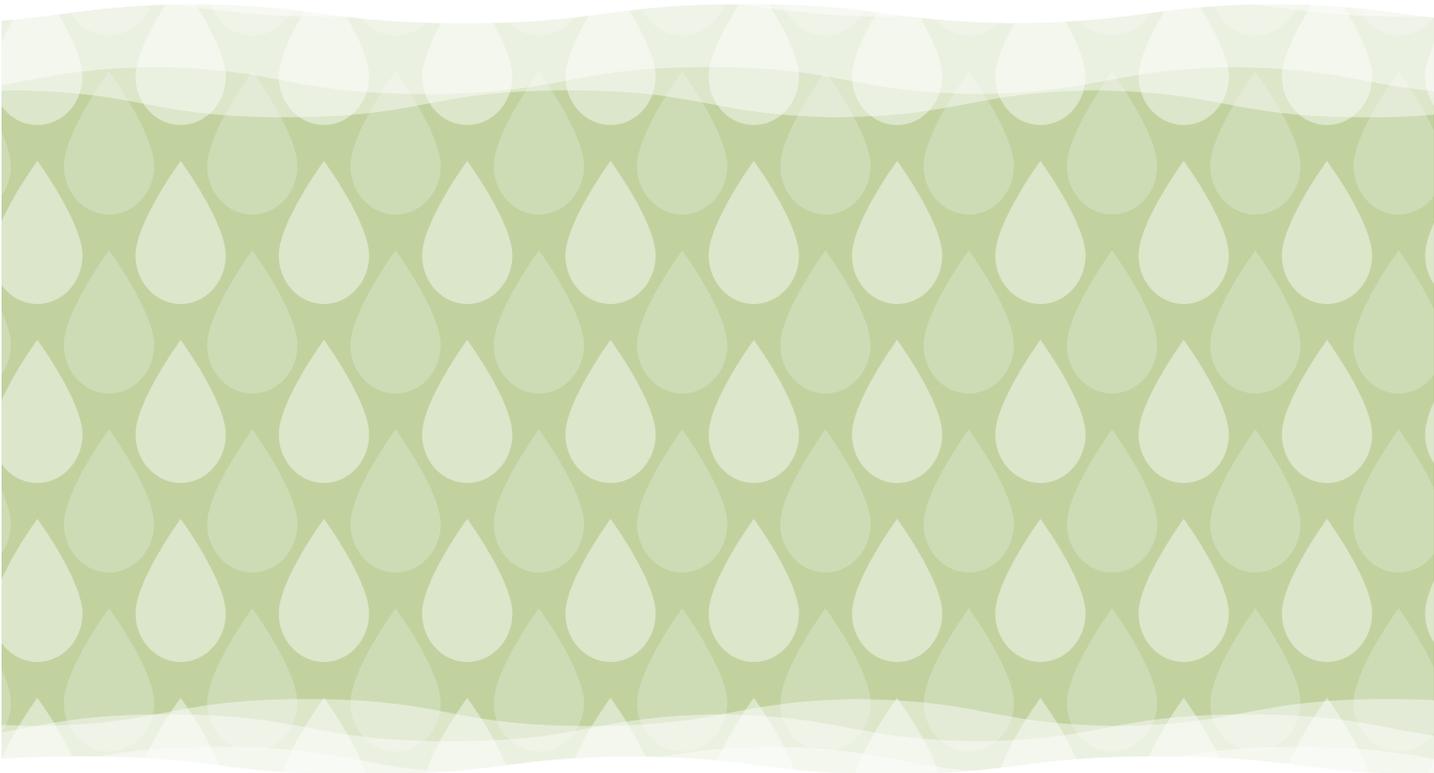


Washington State
MUNICIPAL STORMWATER CONFERENCE

November 5 & 6, 2014 • Puyallup, Washington



In partnership with



Washington State
Association of Counties

PugetSoundPartnership
our sound, our community, our chance

Funding provided by



DAY 1 NOVEMBER 5

10:00 am	REGISTRATION		PIONEER PARK PAVILION
12:00 pm	CONFERENCE OPENING REMARKS Congressional Update on Stormwater Issues <i>Congressman Denny Heck</i>		PIONEER PARK PAVILION
12:30 pm	WORKSHOP 1	COUNCIL CHAMBERS	WORKSHOP 2
	Illicit Connection and Illicit Discharge (IC/ID) Field Screening and Source Tracing Guidance Manual Training		PIONEER PARK PAVILION
			LID Plan Review: Tools and Lessons From Ecology and Phase I Permittees
	WORKSHOP 3	LIBRARY	WORKSHOP 4
	Successful Source Control through Behavior Change		CITY HALL 504
			Roads and Highways: Discussions and Presentations on High-Priority Topics

4:00 pm	REFRESHMENTS		PIONEER PARK PAVILION
5:30 pm	AFTER-HOURS SOCIAL NETWORKING EVENT		PARADISE BOWL, TACOMA
	<p>Join your colleagues at Paradise Bowl in Tacoma. Lane fees and shoe rental are provided compliments of the <i>Washington State Municipal Stormwater Conference</i>. Food will be available for purchase at your own expense. Space is limited to 50 individuals, so reservations are required.</p> <p><i>Driving directions for this event are included in your attendee packet.</i></p>		 <p>Paradise Bowl 12505 Pacific Avenue Tacoma, WA 98444</p>

Self-Guided LID Tour

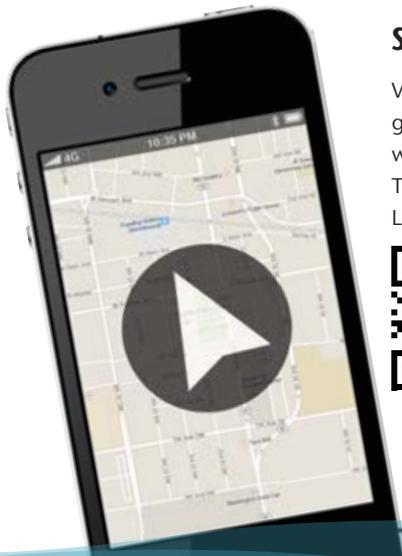
Visit functioning LID stormwater projects & retrofits including green streets, rain gardens, permeable pavements, and green walls. Please take a look at what the Cities of Puyallup and Tacoma, and Pierce County have accomplished to date in LID. You may see something you have seen before, and you may see innovative projects that your city or county may be able to incorporate. Grab the Google Maps tour (*below*) to find directions to each of the sites. In this instance, we're *hoping* for rain!



tinyurl.com/q4a8mc8

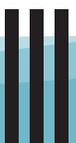
We're Going Green!

You provide the water bottle or coffee mug, and we'll provide the water and coffee!



DAY 2 NOVEMBER 6

	TRACK 1 "BIG PICTURE" STORMWATER	TRACK 2 STORMWATER PROGRAM EFFICIENCIES NOW	TRACK 3 STORMWATER RESEARCH & NEWS
7:00 am	REGISTRATION & REFRESHMENTS		PIONEER PARK PAVILION
8:00 am	OPENING REMARKS & KEYNOTE Why Washington Leads in Stormwater Management <i>Heather Bartlett, Washington State Department of Ecology</i>		PIONEER PARK PAVILION
9:00 am	2014/15 Stormwater Manual and Code Updates: Key Tools and Lessons from Phase I Jurisdictions (Panel Discussion) PIONEER PARK PAVILION	Trash Compactors: Eliminating a Major Source of Stormwater Pollution LIBRARY	STORM: Collective Impact for Stormwater Education, Outreach, and Beyond COUNCIL CHAMBERS
10:00 am	Permeable Pavement Design and Maintenance: Municipal Lessons and Observations PIONEER PARK PAVILION	Integrating IDDE, Public Education, Inspections, and Spill Reporting LIBRARY	Recent GROSS and Other Grant Projects: Where Are They Now? COUNCIL CHAMBERS
11:00 am	A Direct-to-Implementation Approach to Toxics Reduction in the Spokane River LIBRARY	EPA NPDES Audits: Summary and Lessons from Ecology and Phase I Permittees (Panel Discussion) PIONEER PARK PAVILION	Stormwater Underground Injection: An Alternative to MS4 Discharge? COUNCIL CHAMBERS
12:00 pm	LUNCH & PANEL DISCUSSION Recommendations for Improving WQA and TMDL Programs in Washington State		PIONEER PARK PAVILION
1:30 pm	Regional Approaches to Stormwater Management <ul style="list-style-type: none">• Re-envisioning Treatment and Flow Control in Tacoma: The Regional Approach• Using an Ecological Recovery Approach to Stormwater Permit Regulations LIBRARY	Technical Tools for Asset Management and Operations: Real Examples from Permittees <ul style="list-style-type: none">• Utilizing Asset Management Data Based Systems to Meet NPDES Requirements• Private Facility Inspections: From Paper to High Definition• Outfall and Discharge Point Screening Application PIONEER PARK PAVILION	Finding and Eliminating Illicit Discharges: Lessons from Two Regions <ul style="list-style-type: none">• Alternative Fecal Coliform and Stormwater Testing Methods• The Sweet Smell of Success: Finding and Eliminating Illicit Connections in Seattle COUNCIL CHAMBERS
3:00 pm	Improving Stormwater Quality in an Urban Watershed LIBRARY	City of Tacoma's Catch Basin Assessment Program PIONEER PARK PAVILION	Testing Techniques <ul style="list-style-type: none">• Pilot Testing of New Techniques for Illicit Discharge Detection• FC TMDL Bacteria Source Screening: Approaches by King County COUNCIL CHAMBERS
4:00 pm	Innovative Partnerships to Achieve and Exceed NPDES Permit Requirements LIBRARY	Building a Comprehensive Stormwater Retrofit Program COUNCIL CHAMBERS	Results from Current Research on Pollutant Export from Bioretention Systems and Next Steps PIONEER PARK PAVILION
5:00 pm	CLOSING REMARKS		PIONEER PARK PAVILION



Welcome to the Inaugural Washington State Municipal Stormwater Conference!

The Washington Stormwater Center—in partnership with their statewide advisory committee, the City of Puyallup, the Association of Washington Cities, the Washington Association of Counties, the Puget Sound Partnership, the City of Puyallup, and the Washington Department of Ecology—is pleased to announce the Inaugural Washington State Municipal Stormwater Conference.

This unique conference focuses specifically on addressing high-priority issues and challenges faced by municipal NPDES permittees statewide. Throughout both days of the conference there will be opportunities to meet, talk, and learn from stormwater managers from around the state. Panel and presentation sessions will be constructed so that there is time for idea exchange among the audience.

As with most conferences, there are so many people to thank and to honor. There are many across the state who have contributed their support and hours of emails and discussion to make this conference happen. From the Washington Department of Ecology (our funder) to the partners, advisors, presenters, sponsors, and exhibitors—all have had a large role in putting together this initial state conference. We are especially thankful for this great group and have devoted a whole page in this program to list their names so you can see each of them.

A note on conference structure: the conference takes place over two days. The first day is devoted to more in-depth workshops on four topics of interest led by people who have worked hard to assemble a meaningful afternoon. The second day resembles a more traditional conference day with panels and presentations that take place at three locations around the Pioneer Park quad. As this is the first statewide conference, and we are hoping there will be others in the future, please fill out the conference survey we will be emailing to you as we will be looking for ideas and suggestions on how to grow forward.

Thank you all for your interest and support of this inaugural conference. And, welcome to Puyallup.



Mark Palmer
Grant Recipient & Municipal Lead
City of Puyallup



John D. Stark
Director
Washington Stormwater Center
WSU Puyallup Research & Extension Center

10:00 am - 12:00 pm

Registration

PIONEER PARK PAVILION

12:00 - 12:30 pm

Call to Order

PIONEER PARK PAVILION

PRESENTED BY Tanyalee Erwin, Assistant Director, Washington Stormwater Center.

Welcome

PIONEER PARK PAVILION

PRESENTED BY John Stark, Director, Washington Stormwater Center and Washington State University Puyallup.

► CONFERENCE OPENING REMARKS

PIONEER PARK PAVILION

Congressional Update on Stormwater Issues

PRESENTED BY Denny Heck, Representative, Washington State 10th Congressional District.

