental Engineering. Natural Resource Scientist in Ecology, who leads and manages receiving water status and trends monitoring, as part of Stormwater Action Monitoring (SAM) program under municipal stormwater permit in Western Washington.*

Stormwater Action Monitoring (SAM) is a collaborative program funded by 96 Western Washington municipal stormwater permittees to improve our understanding of the impacts of stormwater, conditions of our receiving waters, and effectiveness of stormwater management activities.

In 2015-2016, SAM evaluated the status of receiving water bodies in Puget Sound. A group of scientists spent two years reviewing the findings from this stream and nearshore monitoring and other literature to improve the future monitoring design. The new study design was approved by the Stormwater Work Group to be implemented from 2020 and moving forward.

The new study design continues to use the probabilistic sampling site selection tool and integrated receiving water health indicators. The survey design enables site-specific monitoring information to provide a representative, regional-scale assessment of the entire Puget lowland watershed study area. Receiving water conditions are measured by diverse indicators including the Benthic Index of Biotic Integrity (B-IBI) as a biological endpoint in streams; bioaccumulation of contaminants in nearshore mussels; toxic chemicals including heavy metals and organics in stream sediments; and nutrients in stream water. These measurements will be evaluated in relation to the urban development gradient and other human influence factors on stormwater impacts to receiving waters in the region.

With the study design improvement, SAM receiving water status and trends monitoring will help permittees to understand their own receiving water conditions and their changes in a regional perspective. A key tool for communicating the results is cumulative distribution function (CDF) curves that will illustrate changes over time. Participants will learn how to interpret the regional results and apply them locally.

11:35 - 12:05 PM

Redmond Paired Watershed Study: Overview and Key Findings Through Year 4 of Implementation

John Lenth, Herrera; Jessica Atlakson, City of Redmond

JOHN LENTH *John Lenth currently serves as the Water Practice Director for Herrera Environmental Consultants. He has over 25-years of experience in water resource science, planning, and management. John has designed and implemented numerous studies to characterize stormwater pollutant concentrations from various land uses and the effectiveness of related control measures. He received a MS in Environmental Science from Western Washington University and a BA in English from Seattle University.*

JESSICA ATLAKSON *Jessica Atlakson is an Environmental Geologist with the City of Redmond. She is the project manager for the Redmond Paired Watershed Study and provides technical support for Redmond's storm water and drinking water utilities. Prior to moving to Washington, she was the Pesticide Groundwater Quality Program Manager for the Idaho State Department of Agriculture and led the Groundwater Quality Assurance Program for the Idaho Department of Environmental Quality.*

The effectiveness of nonstructural and structural controls for stormwater runoff has been well documented at the site and parcel scale; however, limited data exists on the effectiveness of these controls in aggregate for improving receiving water conditions at the watershed scale. To address this data gap, the Redmond Paired Watershed Study is being implemented over an anticipated 10-year timeframe to document improving receiving water conditions stemming from watershed scale rehabilitation efforts. This presentation will summarize results from monitoring performed over the first four years of study implementation; including lessons learned from retrofit installations of stormwater detention vaults in the Evans Creek watershed and documented improvements in water quality from increased street sweeping frequency in the Monticello Creek watershed.

The Redmond Paired Watershed Study (RPWS) is a monitoring study that was selected for implementation in 2014 through the Stormwater Action Monitoring (SAM) program. The goal of the RPWS is to measure the effectiveness of watershed-scale rehabilitation efforts implemented by Redmond and King County for improving receiving waters conditions. The RPWS utilizes a “paired watershed” experimental design that involves measurements of various hydrologic, chemical, physical habitat, and biological indicators of stream health in seven watersheds over an anticipated ten-year period. This presentation summarizes results and key findings from analyses performed on data from monitoring in water years 2016 through 2019.

12:10 PM - 12:40 PM

Acute Cerebrovascular Effects in Juvenile Coho Salmon Exposed to Roadway Runoff

Stephanie Blair, Washington State University

STEPHANIE BLAIR *Stephanie is a PhD candidate in WSU's School of the Environment. Stephanie earned her B.S. from Evergreen State College in 2008 with an emphasis in chemistry and M.E.S from Evergreen in 2017. She is investigating the toxic modes of action in the acute mortality syndrome of coho salmon exposed to urban stormwater runoff. Her work focuses on mechanisms of blood-brain barrier disruption, circulatory impairment and oxidative stress induced by contaminants in roadway runoff. Stephanie grew up in Tacoma and is currently residing in Olympia, WA.*

Research update on the toxicology of urban stormwater and coho salmon.

Juvenile and adult coho exposed to roadway runoff display symptoms of cardiorespiratory distress and acute mortality after 5-7 hours of exposure. Blood chemistry and vascular perfusion studies reveal that blood vessels of coho become ‘leaky’ due to runoff exposure, leading to disruption of the blood-brain barrier. These results improve our understanding of how stormwater contaminants affect coho salmon, which will improve our ability to test the effectiveness of stormwater remediation strategies.

12:40 PM - 1:10 PM

Anti-Ozonants Used in Tire Rubber

Craig Manahan, Ecology

CRAIG MANAHAN *Craig Manahan is a Chemist at the Washington State Department of Ecology. His work is focused on finding safer alternatives to hazardous chemicals in consumer products.*

Overview of the role of 6PPD in tire rubber, and challenges in finding safer alternatives to its use.

TRACK 2 | IDDE & SOURCE CONTROL

8:40 - 9:10 AM

Illicit Connections, Illicit Discharges, and Identifying Sources of Stormwater Pollution Part II: Updated Field Manual, Trainings, and Videos

James Packman, Aspect Consulting; Jeanne Dorn, King County Stormwater Services; Rebecca Dugopolski, Herrera

JAMES PACKMAN *James J. Packman is a Senior Hydrologist with Aspect Consulting and has 23 years of experience in the ecology, engineering, and management of terrestrial surface waters and watersheds. James' areas of expertise include: technical assistance and permit compliance under the NPDES, MTCA, and Superfund regulatory programs; assessing pollution source control activities, illicit discharges, and BMPs; and monitoring surface waters, stormwater, and sediment. James has a Master of Science degree in Forest Engineering from the University of Washington and a Bachelor of Arts and Science dual degree in Environmental Sciences and English Literature from The Evergreen State College.*

JEANNE DORN *Jeanne Dorn, RG, MPA is a water quality program manager with King County Stormwater Services Section, Water Quality Compliance Unit. She is the overall lead for illicit connection and illicit discharge programs required by the Phase I permit, including the conveyance screening program and the fecal coliform total maximum daily loads (FC TMDLs). Ms. Dorn received her Bachelor's degree in geological sciences and her Master's degree in public administration, both from the University of Washington. She is a registered geologist in Washington State. Her work background prior to King County included geological and geotechnical engineering investigations as well as groundwater and soil remediation projects.*

REBECCA DUGOPOLSKI *Rebecca Dugopolski, PE, is an associate engineer with Herrera Environmental Consultants in Seattle, Washington with over 15 years of experience in stormwater monitoring, design, and NPDES permit compliance. She received her Bachelor's degree in Environmental Engineering from Michigan Technological University and her Master's degree in Civil and Environmental Engineering from the University of Washington. Ms. Dugopolski has worked with numerous Phase I and Phase II jurisdictions in Eastern and Western Washington to help permittees meet their NPDES permit requirements.*

- Become familiar with the content and purpose of the 2020 IC-ID Manual.
- Learn about the virtual training curriculum that was developed and the 8 workshops that were provided on the 2020 IC-ID Manual.
- Learn about the videos created to demonstrate the use of equipment for indicator tests covered in the IC-ID Manual.
- Understand how this project fits into the Ecology SAM program and how the results can be used to support municipal stormwater management.

This presentation will summarize the updated Illicit Connection (IC) and Illicit Discharge (ID) Field Screening and Source Tracing Guidance Manual. Originally published in 2013, the 2020 update to the ICID Manual includes streamlined information, new technical approaches, and updated equipment costs. Six new training videos were also developed to add to the 2013 video library. The presentation will also include lessons learned from adapting in-person training materials to be presented virtually. The project supports IDDE permit implementation as well as TMDL evaluations, source control inspections, education and outreach efforts, and pollution identification and correction.

Regional Spill Hotline Feasibility Study

Rebecca Dugopolski & Jenn Schmidt, Herrera; Todd Hunsdorfer, King County

REBECCA DUGOPOLSKI Rebecca Dugopolski, PE, is an associate engineer with Herrera Environmental Consultants in Seattle, Washington with over 15 years of experience in stormwater monitoring, design, and NPDES permit compliance. She received her Bachelor's degree in Environmental Engineering from Michigan Technological University and her Master's degree in Civil and Environmental Engineering from the University of Washington. Ms. Dugopolski has worked with numerous Phase I and Phase II jurisdictions in Eastern and Western Washington to help permittees meet their NPDES permit requirements.

JENN SCHMIDT Jenn Schmidt has helped municipal clients use technology strategically to inform environmental decision making in the Pacific Northwest for more than 16 years. In her role as Spatial Science Manager for Herrera Environmental Consultants, she has developed data-driven approaches to address a wide range of stormwater and water quality issues, including NPDES permit compliance, LID feasibility studies, and software and asset management needs assessments.

