

**Washington Stormwater Center
Draft Work Plan
2019 - 2021**

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Introduction

Executive Summary

The Washington Stormwater Center (WSC or “the Center”) provides businesses, municipalities, agencies, tribal entities, NGOs, non-profits and the science community with context, information, communication support, and technical assistance to tackle the problems associated with polluted runoff and provides solutions, options and frameworks for action. We envision a future where communities are knowledgeable about stormwater issues and can apply planning and tools provided by the WSC and others to protect clean water and promote thriving ecosystems.

The Washington Stormwater Center was developed as a joint center between the Washington State University, Puyallup Research and Extension Center and the University of Washington-Tacoma, Center for Urban Waters in 2010. Both Universities conduct collaborative research projects which address different aspects of stormwater and water quality issues. WSU conducts Low Impact Development (LID), Ecotoxicology, materials and tree research while delivering outreach and education programs to NPDES permittees and other stakeholders. UW runs the Emerging Stormwater Treatment Technology Program, referred to as [TAPE](#), which evaluates new stormwater technologies, runs an analytical chemistry lab and both universities are involved with joint research focused on chemicals of emerging concern and toxins in the aquatic environment.

The Washington Stormwater Center was formed by legislation in 2010 and has grown into a world-class research center which boasts research in ecotoxicology, low impact development, and materials science in which researchers collaborate with regional and national partners. Our municipal program works regularly with municipal jurisdictions and associated organizations to better understand barriers, working to remove them and ensuring timely and updated information regarding regulatory, policy and contextual trends. Our business program is supported by our shared research with Boeing and participation in the Puyallup Watershed Initiative’s Stormwater Community of Interest.

We participate on the Stormwater Strategic Initiative Lead team associated with Puget Sound recovery which informs the Center’s work and includes research, trends and project level results. This regional work also connects WSC with the work of the Puget Sound Ecosystem Monitoring Program, including its stormwater, freshwater and toxics workgroups, and a large network of regional recovery practitioners and trends.

This work plan is the basis for our work from July 2019 through June 2021. We will update it each biennium with new planned projects and through discussion with our advisory committee. It is practical, grounded and constrained by current funding, but also aspirational in nature, identifying areas we want to fund and develop staff capacity.

Background

The Washington Stormwater Center was created in 2010 by the Washington State Legislature who saw the need for a stormwater technical resource center to provide municipalities and businesses with non-regulatory assistance to their Clean Water Act permitting responsibilities. The term “technical” pertains not only to technical, engineering based recommendations but the context for improving water quality and addressing stormwater: how to collaborate and build capacity for change in groups, how to adopt new approaches to stormwater, how to build effective collaborations and translating research into actionable pathways.

Early in the Center’s existence, WSC convened a Stakeholder Advisory Group (SAG) to develop an initial work plan and priorities. Since that time, we have completed many important projects and research, and our priorities have evolved. Our “core work” funded by the Department of Ecology remains focused on providing technical assistance to stormwater permittees, evaluating stormwater technologies, and certifying Low Impact Development practitioners. The Center has procured other funding sources to conduct additional work. The Center now focuses work in the following program areas:

- Stormwater Permit Assistance
- Low Impact Development Research and Certification
- Emerging Technology Testing
- Ecotoxicology Research
- Puget Sound Recovery Program Support (funded through EPA National Estuary Funds)

Work Plan Goals

The goal of this work plan is to set forth a set of strategic elements for each program within the Center to guide our projects. Some of these projects were previously identified in external funding agreements, and other projects will be chosen with input from, and in collaboration with, a reconvened Stakeholder Advisory Group (SAG) which will include representatives from state agencies, local government, the business community, environmental community, tribes and the building/development industry.

Washington Stormwater Center Elements

This work plan describes the Center’s overall goals, funding, capacity, and planned projects. Some of the work plan elements are currently funded, the work plans of which are located in appendices, which will take place from July 2019 through 2021. This includes some work which has already been completed. Additional plan elements are

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stretch goals that will be funded as WSC receives unrestricted operating capital which enables program expansion.

The WSC Work Plan Elements include:

- I. Center management including operations, communication, and planning
- II. Permit assistance for municipal, construction, and industrial stormwater
- III. Low Impact Development (LID) Certificate Program
- IV. Emerging technology testing
- V. Research, and
- VI. Puget Sound Recovery Program Support.