On November 6th, 2012, the residents of Washington's new 10th Congressional District elected Denny Heck to be the district's first member of the United States House of Representatives. Since taking office, Congressman Heck's top priorities have been creating jobs, growing our economy and keeping the American Dream alive for the middle class and those working to get into it. He has been a vocal advocate for military families and veterans as well as for the health and natural beauty of the Puget Sound's environment.

Congressman Heck is the only Member of Congress from the Pacific Northwest that serves on the House Financial Services Committee. He is a member of the Financial Institutions and Consumer Credit Subcommittee, Oversight and Investigations Subcommittee and Monetary Policy and Trade Subcommittee.

In the decade prior to his election to Congress, Congressman Heck successfully grew several small businesses in Washington State. One of those small businesses, which specializes in workplace education, was started in Olympia with only two employees. Today it employs more than 300 people throughout the United States and has continued to grow in recent years. Congressman Heck was also an original investor in Real Networks, the digital entertainment company that pioneered streaming media on the Internet.

A strong advocate of open government, in 1993 Congressman Heck co-founded TWW to provide the people of Washington State greater accessibility to their state government. TWW has grown into the nation's preeminent statewide public affairs network. While at TWW, the Congressman hosted the renowned public affairs program Inside Olympia and won an Emmy for a documentary he wrote and produced.

Congressman Heck served his community in the State House of Representatives for nearly a decade. He was chosen by his colleagues to serve as Majority Leader before retiring in 1986. While in the State House, Congressman Heck was one of the prime authors of the state's historic Basic Education Act. After his time in the Legislature, he served as Chief of Staff to Governor Booth Gardner during his second term.

Congressman Heck is a native Washingtonian and graduated from The Evergreen State College in 1973. He has been married for 39 years to Paula Fruci Heck, an educator who began her career as a teacher and retired as principal at Jefferson Middle School in Olympia. He and Paula have lived in Olympia for nearly 30 years and together they have two sons, Bob and Trey.

12:30 - 4:30 pm

▶ WORKSHOP 1

COUNCIL CHAMBERS

Illicit Connection and Illicit Discharge (IC/ID) Field Screening and Source Tracing Guidance Manual Training

PRESENTED BY Rebecca Dugopolski, *Herrera Environmental Consultants*.

The Illicit Connection and Illicit Discharge (IC/ID) Field Screening and Source Tracing workshop is a highly interactive workshop for municipal staff who want to implement IC/ID field screening and source tracing. The workshop will provide a brief overview of the content of the Washington State Illicit Connection and Illicit Discharge (IC/ID) Field Screening and Source Tracing Guidance Manual. Following the guidance manual overview, you will work through a series of clues with a team to identify illicit discharges. The workshop will also include a series of field equipment demonstration stations where you will have the opportunity to try out several different types of test kits, field meters, and test strips that could be useful tools for your IC/ID field screening program. This popular training was offered at several locations around the state last year to provide hands-on demonstrations and manual training. To accommodate many who could not attend last year, we are offering it again during the first half day of the conference.

▶ WORKSHOP 2

PIONEER PARK PAVILION

LID Plan Review: Tools and Lessons From Ecology and Phase I Permittees

PRESENTED BY Doug Howie, *Department of Ecology*. Mark Wilgus, *King County*. Susie Larson, *City of Seattle*. Ede Courtenay, *City of Seattle*. Mieke Hoppin, *City of Tacoma*. Corey Newton, *City of Tacoma*.

This will include an Ecology-led introduction to the details of revisions to Minimum Requirement #5, as well as overall submittal guidance from Ecology's stormwater manual. Representatives from Phase I jurisdictions will discuss lessons and tools regarding how they are approaching the new aspects of MR#5, and what they're doing internally to facilitate associated development plan review. This may include issues with communication and politics as well as general technical issues related to Phase I's recent code/manual update process related to MR#5. Also discussed will be tools developed by Phase I jurisdictions that others may be able to use or mimic (e.g., checklists, submittal forms, templates, etc.). The workshop will not go into the details of specific BMP designs and plan review considerations, but will focus on larger internal challenges faced by municipal stormwater staff and plan review staff.

▶ WORKSHOP 3

LIBRARY

Successful Source Control through Behavior Change

PRESENTED BY Tiffany Odell, *Pierce County*. Dave Ward, *Puget Sound Partnership*.

Nonpoint pollution starts with people. Whether you're a stormwater manager, engineer, program director or outreach professional, you need to understand what it takes to motivate source control among your residents. Like engineered solutions, source control through behavior change applies science and research to achieve desired outcomes. Successful behavior-change programs employ behavioral science, marketing, and rigorous evaluation. This session will focus on Social Marketing as a method to influence behaviors for pollution reduction. It will emphasize successful programs and will walk through eight specific criteria that managers can use to gauge the effectiveness of their programs. This session can be valuable for managers who oversee stormwater outreach programs; source control professionals; public outreach professionals and stormwater engineers who want to improve their understanding of a balanced treatment/source control program.

▶ WORKSHOP 4

CITY HALL 504

Roads and Highways: Discussions and Presentations on High-Priority Topics

PRESENTED BY Mark Maurer, *WSDOT*. Aimee Navickis-Brasch, *Gonzaga University*. Curtis M. Nickerson, *CARDNO*. Michael O'Neil P.E., *King County Department of Transportation*.

The session grew out of the work started by the statewide Stormwater Working Group's Roads and Highways Subgroup and will include presentations and discussions on high-priority topics now facing roads and highways managers and staff. Topics and discussion points were developed through a group survey that helped to focus the content of the session.

🕒 4:00 - 5:00 pm

Refreshments

PIONEER PARK PAVILION

🕒 5:30 - 7:30 pm

Bowling/Networking Event

PARADISE BOWL, TACOMA

Driving directions for this event are included in your attendee packet. A map of dining locations is also included in your packet.

4

Washington State

MUNICIPAL STORMWATER CONFERENCE

7:00 - 8:00 am

Registration & Refreshments

PIONEER PARK PAVILION

8:00 - 9:00 am

Call to Order

PIONEER PARK PAVILION

PRESENTED BY Tanyalee Erwin, Assistant Director, Washington Stormwater Center.

Welcome

PIONEER PARK PAVILION

PRESENTED BY John Stark, Director, Washington Stormwater Center and Washington State University Puyallup.

▶ KEYNOTE

PIONEER PARK PAVILION

Why Washington Leads in Stormwater Management

PRESENTED BY Heather Bartlett, Washington State Department of Ecology

Heather Bartlett manages the Water Quality Program for the Washington State Department of Ecology. She has 23 years of natural resource and public health experience and a degree in biology from Washington State University. She has a track record of working through complex and controversial issues. She came to Ecology from the state Department of Health, where she was deputy director field operations manager for the Drinking Water Program for 16 months.

Most of Heather's previous public service career was at the Washington State Department of Fish and Wildlife, where she started her career as a fish biologist and served in supervisory positions in the fisheries program. She also was the hatchery-reform coordinator, the salmon and steelhead division manager. She was the hatcheries division manager when she left Fish and Wildlife to join the team at Health.

Heather is married to a high school English teacher who is also a head coach at Tumwater High School. They have two teenagers and live in Tumwater.

9:00 - 10:00 am

▶ TRACK 1

PIONEER PARK PAVILION

2014/15 Stormwater Manual and Code Updates: Key Tools and Lessons from Phase I Jurisdictions (Panel Discussion)

PRESENTED BY Sherell Ehlers, City of Seattle. Mieke Hoppin, City of Tacoma. Mark Wilgus, King County. Dennis Dixon, Pierce County.

ABSTRACT. NPDES Phase I Municipal permittees are in the process of updating their stormwater codes and manuals to comply with the requirements of the latest NPDES permit requirements. Several Phase I permittees will present a summary of notable lessons and tools that have been developed as part of these recent updates. Discussions may focus on specific topics that caused the most concern or discussion internally among municipal staff and departments and how those issues were addressed or resolved.

Likewise, the panel members will introduce notable tools that have been or will be developed to support the code and manual updates, and therefore that may be of use to other jurisdictions faced with similar needs and regulatory requirements. Tools may include checklists, submittal forms, covenants, agreements, sizing tables, LID infeasibility tools, etc. The session will include time for a Panel Discussion to allow the presenters to elaborate on these topics, compare experiences among their jurisdictions, and address questions from the audience. Given the considerable time and effort that has gone into the past and present Phase I stormwater code and manual updates, the intent of this session is to share the outcomes with an audience of peers who may soon be going through a similar code update process.

LEARNING OBJECTIVES & OUTCOMES. This panel discussion will help Phase II permittees and other interested professionals by providing some of the key highlights, challenges, and outcomes from the ongoing Phase I Code and Manual update efforts. Given that Phase II permittees will have to adopt new stormwater ordinances in the coming years, this discussion will provide attendees with valuable lessons and efficiencies that may be applicable to their own pending code and manual updates.

► TRACK 2

LIBRARY

Trash Compactors: Eliminating a Major Source of Stormwater Pollution

PRESENTED BY Dan Smith, *Surface Water Quality Program Coordinator, City of Federal Way.*

Dan Smith is an environmental professional with over 30 years of experience in the environmental and health & safety fields within both the public and private sectors. He currently holds the position of Surface Water Quality Program Coordinator for the City of Federal Way, Washington. In this position, he provides for the implementation of various stormwater and surface water monitoring programs, compliance strategies, and lake management concepts within the framework of municipal governmental operations (specifically NPDES Phase II municipal stormwater permitting). These programs are all centered upon the protection of natural resources, aquatic habitat, native salmon populations, and most importantly, the preservation and restoration of Puget Sound.

ABSTRACT. The City of Federal Way Surface Water Management (SWM) division has identified areas where solid and liquid wastes are handled, stored, and ultimately transferred to disposal company trash receptacles (specifically trash compactors) as significant contributors of stormwater pollution. As a result, appropriate and reasonable water quality code enforcement aimed at eliminating these sources has been carried out per requirements specified in the city’s Phase II Western Washington Municipal Stormwater NPDES Permit. Through focused Illicit Discharge Detection and Elimination (IDDE) actions, the SWM utility has implemented a successful program to correct the problem—a non-compliance situation which affected nearly twenty five-percent of the trash compactors within the jurisdictional boundary of Federal Way.

Conventional thinking may lead one to believe that commercial establishments and multi-family apartment complexes manage solid waste properly. However, due to storm drainage locations that are often obscured, poor on-site application of pollution prevention best management practices, operator error, the selection of improper equipment for the generated waste stream, and mechanical failures, we discovered that trash compactors are accidents waiting to happen. Stormwater catch basins are almost always located within or adjacent to waste management areas, providing a convenient MS4 entry point that all too often sees flows more appropriate for the sanitary sewer system than our streams, lakes, and wetlands. An initial comprehensive inspection and careful review of compactor mechanisms and their types allowed us to identify these leachate discharges. We also found that efforts to ensure proper disposal practices on the part of employees was being essentially negated by improperly maintained compactors, dumpsters and other types of holding receptacles.

Federal Way recognizes that SWM and local solid waste regulators must work together to take proactive approaches to ensure that conventional waste streams do not become part of our natural streams, and the city is working to create a vested interest on the part of property owners, businesses, private residents, waste handling companies, health department officials, and contracted trash haulers to eliminate the co-mingling of solid waste and stormwater. While employee/user education and outreach is a critical part of reducing/eliminating these illicit discharges, it is not only human failings that must be addressed

with respect to best management practices; equipment selection, maintenance and operation must also be addressed. Compliance through water quality code enforcement has been challenging, but it has ultimately been successful in eliminating prohibited discharges emanating from more than twenty leaking sites. Planned future work may lead to permanent code revisions addressing possible retrofits, or amended ordinances that could demand that new compactor installations be directly tied into sanitary. We believe that the lessons learned and the outcomes related to this targeted IDDE effort should be of great interest to other MS4 NPDES permittees.

LEARNING OBJECTIVES & OUTCOMES. The expected outcomes and learning objectives of this presentation are relevant to municipal stormwater permit programs: public education, commercial inspections, IDDE investigations, and enforcement. The topic illustrates that these types of prohibited discharges can be significant, and demonstrates the need for multi-departmental (solid waste and code enforcement), multi-entity (health), and multi-organizational (compactor manufacturer) coordination.