TODD HUNSDORFER For over a decade Todd has worked on a variety of stormwater management programs. He has extensive experience managing stormwater education and outreach programs, administering infrastructure operations and maintenance programs, TMDL implementation, and commercial and construction code compliance programs. At King County he manages several regional watershed-based stormwater initiatives including Our Green Duwamish, a watershed wide, collaborative, stormwater strategy.

- Review barriers to and benefits of implementing a regional spill reporting system
- Discuss the recommended core components of a regional spill reporting system
- Assess available products and implementation strategies at a local, sub-regional, or regional scale

The regional spill hotline feasibility study funded by the Stormwater Action Monitoring (SAM) program focused on gathering information and conducting an assessment on the feasibility and desire for a regional hotline to report spills. The evaluation involved a statewide permittee survey, targeted interviews with municipalities and state agencies, and discussions with vendors. One challenge faced was that the idea of implementing a regional spill hotline is not broadly supported by most jurisdictions and state agencies. Three systems were selected for detailed evaluation focused on implementation and could be used to streamline NPDES permit reporting while retaining local spill response procedures.

A Phase II Permittee Perspective on IDDE Program Implementation: Case Studies and Lessons Learned

Paul Marrinan, P.E., City of Puyallup; Angela Vincent, Ecology

PAUL MARRINAN, P.E. Paul is a Senior Stormwater Engineer with the City of Puyallup. Among other responsibilities, Paul currently manages the Phase 2 Municipal stormwater permit and its associated programs for the City of Puyallup. Paul has been at the City since 2015 and worked as a Development Review Engineer prior to becoming the Stormwater Engineer in 2017. Paul has worked for small private engineering consultants in the past which has allowed him to work on many varied projects, as well as spend time in the field as an inspector and surveyor. Paul graduated from the Ohio State University in 2004 with a degree in Civil Engineering with a specialization in Environmental Engineering.

ANGELA VINCENT Angela is a municipal stormwater permit planner with the Washington State Department of Ecology. Angela assists MS4 permittees in western Washington with Municipal Stormwater Permit compliance. Angela has worked for the Department of Ecology in her current position since March 2017. Prior to working at Ecology, Angela worked as a Life Scientist with the U.S. Environmental Protection Agency (Great Lakes Region). Angela has a Bachelor's degree in biology from Grinnell College and a certificate in Geographic Information Systems from the University of Washington Tacoma

- Describe IDDE Minimum Performance Measures in the Permit, including new standardized IDDE reporting.
- Present case studies, including outcomes.
- Support Phase II Permittee sharing and learning from one another.

In this presentation, we discuss the minimum performance measures needed for a Permit-compliant IDDE Program. Municipal stormwater permittees implement IDDE field screening and pollutant source tracing protocols. When an illicit discharge into or from a Permittee's MS4 is discovered, the Permittee notifies Ecology of the discharge and takes action to clean-up the spill. Permittees must also investigate suspected illicit connections, and eliminate any confirmed illicit connections.

We present the City's IDDE Program, including case studies. These case studies illustrate the City's procedures, and field methods for IC/ID screening and spill response. The City's approach to IC/ID is: remedy the damage and seek voluntary compliance from the spiller/responsible party. Sometimes the spiller is not aware the drain (storm) does not lead to a treatment plant. Education is key in this circumstance. In this talk, we describe examples of illicit discharge education that the City has provided to different people/groups (e.g., contractors, home owners and developers).

10:25 - 10:55 AM

Business Inspection Group (BIG) Report as a Resource for S5.C.8 Requirements

Susan McCleary, City of Olympia; Tally Greulich, City of Redmond; Heidi Zarghami, City of Lacey

SUSAN MCCLEARY Susan develops and manages stormwater pollution prevention programs for business and residential populations. She is a huge supporter of regional collaboration to improve environmental outcomes. Susan has professional and academic training in sustainable urban development, social marketing and environmental education. Susan is co-founder and co-facilitator of the Business Inspection Group (BIG), jurisdictional coordinator for the Thurston Regional Environmental Education Partnership and a STORM Steering Committee member.

TALLY GREULICH Tally has worked for the City of Redmond for five years, where she administers the Local Source Control program at local businesses. She also implements the stormwater education and outreach portion of the NPDES permit and is currently on the core team for the regional dumpster campaign. She is a native Washingtonian who loves hiking in our beautiful forests.

HEIDI ZARGHAMI As the Water Resource Outreach Assistant, I help to develop education and outreach events and campaigns to improve local water quality for the City of Lacey. Previously I worked with Susan McCleary in Stormwater Education and Outreach with the City of Olympia in project planning, social marketing and report development. As a graduate of the Master of Environmental Studies (MES) program at Evergreen State College, I developed a particular interest in creative ways to engage people on environmental topics. My passion is to implement positive change in the urban environment to improve social, economic, and environmental conditions.

The Business Inspection Program Report is a resource for Phase II permittees. This presentation will review what is in the report and how jurisdictions can use the information to develop their business inspection programs.

With the issuance of the 2019-2024 Western Washington Phase II Municipal Stormwater Permit, jurisdictions across the Puget Sound region are required to develop and implement a Source Control Program for Existing Development. With the permit requirement in mind, the Business Inspection Group (BIG) conducted a survey to gain knowledge of existing business inspection programs across the region. The information was compiled into a report that provides detailed information to Permittees by providing examples and best practices to address various elements of a business inspection program.

11:00 - 11:30 AM

Phase II Source Control Program & Inspection

Diana Halar, City of Lakewood

DIANA HALAR Diana has worked for the City of Lakewood as the Stormwater Compliance Inspector for almost 17 years. During this time, they have developed inspection, source control and education and outreach program to meet the requirements of the NPDES permit. Prior to that she worked for Peninsula Light Company dealing with PCB transformers.

- How our Phase II city developed our Source Control program
- How it meets the S5.C.8 permit requirements

How Phase II cities can meet the requirements of the current NPDES Permit, section S5.C.8. This presentation will demonstrate one way that cities can establish their inventory, how they can meet the 20% annual inspection, mapping tools that help with source control inspections and an example of an enforcement policy that helps navigate issues, establish guidelines and meet compliance.

11:35 - 12:05 PM

Discussion: What do the ISGP and the MS4 Permit Source Control Requirement Mean For Your Jurisdiction?

Evan Dobrowski & Colleen Griffith, Ecology

EVAN DOBROWSKI Evan Dobrowski has nine years of experience working with environmental regulations and enforcement. Born, raised and educated in the Pacific Northwest, receiving a Bachelors degree from Western Washington University in Environmental Science and policy in 2013. He enjoys the great outdoors and devotes his life to reduce human impacts to the environment for future generations. Evan has spent his entire career in the public sector, starting out in farm planning and mitigation, and working into permitting and policy development and enforcement. If you see him on your site he is there to see how he can help solve a problem not create more; so please see him and other inspectors as a member of the team.

COLLEEN GRIFFITH Colleen Griffith has worked in Water Quality at the Department of Ecology for five years. Her roles have spanned many aspects of stormwater, from nonpoint runoff, to Construction and Industrial Stormwater Permits, and for the past two years she has been a Municipal Stormwater Permit Planner in the Northwest Region.

The Department of Ecology Municipal Stormwater General Permits for Western Washington include “Source Control Program for Existing Development” as part of their Phase I and Phase II Permit requirements. This program requires Permittees to inventory and inspect local businesses that are potential sources of pollution in local stormwater systems. Come for a panel discussion with a Department of Ecology Municipal Stormwater Permit Implementation Planner and an Industrial Stormwater Permit Inspector to discuss how these two NPDES Permits intersect and overlap.

Business Inspection during COVID

Arthur Lee, Snohomish County; Kevin Brennan, City of Tacoma; Erik Lust & Angela Peterson, City of Seattle

ARTHUR LEE Arthur Lee is interim lead for the Snohomish County Business Inspection team. He has been involved in NPDES and stormwater quality management for many years, and has a background and degrees in Civil Engineering, Planning, and Political Science, with interests in watershed management, infrastructure planning, and GIS.

KEVIN BRENNAN Kevin Brennan has been with the City of Tacoma Environmental Services for the last 15 years. Kevin is a Senior Environmental Specialist and supervises the Source Control general business inspection group.

ERIK LUST Erik Lust over the past four years has led the Stormwater Source Control team ensuring NPDES compliance for Business Inspection, Private Stormwater Facility, IDDE Investigation, and Spill Response functions. A critical function for the team is ensuring the efficacy of the Duwamish Superfund cleanup through effective source control. Previous to Seattle Public Utilities, Erik worked for a small northern California town as an environmental compliance analyst, lab manager, wastewater treatment supervisor, and public works deputy director roles for 23 years.

ANGELA PETERSON Angela Peterson has been an Environmental Compliance Inspector on the Stormwater Source Control team at Seattle Public Utilities for almost three years. She primarily conducts business inspections and is also on the Spill Response team. Angela is a Pacific Northwest native and has a BS in Environmental Health from the University of Washington. Prior to Seattle Public Utilities, Angela worked for Snohomish Health District for 4 years as an Environmental Health Specialist.