Each of these WSC Work Plan Elements/Programs is discussed in detail below. The projects planned for each Work Plan Element/Program are discussed in the following section of this document.

Budget Overview

1.Center Management	\$55,529	Ecology
2. Permit Assistance	\$218,747	Ecology, Boeing
3. Muni Con	\$140,000	Ecology
4. LID Certificate Program	\$56,000	Ecology
5. Emerging Technology Testing	\$240,000	Ecology, TAPE Fees
6. Research	\$1.2 M	Various
7. Puget Sound Support	\$150,000	EPA (NEP)
Total	\$2,060,276	Various

*Numbers do not reflect WSU F&A overhead rates

WSC Elements/Programs and Priority Projects

Element 1. WSC Management, Operations, Communication, and Planning

Element Goal: The overall goal of this first Work Plan Element is to improve and institutionalize the Center's management procedures over the coming biennium.

Task 1: Update work plan

WSC will actively update our work plan biannually or as needed as we identify and accommodate emerging partnerships, research results and prospective planning to account for regulatory changes, national trends and pertinent updates in NPDES requirements.

We will update our current Stakeholder Advisory Group (SAG) to accommodate and reflect these changes and seek their input on priorities for future emphasis. This work builds on 2017-2018 Partnership identification and priority selection as part of WSC's then transition planning process.

Task 2: Improve internal tracking methods

Project management, recordkeeping and reporting systems are the systems by which WSC manages its projects, maintain records for grants, research, operations and the internal structural controls for the entire reporting system. This system links WSC's work with its contextual management in WSU Pullman and the College of Agriculture, Human and Natural Resource Sciences (CAHNRS).

WSC's operations are integral to the WSU Extension Research Center/Puyallup operations umbrella and our internal controls and operations follow those guidelines.

Task 2A: WSC will utilize its meeting, conference, presentation and inquiry log that will be updated regularly to inform quarterly reports. A list of meetings, conferences, and partnership meetings will be tracked and reported, including panels and advisory committee staff and managers serve on.

Task 2B: For operations WSC will maintain internal controls to track reimbursement, quarterly progress reports and the Outcome Summary Report. Our communication and planning elements will help guide our overall strategic planning and communications tools and approaches to amplify our impact, leverage funding and attract evolving partnerships.

Task 3: Evaluate current versus future program capacity

WSC, through its internal strategic planning process, will evaluate its current and future program capacity and evaluate the gap in between the two. These determinations will be supplemented by advice from the SAG and will depend on fund source availability and trend analysis of emerging stormwater issues.

The following issues and trends are being tracked to help frame WSC priorities over the biennium. These “Meta Trends” – recent information and developments – may influence future programming and will generally inform our work:

- Results from EPA Headquarters’ Water Finance Listening Sessions
- Implications of Emerging Public-Private Financing Opportunities
- The role of digital and cloud platforms to help smaller jurisdictions with asset management, permit compliance, record keeping, and reporting
- Emerging trends and promising research in Green Stormwater Infrastructure (bioretention, shared work regarding tire particle fractionation)
- Ramifications of tire wear research, roofing study
- Cross over influence from Puget Sound work including project results, land use and stormwater planning projects, the use of Decision Support Tools and Economics Guidance
- The results of King County’s Climate Change downscaling results and requests for “crowdsourcing” from King County (Jeff Burkey’s research)
- The revised Industrial Stormwater Permit
- The Watershed Planning requirements under Ecology’s new permit
- The Street Sweeping Technical Workgroup with the Puget Sound Partnership, the findings of which will have influence on the emerging Toxics in Fish Implementation Strategy and the use of High Efficiency Sweepers to attenuate toxic loading to water
- One Water research and applied practice which promotes integrated land use and water planning
- Puget Sound Nutrient Forum work to identify “watershed” contributions to low dissolved oxygen concentrations in marine waters
- Follow up from the 2018 Tribal Stormwater Summit

Task 4: Reconvene the Stakeholder Advisory Group

The Stakeholder Advisory Group (SAG) will review the achievements and challenges of WSC’s first ten years and help the Center chart the course for the coming ten years. Letters of invitation will be sent to SAG members in early 2020. The initial meeting is planned for June 4, 2020, with two more scheduled for the fall of 2020 and the spring of 2021.

The reconvened SAG will include representatives from state agencies, non-profits, local governments, industries, associations and tribes. Their expertise and input will be sought to update this work plan and ensure the most meaningful and effective set of projects and activities will be conducted and supported by the WSC in future years.