► TRACK 3

COUNCIL CHAMBERS

STORM: Collective Impact for Stormwater Education, Outreach & Beyond

PRESENTED BY Stef Frenzl, *Communication Specialist II, Snohomish County.*

Stef Frenzl has over 15 years of experience in the fields of social marketing, group facilitation, ecological research and habitat restoration and protection. He is a Core Team member of Stormwater Outreach for Regional Municipalities (STORM), a consortium of over 80 Puget Sound jurisdictions working to fulfill NPDES permit education and outreach requirements. He also serves on the Steering Committees for the "Puget Sound Starts Here" awareness campaign and the nationally-recognized Don't Drip & Drive vehicle leak campaign.

ABSTRACT. Nobody wants to unknowingly recreate the wheel from scratch, yet we see it happen more often than we'd like to admit. Even worse, well-intentioned people with the same goal sometimes get in each other's way, and projects can get caught in the crossfire. How can we prevent these problems from happening? One solution is through Collective Impact, a structured form of collaboration that embraces continuous improvement and rigorous data to drive transformative change. The five characteristics of Collective Impact will be described and STORM (Stormwater Outreach for Regional Municipalities), a network of over 80 Puget Sound jurisdictions, will be used as a case study to show how aligning goals and resources can yield innovation, leverage resources and take advantage of the "collective genius" to fulfill stormwater permit requirements efficiently and effectively. Practical tips and lessons-learned will help Eastern and Western Washington jurisdictions assess the benefits and costs to establishing collaborative networks to support stormwater permit-related activities. Additionally, specific challenges Eastern Washington jurisdictions face when establishing collaborative networks will be addressed, and suggestions for overcoming those challenges will be provided.

LEARNING OBJECTIVES/OUTCOMES.

- Learn the basics of Collective Impact and how to apply its principles to fulfill NPDES permit implementation
- Learn about STORM, a Collective Impact case study, and what makes STORM a successful network that drives innovation.
- Learn how STORM's successes and lessons learned can skyrocket your success when forming new collaborative networks to meet stormwater permit requirements.

10:00 - 11:00 am

▶ TRACK 1

PIONEER PARK PAVILION

Permeable Pavement Design and Maintenance: Municipal Lessons and Observations

PRESENTED BY Mark Palmer, *City of Puyallup*. Jessica Knickerbocker, *City of Tacoma*. Tim Horton, *Skilling Connolly*.

ABSTRACT. Implementation and shared knowledge on permeable pavements can be a barrier to further use of such systems for on-site stormwater management. It's understandable why there is an inherent resistance to these new methods. As we move forward with new designs influenced by Low Impact Development and policies designed to protect natural spaces within and around our communities, engineers will be challenged to shed traditional design methods for new innovative designs. Pervious pavement is one method in the engineers' tool box used to implement LID techniques. Materials, performance standards and construction practices will need to be standardized and tested to ensure future investments in our communities infrastructure yields returns suitable for growth. Surface water runoff is the leading cause of pollution in our region; various forms of surface pavement make up a large portion of these engineered landscapes, making it one of the most important components within this tool box. Pervious pavement in sync with other methods will help with stormwater BMP's. Transitioning is always a challenge but inevitable as we address the issues facing our communities. Industry, education and state government are working together to address these issues, moving us in a direction that influences innovative design. This is one area where we are seeing solid traction and real applications in our surroundings.

The City of Tacoma and City of Puyallup have implemented various green infrastructure projects. These retrofit projects are located on commercial roadways, arterial roads, and residential streets. Permeable pavement, bioretention and sustainable landscape design are the heart of these projects. In Tacoma, the design approaches are rewarded by Greenroads™ in the Pavement Technologies and Environment and Water categories. Permeable pavement in particular has proven to be a cost-effective stormwater management tool for Tacoma. However, it is still evolving and lacks industry standards. Tacoma is currently leading a statewide effort to establish standard specification for Washington.

Greenroads™ provides tools to assist engineers, directors and elected officials to make informed decisions about rebuilding roads sustainably. Green infrastructure is a cost-effective strategy that also manages stormwater. Both require a hands-on approach with a knowledgeable team.

LEARNING OBJECTIVES/OUTCOMES. We have learned many valuable lessons in the design, construction, and maintenance of green infrastructure. These lessons extend beyond current manuals and are key elements for retrofit projects. Until green infrastructure is standard practice, communities need dedicated teams of civil, geotechnical, and materials engineers, construction and maintenance staff for these projects to be successful long term. This presentation will include a panel discussion on advances in permeable pavement with real world applications and ongoing research information. Topics will showcase existing options for current and future installations. Attention will be given to case studies that identify successful projects and will include areas which presented problems.

▶ TRACK 2

LIBRARY

Integrating IDDE, Public Education, Inspections, and Spill Reporting

PRESENTED BY Mindy Fohn, *Water Quality Manager, Kitsap County*.

Mindy Fohn has 20 years of experience in water quality issues in Kitsap County and Puget Sound. She was an environmental technician at the City of Bremerton Public Works, a water quality/septic inspector at Kitsap Public Health District, and most recently, the Water Quality Manager at Kitsap County Public Works. Mindy manages the Facility Inspection, Water Monitoring, and Education Programs, as well as the Silverdale LID Retrofit Program.

ABSTRACT. Kitsap County Public Works has evolved outfall screening, spill reporting and facility inspection programs gradually since 1995 so that now and in the future they operate as one integrated approach.

Upon review of the outcomes and effectiveness of the outfall screening program, spill hotline reporting and other inspection programs such as commercial facilities and septic inspections, it was determined that real gains were made with an “eyes on the ground” approach rather than visual and chemical screening of outfalls.

In 2009, a regional spills hotline reporting system was implemented whereby both staff and citizens report spills to one call center, Kitsap 1. Citizen surveys and focus groups provided valuable insight about how to advertise the reporting hotline and addressed major barriers to citizen reporting. The regional nature is unique and involves the Cities of Bremerton, Poulsbo, Port Orchard and Bainbridge Island. It was coordinated with the Kitsap County Department of Emergency Management.

Facility inspections were a separate program and focused on public facilities, subsequently migrating to include commercial facilities. However, compliance was hit and miss. Kitsap County then partnered with Kitsap Public Health District from 2006 to 2008 to pilot the program in the urban area of Silverdale, WA. We worked to develop methods, materials and enforcement strategies to obtain 100% property compliance with stormwater maintenance standards and prevention of illicit discharges due to poor housekeeping practices.

The program has realized time efficiencies with the increased compliance rates so that the number of follow up inspections and violation notices has been reduced. The staffing was reduced by 1.0 FTE in 2013 while at the same time staff duties increased to include a wider variety of work such as culvert inspections and assisting the green stormwater program.

Locating outfalls was important in the first Phase II permit, and the new Permit requirements introduce a common sense and effective approach to IDDE building upon the lessons learned in the initial Permit. Future Kitsap County work includes updating the IDDE Program Plan to further integrate these programs.

LEARNING OBJECTIVES & OUTCOMES. Jurisdictions will learn how to integrate programs increasing effectiveness at preventing and removing non-stormwater discharges while gaining efficiencies. The presentation will focus on how background research guided a review of the outfall screening program and comparison to spill reporting and site inspections to identify where to focus efforts, a unique regional reporting hotline approach, partnering with other agencies for education and enforcement, available resources, and the role of quality education messaging.

► TRACK 3

COUNCIL CHAMBERS

Recent GROSS and Other Grant Projects: Where Are They Now?

PRESENTED BY Dan Gariepy, *Department of Ecology.*

Dan Gariepy has worked at the Department of Ecology's Municipal NPDES unit since 2011. He works on technical aspects of developing guidance and supporting grants and loans. He was also a member of the team that developed the 2012 Stormwater Management Manual for Western Washington, the primary guidance manual for Western Washington. Dan has been in environmental engineering and stormwater engineering for more than 20 years. He has worked as a consultant to Washington NPDES permitted municipalities, assisting them in municipal projects and providing contracted stormwater review of private development permits.

ABSTRACT. The State Legislature and the Department of Ecology has invested in grant programs to help improve the water bodies impacted by stormwater across our state. This presentation will focus on a few of the programs and delve into some case studies on how those funds have turned into projects. The presentation will also discuss the long term possibilities of the funding program. This talk focuses on the main categories of grants: Grants of Regional or Statewide Significance; Capacity Building; and Capital Construction.

Grants of Regional or Statewide Significance is a unique funding program in Washington that allows the NPDES permittees an opportunity to propose grant ideas that they feel will benefit the larger stormwater community. Monies are available for this purpose every other year through carry-forward funding provided

PRESENTATIONS

by the Washington State Legislature to local governments to support stormwater permit implementation. The program has produced a great diversity of projects, from Education and Outreach to scientific studies on treatment media. This resulting large body of work is designed to be open and shared with any municipality that might have similar needs.

Capacity Grant funding has been in place for several years as a non-competitive allocation for Municipal NPDES permittees. The 2013 Legislature provided funding added a separate appropriation to make two parts to the capacity grants -- permit implementation and project specific planning and design. This round of permit implementation funding awarded a grant of \$50,000 to be used for permit implementation activities by eligible cities.

Additionally, each city or county covered by one of the municipal stormwater permits is eligible to receive up to \$120,000 for project specific planning and design (pre-construction) activities. If the eligible recipient chose to accept the project specific planning and design funding offer, Ecology added the amount to the 2013-15 Biennial Municipal Stormwater Capacity Grant Program agreement.

Several rounds of Capital Construction funding have been awarded by Ecology under specific initiative from the state legislature. The current round is the Stormwater Financial Assistance Program (SFAP) grant. The SFAP is designed to fund stormwater projects and activities that have been proven effective at reducing environmental degradation from stormwater. The SFY16 funding cycle is the initial year for the integration of stormwater-specific funding into the Integrated Water Quality Financial Assistance Program.

A brief overview of the progression of the grant programs will be discussed. A number of sample projects will be discussed briefly to illustrate the outcomes of the grant programs.

LEARNING OBJECTIVES & OUTCOMES. This presentation is designed to provide an overview of Ecology's grant funding programs. The objective is that the permittee has a better understanding of the purpose of the funding program, along with some concrete examples of how the program has been used by other permittees. Overall, the presentation will help permittees understand the opportunities they may be able to access through these programs.

11:00 am - 12:00 pm

▶ **TRACK 1**

LIBRARY

A Direct-to-Implementation Approach to Toxics Reduction in the Spokane River

PRESENTED BY Lynn Schmidt, *Stormwater Permit Coordinator, City of Spokane*. Adriane Borgias, *Water Quality Lead (Spokane River), Department of Ecology*.

Lynn Schmidt, PE, is the Stormwater Permit Coordinator for the City of Spokane Wastewater Management Department, where she coordinates compliance activities under the Phase II Municipal Stormwater NPDES Permit, the City's PCB Adaptive Management Plan, and the City's involvement in the Spokane River Regional Toxics Task Force (SRRTTF).

Adriane Borgias, Department of Ecology, works to further the efforts of the SRRTTF with the goal of reducing toxics in the river. She previously worked in the energy industry, for the Kootenai Tribe of Idaho, and as a private consultant. She has a degree in Chemistry from University of California (UC) Berkeley and a Master's Degree in Environmental Science from the University of San Francisco. In 2010 she spent four months in Bangalore, India, as a Fulbright-Nehru Environmental Leadership Scholar.

ABSTRACT. The Spokane River community has engaged in an innovative direct-to-implementation approach to address toxics in the watershed. Collaboration with other entities on a watershed scale is a cornerstone of making progress in toxics reductions. Local municipal and industrial dischargers along with regulators, state entities, and environmental organizations formed the Spokane River Regional Toxics Task Force (SRRTTF), a direct-to-implementation alternative to the traditional TMDL process. Its vision statement is to "work collaboratively to characterize the sources of toxics in the Spokane River and identify and

implement appropriate actions needed to make measurable progress towards meeting applicable water quality standards.” Much of the focus of the SRRTTF has been on polychlorinated biphenyls (PCBs), a carcinogenic, man-made toxic that has been identified ubiquitously throughout the environment. PCBs have been identified as a “legacy contaminant,” but are also still incidentally generated in manufacturing processes at concentrations up to a billion times greater than water quality standards.