Different approaches used by jurisdictions in response to COVID and changing conditions, to adaptively manage, at various levels, for safe and effective business inspections.

This is a panel discussion on Pollution Source Control program adaptations due to the COVID 19 pandemic, in order to continue with NPDES program objectives, under new and changing conditions. There will be three short presentations by each of the participating jurisdictions, followed by a question and answer period.

Arthur Lee, Snohomish County. Adaptations included safety protocols, inspection prioritization, and inspection process model changes.

Kevin Brennan, City of Tacoma. PPE, Social Distancing With the Help of Technology, Spill Response, Business Inspections, Inspection Goals 2020.

Erik Lust & Angela Peterson, Seattle Public Utilities. Presenting on program adjustments throughout the pandemic. Emphasis on institutional priorities that drove stormwater program adaptation and the eventual hybrid virtual/in-person model currently used.

TRACK 3 | OPERATIONS & MAINTENANCE

Optimal Mulching for GSI Management

David Jackson & Derek Hann, Snohomish Conservation District

DAVID JACKSON David Jackson is the program manager for Community Conservation at Snohomish Conservation District. He has a background in LID and Green Infrastructure installation and management.

DEREK HANN Derek Hann is the staff engineer for the Community Conservation program at Snohomish Conservation District. He has over 10 years of experience installing and managing green stormwater and LID projects for the District.

Snohomish Conservation District would like to present on how appropriate mulching has helped with maintenance. It took a few years to get the ratios correct. This process has resulted in changing how mulch is applied to gardens in the build phase, which has led to easier maintenance. Returning to earlier projects to add/change mulch has yielded similar results. Poorly maintained installations do not function as intended or as permitted and may put the owners into noncompliance, depending on the nature of the installation. Furthermore, they are often an eyesore and may become a hurdle to additional implementation.

Washington State Funded Stormwater Retrofits—Looking Back

David Mora & Heather Bearnese-Loza, Ecology

DAVID MORA Department of Ecology Stormwater Grant Project Manager, Water Quality Program. David evaluates retrofit facility stormwater grant proposals and checks up on projects during construction and after constructed.

HEATHER BEARNES-LOZA Department of Ecology Stormwater Grant Project Manager, Water Quality Program. Heather evaluates facility stormwater grant proposals and checks up on projects during construction and after constructed.

- Share observations on Retrofit BMP issues, from across different municipalities
- Municipal stormwater grants opportunities for improvement

Between 2006 and 2020, the State of Washington funded over \$165M in stormwater facility retrofit projects. Facility designs must be in accordance with the Stormwater Manual or have achieved General Use Level Designation through TAPE.

Ecology has developed an ArcGIS Online Collector Application to help track maintenance conditions of grant funded BMPs. Collector's maintenance issue domain is based on the Manuals' maintenance standards. We have found that maintenance issues occur frequently, however, most stormwater facility BMPs constructed with grant funding are still functional. This paper reports on frequency of maintenance issues and on the most common issues significantly impairing functionality.

Drones as a Tool for Stormwater Projects

Kelsey Mach, Landau Associates, Inc.; Matt Balder, Thurston County

KELSEY MACH Kelsey Mach is a Project Geologist-In-Training with Landau Associates, Inc (LAI). Throughout her time at LAI she has supported several Industrial Stormwater General Permit projects as well as other permitting and environmental projects for municipal clients. Prior to LAI, Kelsey worked for the USGS National Unmanned Aircraft Systems (UAS) Project Office on developing data collection and processing procedures for cutting edge UAS sensors and platforms, and Kelsey has used her expertise in UAS technology to jumpstart a program at LAI.

MATT BALDER Matt Balder is an Assistant Design Engineer with Thurston County Public Works. His focus and duties at Public Works have been centered around plan production and design for road, bridge, utility, stormwater and environmental preservation projects. Matt has been integral in starting an Unmanned Aerial Systems (UAS) program at Public Works after seeing its potential applications and benefits.

- Understand basic capabilities of drones and drone data
- Understand basic drone data collection procedures
- Gain insight into drone applications for stormwater projects
- Learn about establishing and maintaining a drone program as a municipality

Municipalities throughout Washington are incorporating drones (Unmanned Aircraft Systems/UAS) into the structure of their regulatory and environmental projects. Compared to traditional data collection methods, drones allow for greater quality data, in less time, with less manpower and funds. Thurston County will discuss how they have used drones as an effective tool for mapping and compliance monitoring of stormwater sites and infrastructure, leading to increased worker safety and greater transparency between stakeholders. The presentation will also discuss common challenges of drone use, including privacy concerns, funding, acceptance of the technology, and learning curves for regulations, equipment, software and related technical concepts.

The Organic Evolution of an Multi-departmental Municipal O&M program

Trey (James) George, City of Spokane; Taylor Hoffman-Ballard, Osborn Consulting

TREY (JAMES) GEORGE James "Trey" George III is an Environmental Analyst for the City of Spokane, where he is responsible for ensuring that the City meets the conditions of its Phase II Municipal Stormwater Permit by engaging with interdepartmental City personnel, coordinating with other regional permittees, and interacting with local agencies and regulators. Prior to taking the position with the City, Trey managed industrial stormwater in the chemical manufacturing and forest products industrial sectors, which followed a few years consulting for sites with groundwater and stormwater issues.

TAYLOR HOFFMAN-BALLARD Taylor Hoffman-Ballard is a Stormwater Engineer at Osborn Consulting who focuses on research and effectiveness studies, planning, design, and operations and maintenance for stormwater management systems and technologies. She has specialized training through the University of Minnesota Erosion and Stormwater Management Certification Program for inspection and maintenance of stormwater treatment practices and has experience in developing sustainable designs that support long-term operations and maintenance.

- Identify multi-department approaches used with respect to stormwater facility O&M in order to build a robust and responsive O&M program, in lieu of a single stormwater utility.
- Reflect on the challenges in your municipality for engaging the public, including private property and business owners, for stormwater O&M responsibilities through the observation of how they were approached by another municipality.

The content of this presentation will be two digital media videos, in addition to a small number of slides, that discuss operation and maintenance (O&M) of stormwater treatment areas. The purpose of the videos is an outreach and awareness program that is currently being led by the City of Spokane with support from Osborn Consulting. The program is targeted towards the general community to educate them on the maintenance of stormwater facilities. The City developed the videos, in addition to pamphlets, as a means of delivering the public awareness campaign, which is also being leveraged as training supplements for multi department City personnel. The material presented will show how the City has approached the operation and maintenance (O&M) of public stormwater assets using resources across multiple departments to perform this O&M work, in lieu of a single formal stormwater utility. The program evolved organically in ad hoc response to the Phase II municipal stormwater permit initial issuance and subsequent revisions, and compliance is maintained via partnerships and inter departmental coordination.

Maintenance of Natural Systems in an Urban Environment

Don McQuilliams, City of Bellevue

DON MCQUILLIAMS Don is the Operations Manager for Bellevue Utilities, overseeing the Storm & Surface Water and the Water Quality aspects of the Utility. Don serves as the City's NPDES Coordinator and has been involved in Stormwater Management since 2008 and Municipal Operations for over 20 years. Active in Regional Stormwater activities, Don was recently elected as the Chair of the Stormwater Workgroup and is a member of several other regional workgroups promoting stormwater management

- Understand how to build a program that proactively monitors and maintains natural systems and recognizes hazards before they become a problem.
- Learn how to effectively maintain & permit work within natural systems and recognize ongoing problem needs within natural systems.

All of our municipalities have natural systems within them that we are responsible for managing. Some organizations manage more than others but the problems to manage natural systems remain the same. Permitting, work process, timing and minimizing impacts all play a role in managing natural systems. This presentation will take a look at some of the different natural systems that municipalities typically manage and present some solutions/ideas to effectively manage our natural systems with the limited resources available.

11:35 - 12:05 PM

Regulated Stormwater Facility O&M Program: Phase I and Phase II Approaches

Will Gibson, Snohomish County; Nels Rasmussen, City of Arlington

WILL GIBSON Will Gibson is an engineering technician V at Snohomish County Conservation and Natural Resources. He has been with the county since June of 2002 starting in the road maintenance division as a general laborer and worked his way up to crew chief installing and repairing drainage infrastructure. In September of 2014 he was excepted as an inspector within the Surface Water Management Division. His strong skills are plan reading, deciphering ownership and obligation documents for drainage facilities and understanding project flow from conception to completion. Will lives in Arlington Washington with his wife and two children. The family and him enjoy all that the outdoors have to offer and is glad to be in a position where his work has an influence on water quality and natural resources.

NELS RASMUSSEN Nels Rasmussen is the Stormwater Utility and Natural Resources Lead for the City of Arlington Public Works Department. Nels has over 15 years of experience in state and local government focusing on water quality and stormwater permit compliance. He has focused on municipal phase II permit program creation and management for the past six years in Minnesota and Washington.