Suggested Stormwater Advisory Committee (SAG) Organization types will expand beyond those identified in the 2011 Report to the legislature to include: Cities, counties, non-profits, economic development and business interests, tribes and “integrators” that can put the pieces together.

Task 5: Communications and strategic planning

WSC’s planning also includes a communications plan which provide guidance regarding science communication, tailored audiences messaging and stormwater communications specifically. The tools in the Communication plan will provide efficiencies that allow the Center to focus its limited resources on providing communication products and approaches that best serve the needs of businesses and municipalities that rely on our permit assistance program.

Task 5A: WSC staff will update the draft WSC Strategic Plan that was developed in 2017-18.

Task 5B: WSC staff will finalize the WSC Communication plan and use it to help shape and refine our overall communications strategies. This will include developing a strategy for sharing information about current WSC research with stakeholders outside of the WSC.

External Communications

WSC’s draft communications plan contains considerable detail regarding planning, messaging, audience identification and applied research and science. communication. Over the biennium, we will finalize the plan and use it to help shape and refine our overall communications strategies. WSC has identified the following draft audiences as priorities:

- NPDES Coordinator Groups
- NPDES Permit Holders (business, industrial, municipal and secondary permittees)
- Tribes
- Jurisdictions that are under-staffed with stormwater staff who could benefit from Phase I Collaborators
- Research collaborators listed on our research profile
- Puyallup Watershed Initiative
- Boeing
- Our Funders
- Students and researchers seeking information regarding Washington State Stormwater Issues
- King County and Redmond as leads in our emerging climate change work
- Puget Sound recovery practitioners

Additional partners will be added depending on a variety of factors.

Task 6: Website (Task 4 in the Core Ecology Grant, 7/1/19-6/31/2021)

The new WSC web site will launch in March 2020. We will use internal protocols to ensure it is continually updated to reflect relevant information and resources for NPDES permittees. WSC will consult with Ecology's Subject Matter Experts (SMEs) as needed or as collaboratively planned. Much of the information we post to our website originates from Ecology SMEs. Other information, such as pertinent news articles, journal publications, case studies, national and international research projects, etc. are vetted by internal staff and experts, utilizing our discretion and knowledge.

Task 7: Develop funding strategy (Task 3 in the Core Ecology Grant, 7/1/19-6/31/2021)

WSU will establish sustainable funding by exploring continued and increased financial support from Washington State University and the WSU Foundation. WSU staff will explore legislative line item funding through WSU. WSC will continue its previous fundraising research and grant applications including applications to sources identified by a 2018 funding advisory group to the WSC.

Economic Development Sources: Case Foundation, Alfred P. Sloan Foundation, (for land use work), Lincoln Institute of Land Policy, (for job connections), Annie E. Casey Foundation, (for biophilic design related to GSI): The Henry Luce Foundation.

Green Infrastructure Sources: TOSA Foundation, Pisces Foundation, Morris and Gwendolyn Cofritz Foundation, Keith Campbell Foundation for the Environment, Sidney Frank Foundation, William Penn Foundation, Resources Legacy Fund, Russell Family Foundation, Summit Fund of WA, Surdna Foundation, Prince Charitable Trusts, Grand Victoria Foundation, U.S. Fish & Wildlife Foundation, Rockefeller, Philip Morris USA.

Stormwater: Joyce Foundation, Water Environment Research Foundation, Federal Highway Administration, Environment and Water Resources Institute of the ASCE, Johnson Foundation, CS Mott Foundation, National Association of Clean Water Agencies.

Task 8: Assist Ecology in informing the legislature of progress made in achieving WSC objectives.

WSC will partner with Ecology in developing a report for the legislature each biennium. The Director will provide pertinent information to Ecology staff and will assist Ecology as specified in the RCW WSC issued an Annual Report at the close of 2018 and plans to collaborate with Ecology to report to the Legislature in 2020.

Proposed (Unfunded) Tasks: There is no line-item budget for this.

Element 1. Budget, Schedule, and Resources

Staffing: This work, as described above will require 2 FTEs (80/hours/week), some of which is included in the job duties for the WSC Director and Assistant Director. An additional Communications and External Relations staff needs to be funded and hired. A staffing plan will be developed during the SAG deliberations for further discussion.