Currently the majority of the PCB loading to the Spokane River is unaccounted for and work is underway to identify and fill these data gaps in the watershed. In addition, one goal of the SRRTTF is to address the issue of relatively high PCB concentrations allowed in products versus stringent water quality standards. Each of the municipal and industrial dischargers are investigating PCB sources in their own systems.

The City of Spokane is actively engaged in the SRRTTF and is working to make measurable progress in reducing toxics in its stormwater, combined sewer, and wastewater systems. An adaptive management plan was implemented to identify PCBs in stormwater and catch basin sediments in a heavy industrial area of the City. The City also submitted an Integrated Clean Water Plan, which holistically addresses clean water regulation through prioritized public works projects. PCBs are a contaminant of concern addressed in the Integrated Clean Water Plan.

This joint presentation by the Department of Ecology and City of Spokane will describe the innovative direct-to-implementation approach, formation of the SRRTTF’s organizational concepts and structure, and an example of one Phase II stormwater permittees’ efforts towards toxics reductions in stormwater.

LEARNING OBJECTIVES & OUTCOMES. The objective is to demonstrate an innovative direct-to-implementation approach to pollutant reduction on a watershed scale as an alternative to a traditional TMDL. The presentation focuses on efforts undertaken in the Spokane River watershed as an example, including the City of Spokane’s Integrated Clean Water Plan and toxics reduction efforts in its stormwater system. The direct-to-implementation approach may be applied to any pollutant in any watershed across the state. This example is a particularly complicated case as PCBs are ubiquitous, persistent toxics and the Spokane River crosses state boundaries.

► TRACK 2

PIONEER PARK PAVILION

EPA NPDES Audits: Summary and Lessons from Ecology and Phase I Permittees (Panel Discussion)

PRESENTED BY Rachel McCrea, *Department of Ecology*. Bill Leif, *Snohomish County*. Lorna Mauren, *City of Tacoma*. Doug Navetski, *King County*. Kate Rhoads, *City of Seattle*.

ABSTRACT. NPDES Phase I Municipal permittees recently went through audits of their permit-required activities. This Panel Discussion will include an introduction from Ecology to provide context for the EPA audits, followed by discussion among the panel members specific to the key challenges and lessons from the audit preparation, as well as significant outcomes and lessons that resulted from the audits. The information will be generally informative to permittees and other stormwater professionals, but in particular will help Phase II permittees understand the realities of the audit process and the effects on permit compliance activities.

LEARNING OBJECTIVES & OUTCOMES. This panel discussion will summarize the process and outcomes from the recent EPA audits of NPDES Phase I Municipal permittees. Previously, this information has not been formally shared with other permittees and stormwater professionals. The audience will learn about the overall audit process and outcomes to inform and enhance their own permit-compliant programs. Specifically, the audience will understand what is needed to prepare for the audits, what might be expected during an audit, and whether and how the audits may change how the permittees implement permit requirements.

▶ TRACK 3

COUNCIL CHAMBERS

Stormwater Underground Injection: An Alternative to MS4 Discharge?

PRESENTED BY Rod Struck, *Senior Hydrogeologist, GSI Water Solutions*. Barbara Adkins, *Project Manager, City of Portland Bureau of Environmental Services*.

Rod Struck has 28 years of experience managing water and environmental projects. His expertise in evaluating stormwater contaminants stems from his experience overseeing stormwater source control and environmental cleanup activities within the Portland Harbor Superfund Site, first with Oregon Department of Environmental Quality (DEQ), then with the City of Portland, and currently with GSI Water Solutions, Inc. While with the City of Portland he managed the UIC stormwater program.

Barb Adkins manages the City of Portland, Bureau of Environmental Services' Underground Injection Control (UIC) Program. She has worked for the City since 2006. Barb served as the Co-chair of the Association of Clean Water Age.

ABSTRACT. The City of Portland has about 9,000 Class V underground injection control systems (UICs) that collect stormwater from public rights-of-way and allow infiltration to the subsurface. UICs are an essential element of Portland's comprehensive watershed strategy, emphasizing a more natural, sustainable approach to stormwater management and promoting use stormwater as a resource. UICs offer a good alternative to the traditional piped approach and keep runoff in the watershed and out of sewers, reducing stormwater discharge to rivers and streams. UICs can also provide overflow capacity for sustainable stormwater management facilities.

Portland's UICs are operated in compliance with a Water Pollution Control Facility (WPCF) permit issued by Oregon DEQ in June 2005. The permit establishes the assessment, operation, maintenance, monitoring, and corrective action requirements that Portland must implement to ensure both the protection of groundwater as a drinking water resource and compliance with the federal Safe Drinking Water Act. Portland has completed ten years of assessment, management, monitoring, and structural solutions, and has a well-established UIC Program based on minimizing risk. A robust statistically-derived monitoring program has been in place for nine years, allowing stormwater quality to be characterized and to demonstrate permit compliance. The permit includes maximum allowable discharge levels (MADLs) for typical right of way pollutants, based on drinking water standards and requires monitoring at the point stormwater enters the UIC. Of the pollutants detected in stormwater, most were at very low levels with only a small number exceeding 50 percent of the MADLs and a few exceeding MADLs.

One of Portland's programmatic challenges was the permit requirement to implement corrective actions for UICs with pollutant concentrations that exceeded MADLs for two consecutive years. In response, Portland developed an innovative Groundwater Protectiveness Demonstration model (GWPD) using site specific information. This model evaluates whether stormwater pollutant discharges adversely impact groundwater following infiltration and attenuation (sorption, degradation, dispersion) in unsaturated soil. Portland's monitoring and modeling work:

- Demonstrated UICs with discharges of stormwater exceeding MADLs, vertical separation distances greater than five feet, and within permit-required, drinking-water-well setbacks are protective of groundwater as a drinking water resource.
- Demonstrated structural retrofits or UIC closures were unnecessary to protect groundwater from stormwater discharges within public rights-of-way, resulting in over 500 no-further-action determinations from DEQ and an estimated cost savings of over \$10 million dollars for implementing corrective actions.
- Allowed Portland to obtain a number of permit modifications, including changes to the MADLs.
- Provided a basis for DEQ's 2013 permit template benefitting other municipal WPCF permittees.

- The Portland model illustrates the effectiveness of using science to inform policy and in doing so, reaps the many benefits of UICs. Moving forward, Portland will also utilize this programmatic information as it prepares to negotiate its 2015 Permit with DEQ.

LEARNING OBJECTIVES & OUTCOMES. 1) Underground injection control (UIC) structures can be part of a comprehensive watershed strategy to use stormwater as a resource by infiltrating it back into the ground. 2) Nine years of monitoring have shown that stormwater UICs in municipal rights of way are protective of groundwater quality. 3) Modeling tools are available for locations (e.g., specific commercial areas) or scenarios (e.g. specific pollutant loads) to demonstrate where pollutants in stormwater runoff are treated by chemical, biological and physical process in the soil to levels that are protective of groundwater. 4) These tools can be used to help determine corrective actions (e.g., retrofits, no further actions) for UICs to maximize capital budgets.

🕒 12:00 - 1:30 pm

▶ LUNCH PANEL PRESENTATION

PIONEER PARK PAVILION

Recommendations for Improving WQA and TMDL Programs in Washington State

PRESENTED BY Steve Britsch, *Snohomish County*. Jana Ratcliff, *Washington Department of Transportation*. Mindy Fohn, *Kitsap County*. Doug Navetski, *King County*. John Collins, *Pierce County*. Melissa Gildersleeve, *Department of Ecology*.

The Interagency Project Team consists of staff from the surface water departments of Clark, King, Kitsap, Pierce, Snohomish, and Thurston counties and staff from the Washington State Department of Transportation (WSDOT). The Team was formed to improve implementation of the Clean Water Act (CWA) Section 303(d) and total maximum daily load (TMDL) programs in Washington State.

ABSTRACT. Implementation of Clean Water Act programs to assess waters for impairment and develop clean-up plans (TMDLs) pose substantial administrative, technical, financial, and legal challenges for federal, state, and local agencies as well as stakeholders. Recognizing these challenges, an Interagency Project Team formed in 2012 to discuss approaches to recommend improvements to Water Quality Assessment (WQA) and TMDL programs in Washington State. The Interagency Project Team recently completed a “compare and contrast” approach to identify programmatic methods and lessons learned by Washington State and other states regarding WQA and TMDL procedures. The objectives of the project were to: 1) learn alternative approaches for CWA programs from other states, 2) utilize the research to develop recommendations for improving Washington State’s WQA, listing/de-listing, and TMDL procedures, and 3) work with EPA and Ecology to refine and implement many of the recommended improvements.

Recommendations include:

1. Establish a multi-stakeholder Standing Committee to improve coordination and engagement with the regulated community
2. Implement existing regulatory authority related to unpermitted and nonpoint sources
3. Refine water quality standards and water quality assessment methodologies
4. Improve and employ consistent processes for collecting, assessing, and utilizing credible data in WQA and TMDL development
5. Refine water-quality-assessment categories to improve clarity and aid in defining priority water bodies
6. Update the current biological assessment and listing methodology
7. Define TMDL prioritization methodology, timelines, and process for public involvement
8. Define TMDL development methodology

- 9. Develop consistent TMDL implementation expectations

LEARNING OBJECTIVES & OUTCOMES. Implementation of Clean Water Act programs to assess waters for impairment and develop clean-up plans (TMDLs) pose substantial administrative, technical, financial, and legal challenges for federal, state, and local agencies as well as stakeholders. Implementation of TMDLs can entail huge costs, major land-use restrictions, and increased risk of third-party legal challenges for those that must meet these requirements through their stormwater NPDES permits. We seek to inform stakeholders of a project to compare and contrast Washington State’s water-quality-assessment and TMDL programs with other states and the resulting recommendations proposed to Ecology. The goals are to improve accuracy, transparency, predictability, and consistency of decision making, leading to improvements in water quality and use of public resources.

1:30 - 3:00 pm

▶ **TRACK 1**

LIBRARY

REGIONAL APPROACHES TO STORMWATER MANAGEMENT

▶ **TRACK 1A**

LIBRARY

Re-Envisioning Treatment and Flow Control in Tacoma: The Regional Approach

PRESENTED BY Dana de Leon P.E., *City of Tacoma, Environmental Services.*

Dana de Leon is a professional engineer at the City of Tacoma Environmental Services Department. She is a chemical engineer with 27 years of experience in stormwater studies related to quality/quantity studies, source control, NPDES regulatory issues, and stormwater treatment technologies. Her main focus is stormwater source control, fate and transport of stormwater contaminants, and stormwater treatment.

ABSTRACT. Redevelopment in Tacoma can be complex in our highly-urbanized area. The complexities are driven by limited space, aging infrastructure, and lower rents in comparison to other urban areas. Ease of development and more lucrative rents can drive development elsewhere. Tacoma has developed a Draft Regional Stormwater Facilities Plan where Minimum Requirements (MR) #6 Water Quality Treatment and MR #7 Flow Control as defined in Tacoma’s NPDES Phase I Municipal Stormwater Permit and our 2012 Stormwater Management Manual (Volume 1: Sections 3.4.6. and 3.4.7) would be met by using regional systems in lieu of constructed, individual, on-site facilities for development/redevelopment projects. The Draft Plan is under review by WA State Department of Ecology.

LEARNING OBJECTIVES & OUTCOMES. This presentation provides permittees with alternatives for meeting Post-Construction Stormwater Management for New Development and Redevelopment requirements in the NPDES Municipal Stormwater Permits: W. WA Appendix 1: MR #6 Water Quality Treatment and MR #7 Flow Control, and E. WA 5.a.ii.b.2 and Appendix 1: Core Element #5 Runoff Treatment and #6 Flow Control. The benefits of a Regional Stormwater Facilities Plan are: retrofits larger areas faster than would occur under normal new development and redevelopment, resulting in flow- and pollutant-load reductions to receiving waters; uses economy of scale to get best unit price for both construction and operations and maintenance (O&M); supports development through in-lieu programs; provides developers with certainty regarding requirements, costs and timeline; and targets the most sensitive receiving waters.

Using an Ecological Recovery Approach to Stormwater Permit Regulations

PRESENTED BY Andy Rheume, *Senior Planner, City of Redmond*. Ed O'Brien, *Department of Ecology*. Heather Ballash, *Department of Commerce*. John Lenth, *Herrera Environmental Consultants*.