Learn about alternative ways of designing and implementing a regulated stormwater facility inspection and maintenance program (O&M) in a dynamic world. With unique opportunities and challenges, Snohomish County and City of Arlington will describe their program approaches, provide helpful lessons learned and discuss their future program goals. Snohomish County Stormwater Utility serves over 450,000 customers and the City of Arlington Stormwater Utility Arlington serves 20,000 customers, including both residential and commercial ratepayers. On vastly different scales, these two jurisdictions tackle O&M permit requirements in creative and effective ways.

12:10 PM - 12:40 PM

Stormwater Infiltration at Seattle-Tacoma International Airport

Tom Atkins, Aspect Consulting

TOM ATKINS Tom Atkins, PE, LG, successfully applies his engineering, environmental science, communication, and business management skills to meet project challenges. His diverse water resources background includes industrial and municipal stormwater, NPDES permit compliance; LID infiltration assessments, surface water and basin planning; and stormwater, groundwater, wetlands, and aquatic habitat resources monitoring. As an accomplished communicator, leader, and technical manager, Tom has a proven track record of guiding multidisciplinary teams to deliver cost-effective solutions.

The Port of Seattle is interested in stormwater infiltration at STIA to achieve NPDES permit flow control requirements and GSI sustainability goals. Over the past four years infiltration has been investigated through shallow and deep infiltration feasibility assessments (2016), an infiltration infeasibility assessment driven by FAA requirements (2017), shallow infiltration testing (2018), and the development of shallow and deep infiltration Standard Operating Procedures (2019) to guide the testing, analysis and design of BMPs for future development. This presentation will summarize the challenges, outcomes and tools that this work has produced, and will describe the deep infiltration testing planned for 2021.

INSPIRATIONAL SPEAKER

8:00 - 8:30 AM

Where the Rubber Meets the Road: Tire Chemicals in the Toxicology of Stormwater

Jen McIntyre, Washington State University

JEN MCINTYRE *Dr. Jenifer McIntyre is an assistant professor of aquatic toxicology at the Washington State University's School of the Environment. She is passionate about science that effects change. Her B.Sc. (1997) in environmental biology at Queen's University led to the ban of a pulp mill effluent used as a road dust suppressant. Her M.S. (2004) from the University of Washington on contaminant bioaccumulation led the Washington State Department of Health to issue a fish consumption advisory for Lake Washington. Her Ph.D. (2010) research at UW on olfactory neurotoxicity of copper in coho salmon helped pass legislation in Washington and California that phases out metals in brake pads. Dr. McIntyre currently focuses on the ecotoxicology of urban stormwater runoff and the biological effectiveness of green stormwater infrastructure.*

Stormwater runoff contains a complex mixture of chemical contaminants that can impair aquatic organisms in receiving waters. Effects range from sub-lethal impairments reducing the health and fitness of individuals to acute mortality. Coho salmon (*Oncorhynchus kisutch*) are extremely sensitive to stormwater runoff; acute mortality events are documented in the Pacific Northwest in every fall when salmon return from the ocean to spawn in urban-impacts streams. The primary responsible contaminant was recently identified as 6PPD-quinone - a chemical derived from a common ingredient in vehicle tires. This talk will describe toxic impacts of roadway runoff, including the pre-spawning mortality phenomenon, explain the discovery of 6PPD-quinone, and describe a path forward for understanding the role of tire chemicals in the toxicology of stormwater.

TRACK 1 | PERMITTING & REGULATION

8:40 - 9:10 AM

Geotechnical Plan Review Can Save the Day!

Jennifer Saltonstall, Associated Earth Sciences, Inc.

JENNIFER SALTONSTALL *Jenny has 22 years of experience in Puget Sound area geologic/hydrogeologic studies, specializes in groundwater recharge (infiltration) evaluations and has developed innovative shallow and deep infiltration methods, testing protocols and groundwater modeling to optimize infiltration opportunities. She has been the technical lead and/or Principal-in-Charge of multiple municipal projects requiring extensive basin-wide characterization for both stormwater retrofit and infiltration feasibility using conventional, green and UIC infiltration BMPs. She is very familiar with site soil, groundwater characterization criteria and geotechnical considerations necessary for conceptual design through construction.*

Geotechnical Considerations for Design, Construction, and O&M of Infiltration BMPs – from Bioretention to Deep UIC Wells. From bioretention to deep UIC Wells, detailed plan review and construction observations are essential for long-lived, low maintenance infiltration facilities. In general, most infiltration systems are ignored after construction until they fail or become a nuisance. Plan review is an opportunity to cross-check siting and design elements with geotechnical and hydrogeologic explorations, testing and recommendations and identify potential construction issues or applicable conditions of approval. The effects of improper/inadequate characterization and/or poor construction oversight lead to poorly functioning or high-maintenance facilities. We present key plan review elements and accompanying case studies.

9:15 - 9:45 AM

History of Structural SW Controls

Emma Trewhitt, Ecology

EMMA TREWHITT *Emma Trewhitt is a graduate of the University of Nebraska-Lincoln, with degrees in both Wildlife Ecology and Management, and Environmental Studies. She has been working in the stormwater industry for the past 10 years, including time with the City of Lincoln, NE, Americorps and the Nebraska Department of Energy and the Environment. Since 2017, she has been the Phase I Municipal Stormwater Permit Writer with the Washington Department of Ecology.*

- **History of Structural SW Controls in municipal stormwater permits**
- **How permit requirements evolve over time.**

The SSC PH I MS4 permit requirements stem directly from the EPA rules, which suggest the inclusion of structural control measures in the SWMP. The SSC requirements aim at retrofitting existing unmanaged and/or inadequately managed developed areas to reduce impacts to the watershed hydrology and pollutant discharges from the MS4s that are not adequately addressed in other parts of the SWMP. Retrofit requirements have always been included in the Phase I permits, and over time they have been revised and progressively become more detailed with each permit reissuance based on public comments, PCHB rulings, results from monitoring data obtained by the permittees during the permit cycle, and the work of regional environmental groups, among others. This presentation will outline the history of this constantly evolving requirement.

9:50 - 10:55 AM

Structural Stormwater Controls (SSC) Science Review and Synthesis

Aimee Navickis-Brasch, PhD, PE & Maria Peraki, PhD, EIT, Osborn Consulting

AIMEE NAVICKIS-BRASCH, PHD, PE *Aimee Navickis-Brasch, PhD, PE is a Engineering Manager at Osborn Consulting and an adjunct faculty member at Gonzaga University where she teaches Stormwater Management.*

MARIA PERAKI *Maria is a Project Manager with Osborn Consulting. During her time with the company, she has worked on stormwater management design, creek restoration, planning, and permit compliance projects. Maria holds a BSc and MEng on Environmental Engineering from the Technical University of Crete (Greece). Her thesis topic related to groundwater flow and contaminant transport. She also holds a PhD on Civil and Environmental Engineering from the University of Vermont. Her research was focused on application of electrokinetics for subsurface energy extraction related practices, a topic that encompassed areas of Water Resources, Geotechnical, and Petroleum Engineering.*

The SSC NPDES MS4 Phase I Permit requirements aim at retrofitting existing unmanaged and/or inadequately managed developed areas to reduce impacts to the watershed hydrology and pollutant discharges from the MS4s that are not adequately addressed in other parts of the SWMP. Retrofit requirements have been in part of phase I permit since 1995 however these requirements have become increasing more stringent with each permit issuance and will likely become part of future phase II permits. In Spring of 2020 a consultant team was selected to develop an objective science-based white paper focused on addressing specific benefit and application questions regarding the current SSC retrofit requirements. The whitepaper will be used by municipal stormwater permittees to inform the selection of future projects and as a basis for stakeholder policy discussions to inform 2024 NPDES municipal permit requirements for SSCs. This presentation will provide an overview of the work complete and findings. The consultant team includes staff from Osborn Consulting, Parametrix, Aspect, and GeoSyntec who will be available to answer questions during the presentation.

11:00 - 12:05 PM

Retrospective: Development of the MS4 Permit & Regulations (Panel)

Bill Moore, Ecology (retired); Bill Leif, Snohomish County; Anne Dettelbach, City of Redmond

BILL MOORE *Bill Moore retired in 2018 after 30 years with the Department of Ecology. While at Ecology, he oversaw the development, issuance, and administration of the 2007 and 2012 municipal stormwater permits.*

BILL LEIF *Bill Leif started out in geology followed by wastewater engineering before being swept into Snohomish County's MS4 in 1991. Bill has the dubious distinction of being the last member of the original NPDES Phase 1 gang who is still working on the Phase 1 permit.*

ANNE DETTELBACH *Anne Dettelbach works for City of Redmond as a Senior Planner in the Public Works Department. From 2006 to 2016, Anne worked at the Department of Ecology where, among other things, she helped craft Eastern and Western Washington Municipal Stormwater Permits and design/implement the state Municipal Stormwater Permit Program.*

With the influx of new professionals into our field and the exodus of the “seasoned ones” via retirement or relocation, the transfer of institutional knowledge and the history of the MS4 Permits’ evolution since the original 1995 issuance is rapidly fading. Come hear a panel discussion among three “stormwater veterans” who will share their experiences and perspectives on a few of the key issues and events that shaped the trajectory of the MS4 permits. Key areas explored include: the basis of the Permit’s structure, standards of compliance, and monitoring framework.