Secured Funding: This element is currently partially funded through the WSC Office of Research and the Ecology Core Grant.

Table 2. Element 1 priorities, schedule, and funding (for this biennium).

Task	Priority	Schedule	Current Cost	Funding Source
Task 1: Update Work Plan	High	Biennially	\$10k*	Ecology Core Grant
Task 2: Improve Internal Tracking Methods	Medium	Ongoing		Unfunded
Task 3: Evaluate Current versus Future Program Capacity	Medium	Biennially		Unfunded
Task 4: Reconvene the Stakeholder Advisory Group	High	3 times Year	\$23k	Ecology Core Grant
Task 5: Communications and Strategic Planning	High	Ongoing		Unfunded
Task 6: Website	High	2020 and ongoing	\$25k	Ecology Core Grant
Task 7: Develop Funding Strategy	High	Ongoing	\$50k	Ecology Core Grant
Task 8: Assist Ecology in informing legislature on progress	High	Biennially	minimal	Not called out in any funding source

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*does not include University F&A rates

Element 2. Permit assistance for municipal, construction, and industrial stormwater

Element Goal: Our goal is to provide assistance, outreach and education to stormwater NPDES permittees to help them achieve and maintain compliance with the permits issued by the Washington Department of Ecology. WSC staff are working on the Municipal Resource Plan which will set forth additional detail regarding current work, aspirational future plans and the gap in between. This MRP will be done by the end of March 2020.

Sub-Element 2A: Municipal Program Support

Task 1: General permittee support

Task 1.1: Provide assistance to new permittees

The WSC permit assistance program serves new and existing municipalities by providing tools for complying with Washington's NPDES permits. This assistance is tailored to fit the permittees' needs and is based on best available information and technologies. The WSC is a non-regulatory entity that focuses this program on three NPDES permits: Phase I and Phase II Permits in Western Washington and Phase II Permits in Eastern Washington.

The program sets priorities for its service based on whether inquiries are permit related, there are numerous requests for the same or similar information and jurisdiction approaches have definite timelines. Our guiding priority is to help permittees meet permit conditions, followed by overall problem solving and identifying innovations through our many collaborative efforts and partnerships.

Services described below are provided to both Western and Eastern Washington jurisdictions.

The municipal program is based on Ecology's current permit requirements and incorporates materials and learning from the permittees themselves through surveys and discussions with NPDES coordinator groups. Through ongoing interaction with these groups, the Municipal program gleans a realistic and forward leaning sense of priority needs in these communities.

Meeting Management

The municipal program designs, runs and follows up with a wide range of meetings which require planning and attention to detail. The simplest of meetings require planning, collaboration and multiple-iterations of content development. Sub-elements include:

1. Work with the partner to develop technical assistance, training and other content to meet permit requirements (multiple meetings to prepare and edit training materials)
2. Solicit input from municipal permittees to determine if subject is a priority and municipal staff were interested in attending the training
 - Determine what is reasonable fee for municipal staff
 - Determine the location
3. Review content with Ecology subject matter experts (SMEs)
4. Plan the trainings
 - Determine budget and how to fund or find in-kind opportunities (location rental, food, supplies/materials, travel)
 - Secure locations with Municipal hosts (no venue fee)
5. Manage registration and budget
6. Promote training through list serve emails and in person announcements at stormwater coordinator group meetings
7. Procure supplies and materials
8. Order and shop for food
9. Prepare WSU required event documents pre and post training (request to serve food, attendance sign-in)
10. Manage training event
11. Communicate with attendees
 - Confirm registration
 - Send notices (agenda, parking instructions, etc.)
 - Send post training documents
 - Respond to attendee inquiries, cancelations, registration transfers

Building Capacity in Phase II Jurisdictions

WSC coordinates with many of the Phase II jurisdictions through permittee coordination groups. Services include sharing updates, technical reports, identifying barriers, and building capacity in those groups through administrative assistance. In working with Phase I jurisdictions, we are coordinating and delivering Plan Review Workshops in which Phase II jurisdictions are receiving **plan review training**. This plan review training was produced in collaboration with Tacoma. There is a demand for additional training.

The program is also working with Poulsbo on developing **internal compliance language**. This will be complete by June 2020. We also recently developed a resource and contact list for the three new Phase II permittees (College Place, Clallam County and Shelton) and arranged for Phase I assistance/collaboration for these jurisdictions.