Over the last six years, Andy Rheume has been developing an innovative, alternative approach to the default permit requirements for stormwater management that is expected to expedite the recovery of streams in urbanized watersheds. His efforts culminated in the development of Redmond's Citywide Watershed Management Plan which was subsequently approved by multiple stakeholders, including Ecology. In recent years, he has been involved in regional collaboration to foster the adoption of this alternative approach and monitor its effectiveness in priority watersheds where stormwater-runoff treatment, LID, and flow-control facilities will be constructed using current design standards at an accelerated pace. Andy has 14 years of stormwater-management experience in various capacities, and has a BS in Environmental Sciences from the University of Washington.

ABSTRACT. The municipal stormwater permits establish minimum requirements for permittees to address stormwater impacts from new development and redevelopment through the implementation of programmatic and structural best management practices (BMPs). In theory, if these BMPs are applied to all the developed land in a watershed, the receiving water would be protected from stormwater related hydrologic and water-quality impacts. While the effectiveness of stormwater BMPs has been well-documented on the site scale, limited data exists nationally on the effectiveness of these controls in aggregate for actually protecting conditions in receiving waters.

In February 2014, Ecology approved a Citywide Watershed Management Plan (WMP) for the City of Redmond (City) that allows use of a watershed approach for implementing required stormwater BMPs pursuant to the municipal stormwater permit. This approach is an alternative to applying the default approach to stormwater management throughout Washington. Through the implementation of this WMP, the City will establish a fee-in-lieu program that will allow investments in stormwater BMPs to occur using private and public funding. The City will focus these investments in a subset of priority watersheds that are moderately impacted by urbanization and therefore expected to respond more quickly to rehabilitation efforts. The WMP also creates a careful decoupling of where redevelopment occurs and where stormwater controls and infrastructure are installed.

Recognizing the importance of creating healthy aquatic ecosystems in urbanized areas, Redmond's WMP has become an example of how using an alternative approach has more potential to recover aquatic habitat while supporting development of dense urban centers for expected population and job growth. Due to this dual nature, this alternative has fostered an alliance of state agencies and local governments to create tools to assist stormwater permittees in developing alternative local regulations that simultaneously address stormwater management, aquatic ecosystem recovery, and development of urban centers. This presentation will include an overview of Ecology's Stormwater Control Transfer Program Guidance, developed to support local jurisdictions.

The implementation of this approach provides a unique opportunity to study the effectiveness of stormwater BMPs for improving receiving water conditions on an accelerated time frame. The City is implementing a study to quantify improvements in receiving water conditions based on routine and continuous measurement of various hydrologic, chemical, physical, and biological indicators of stream health. This study will utilize a "paired watershed" experimental design. This study will initiate in the fall of 2014 and will be implemented over an anticipated ten year timeframe with funding from Ecology's Regional Stormwater Monitoring Program.

Over the next ten years, the implementation of Redmond's WMP and the effectiveness study will provide valuable feedback to federal, state and local governments regarding the benefits of stormwater BMPs and their application across an urbanized, small-stream watershed.

LEARNING OBJECTIVES & OUTCOMES. This presentation will benefit both Eastern and Western Washington permittees by illustrating an alternative approach to the default stormwater regulations that allows greater flexibility

for directing some of the required stormwater controls for redevelopment projects to priority watersheds where they will provide greater benefit. This approach is expected to rehabilitate moderately impacted streams at a lower cost and on a shorter frame relative to what can be expected through the default stormwater regulations. Tools from this presentation will include an overview of the stormwater control transfer program guidelines, a discussion of Redmond’s experience developing and implementing the program, and a summary of efforts currently underway to monitor the effectiveness stormwater BMPs for restoring streams in priority watersheds where this approach is being applied.

▶ **TRACK 2** **PIONEER PARK PAVILION**
TECHNICAL TOOLS FOR ASSET MANAGEMENT & OPERATIONS: REAL EXAMPLES FROM PERMITTEES

▶ **TRACK 2A** **PIONEER PARK PAVILION**
Utilizing Asset Management Data Based Systems to Meet NPDES Requirements

PRESENTED BY Don Robinett, *Stormwater Compliance Manager, City of SeaTac.*

Don Robinett has a master’s degree from the Program in Environmental Science and Regional Planning at Washington State University (WSU) and a bachelor’s degree in Communications/Public Relations from WSU. He is a Certified Professional in Erosion Sedimentation Control with 20 years of experience in the stormwater industry and over seven years experience in managing municipal NPDES compliance for Phase II jurisdictions.

ABSTRACT. One of the most time consuming, and at times, exhausting requirements of the municipal stormwater permits is the need for program tracking and reporting. While most jurisdictions have permit tracking database systems, many have not implemented this technology in their operations and maintenance (O&M) or illicit discharge detection and elimination (IDDE) programs. This presentation will provide detailed examples of how the City of SeaTac is utilizing a GIS-integrated asset management database system to help meet its NPDES tracking and reporting requirements. Customized NPDES forms and reports that will be presented include: Private and Public Stormwater System Inspections, Spill Hotline and IDDE Investigation, IDDE Field Screening and Catch Basin Inspections. The presentation will focus on demonstrating how jurisdictions can utilize asset management database systems to not only simplify annual tracking and reporting, but also help to direct management decisions on NPDES programs (i.e. identify target areas for IDDE and stormwater educations programs based on mapping of illicit discharges).

- Why is it important? Database systems are a useful tool which can be used to streamline NPDES tracking and reporting requirements.
- Outcomes? Consistent and efficient access to tracking and reporting data. This approach also has broader implications for NPDES program and surface water utility management.
- Challenges/lessons learned? Garbage in garbage out. Clarifying roles and responsibilities for entering data; and maintain high level of oversight for the first year.
- Applicability? This approach to NPDES compliance can be useful to any permittee with O&M and IDDE tracking and reporting requirements and can be applied to most GIS linked asset management database systems.

LEARNING OBJECTIVES & OUTCOMES. This presentation will provide detailed examples of how the City of SeaTac is utilizing a GIS-integrated asset management database system to meet NPDES tracking and reporting requirements more efficiently. Customized NPDES forms and reports that will be presented include: Private and Public Stormwater System Inspections, Spill Hotline and IDDE Investigation, IDDE Field Screening and Catch Basin inspection. The presentation will focus on demonstrating how jurisdictions can utilize asset management database systems to not only simplify annual tracking and reporting, but also help to direct management decisions on NPDES programs (i.e. identify target areas for IDDE and stormwater educations programs based on mapping of illicit discharges).

Private Facility Inspections: From Paper to High Definition

PRESENTED BY Dan Repp, *City of Shoreline*.

ABSTRACT. NPDES Municipal Stormwater Permittees are required to inspect private stormwater facilities for maintenance purposes. Challenges in this type of inspection program can include: a growing work load with new development, communicating effectively with private property owners, and inaccurate mapping. Finding ways to streamline an inspection program that eases all of these challenges could benefit many permittees. This presentation will show how the City of Shoreline’s implementation of a GIS-based asset management system streamlined its inspection program.

In 2013, the City of Shoreline implemented a GIS-based asset management system, moving the inspection program from a paper process to one based in GIS technology. The inspection program includes approximately 300 privately-owned stormwater facilities, making the old method of institutional knowledge and Excel spreadsheets cumbersome. The new asset management system has streamlined the field inspection and communication processes.

Because the private facility inspection process is not a standard Inspection-to-Work Order process, tracking inspection findings, relaying them to landowners, and tracking compliance was administratively time consuming. Now, inspection findings are directly related to mapped assets, reducing the need to sift through hard files. Property owners seem to have a better understanding of their system through the GIS maps provided to them. Administration time has been reduced with automated reports to property owners.

Field inspections used to be completed with a binder of hand-drawn maps, jotting notes on generic field forms, then transferring information to spreadsheets in the office. Too much field staff time was spent finding lost features using not-to-scale maps because hand drawn maps were difficult to update and navigate. Now, field inspectors are equipped with mobile devices, using maps from an up-to-date GIS inventory. Individual features are shown in relation to aerial photos, and structure details are available with the click of a button.

With the prospective proliferation of smaller on-site BMPs and facilities, future iterations of the inspection program must be agile. Lessons learned with the initial configuration process suggest that this process will have the flexibility needed to achieve success.

LEARNING OBJECTIVES & OUTCOMES. An Asset Management System can be one tool for permittees to use in managing a private facility inspection program (a growing requirement under the NPDES permit). Through the use of a GIS-based asset management (AM) system, the City of Shoreline has been able to streamline its own inspection program. Efficiencies include: better understanding of the entire stormwater system through an updated GIS asset inventory, managing all landowner correspondence in the AM system, having answers to follow-up questions at your fingertips, and generating reports on past performances of a facility. While some custom reports were required, this up front cost allows us to easily track ever-changing contact information and report inspection findings. The City is still refining the process after one cycle of implementation, but has found that less time is spent tracking down information.

Outfall and Discharge Point Screening Application

PRESENTED BY Mark Preszler, *King County*. Jeanne Dorn, *King County*. Brett Randle, *King County*.

Mark Preszler is the coordinator of King County's NPDES Stormwater Mapping and Information Management Programs. He has over fifteen years of experience in GIS, remote sensing, spatial analysis and modeling, database management, and software development, particularly as it applies to the management of natural resources and decision support systems.

Jeanne Dorn is a Water Quality Project/Program Manager III with King County Stormwater Services Section/Water Quality Compliance Unit. She leads various illicit connection and illicit discharge programs, including the conveyance screening program and the fecal coliform total maximum daily loads (FC TMDLs) specified in the 2013-2018 Permit.

Brett Randle is the Mapping Editor of King County's NPDES Stormwater Mapping and Information Management Programs. He has five years of experience in GIS and environmental science related to streams.

ABSTRACT. In order to meet requirements within the Phase I NPDES Municipal Stormwater Permit, King County created a mobile application for screening, collecting, and reclassifying its outfalls and discharge points. The Outfall and Discharge Point Screening Application is based on the new outfall and discharge point definitions recently proposed by the Washington State Department of Ecology. King County recognizes that entities subject to shared permit requirements can benefit from regional integration of stormwater data management and collaborative development of tools that meet shared, regional business needs. For these reasons, King County supplies this Application package to any interested jurisdiction upon request.

The Application can assist jurisdictions in meeting their conveyance screening and mapping permit requirements. The Application directs staff to mapped outfalls, then to reclassify these features under the new outfall and discharge point definitions. The Application also enables staff to add new outfalls and discharge points, as well as move existing locations based on GPS, aerial imagery, or base maps. The Application operates within the ESRI Collector App, which is freely available for iOS and Android devices. The Collector App provides driving directions to individual points and GPS location awareness so that field staff may orient themselves on the mapping device. Users may also add supporting data layers to the map display, such as wetland areas, stormwater drainage, stormwater facilities, streams, and land ownership data to facilitate accurate classification of outfalls and discharge points. Users can upload attachments, providing a streamlined method for pictures and assorted documents to reside in the spatial database for easy access.

LEARNING OBJECTIVES & OUTCOMES. This presentation benefits permittees in Washington by demonstrating how shared data structures and mapping applications add an ease and efficiency to stormwater mapping for permit requirements. This discussion presents permittees with a field data collection application which operates through ESRI ArcGIS Online, or can be adapted to another customized interface. King County is employing this application in support of outfall and discharge point screening requirements found in the Phase I NPDES Municipal Stormwater Permit. This presentation identifies specific challenges and lessons learned in developing modern mapping applications in support of permit requirements and deadlines, and within budget constraints. This application greatly improves the efficiency of municipal permit compliance by offering a mobile product for screening and mapping outfalls and discharge points.

▶ TRACK 3

COUNCIL CHAMBERS

FINDING AND ELIMINATING ILLICIT DISCHARGES: LESSONS FROM TWO REGIONS

▶ TRACK 3A

COUNCIL CHAMBERS

Alternative Fecal Coliform and Stormwater Testing Methods

PRESENTED BY Simon A. Smith, *Research Scientist, University of Idaho*. Rob Buchert, *City of Pullman*. Shilo Sprouse, *City of Pullman*.