12:10 - 12:40 PM

UIC Vs NPDES Regulatory Framework Design Considerations, Inspection Requirements

Douglas Howie, Ecology; Martin Nelson, City of Kennewick

DOUGLAS HOWIE *Doug Howie is a stormwater engineer for the Department of Ecology with more than 40 years-experience in planning, design, and construction of stormwater projects. He manages the TAPE program where Ecology evaluates emerging technologies for use in Washington State. He is also the lead editor of the treatment BMP sections in the recent stormwater manual updates for eastern and western and presents classes on both manuals for permittees and other engineers. He is also a founding member of the STEPP workteam. Doug is a licensed PE in Washington and Idaho, a Life Member of ASCE, and an Adjunct Professor in Civil Engineering at St. Martin's University in Lacey, WA where he teaches statics, surveying, and stormwater design classes.*

MARTIN NELSON *Martin Nelson has been involved in stormwater management with the City of Kennewick for 10 years. He has been involved in the development of the Eastern Washington LID Manual and the 2019 SMMEW as well as regional planning for monitoring studies and review of the last two NPDES permits.*

Provide updated information to improve understanding of UIC design, installation, and registration. Support Ecology's discussion on through the Kennewick example.

The initial part of the presentation will be an overview of the UIC rule and how it Ecology moved the design criteria into the Stormwater Management Manual for Western Washington. Ecology evaluated information from recent UIC registration applications to determine where there is a miscommunication between Ecology and permittees regarding design of UICs. The City of Kennewick Intends to provide an overview of our UIC related infrastructure. They will share how they have historically used UICs and some changes they have made in recent years. The City's presentation will include the diversity of their soil types, infiltration rates, and depth to Groundwater, the number of UIC's, and the history of LID/ groundwater recharge in Kennewick. We will also briefly cover how Kennewick dealt with the challenges of inspecting during COVID.

8:40 - 9:10 AM

Integrating Salmon-Safe and the NPDES Permit

Autumn Salamack & John Featherstone, City of Shoreline; Bryan Berkompas, Aspect Consulting

AUTUMN SALAMACK Autumn has served as the Environmental Services Coordinator with the City of Shoreline since March 2019. She coordinates cross-departmental implementation of the first municipal Salmon-Safe certification program in the State of Washington. She has 20 years of experience developing and implementing programs related to climate change, energy efficiency and conservation, waste reduction, water conservation, pollution prevention, habitat preservation and green building for local government, non-profit organizations and private business.

JOHN FEATHERSTONE John has been fascinated by stormwater and streams since being a kid splashing in puddles on the playground, which translated to a fulfilling career in surface water utility management, engineering, and project management. Since 2019 he has served as the City of Shoreline's Surface Water Utility Manager after having started working at the City in 2014 as Surface Water Engineer. Prior to that he worked for decade in consulting as a civil engineer developing project designs.

BRYAN BERKOMPAS Bryan is a hydrologist and has been working with city, county, and state agencies to address stormwater and surface water issues since 2001. He still feels a little twinge of excitement about working in the rain on a cold winter evening and takes that as a sign that he is in the right line of work. He enjoys designing and implementing monitoring programs that meet his clients needs and provides them the answers they need to make sound decisions.

- Learn what Shoreline's Salmon-Safe certification covers that pertains to stormwater
- Learn how Shoreline's Salmon-Safe conditions align with NPDES permit requirements (where there's overlap, what's required above and beyond, etc.)
- Hear about Shoreline's experiences with Salmon-Safe implementation and lessons learned to date, specifically as they pertain to NPDES permittees

Shoreline is the first municipality in Washington to achieve Salmon-Safe certification. Salmon-Safe guidelines are rigorous but also complimentary with many of the requirements of the NPDES Phase II permit. This presentation will discuss the process of achieving Salmon-Safe certification, the benefits of Salmon-Safe certification, and designing programs that satisfy the requirements of both the Permit and Salmon-Safe.

9:15 - 9:45 AM

Global Solutions to Local Stormwater Challenges

Jane Dewell, Port of Seattle; Stefano Mazzilli, Pure Blue

JANE DEWELL Jane oversees the Maritime Stormwater Program at the Port of Seattle including Phase I municipal permit compliance and stormwater utility infrastructure maintenance and rehabilitation. Jane and her team have developed and tested innovative stormwater treatment to support the organization's goal of being the greenest seaport in North America. She has over 30-years experience in program management, including environmental consulting and state government in Hawaii and Washington, focused on stormwater, source control, pollution prevention, regulatory support and permitting.

STEFANO MAZZILLI Stefano leads PureBlue's Puget Sound Recovery project identifying industrial permittee's needs, and connecting them with appropriate technologies, BMPs and management resources addressing their challenges. Stefano is also Senior Research Scientist at Puget Sound Institute, University of Washington. He is a technical leader in water pollution and resource planning, assisting governments, institutions and NGOs to adopt and apply new technologies for improved decision making. Over the last 20 years, Stefano has worked with various UN agencies internationally and research institutions and government bodies in the USA and Australia.

Technical and operational innovations are key to achieving stormwater targets for municipalities and industries across the USA. Ports and other marine facilities face further challenges of direct discharge to waterbodies that require specialized innovations. As public entities, ports can investigate and pilot stormwater solutions that have application to the broader community. The Port of Seattle with PureBlue discovered and evaluated innovative stormwater technologies across the USA and globally. Investigation results will be presented, including promising research methodologies, novel technologies and best management practices for near-shore facilities. Effectiveness of innovative technologies currently piloted by Port of Seattle will be shared.

9:50 - 10:20 AM

The On-going Saga of TAPE and STEPP

Douglas Howie, Ecology; Carla Milesi, University of Washington

DOUGLAS HOWIE Doug Howie is a stormwater engineer for the Department of Ecology with more than 40 years-experience in planning, design, and construction of stormwater projects. He manages the TAPE program where Ecology evaluates emerging technologies for use in Washington State. He is also the lead editor of the treatment BMP sections in the recent stormwater manual updates for eastern and western and presents classes on both manuals for permittees and other engineers. He is also a founding member of the STEPP workteam. Doug is a licensed PE in Washington and Idaho, a Life Member of ASCE, and an Adjunct Professor in Civil Engineering at St. Martin's University in Lacey, WA where he teaches statics, surveying, and stormwater design classes.

CARLA MILESI Carla Milesi is the Emerging Stormwater Technologies Coordinator for the Washington Stormwater Center at University of Washington Tacoma's Center for Urban Waters. As such, she is the lead scientist for the Center's collaboration with the Washington State Department of Ecology's Technology Assessment Protocol (TAPE) program. In partnership with Ecology, since 2014 she has managed the operation and development of the TAPE program for certifying emerging stormwater treatment technologies. Prior to joining the Center in 2014, Carla spent over 10 years as an environmental consultant at Cardno implementing and managing stormwater monitoring and BMP assessment projects.

- Update Washington Permittees on the latest status of the TAPE program
- Inform potential users of TAPE products that we are working on improving the ability to determine maintenance cycles for various BMPs in TAPE
- Provide information on the STEPP program and where it is in the creation of the program.

This presentation will include a discussion of the Washington State TAPE program starting with where we are with current applicants and the existing process, following with a discussion of potential modifications to the program that should obtain more information on maintenance of the General Use Level Designation (GULD) BMPs and help to obtain treatment capabilities for other pollutants beyond those managed by the existing Municipal Stormwater General Permits. We will conclude with a short discussion of the status of the Stormwater Technology Evaluation for Products and Practices (STEPP) program. The STEPP program will provide a national platform for the monitoring and evaluation activities currently provided by TAPE.

10:25 - 10:55 AM

National Perspectives on the Stormwater and MS4 Sector

Seth Brown, NMSA

SETH BROWN Dr. Seth Brown has over 25 years of experience in the water sector spanning the private, nonprofit and academic sectors. Seth is the Principal and Founder of Storm and Stream Solutions is also the Executive Director of the National Municipal Stormwater Alliance, which is a 501.c.3 representing stormwater-focused organizations in 23 states across 9 of the 10 U.S. EPA regions, including the State of Washington. Seth received a Ph.D. in civil engineering from George Mason University, teaches courses in stormwater at the University of Maryland, Eastern Shore as well as at Virginia Tech, and is a licensed professional engineer in the State of Maryland.

- Learn about national actions, policies, regulatory activities, legislation, and milestones that impact the stormwater and MS4 sector.
- Learn how stormwater professionals can get involved in national-level efforts and issues.
- Understand how national activities and issues impact local stormwater programs.

The presentation will present information at the national scale on topics ranging from regulatory actions, legislation, policies, and industry group efforts. Topics covered will range from efforts to increase federal funding/financing to major advancements in the maturation of the stormwater sector. An overview of the National Municipal Stormwater Alliance (NMSA) will be provided along with a summary of projects and activities NMSA is leading that has ties to stormwater programs. Lastly, the presentation will illustrate how national-level issues and activities can—and does—have direct impacts on local stormwater programs.