Task 1.2: Develop and distribute compliance tools

WSC is working with the City of Poulsbo on developing internal compliance language and plan review training with Tacoma, both of which will be shared with other jurisdictions. The 2019-2024 Western Washington Phase II Municipal Stormwater Permit, jurisdictions across the Puget Sound region are required to develop and implement a Source Control Program for Existing Development.

Source control compliance best practices were developed from WSC's survey and collaborative work with BIG (business inspection group). These extensive surveys of Phase I and three Phase II source control programs provide a best practices template, example plans and guidance regarding communication and outreach. At the request of Ecology or the jurisdiction, WSC helps jurisdictions that are not in compliance with the permit by sharing resources and other facilitating tools.

The BIG Survey results and analysis were published in February 24, 2020 and can be found on the current iteration of the Center's web site:

<https://www.wastormwatercenter.org/business-inspection-group-big/>

WSC collected new permit compliance tables from four Western Washington and one and Eastern Washington jurisdiction along with a compliance table/calendar from Ecology for the entire state. These materials are posted on the WSC municipal resource web pages for western and eastern WA. These are compliance tools that can be adapted by each jurisdiction to meet their specific needs.

Task 1.3: Develop and host trainings/workshops

In 2018, WSC held a 2-day Tribal Stormwater Workshop and is currently working with the NW Indian Fish Commission (NWIFC) to orchestrate follow up plans and actions. WSC will be coordinating with Ecology and NWIFC's stormwater lead to follow up in winter 2020. A joint phone call in February has already taken place.

Train the Plan Reviewer workshops took place on October 28th, November 5th and November 20th, 2019. A total of 84 persons attended the training and included engineers, public works professionals, planner, community development specialists, consultants and WSDOT. The next workshop is schedule for March 3, 2020. WSC is also developing a Train the Plan Reviewers for Eastern Washington.

Task 1.4: Provide facilitation and administrative support for municipal permittee coordination and workgroups

We coordinate and facilitate assistance and collaboration between Phase I jurisdictions for Phase II jurisdictions. We are accomplishing this through guidance, coaching and identifying those approaches currently being used by Phase I jurisdictions which could be easily replicated by Phase II jurisdictions. We currently collaborate with Tacoma and other jurisdictions in this regard. A recent example is sharing compliance tables and calendars.

Current priorities are strengthening the collaborative/assistance capacity of larger municipalities to help smaller jurisdictions, exploring the use of digital cloud services to simplify data collecting and reporting by small municipalities and ensuring our new web site is structured appropriately to provide clear, updated information and resources.

The Municipal program provides meeting planning support, workshop development, responding to inquiries, acting as an on-call response team, updates NPDES permit information as it changes and attends stormwater workgroup meetings regularly. WSC staff works with 10 NPDES coordinator groups and currently is the lead for BIG, the Business Inspection Group, which focuses on source control training for Phase I jurisdictions and serves as a co-coordinator for the South Sound Phase II Coordinators Group.

The NPDES Coordinator Groups WSC works with are:

- ROAD MAP: Regional Operations and Maintenance Program (O&M Focused)
- Central Phase II Coordinators Group
- Southwest Washington Coordinators Forum
- West Sound Stormwater Manager's Coordination Group
- STORM (Stormwater Outreach for Regional Municipalities)
- South Sound Phase II Coordinator's Group
- North Sound Coordinator's Forum
- APWA Stormwater Managers Committee
- Eastern Washington Stormwater Managers Group
- Business Inspection Group (BIG)(focused on source control inspections and new permit requirements)

WSC Municipal staff also listen to permittees and share efficient and compliance- ready tools and approaches which can be replicated in other jurisdictions.

WSC staff also hosts a more regional role by serving on the Board of the Puyallup River Watershed Council which leads the new Puyallup Lead Integrating Organization (LIO). This work is undertaken in staff's personal capacity and is not funded by WSC.

That said, this important work connects well with our Puget Sound recovery work and helps to identify stormwater permit needs in this jurisdiction.

This work also dovetails nicely with our participation in the Stormwater Community of Interest (COI) led by the Puyallup Watershed Initiative and our Puget Sound work which includes ongoing collaboration with the entire LIO network. This work is ongoing and includes technical and policy assistance and ensuring the work of the COI is shared with municipal clients.