Simon Smith has extensive practical wastewater experience and is a Certified Level 4 Domestic WWTP Operator (WA). In addition to his wastewater treatment and water purification experience, he has more than ten years of experience in the plastics, pharmaceutical, and ceramics manufacturing fields. He also has a solid theoretical foundation with a Doctorate in Engineering Science (WSU), MS in Water Utilization (Pretoria), and BS in Microbiology (Cape Town). Last year Simon joined the University of Idaho, Resource Recovery Laboratories of Dr. Erik R. Coats as a Postdoctoral Fellow. In 2009 the City of Pullman commissioned Simon's company Worldthree LLC to help measure fecal coliform in one of its stormwater monitoring projects. Several novel technologies were developed during this and subsequent studies, and as Worldthree LLC is committed to open source, Simon shares these freely.

ABSTRACT. The City of Pullman (WA) has an active stormwater management program focused on improving water quality, infrastructure, and public awareness, to facilitate compliance with NPDES Phase II MSP requirements. One of the program's water quality priorities is to reduce the fecal coliform (FC) counts entering its stormwater collection system, and the City has performed several stormwater system monitoring studies to achieve this goal. Many simple tools and methods have been developed during the Pullman study, and as other stormwater managers and operators face similar hurdles, this presentation shares the insights and lessons of the Pullman study.

For instance, FC measurement can become expensive, particularly when large numbers of samples are collected, and while it is essential to use a standard FC method when monitoring system performance for regulatory purposes, simpler and cheaper FC methods allow more detailed coverage during initial system assessments. This presentation will show attendees how to perform the simplified, quick, and cheap FC screening test used in the Pullman study.

Stormwater technicians measure water flow when collecting samples so they can calculate the load at each sampling point. Many different flow measurement devices are commercially available, but this presentation will describe four alternative flow measurement methods tested during the Pullman study. These alternative methods can be used to corroborate traditional methods, and are quick, cheap, and provide a permanent record of the sampling conditions.

In addition to sharing methods of FC- and flow-testing, the presentation will also share techniques to collect more accurate precipitation data, and show stormwater technicians how to build their own sampling tools from cheap and widely available materials.

LEARNING OBJECTIVES & OUTCOMES. We will show attendees a variety of accurate, simple, and cost effective tools and methods we developed during the City of Pullman stormwater studies. We will also demonstrate four different water flow measurement techniques that can be performed with devices such as cell phones, or that can be built with materials costing less than \$100.

▶ TRACK 3B

COUNCIL CHAMBERS

The Sweet Smell of Success: Finding and Eliminating Illicit Connections in Seattle

PRESENTED BY Adam Bailey, *City of Seattle.*

Adam Bailey graduated from Western Washington University with a degree in Natural Resource Management and has been working in the environmental field for the past 12 years. He has previously worked in a number of positions before discovering his one true love: Illicit Discharge Detection and Elimination which he has been happily conducting for the past five years with great success for the City of Seattle.

ABSTRACT. Illicit Discharge Detection and Elimination (IDDE) is a permit stipulation that all NPDES Phase I and II permittees are required to meet. While many municipalities and counties have had limited success in locating sources of pollution through their respective IDDE programs, the City of Seattle has had great success in locating and eliminating scores of cross connections by utilizing a different approach to IDDE which is both basic and thorough. Analyzing for basic parameters and intensive sampling (taking numerous sample points at strategic junction points in a drainage system) has proven to be very effective in locating pollution sources which would not likely have been discovered through outfall screening. The City's approach in eliminating cross connections by working with homeowners and businesses through a code compliance process has also been successful. Other highly urbanized Phase I and II permittees may find these approaches useful in eliminating pollution as well.

To date, the City of Seattle's IDDE team has located and eliminated over 100 individual cross connections. Discoveries range from a South Seattle housing development with over 50 cross connections with discharge to a popular swimming beach to a sausage factory discharging sewage and process wastewater to the Duwamish River. In all these discoveries, the city was able to work constructively with those responsible to have the repairs made thanks to a streamlined and well-defined process leading to a 100% compliance rate.

Considerable work goes into sampling, source tracing, locating and eliminating illicit connections and each one of the aforementioned processes offers unique challenges and the presentation will address each of these processes and the tools we use to address the challenges associated with each process. Drawing conclusions from conflicting sampling data, notifying a homeowner of a costly repair and working to locate a cross connection from a large hospital are just a few of the challenges we've faced in the past five years.

LEARNING OBJECTIVES & OUTCOMES. The presentation will benefit permittees in that it will outline the approach the City of Seattle takes in conducting IDDE, which is both simple and thorough. This approach has proven to be effective and the presentation will explain this process and why it works noting program specifics and interesting case studies. The presentation will also outline challenges with each unique aspect of the program and how the City has addressed these challenges. It is the hope that other Phase I and II permittees will find the City of Seattle IDDE program or aspects of the program useful in eliminating pollution sources in their respective city or county.

▶ 3:00 - 4:00 PM

▶ TRACK 1

LIBRARY

Improving Stormwater Quality in an Urban Watershed

PRESENTED BY Lorna Mauren P.E., *City of Tacoma Environmental Services Department.*

Lorna Mauren is an Assistant Division Manager with Tacoma's Environmental Services Department with over 25 years of experience in stormwater and other civil disciplines. She holds a BSCE degree from the University of Washington. Currently Lorna manages an energetic group of engineers and environmental specialists, whose stewardship of the surface water utility includes asset management, infrastructure replacement, MS4 NPDES permit compliance and innovative approaches to green infrastructure, system maintenance, and water quality improvements.

ABSTRACT. Located in the heart of downtown Tacoma, the Thea Foss Waterway was once characterized by oil sheens, coal tar deposits and dilapidated buildings. In 1985, the EPA declared the waterway a

Superfund site. In 2006, the City of Tacoma and its partners completed a \$105 million remediation of the waterway. This work was in coordination with an aggressive revitalization of the waterfront corridor. Today the waterway is the focal point of a university, several museums, a revitalized downtown district, condominium developments, reconstructed marinas and a recently completed urban water quality research center. With millions of dollars invested and a legacy on the line, it is imperative that the City of Tacoma avoid recontamination of the waterway, especially now that it has emerged as a tremendous economic and environmental asset to the community.

To ensure that the Thea Foss Waterway remains the asset it was envisioned to be and has since become, the City of Tacoma embarked on an aggressive stormwater management program in 2001 including source control, maintenance, rehabilitation, treatment, and education. To track the progress, these efforts were paired with extensive monitoring of stormwater, baseflow and sediment throughout the watershed. Now the twelve-year record of activity has been correlated with monitoring results, and the results are impressive. Forty-four statistically significant time trends (44 out of 49 tests, or approximately 90% of the tests) were shown to be decreasing in Year 12 using simple linear regression. No trends were increasing.

LEARNING OBJECTIVES & OUTCOMES. Attendees will be presented with improvements in stormwater quality directly tied to watershed management practices including source control, maintenance, and treatment devices. A cost versus area improved analysis is included. Attendees can clearly deduce where the “best bang for the buck” truly lies.

► TRACK 2

PIONEER PARK PAVILION

City of Tacoma’s Catch Basin Assessment Program

PRESENTED BY Michael Rose, Associate Engineer, City of Tacoma.

Michael A. Rose, E.I.T. is an Associate Engineer with the City of Tacoma with over eight years of experience in storm and sanitary systems. He received a Bachelor's of Arts in Business Administration from Eastern Washington University and spent three years study in engineering. He has spent years working with multi-function teams developing databases and management systems with the overall goal of making data collection and compliance easy and efficient.

ABSTRACT. The City of Tacoma has done extensive work developing programs to track maintenance and forecast work in many areas of maintenance; however, when it came to catch basins the City’s program had missed the boat. The City realized the deficiency during a source tracing incident and an internal audit of our programs which identified a need to better track catch basin cleaning. In response to this need, the City of Tacoma has developed a fast, reliable, GIS-integrated program, which meets our needs for source tracing and compliance with Phase I NPDES permit catch basin operations and maintenance. The program provides clear and transparent GIS-integrated goals which are available for all to view.

Our program consists of various web pages which allow a user to input data, search for information, and check the progress of the program as whole. All elements are tailored to the user and are intended to be fast and easy to use. The programming was developed in-house using HTML, C++, and SQL languages and tables. The development of the program focused on integration with GIS, gathering core information needed (inputs) to get desired information (outputs), playing devil’s advocate throughout, and working all processes to the end. In the end we spent a few months with minimal labor and were able to produce a product that met our needs.

The human element became one of the greatest obstacles and assets through development. Humans want to succeed, sometimes to a fault. Upon implementation, we have found that crews would often do their best to make the program work rather than report that a program component didn’t work. It took some time but ultimately, understanding our field users became our biggest asset to success. In addition, involving field users in the development process allowed the field users to develop a sense of ownership and pride in their work, which helped to bridge the gap between management and field staff.

Our next steps are to expand this program from catch basins to other types of storm assets (cartridge filters, detention facilities, etc.) and create seamless integration with other programs. We are currently working one asset type at a time with an end goal of having one repository for all assets and their condition. Integration with other programs will allow for process efficiencies, like field staff identifying a source control issue (such as oil in a basin), followed by an automated notification to the Source Control Inspector allowing inspectors to begin their inspection with all of the pertinent information already populated. This automation will save time and reduce redundancy and potential conflicts in data collection. This program has been a huge success and has allowed us to save time, save resources, and meet our compliance needs.

LEARNING OBJECTIVES & OUTCOMES. Topics included in the presentation display methods and techniques used to develop a system to meet Phase I NPDES compliance for catch basin operation and maintenance. This system could be applied to other areas of compliance and work flow management necessary to operate a successful NPDES program. Permittee’s will gain the experience of years of work from multiple groups and gain knowledge from lessons learned through the process of developing this element of the City’s NPDES program. This program has been a huge step forward in efficiency and focuses on inputs and the necessary results while eliminating redundancies.

▶ **TRACK 3** **COUNCIL CHAMBERS**
TESTING TECHNIQUES

▶ **TRACK 3A** **COUNCIL CHAMBERS**
Pilot Testing of New Techniques for Illicit Discharge Detection

PRESENTED BY Debra Bouchard, *Water Quality Planner III, King County.* Jeanne Dorn, *Water Quality Project/Program Manager III, King County.*

Debra Bouchard is a Water Quality Planner III with King County’s Science and Technical Support group. She is the program lead for the Routine Streams Monitoring Program, Source Tracking Pilot Studies, and the summer Swimming Beach Monitoring Program.

Jeanne Dorn is a Water Quality Project/Program Manager III with the County’s Stormwater Services. She is the program lead for various illicit connection and illicit discharge programs, including the conveyance screening program and the fecal coliform total maximum daily loads (FC TMDLs) specified in the 2013-2018 Phase I NPDES Municipal Stormwater Permit.

ABSTRACT. King County, the City of Seattle, and the City of Kirkland collaborated on field testing canine scent tracking in Thornton and Juanita Creek watersheds in May 2014 - combining the two urban creeks into one study design. Canine scent-work results will be compared against laboratory analytical results to evaluate scent tracking reliability. Lab analytical tests included fecal coliform culture methods and Bacteroides in qPCR methodology. The qPCR methods (molecular-based) are themselves currently undergoing preliminary and ongoing evaluation in various county and city programs to determine their effectiveness as source identification and source tracking methods. qPCR methods include tests to identify human-related Bacteroides species, cow- and beef cattle-related Bacteroidales species, and ruminant-related Bacteroidales species (elk, llama, goat, etc.). Over 50 samples were analyzed in each basin.

Additionally, King County and the City of Kirkland collaborated in June 2014 on field testing a rapid field fecal coliform/E. coli detection method (Mobile Water Kit or “MWK”) developed by researchers at the University of Alberta. MWK tests were run on samples from four general areas of King County and City of Kirkland. Laboratory analyses were also run to compare against MWK results, to assess the reliability and usability of MWK for use as a tool to identify high bacterial levels in surface waters and stormwater. Field pilot test results indicate that more work is needed to refine the MWK field technique to facilitate field use, and to enable differentiation between wide ranges of bacterial levels in water. If these refinements are made (possibly through more collaboration with King County and/or the City of Kirkland) the MWK could be a valuable field tool for helping to rapidly identify bacterial exceedances.