11:00 - 11:30 AM

Inspection Process Improvement

Jess Eakens & Morgan Maupin, Ecology

JESS EAKENS I received my B.S. degree from The University of Alabama with a major in Environmental Studies. I have since worked for the Alabama Department of Environmental Management and the Washington State Department of Ecology, specifically focused on NPDES permitting and stormwater management.

MORGAN MAUPIN After studying Environmental Science and Chemistry at Western Washington University, I received a Master of Environmental Studies degree from the Evergreen State College, with a focus on land use and environmental chemistry. Since then I've worked in multiple positions at the Washington Department of Ecology (DOE) and Washington Department of Fish and Wildlife (WDFW). My work has included Watershed Health Monitoring field work, Fish Passage surveys, and most recently Construction Stormwater permitting and management.

- Learn how Ecology's construction stormwater team is using ArcGIS Survey123 to increase and improve productivity, consistency, technical assistance, and permittee compliance
- Discover ways in which the tool can be used for all general permit work
- Share our journey to state-wide implementation, and what's next

The Department of Ecology oversees the Construction Stormwater General Permit for over 2,000 projects state-wide. Providing adequate, consistent, and timely technical assistance is challenging. Using a mobile field form created with ArcGIS Survey123, we are able to triple inspector productivity and field presence, provide more consistent technical assistance to permittees, and reduce report delivery time. The tool can be adapted to other general permits, and inspection components of the Municipal Stormwater General Permit. ArcGIS Survey123 provides a cost-effective means for field staff, without formal IT training, to create forms specifically designed to capture the most essential data to their work.

11:35 - 12:05 PM

Solutions to Stormwater Rate Challenges

Tage Aaker, FCS Group

TAGE AAKER Tage Aaker is an FCS GROUP project manager with ten years of consulting experience in utility rate studies. His experience includes working with water, sewer, and stormwater utility clients to develop level of service scenarios, in-depth analysis of rate structures, and fiscal policy analysis to gauge utilities' financial health. Tage is a graduate of the University of Washington's Foster School of Business and has served on the Education Committee for the Washington Finance Officers Association (WFOA) since 2014. During his free time, Tage enjoys backpacking throughout Washington and playing disc golf.

As stormwater management needs and the costs of meeting those needs increase, there are a number of innovative ways to secure rate increases and improve the equity of your stormwater rate and credit structures. This session will present a number of these solutions for discussion. A case study will be provided to demonstrate how a city can successfully adopt equitable rates to fund the increasing cost of stormwater management. A high-level summary of typical monthly rates throughout the state will also be provided. Attendees will learn about various strategies to communicate the needs (and associated costs) of stormwater management to both elected officials and members of the public.

12:10 PM - 12:40 PM

Treatment of Organic Stormwater Pollutants by Bioretention Soil Media Amended With Biochar and Fungi

Chelsea Mitchell, Washington State University

CHELSEA MITCHELL Chelsea is a PhD candidate conducting her research at the Puyallup Research and Extension Center of WSU. Her current research focuses on optimizing contaminant removal performance in bioretention and permeable pavement systems. Chelsea is interested in linking mechanisms of contaminant removal in Green Stormwater Infrastructure to design and ecological processes.

- Methodology of a mesocosm experiment
- Stormwater treatment with novel bioretention amendments
- Evaluating treatment performance

A year-long bioretention study was carried out in mesocosms to evaluate the potential benefits of adding biochar and/or fungi (*Stropharia rugosoannulata*) to typical bioretention soil media (60% sand, 40% compost). The target contaminants of interest were polycyclic aromatic hydrocarbons, fecal coliform, *Escherichia coli*, dissolved organic carbon, and suspended solids. Soil samples were analyzed throughout the experiment to determine PAH concentrations in the soil over time. The mesocosms were dosed with highway runoff from SR16 in Tacoma, WA during 8 events throughout the study. This presentation will focus on the findings from this study and how they can inform stormwater management.

8:40 - 9:10 AM

Biofiltration Using Smart Configuration and Controls

Ben Fuentes, Kennedy/Jenks Consultants

BEN FUENTES *Ben Fuentes is a key member of Kennedy Jenks' stormwater practice group. He is an experienced project manager and project engineer with technical expertise in modeling, planning, design, and construction management, and has been the lead designer for numerous multi-stage regional biofiltration systems.*

Biofiltration is becoming an increasingly popular way to treat stormwater for stringent regulatory requirements in small footprints at affordable costs. The presentation will describe numerous ways a permittee can creatively retrofit their existing drainage systems to incorporate biofiltration in a manner that best suits their own needs, drivers, and budget. Specifically, the presentation will discuss lessons learned from the installation of over 20 systems on alternative medias, plant types and placement, physical configurations, multi-stage systems, manual and automated operational controls, and O&M triggers/considerations.

9:15 - 9:45 AM

Biomass Production on Vegetated Filter Strips

Hisham El-Husseini, Richard Gustafson, Heidi Gough & Renata Bura, University of Washington

HISHAM EL-HUSSEINI *I am a post-graduate student researching at the University of Washington. My research includes modeling biomass production on Washington roadsides to reduce stormwater runoff pollution and supply the emerging bioeconomy with a lower cost feedstock.*

RICHARD GUSTAFSON *Rick Gustafson is a chemical engineer who is finding ways to create the fuels and chemicals we use every day out of biomass, rather than petroleum. Gustafson holds the Denman Chair in Bio-Resource Science and Engineering at the University of Washington.*

HEIDI GOUGH *Heidi's research specializations are in the linkage between applied microbial ecology and environmental engineering. Her current and recent projects have included characterization of microbes capable of degrading pharmaceutical contaminants in wastewater, anaerobic co-digestion for improved methane generation, applications of vermiremediation to crude oil contaminated soils, and impacts of metal contaminants to sediment microbial ecology.*

RENATA BURRA *Renata Bura is the Denman Professor of Pulp and Paper Science in the School of Environmental and Forest Resources. As a biotechnologist, Bura focuses her research on ways to turn biomass into useful products, working primarily on the manufacture of two different biochemicals: bioethanol and xylitol*

Roadside vegetated filter strip (VFS) maintenance and operating costs can be reduced by also serving as sites for biomass production. Biomass, produced on VFSs, can provide a moderately-priced biorefinery feedstock to produce low-carbon fuels and chemicals. This research explored the cost savings and environmental effects of converting available roadside land in Western Washington into VFS biomass production sites. By utilizing roadside VFSs for both reducing highway runoff pollution and producing biomass, costs between participating stakeholders can be shared and reduced. The shared cost model was shown to reduce biomass costs by 14% and significantly reduce highway runoff pollution in sensitive aquatic areas.

Asset Management Software Selection

Francesca White & MaKenna Lindberg, Osborn Consulting

FRANCESCA WHITE Francesca is a project engineer at Osborn Consulting with specialized experience focused on stormwater management planning and design. Through her work, Francesca has supported public agencies with identifying low impact development stormwater solutions, performing hydrologic and hydraulic analysis, and designing stormwater facilities for flow control and water quality. She is familiar with preparing permit applications and submittal materials for various permits including the NPDES Phase II Permit.

MAKENNA LINDBERG MaKenna has experience in both the public agency and consultant sides of public infrastructure planning and design, including an internship with the City of Newcastle's Stormwater Management group before joining Osborn Consulting. During her internship, MaKenna assisted in MS4 asset tracking, annual stormwater facility inspections, education and outreach events, and more. Her current work focuses on supporting stormwater management programs across Washington, including asset management and NPDES Phase II Permit compliance. MaKenna's background is in environmental science, with experience in habitat restoration, wetland delineation, water quality sampling, climate change analysis, urban plan design, and forest ecology.

Tracking stormwater management data has become increasingly difficult as NPDES permit requirements advance each cycle. Spreadsheets and network storage are no longer sufficing for jurisdictional needs. Various asset management software programs have tools that can be used to organize MS4 programs but selecting and implementing a software can be daunting.

When determining which software features are right for your jurisdiction, it is easy to get lost searching the vast maze of asset management software programs available. A number of preexisting factors must be considered when choosing the most applicable software: who will be using the software, what are the primary and secondary purposes for the software, what is the required implementation timeline, and what is the allowable budget. The level of service and price also varies among available software programs. Advanced 'off-the-shelf' software can be purchased, or smaller software programs can be built to meet specific needs. Taking the time to weigh the necessity and importance of each feature will aid in the overall decision on software.

The City of Port Angeles recently hired Osborn Consulting, Inc. (OCI) to help them select an asset management software that is best suited for their MS4, regarding the new 2019-2024 Western Washington NPDES Phase II Stormwater Permit requirements. OCI developed a workflow with the client to make sense of all the options available and select the best solution for the City. First, the limitations of their current asset tracking program were defined, and a list of needs were determined. OCI then created matrices for comparing the different features offered by a multitude of software. Research was completed and demonstrations were attended to collect valuable information that would inform the City in their selection. OCI team members will share their successful process for software selection used for Port Angeles, which can be applied to any jurisdiction.

There are many factors to compare when determining the best-fit asset management software to benefit a stormwater program. This presentation will outline what to consider and the steps for a utility to get started.