Staffing: Laurie Larson-Pugh

Secured Funding: Ecology Core Budget

Task 2: Plan and organize Muni Con

Muni Con or the Municipal Stormwater Conference, is held biennially and requires planning a full year in advance. This past year we held Muni Con in SeaTac in 2019. In 2021, we will be hosting the conference in Kennewick on April 28th- 29th. Planning is substantive and involves hosting an advisory committee, soliciting and reviewing abstracts, managing registration and site logistics, as well as soliciting sponsorships.

Muni Con development is complex and requires multi-year planning including: (1) Project Administration and management; (2) Soliciting input from Ecology, permittees and stakeholders (agenda setting, meetings, and outreach, including a summary of regional stormwater meeting topics of importance); (3) Conference content development (draft topic lists, presenters, contact outcomes, abstract development and evaluation); (4) Conference logistics (contracts, venue, food, sponsors, exhibitors, physical equipment, all within a logistic framework plan); and (5) Conference implementation and follow up which includes extensive evaluation work.

The Muni Con Advisory Committee includes representatives from the following jurisdictions and organizations: Phase I and Phase II stormwater coordinators which represent Bellevue, Kent, Tacoma, Vancouver, City of Spokane and Kennewick as well as the secondary permittee, Port of Seattle. The first kick off meeting will occur in February 2020. A “save the date” announcement has been sent to the municipal listserv and the second announcement was sent the week of February 10th.

Venue contracting challenges have delayed planning, but the contract was signed in January 2020 and planning is moving apace. The new permit requirements have made it difficult to get staff commitments to join the advisory committee (because the permit is their priority) but three jurisdictions have committed to filling advisory positions.

Staffing: Laurie Larson-Pugh

Secured Funding: Ecology Core Budget

Task 3: Provide Additional Eastern Washington-specific materials and services

The Eastern Branch of the WSC (EBWSC) addresses stormwater as well as contextual water issues. The goal of this current work is to gain the trust of the permittees, show progress on Eastern Washington stormwater issues even if some activities are tangential, and to work towards creating a more significant presence for the WSC in this region. The WSC has also developed forward-looking business plan for a physical location to host the Eastern Washington Branch. We now operate our services to eastern Washington permittees through staff in Puyallup and Pullman. This branch is relatively new and includes the following internal and partnership elements:

- Developed a two-phase business plan for the EBWSC (Phase 1 – Eastern Office, Phase 2 – Eastern Branch).
- Included plan and budget for EBWSC in CAHNRS 5-year planning documents
- Meetings with CAHNRS for EBWSC salary support via Agricultural Extension
- Meetings, calls and outreach to the Eastern Washington Stormwater Managers group
- Meetings, calls and outreach with the City of Spokane
- Meetings, calls and outreach with the Spokane Conservation District
- Meetings, calls and outreach with the Palouse Conservation District
- Developed a factsheet template for reporting WSC research activities to stormwater permittees to present our research in a more accessible way to eastern Washington permittees
- Developed a permit tracking tool for the 2019 eastern WA permit that complement's Ecology's summary table
- Developed a WSU-Spokane connection for Educational Partnerships for Innovation in Communities (EPIC) using rigorous stormwater regulation review combined with classroom innovation for improving and incentivizing code language
- Developing a site design review template for the 2019 eastern WA Stormwater Management Manual

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Staff grant and project success includes some research which is exclusively held and used in Eastern Washington and does not include WSC.

- 07/03/2018, "Technology for trade: new tools and new rules for water use efficiency in agriculture and beyond", successful proposal to USDA-NIFA for 5,166,223 (5 years)
- 04/17/2019, "Improving Stormwater and River Water Quality in the Inland Northwest", successful proposal to Horizons Foundation for \$10,000 gift (1 year)

- 05/13/2019, "An Analysis of US Water Centers' Governance Structure and Past Performance", successful proposal to NIWR for \$15,167 (1 year)
- 06/20/2019, "Evaluation of Biofiltration Swale Media Mixes for Maximizing Phosphorus Removal", successful proposal to WSDOT for \$180,000 (2 years)
- 12/10/2019, "Innovative Treatment Techniques to Reduce Land-based Nutrient Pollution and Harmful Algal Blooms", recent pending proposal to EPA for \$1 million
- 09/30/2019, "Using CropSyst to Evaluate Biochar as a Soil Amendment for Crops". WSU Waste to Fuels Technology Partnership. Submitted to Ecology.
- 11/30/2019, "An Analysis of National Institutes for Water Resources Governance Structure - Phase 1 Draft Report". Submitted to NIFA.
- 12/03/2019. "Factsheet - Remediation of Stormwater Pollutants by Porous Asphalt Pavement", Jayakaran A. and N. Pickering, Washington Stormwater Center, Washington State University.