LEARNING OBJECTIVES & OUTCOMES. The pilot field tests to be presented could help refine new techniques of identifying sources of high bacteria in surface waters and stormwater conveyance systems. No actual tools are as yet recommended, but the ongoing piloting work will be presented. Some lessons learned about these potential tracking tools will be included. If these tools are improved to a high degree of reliability and if costs associated with per-use are lowered, municipal stormwater permit compliance may be increased (faster identification of illicit connections/illicit discharges).

▶ TRACK 3B

COUNCIL CHAMBERS

FC TMDL Bacteria Source Screening: Approaches by King County

PRESENTED BY Jeanne Dorn, *Water Quality Project/Program Manager III, King County.*

Jeanne Dorn is a Water Quality Project/Program Manager III with the County's Stormwater Services. She is the program lead for various illicit connection and illicit discharge programs, including the conveyance screening program and the fecal coliform total maximum daily loads (FC TMDLs) specified in the 2013-2018 Phase I NPDES Municipal Stormwater Permit.

ABSTRACT. Appendix 2 of the 2013-2018 Phase I NPDES Municipal Permit requires that King County performs specific tasks related to fecal coliform total maximum daily loads (FC TMDLs). King County Stormwater Services Section has begun implementing a bacteria source screening program in the first of its Appendix 2 FC TMDL areas, the Puyallup River Watershed. Appendix 2 requires that King County designate areas discharging via its MS4 to Boise and Jovita Creeks as high priority areas for illicit discharge detection and elimination. The presentation will describe technical approaches, including mapping research and sampling and analysis work plans, as well as successes and findings up to Autumn 2014. The presentation will also describe collaborative efforts between King County sections including Stormwater Services, Science & Technical Support and Rural and Regional Services, in addition to Public Health - Seattle & King County, and the Washington State Department of Agriculture.

LEARNING OBJECTIVES & OUTCOMES. Attendees may benefit from specific technical approaches to bacteria source screening in King County's Puyallup Watershed fecal coliform total maximum daily load (FC TMDL), including its overall work plan, mapping research, and screening and sampling methods. Attendees may also learn from inter-agency collaborations begun by Stormwater Services Section, including cooperating with King County's Rural and Regional Services Section, King County's Science & Technical Support Section, Public Health Seattle-King County, King Conservation District and the Washington State Department of Agriculture.

🕒 4:00 - 5:00 pm

▶ TRACK 1

LIBRARY

Innovative Partnerships to Achieve and Exceed NPDES Permit Requirements

PRESENTED BY Kate Riley, *Program Manager, Snohomish Conservation District.* Teresa Brooks, *Kitsap Conservation District.* Melissa Buckingham, *Pierce Conservation District.* Kara Kaelber, *Franklin Conservation District.* Also associated partner jurisdictions.

Kate Riley holds a master's degree in Environmental Engineering and has worked internationally in Green Stormwater Infrastructure, sustainable landscape design, and community engagement. She facilitates partnerships with diverse stakeholders, to raise awareness towards behavior change and implementation of projects on-the-ground. Kate works with ten Phase I and Phase II jurisdictions, most notably with Mathew Goad, Engineering Technician for the City of Lake Stevens on their 'I Love the Lake' outreach campaign.

ABSTRACT. Partnering with a Conservation District has enabled many jurisdictions to not only meet but exceed their permit requirements, by creating forward-thinking programming within their communities. The four conservation districts represented have relationships with almost twenty Phase I and II jurisdictions in Washington, and are successful because of their cost-effective services, access to private landowners, and

innovative outreach strategies. Conservation Districts are known for being the “Boots on the Ground”, as shown by the project examples in this presentation, including the “I Love the Lake” campaign in the City of Lake Stevens, the “Green Streets” initiative in Kitsap County, the DePave program in Pierce County, and the educational programs of “Wheat Week” and “Water on Wheels” in Eastern Washington. Conservation Districts are committed to serving their municipalities, often times facilitating additional strategic partnerships, leveraged funding, and long-term community engagement.

LEARNING OBJECTIVES & OUTCOMES. The main objective of this presentation is to demonstrate the diversity of ways that jurisdictions can benefit from collaborating with their local Conservation District. We will discuss funding and partnership opportunities, unique incentive programs, and outreach strategies. Permittees will learn about several successful programs that can meet more areas of the permit, and work towards lasting change in their communities.

▶ TRACK 2

COUNCIL CHAMBERS

Building a Comprehensive Stormwater Retrofit Program

PRESENTED BY Scott Murphy, *Stormwater Retrofit Engineer, Kitsap County.*

Scott Murphy is a licensed civil engineer working for Kitsap County Public Works, Stormwater Division. He received his bachelor’s degree in Civil Engineering from the University of Washington. Scott is currently the lead engineer for Kitsap County’s stormwater facility retrofit program and is focused on incorporating Green Stormwater Infrastructure into the majority of Kitsap County’s stormwater retrofit projects.

ABSTRACT. In June of 2009, the Kitsap County Commissioners adopted the “Water as a Resource” policy which recognized storm and surface water runoff as the leading transport medium of pollution into Puget Sound and its associated wetlands, creeks, streams and rivers. Additionally, local groundwater studies indicate that 80% of Kitsap County citizens obtain their drinking water from groundwater resources and these are only replenished by the infiltration of precipitation that falls on Kitsap County. This has caused us to expand and restructure our retrofit program to address these challenges and help ensure that we will have clean and adequate water resources to accommodate future growth. The Kitsap County, Department of Public Works, Stormwater Division is responsible for more than 600 stormwater facilities and the associated infrastructure. Many of these assets were created during an era when removal of pollutants and flow control was not adequately addressed thereby adversely impacting our local waterways. Through our stormwater retrofit program, many of these facilities are being altered to improve water quality, reduce runoff, and restore a more natural hydrology to our facilities through infiltration.

This Presentation will focus on the following topics:

1. Developing effective multi-agency partnerships. Clean Water Kitsap is a multi-agency collaborative effort between Kitsap County Public Works, Kitsap Public Health District, Kitsap Conservation District, Washington State University, and private land owners. These partnerships allow us to better meet our goals and policies, share ideas, and to evaluate and research new and emerging technologies.
2. Essential elements of a comprehensive and effective retrofit program. Our retrofit program encompasses many elements:
 - Community-based retrofit studies and plans.
 - Reconfiguration and vegetative enhancement of regional and neighborhood ponds.
 - Evaluation and selection of local access roads to receive a “Green Streets” treatment.
 - Replacement and enhancement of aging and deteriorated infrastructure.
 - Slope stabilization and erosion-control projects.
 - Localized projects to correct drainage deficiencies and minor flooding as identified through drainage studies and customer requests for action.

3. Developing manuals and guides. Kitsap County has worked or is working with various consultants to develop the following retrofit design guidance manuals for use internally and by other agencies and individuals.
 - Kitsap County Stormwater Pond Retrofit Design Guidance Manual.
 - Roadside Ditch and Shoulder Water Quality Enhancement Plan.
 - Kitsap Green Streets Plan.
4. Program funding and expenditures.
 - Annual property based stormwater program fees.
 - Washington State Department of Ecology grants.
 - Allocation of funds.
5. Project examples and lessons learned. Some photos and discussion of a variety of retrofit projects, measuring the overall success of the project and lessons we've learned along the way which have guided elements of our project design and construction methods.

LEARNING OBJECTIVES & OUTCOMES. The learning objectives for this presentation are how to incorporate various program elements and strategies in order to develop, grow, and maintain an effective stormwater retrofit program which will produce lasting benefits for the environment and the community. The desired goal of this presentation is to leave the audience with examples of program guidance manuals, successful projects, and community benefits which have resulted from Kitsap County's approach to building a comprehensive stormwater retrofit program.

► TRACK 3

PIONEER PARK PAVILION

Results from Current Research on Pollutant Export from Bioretention Systems and Next Steps

PRESENTED BY Chris May, *Stormwater Division Senior Program Manager, Kitsap County Public Works*. Andy Rheume, *City of Redmond*. Doug Howie, *Department of Ecology*. Curtis Hinman, Dylan Ahearn, and John Lenth, *Herrera Environmental Consultants*.

Dr. Christopher W. May is a freshwater ecologist and environmental engineer with expertise in urban watershed assessment and management. Currently, he is the Senior Program Director of the Kitsap County Public Works, Surface and Stormwater Management (SSWM) Program. Prior to joining the Kitsap County SSWM team, he was a senior research scientist and engineer at the Battelle Marine Sciences Laboratory (MSL) and, before that, a research engineer at the University of Washington Applied Physics Laboratory (UW-APL).

ABSTRACT. Infiltrating stormwater onsite helps achieve the low impact development (LID) objective of more closely mimicking pre-disturbance hydrology. Bioretention and rain gardens are two of the most common onsite best management practices (BMPs) used to meet the objectives of LID due to their hydrologic benefits. Early research from the east coast also indicated that these BMPs provide pollutant reduction benefits. However, regional and national research indicates nitrogen (N), phosphorus (P), and copper (Cu) may be exported from these systems. The sources of N, P, and Cu can come from various materials including compost, mineral aggregates, and natural and engineered amendments.

Following the release of this research, the Washington State Department of Ecology (Ecology) provided new guidance in March 2013 that proposed restrictions for installing bioretention facilities with under-drains that would discharge directly to surface waters. Ecology also indicated more detailed assessment of potential groundwater quality impacts might be needed where multiple bioretention facilities would discharge over public drinking water supplies. Ecology's long-term strategy involved the financing of additional studies on bioretention soil media (BSM) to prevent or reduce the export of these pollutants. Two of these studies are being implemented by Kitsap County and the City of Redmond, respectively, with funding from separate Grants of Regional and Statewide Significance (GRSS) through Ecology. The Kitsap County study involves pilot scale testing of different BSMs in columns to meet the following objectives:

PRESENTATIONS

- Analyze the ability of individual bioretention soil media components to resist leaching N, P, and Cu using weak acid and deionized water extraction.
- Analyze media blends for the ability to capture and retain N, P, Cu, and other stormwater pollutants of concern by flushing and dosing media columns (the ability of the media blends to support vegetation will also be assessed).
- Provide recommendations for additional BSM research needed to address unresolved water quality treatment or hydraulic performance issues.

The City of Redmond study involves testing in six full-scale bioretention systems to confirm the results from previous studies and investigate alternative BSMs. Four of these bioretention systems were constructed in connection with improvements to the City's Maintenance and Operations Center Decant Facility. The remaining two systems were constructed in connection with a later phase of the 185th Street Extension Project.

Results from both studies confirm the results from earlier studies that showed export of N, P, Cu during an initial "flushing period" from the default BSM. Both the sand and compost that are used to construct the default BSM appear to be sources for one or more of these pollutants. Through these studies, several alternative components for potential use in constructing BSMs have now been identified that show less potential for pollutant export.

LEARNING OBJECTIVES & OUTCOMES. While bioretention has been shown to provide good water quality treatment for many contaminants, research conducted by the City of Redmond and the Washington Stormwater Center indicated nitrogen, phosphorus, and copper may be exported from these systems. Following the release of this research, the Washington State Department of Ecology issued proposed restrictions for siting bioretention systems in March 2013 that were intended to limit potential impacts on surface water and groundwater from these pollutants. Ecology's long-term strategy involved the financing of additional research on bioretention soil media (BSM) to prevent or reduce the export of these pollutants. This presentation would provide an update for permittees subject to requirements for implementing stormwater controls on the results of this research and an update on Ecology's position regarding bioretention siting.

DAYS 1+2 NOVEMBER 5 + 6 POSTER DISPLAYS

Rain Garden Maintenance Guides and Support From WSU Master Gardeners

PRESENTED BY Aaron D. Clark, PhD

Any investment in new technology and new infrastructure must include a long-term operations and maintenance plan. For many municipalities, this is a significant barrier to investing in green infrastructure. Uncertainties around rain garden maintenance also prevent many homeowners and commercial property owners from investing in green infrastructure. In 2013, Stewardship Partners sought to address this specific problem by “demystifying” rain garden maintenance with an accessible "Rain Garden Care Guide" that features all the basic requirements of successful rain garden maintenance in a simple language, with clear illustrations and easy to follow instructions. The guide includes a one-page "Quick Start Care Guide" tear out that has also been translated into Spanish. At approximately the same time, Oregon State University produced a "Field Guide to Maintaining Rain Gardens, Swales, and Stormwater Planters" that provides a significantly more technical and detailed level of guidance particularly relevant to larger scale municipally owned green infrastructure investments. These paired resources—both tailored to the Pacific Northwest—provide the general public a level of free guidance that is unparalleled in any region of the country and create a solid basis for streamlined and cost-effective O/M of green infrastructure.