Using Real Time Controls in Infiltration

Dan Gariepy, Tetra Tech

DAN GARIEPY Dan is an engineer who has worked in stormwater for more than 20 years. He has served as a regulator and technical resource for the Washington. He is currently working with Tetra Tech to serve communities in Washington State.

This presentation will review the feasibility of integrating real time controls to optimize an infiltration facility for Flow Control. Flow Control is the most challenging standard to meet. This study looked at the potential gains in detention volume reduction by using Real Time Control. The study sought to use the simplest algorithms with the greatest gains. We tried to minimize sensors and complex predictive algorithms to see if the gains could be integrated with limited failure points. There was a challenge in meeting the full rainfall record with a few large storms keeping the volume elevated. Ultimately, this feasibility study demonstrated that real time controls could economically be installed to reduce the required detention volume.

Making Detention Facility Smarter: A Continuous Monitoring Active Control (CMAC) Pilot Project in Redmond WA

Peter Holte, City of Redmond; Josh Van Wie, PE, Osborn Consulting; Matthew Rea, OptiRTC

PETER HOLTE Peter Holte coordinates Redmond's Watershed Management Program. He holds Masters in Environmental Studies from the Evergreen State College and Masters in Public Administration from the University of Washington. He has over 20-years of experience working in stormwater management and habitat restoration.

JOSH VAN WIE Josh Van Wie has worked on a variety of water resources projects in Washington State. His experience includes planning and design for stormwater retrofits, municipal capital improvement projects, and fish passage culverts and habitat restoration. Josh has closely coordinated with agencies including the City of Redmond, Spokane County, Seattle Public Utilities, and others to successfully develop planning studies and PS&E packages.

MATTHEW REA Matt is a water resources engineer with over fifteen years of experience. His role at Opti includes managing the development of West Coast Markets, new Public/Private Partnerships and ongoing strategic partner relationships. Matt established and looks after the Joint Venture between Opti and The Nature Conservancy to use private assets for public water quality goals elsewhere across the US.

- Detail Opti's CMAC technology and how it provides flow duration control and water quality benefits.
- Explain the role these systems can play during implementation of the City of Redmond's Monticello Watershed Program Plan (and thus help to meet SMAP requirements.)
- Detail the feasibility modeling assessment used to identify the ponds select for pilot, and the lessons learned as part of this assessment.

Emerging technologies for stormwater are playing a crucial role in the Pacific Northwest to help municipalities meet their NPDES permit requirements and watershed management goals. Public agencies and their consultant teams must rely on innovation and collaboration to harness the latest technologies as permit requirements become more stringent and watershed management becomes more critical in urbanized areas.

During 2020-2021, the City of Redmond completed a pilot project to install OptiRTC (Opti) Continuous Monitoring and Adaptive Control (CMAC) retrofits at two stormwater ponds. The CMAC system uses cloud software to actively control and optimize pond discharge flow rates using on-site sensors and weather forecast integration to operate a remotely actuated valve. This technology was selected because of its potential to improve flow durations and protect downstream creek habitat in areas that were developed prior to current regulatory requirements for flow control.

This presentation will provide an overview of how Opti CMAC technology works, detail their potential in helping jurisdictions meet NPDES requirements and improve stream habitat, and detail the required feasibility assessments to ensure this technology is used at the right locations.

Right of Way GSI Installations: Lessons Learned

David Jackson & Derek Hann, Snohomish Conservation District

DAVID JACKSON David Jackson is the program manager for Community Conservation at Snohomish Conservation District. He has a background in LID and Green Infrastructure installation and management.

DEREK HANN Derek Hann is the staff engineer for the Community Conservation program at Snohomish Conservation District. He has over 10 years of experience installing and managing green stormwater and LID projects for the District.

Snohomish Conservation District would like to present on implementation of stormwater retrofits within the public Right-of-Way. SCD has constructed a number of public bioretention facilities, with our biggest installs happening during the 2020 construction season. SCD has extensive experience with bioretention construction and would like to present on the unique challenges of implementing in the public space. This includes elements of traffic controls, utility lines, and working with homeowners in a unique capacity. From this, we have gained tools to optimize effectiveness, created a template for other partners, and created a portfolio for outreach to residents and partners.

Gateway to the City of Ellensburg Stormwater Retrofit Project

Jon Morrow, City of Ellensburg; Kaela Mansfield & Megan Ehlebracht, Osborn Consulting

JON MORROW *Jon Morrow is the Stormwater Manager for the City of Ellensburg.*

KAELA MANSFIELD *Kaela is a project engineer at Osborn Consulting's Spokane Office. Her primary focus areas include stormwater LID design and stream restoration, aligning with her interests in preserving and protecting the natural environment in urban settings*

MEGAN EHLEBRACHT *Megan Ehlebracht, EIT Project Engineer Megan is an EIT and has experience with HEC-RAS, StormShed3G, PCSWMM, AutoCAD, QGIS, and technical writing. She has applied those skills to transportation drainage and watershed planning projects in the Inland Pacific Northwest. She is most interested in green stormwater infrastructure and stream restoration. Education: BS, Civil Engineering, Gonzaga University; Minor: Entrepreneurial Leadership Licenses and Certifications: Engineer in Training (EIT), 2019 HRM Training*

Gateway I to the City of Ellensburg is a grant funded retrofit project from the Department of Ecology. Gateway I will incorporate approximately two miles of stormwater treatment on University Way from Wenas Street to Whiskey Creek Crossing. Stormwater will be directed into newly constructed rock lined swales behind the curb and filter through several inches of 60:40 compost mix as specified in the Stormwater Management Manual for Eastern Washington. A primary design component of the project is concentrating and reducing overall long-term maintenance while providing water quality treatment in a semi-arid climate. The project will construct permeable paver sidewalks and trails and line the project with Ginkgo trees on both sides of University Way. To accommodate the project, all utilities will be undergrounded, which further adds to the overall beautification. In addition to treating two miles of stormwater runoff, the project will provide non-motorized transportation, add two new bus pull outs and provide recreation. The project is expected to be completed by 2022. The presentation will focus on the project vision, unique stormwater design and maintenance elements, and lessons learned.

8:40 - 10:20 AM

15 Strategies for Communicating Science and Data to Non-Scientists

Cathy Angell, Cathy Angell Communications

CATHY ANGELL Cathy Angell, M.Ed., is the owner of Cathy Angell Communications and specializes in presentation design and delivery for scientists, educators, and public officials. She was the former coordinator of Washington's Coastal Training Program, considered to be one of the most successful training programs in the country for coastal managers. Cathy is nationally known for her transformative methods and received a communications award from NOAA which is given out each year in her honor.

- Present visuals that have impact;
- Use techniques that will keep your audience engaged in both a live or virtual setting;
- Deliver data in a way that sticks in people's brains;
- Transform the way you do PowerPoint.

Do you speak at virtual or in-person conferences, public meetings, or other events where you need to convey a science-based message? Have you ever felt like you couldn't quite hold the attention of your audience or communicate your message in a way that they could understand? Would you like to learn a simpler, more effective way to design your slides?

10:30 - 11:00 AM

Lucky Dumpster

Laurie Devereaux, City of Bellevue

LAURIE DEVEREAUX Laurie Devereaux has over 21 years of experience in education and outreach for utilities including the last 18 years as the Bellevue Stream Team Program Administrator. In addition to working on the E&O parts of the NPDES Permit, she gets her feet wet running fishy volunteer stream monitoring and helping with special projects like watershed planning. Don't ask Laurie about peamouth minnows or fundraising car washes unless you have time to talk.

How do you turn the problem of messy dumpsters into a social marketing campaign? Take a quick dumpster dive with Laurie to learn how to identify a potential campaign, rally partners, craft a pilot, and collect data. Brainstorm ideas on how to create your campaign while learning about the current regional effort to turn every dumpster into a lucky dumpster.

11:05 - 12:10 PM

People First: How to Create Inclusive Marketing Efforts that Engage Overburdened Communities

Crystal Borde, Vanguard Communications

CRYSTAL BORDE Crystal Borde is a Vice President and leader of the Diversity, Equity and Inclusion Practice at Vanguard Communications, a public relations and social marketing agency based in Washington, D.C. An experienced social marketing practitioner, Crystal applies a DEI lens to her strategic communications counsel and campaign planning for government agencies, nonprofit organizations, foundations, and associations addressing such social issues as environmental and racial justice, sustainable agriculture, mental health, substance use prevention, food security, and education equity.

- Discuss the concept of "people first" and why audiences must be at the center of engaging marketing campaigns
- Understand effective audience inclusion strategies within a social marketing framework
- Explore approaches for collaborating with overburdened communities as partners throughout campaign planning

Our audiences should always be at the center of our marketing efforts. Yet, audience needs, challenges and interests are often an afterthought. In this presentation, we will explore effective audience inclusion strategies through a social marketing framework to position overburdened community audiences at the center of campaign, message and material development planning and serve as insightful marketing collaborators.

Survey Best Management Practices for Informing and Evaluating Behavior Change Campaigns

Jennifer Tabanico, Action Research Inc.