In addition to these printed and online O/M guides, Washington State University Extension and Stewardship Partners have created the "12,000 Rain Gardens for Puget Sound" campaign to empower and educate Puget Sound residents to take control of their own runoff. Now in its third year, the 12,000 Rain Gardens network has established cohorts of trained experts who offer local support in each of the 12 Puget Sound counties. These Rain Garden Mentors, Stormwater Stewards, and Rain Garden Educators provide basic information, education, and support for rain garden owners and other interested individuals. In some counties these volunteers build and maintain rain gardens; in others they provide design and other technical assistance. As a trusted name across the region, country and world, these Master Gardeners are already a part of every community and provide a highly valuable and well coordinated set of services that municipalities stand to benefit tremendously from as they invest in managing stormwater with green infrastructure.

Kitsap County Green Sweep Program

PRESENTED BY Mauro Heine

Under the NPDES permit that governs municipal pollution prevention, jurisdictions are required to reduce pollutant loading from streets using an array of best management practices to the maximum extent possible. Kitsap County operates and maintains numerous stormwater treatment facilities as part of this overall effort to reduce pollutant loading. However these facilities are not 100% effective and do not cover all developed areas due to limited available space and treatment technology. Utilizing high-efficiency street sweepers to remove pollutants from road surfaces is one method to reduce pollution near its source and meet NPDES permit requirements. These sweepers use both traditional brooms to collect larger debris and high-pressure air to loosen very fine sediment from pavement surfaces. A vacuum-assisted filter systems collect this fine material and attached pollutants. The sweeping routes and frequency are based on factors related to pollutant loading potential. The Green Sweep program generated 509 tons of solids which included approximately 33 pounds of copper and 111 gallons of oil. The Green Sweep program is Kitsap County's first line of defense in protecting Kitsap streams, wetlands, lakes, and Puget Sound.

Fighting Phosphorus in Stormwater Using Low Cost Non-Proprietary Media

PRESENTED BY Brian Hite

Wapato Lake in Tacoma, WA is a 23 acre urban lake that has had problems with eutrophication and toxic algae blooms for over a hundred years. Inputs of phosphorus from both environmental and anthropogenic sources contribute to this problem. Much of the 900-acre watershed consists of residential or commercial development, increasing the amount of stormwater containing high levels of phosphorus. Past management efforts designed to control phosphorus inputs and eutrophication at Wapato included constructing a diversion structure which routes phosphorus rich stormwater around the lake. This plan increased the retention time of Wapato to about 8.5 years which has in turn caused other problems. We have been tasked by the City of Tacoma and the Department of Ecology to research the prospects of introducing filtered stormwater runoff into the lake to reduce the long retention time and the effects of toxic algae. Our plan includes creating

a media filter using a waste product from the drinking water industry “Water Treatment Residuals” (WTR) as an amendment to a sand filter to adsorb and trap phosphorus. To determine WTR’s viability as a stormwater media filter, we have compared WTR’s from seven drinking water facilities across Washington State against proprietary commercial stormwater filtration media sold on the market today. The WTR and media mixes were compared using a series of experiments including kinetic and batch adsorption isotherm tests to determine the contact time and maximum adsorption of phosphorus onto the media as well as tests looking into potential negative effects including dissolved metals in the leachate. Through this investigation we have determined that WTR’s from different sources have varying affinities for adsorbing phosphorus. The best performing WTR media in our tests were able to reduce about 85% of bioavailable phosphorus while operating under variable loading conditions. In Phase 2 of this experiment we will compare the best working WTR media mixtures to proprietary mixes in terms of their ortho- and total-phosphorus removal and physical filtration capabilities using stormwater collected from Wapato Lake.

Understanding the Micro-Climate of LID Facilities

PRESENTED BY Larry Matel P.E.

This poster presents some of the results of the City of Bremerton’s efforts to better understand the temperature variations in its LID facilities in street rights of way. A nagging question still asked by many street engineers and maintenance staff relates to the potential impact of freezing conditions on the integrity of porous pavement surfaces. This previously unreported work, partially funded by the City of Bremerton, the USEPA, and the WA ECY, describes data collected by the City during 2010 and 2011 through the use of underground temperature sensors. The data to be presented demonstrates the changes in near surface pavement temperatures during winter conditions under periods, lasting days, of sub-freezing air temperatures. Additionally, a methodology developed for simulating pavement temperature variations will be presented.

Mining Sixty Years of Flow Data from Bellevue's Kelsey Creek

PRESENTED BY Bobb Nolan

I will graphically present monthly rainfall and runoff patterns from Kelsey Creek, using sixty years of continuous flow data from USGS 1212000 and rainfall data from

NWS Seatac station. Changes due to urbanization are most apparent in the fall data, difficult to discern in the winter months, and reappear in the spring. I will try to tease out what might be responsible for these changes.

Additionally, I will present hydrologic metrics such as the Richards-Baker flashiness index to document the dramatic changes due to urbanization and indications of stability over the last fifteen years.

Monitoring creek flow can provide important clues to the overall health of an urban stream, and can provide evidence of changes over even a short period of time.

Stormwater Mapping Tools

PRESENTED BY Mark Preszler

In compliance with the Phase I NPDES Municipal Stormwater Permit (Permit), King County aims to improve data collection proficiency through a progressive mapping toolset, including three mobile collection applications, a comprehensive spatial database, data quality control tools, and a field mapping guide for users. Though still preliminary in production, King County currently uses these tools for all stormwater mapping requirements, outfall and discharge point screening, and water quality sampling. Each tool is built upon the Washington Stormwater Framework (WSF) and its supporting database. This framework can be found on the Washington Stormwater Center’s Website. King County hopes to assist other jurisdictions with comparable mapping needs by offering this toolset as well as through future collaboration designed to reduce costs and improve mapping and data collection effectiveness for all users. This poster presentation will outline the toolset described below and utilize mobile devices to provide hands-on demonstrations to permittees.

King County produced and currently uses three working mobile collection applications. The StormMap App is the most extensive tool in production and it utilizes the WSF and ESRI ArcGIS Mobile software. The StormMap App enables mapping and data collection for all of the most common stormwater features required by the Permit, as well as additional attributes indexed in the WSF. King County also developed the Outfall and Discharge Point Screening Application to meet conveyance screening and mapping requirements found in the Permit. It enables staff to reclassify existing features as outfalls or discharge points according to the Washington State Department of Ecology’s recently proposed definitions, add new points, retire obsolete points, and relocate existing points. The Water Quality Sampling Application allows users to track sample locations, sample

identifiers, notes, instrument parameters, and lab results of water samples as well as in situ readings.

The Outfall and Discharge Point Screening Application and the Water Quality Sampling Application utilize ESRI Collector App, which is currently available for iOS and Android devices at no cost. Users can also upload attachments, allowing for photos and lab results to reside in the spatial database for easy access.

The spatial database's data structure is based upon the standard terminology within WSF. All of the tools in this presentation feed into or interact with this database.

The quality control tools automate the resolution of common errors. Similarly, a more extensive review can be completed using the ArcMap project (mxd) that ensures data quality control by using well defined editing templates based on the WSF.

The field mapping guide contains standard operating procedures for field mapping and attribute collection, as well as screenshots and application set-up instructions.

Tracing Sources of Pollutants to MS4 Discharging to Portland Harbor

PRESENTED BY Linda Scheffler & Karen Demsey

The City of Portland's MS4 system includes 36 outfalls that discharge to the Portland Harbor Superfund Study Area, a 10-mile reach of the Willamette River. These outfalls drain an upland area totaling more than 5,000 acres of mixed land uses, including heavy and light industrial, commercial, major transportation (i.e., highways and freeways), residential, and open space. The harbor has been an active industrial area for over 100 years and legacy contaminants remain in some upland areas. When EPA designated this reach as a sediment Superfund site in late 2000, the City had already begun to develop a targeted source-tracing approach in the harbor outfall drainage basins. The objective was to utilize the joint authorities of the City and the Oregon Department of Environmental Quality (DEQ) to identify significant upland sources of pollutants that existing programs were not designed to find, so that these sources would be controlled before in-river cleanup of the harbor begins. This presentation describes the City's innovative approach for source tracing, which is applicable to municipal conveyance systems in Washington and elsewhere that drain industrial areas and discharge into sensitive receiving waters.

The City of Portland Outfalls Project took the following approach to source investigation and control:

- Identification of potential sources and pathways. Industrial land uses typically have the highest pollutant concentrations and broadest range of pollutant types, so land use was used to identify potential source areas. Potential pathways evaluated included discharges via piped connections to the MS4 system, overland runoff to offsite catch basins, infiltration of contaminated groundwater into storm lines, and offsite vehicle tracking of contaminated soil.
- Data collection and evaluation. Source tracing included historical research, data collection, and review of data collected by other parties. Sample locations generally progressed "up-the-pipe") from the outfall to specific source areas. Sample methodologies were modified as needed to address technical challenges that arose during the investigations.
- Referral for source control. Previously unknown contaminant sources were referred to the city, state, or federal program that would be the most appropriate for overseeing source control selection and implementation by that site. City MS4 source control programs utilized technical assistance to industrial stormwater dischargers and implementation of stormwater development standards during property redevelopment.

Case studies from individual outfall basins provide examples of how these steps were tailored to suit the specific circumstances of each basin. These case studies illustrate important lessons learned during the course of the project and show how this multi-faceted, iterative, up-the-pipe approach proved successful and efficient for source tracing and control. A summary of the recent City of Portland Outfalls Project investigation, the Municipal Stormwater Source Control Report for Portland Harbor is available on the BES web site at www.portlandoregon.gov/bes/64448

Why Implement a Local Watershed Health Monitoring Program?

PRESENTED BY Renee Scherdnik

Kitsap County Public Works Stormwater Division implements the Watershed Health Monitoring Program. Indicators selected are continuous stream flow, stream benthic macroinvertebrates, near shore mussels and riparian integrity. Additionally, Stormwater Fees pay for public health monitoring of fecal coliform contamination in streams and marine waters implemented by the Kitsap Public Health District. The Watershed Health Monitoring Program is separate and distinct.

A major difference between the local program and the regional program permit pay-in option is the site selection.

POSTER DISPLAYS

The regional program is a probabilistic design to assess urban vs. rural (UGA vs. non-UGA) land use. The local program is a targeted-fixed station design and census of the major small stream basins.

Partnerships play a major role in data collection and analysis. Continuous flow data is collected by the Kitsap Public Utility District using USGS methods. King County maintains the data in a web-based system for easy access. King County performed an analysis of the historical and current Kitsap data record and provided recommendations for program improvement and long-term flow metrics.

Benthic data was collected from historical records back to the mid-1990s and entered into the Puget Sound Benthos Database for a more complete long-term record. A total of 50 sites, some new and some historic, were used in this monitoring program. Based upon a consultant review, the sampling plan was modified using a rotation basis whereby stations with more development are sampling yearly and basins with less development are sampling every two or three years.

Riparian data is a new parameter and Kitsap is unsure about the applicability of a targeted site selection system for this metric. Riparian data may be better suited for effectiveness projects at floodplain enhancement sites.

The program was started as a status and trends analysis but now is expanding to include effectiveness studies of retrofit and floodplain projects. Projects are in the design and construction phase in Suquamish, Manchester, Silverdale, Illahee, Dickerson Creek and Clear Creek. Strategic Mussel Watch stations were established adjacent to the shoreline communities in 2012. Benthic, flow, and riparian data will be collected intensely before and after the projects in the Clear Creek and Dickerson Creek stream basins. Kitsap County is working to obtain grant funds to hire a consultant to assist with a scientifically-sound sampling plan that can detect change over time.

Informing management and elected officials of the value of the program is essential. The program provides long-term metrics for the "Water as a Resource Policy Implementation Plan". Standard metrics of improvement, protection or decline of streams and near shore will inform and track the progress of implementing new stormwater standards, practices and retrofit projects.

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Conference Partners

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Presenting Organizations

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