JENNIFER TABANICO Jennifer Tabanico is President and owner of Action Research, a firm that specializes in changing behavior for the public good by applying marketing and social science research to outreach programs that promote safe, healthy, and sustainable communities. Jennifer has a Master of Arts degree in Experimental Psychology and more than 19 years of experience developing behavior change programs for public and private agencies, including 14 years of work on stormwater programs. Ms. Tabanico has authored or co-authored works in academic outlets including the Journal of Environmental Psychology, Social Influence, and Social Marketing Quarterly. Most recently, she authored a book chapter on behavior change in the Handbook on Household Hazardous Waste. Jennifer also currently serves on the Editorial Board for Social Marketing Quarterly and as an instructor for the University of California San Diego (UCSD) Extension's Behavior Change and Sustainability certificate program.

- Determine whether it is appropriate to conduct a survey to address their research question
- Implement a process for developing a cohesive survey instrument
- Apply best practices for survey design that will help to ensure meaningful findings.

From survey links in emails to pleas printed on retail shop receipts to telephone interviewers calling just as you are settling down for the evening, hardly a day goes by where we aren't asked to complete some sort of survey. Surveys are prevalent because they can be a reliable and efficient way of gathering information from a target audience. Indeed, many program planners rely on the results of surveys and polls to craft or evaluate outreach materials and messages. In recent years, surveys have become even more common place as user-friendly technologies have transformed a powerful research method into a tool that is simple for anyone to administer. While nearly anyone can generate questions and administer a survey, getting meaningful answers is a both a science and an art that takes training and experience. Surveys are a powerful tool that should be approached in an informed and strategic manner. A well-designed survey can offer valuable insights, but there are also several common pitfalls that can render the data meaningless. This session is designed to provide a basic introduction to best practices of survey writing and administration that maximize responses and achieve meaningful results.

WORKSHOP TRACK 2 | STORMWATER MANAGEMENT ACTION PLANS

8:40 - 9:10 AM

SMAP Overview and Guidance

Abbey Stockwell, Ecology

ABBEY STOCKWELL At Washington State Department of Ecology, Abbey is the municipal stormwater team lead and the Phase II Municipal Stormwater permit writer for the state. She received her Master's degree from Humboldt State University in Natural Resources Planning - where she focused on policy barriers to implementation of Low Impact Development. Prior to moving to Washington, she worked as a county planner and coordinated the Phase II municipal stormwater program.

- Understand the Phase II Permit requirements for SMAP
- Review of Stormwater Management Action Plan Guidance

Stormwater Management Action Planning is a new requirement in the Western Washington Municipal Stormwater Permits. This presentation will provide an overview of the permit requirements for Phase II Permittees and review the guidance for developing SMAPs.

9:15 - 10:20 AM

Puget Sound Watershed Characterization Tool

Colin Hume, Ecology

COLIN HUME Colin Hume is the Puget Sound Recovery Lead for Ecology's Shorelands and Environmental Assistance Program. He is also the manager and Senior Watershed Planner for Ecology's Puget Sound Watershed Characterization Project. Colin Holds a B.S. in Ecology from Western Washington University and a M.S. in Environmental Planning from the University of Michigan School of Natural Resources. Much of his work focuses on bringing landscape-scale data about watershed processes to stormwater, land use, and Puget Sound recovery planning.

- Understanding of spatial data available to support stormwater planning processes
- Understanding of applications of watershed process indices in stormwater planning
- Understanding of technical support available for stormwater planning

This presentation will provide an overview of the Puget Sound Watershed Characterization indices of watershed processes developed by the Department of Ecology. Additionally, case studies illustrating applications in stormwater planning, as well as ways in which Ecology may provide technical support to jurisdictions engaged in SMAP permit requirements will be covered.

10:30 - 11:00 AM

Plans on Plans: Incorporating SMAP into Comprehensive Planning

Elizabeth Lowell, HDR Inc.; Michelle Perdue, Kitsap County; Phil Struck, Struck Environmental

ELIZABETH LOWELL Elizabeth Lowell is the Utility Management Services Business Class Lead in Washington for HDR. She is a process expert in optimization and efficiency studies for water distribution, wastewater collection, and surface water systems, specializing in asset management, the development of performance plans, and goal-setting and strategic planning. For the past seven years she has worked directly with utilities on programmatic assessments of asset management practices, O&M strategies, and strategic planning. Previously, she spent four years as a Project Development Manager in sustainable solid waste management business strategy, process, and market analyses.

MICHELLE PERDUE Michelle has over 14 years of experience in municipal stormwater management and environmental communications, with a focus on delivering critical community outcomes like flood protection, improved surface water quality, efficient regulation of development, well-planned watersheds, and effective and empathetic customer service. Her work at Kitsap County, in harmony with the Clean Water Kitsap partnership, has included nationally-recognized projects and programs that reduce flooding, prevent pollution, and restore fish habitat; ensuring that our shellfish beds, streams, and water bodies remain functional for the humans and wildlife that depend on them. Prior to joining Kitsap County, Michelle was the Municipal NPDES Stormwater Permit Manager for the City of Moses Lake, Washington.

PHIL STRUCK Phil Struck is a Principal at Struck Environmental, Inc. in Poulsbo, Washington. Phil has over 30 years of experience working on a wide variety of stormwater management, water quality and habitat protection projects in the Puget Sound region.

Sometimes to put together a successful plan, it takes, well, planning. When Kitsap County embarked on a comprehensive stormwater plan, they wanted to incorporate their Stormwater Management Action Plan in the effort. This presentation will discuss how this was accomplished, and what's next for the County. Participants will get an overview of the SMAP process the County followed, points of integration with other planning efforts, and business planning efforts now underway.

11:05 - 11:35 PM

Best Bang for the Buck! Developing a Fundable SMAP Grant Application

Jessica Schwing, Ecology

JESSICA SCHWING Originally from the Midwest, Jessica has enjoyed the privilege of living and working in the Lake Superior, Lake Michigan, Chesapeake Bay, Lake Tahoe, and Puget Sound watersheds. Jessica's interest in finding cost-effective solutions to water quality problems began in 2003 at Lake Tahoe where she implemented one of the nation's earliest attempts at mandating low impact development retrofits. Today, Jessica provides leadership for the Ecology's Stormwater Financial Assistance Program which has provided over \$400 million dollars to local governments across the state.

- Identify resources for SMAP development.
- Understand the relationship between SMAP, Stormwater Retrofit funding, and successful funding applications.
- Communicate your planning goals to internal and external stakeholders, including Ecology.

Feeling overwhelmed by planning? Concerned that you are spending dollars on plans that will sit on a shelf? Learn how to stretch your stormwater dollars by identifying ways to align SMAP and Stormwater Retrofit Planning to maximize grant funding eligibility. In this session we will discuss ways to plain-talk your planning process and develop a plan that can be used to justify future funding requests. We will share some lessons learned from previously-funded Ecology projects and give some insight into what is likely to score well in future application cycles. We will also provide a few tips for filling out a grant application and working with an outside consultant.

9:00 - 12:05 PM

IDDE/IC-ID Field Screening and Source Tracing Guidance Workshop

James Packman, Aspect Consulting, LLC; Jeanne Dorn, King County; Rebecca Dugopolski, Herrera

JAMES PACKMAN James J. Packman is a Senior Hydrologist with Aspect Consulting and has 23 years of experience in the ecology, engineering, and management of terrestrial surface waters and watersheds. James' areas of expertise include: technical assistance and permit compliance under the NPDES, MTCA, and Superfund regulatory programs; assessing pollution source control activities, illicit discharges, and BMPs; and monitoring surface waters, stormwater, and sediment. James has a Master of Science degree in Forest Engineering from the University of Washington and a Bachelor of Arts and Science dual degree in Environmental Sciences and English Literature from The Evergreen State College.

JEANNE DORN Jeanne Dorn, RG, MPA is a water quality program manager with King County Stormwater Services Section, Water Quality Compliance Unit. She is the overall lead for illicit connection and illicit discharge programs required by the Phase I permit, including the conveyance screening program and the fecal coliform total maximum daily loads (FC TMDLs). Ms. Dorn received her Bachelor's degree in geological sciences and her Master's degree in public administration, both from the University of Washington. She is a registered geologist in Washington State. Her work background prior to King County included geological and geotechnical engineering investigations as well as groundwater and soil remediation projects.

REBECCA DUGOPOLSKI Rebecca Dugopolski, PE, is an associate engineer with Herrera Environmental Consultants in Seattle, Washington with over 15 years of experience in stormwater monitoring, design, and NPDES permit compliance. She received her Bachelor's degree in Environmental Engineering from Michigan Technological University and her Master's degree in Civil and Environmental Engineering from the University of Washington. Ms. Dugopolski has worked with numerous Phase I and Phase II jurisdictions in Eastern and Western Washington to help permittees meet their NPDES permit requirements.

- Become familiar with the content of the 2020 IC-ID Manual
- Understand how to use the 2020 IC-ID Manual when investigating an illicit discharge
- Learn how to use some common field equipment for indicator sampling
- Learn about proper sampling techniques and what to look for during catch basin/manhole inspections

Join us for an interactive virtual training on the 2020 Illicit Connection and Illicit Discharge Field Screening and Source Tracing Guidance Manual (IC-ID Manual).

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