Please refer to the Budget Table in the Municipal Resource Plan, expected end of March 2020.

Staffing: Laurie Larson-Pugh and Nigel Pickering. Funds will be split among WSC staff in proportion to proposed activities.

Secured Funding Ecology Core Budget and fund sources noted above.

Proposed (Unfunded) Tasks:

Sub-Element 2A: Budget, Schedule, and Resources Summary Page 16: Laurie and Nigel- budgets for Eastern Washington work:

Municipal Resource Plan and Budget

The Municipal Resource Plan will be completed by the end of March 2020 and will set forth budget elements including current work, desired work and gaps.

Task	Description	Priority	Schedule	Cost	Funding Source
Task 1: Develop eastern WA workplan with permittees	Work directly with Eastern WA. permittees to determine ideal products and services from WSC	High	Fall 2020	\$12,000	Ecology
Task 2: Improve Internal Tracking Methods	Improve coordination within WSC staff located in Puyallup and Pullman to deliver a consistent message and useful products	High	Ongoing	n/a	
Task 3: Evaluate current and future program capacity	Assist in building permittee capacity such as funds to cover training logistical costs, facility rental, grant writing costs	Medium	Summer 2020	\$6,000	?
Task 4: Develop eastern WA. advisory group*	Organize advisory group comprised of a select number of E. WA permittees and ECY subject matter experts to inform and prioritize products and services along with future resource capacity	High	Current	\$5,000	?
Task 5: Conceptual Planning and Costing of EBWSC	Planning and costing analysis for a future EBWSC – possibly a lab located in Spokane	Low	Late 2021	\$50,000	?

*Considering a separate Eastern WA. Group in addition to the SAG

Sub-Element 2B: Construction Permit Support

There is currently no budget for Construction Permit assistance. WSC will post the Ecology page for the Construction permit and include updated notices regarding training opportunities, case studies and best practices.

Proposed (Unfunded) Tasks

Activities for this future permit assistance program will include assistance with:

- Understanding the responsibilities under the permit
- Stormwater Pollution Prevention Plan (SWPPP) development and use
- Obtaining coverage under the permit
- Finding resources for implementing sediment, erosion and pollution prevention control measures.
- Provide outreach messages such as “Do what your Erosion and Sediment Control expert tells you” and “be aware of third-party lawsuits”, etc. by website post information and links to Ecology pages.

Tasks will be developed in collaboration with Subject Matter Experts (SMEs) at Ecology.

Sub-Element 2B: Budget, Schedule, and Resources

Staffing: None

Secured Funding: None

Table 4. Element 2B priorities, schedule, and funding.

<i>Task</i>	Priority	Schedule	Cost	<i>Funding Source</i>
Task 1: Permittee assistance				
Task 2: Workshop development				
Task 3: Web Site updates				

Sub-Element 2C: Industrial Permit Support

Task 1: Develop “ISGP Basics” curriculum and hold four workshops

Task 2: Develop “Step to Compliance” and “Myths and Misconceptions” webpage

Task 1A: Develop ISGP Basics Curriculum and Conduct Training

In 2020, WSC will co-produce four Industrial stormwater training workshops with ECOSS. WSC is conducting the training itself for “Basic Building Blocks of the Industrial Stormwater Permit. These will be held on February 27th, May 6th, June 10th and September 23rd. ECOSS will provide the remaining five Industrial stormwater training sessions.

Task 2A: Web Resources

WSC is currently developing web text regarding steps to compliance and myths and misconceptions which will be posted in 2020 on our new web site.

Proposed (Unfunded) Tasks: Hold additional Industrial stormwater training workshops, build video library of the workshops and be able to conduct additional on-site visits.

Sub-Element 2C: Budget, Schedule, and Resources

Staffing: Lisa Rozmyn and Laurie Larson-Pugh

Secured Funding: Ecology Core Budget, Boeing

Table 5. Element 2C priorities, schedule, and funding.

<i>Task</i>	Priority	Schedule	Cost	<i>Funding Source</i>
Task 1: Conduct Trainings	High	2/27, 5/6, 6/10 and 9/23		Boeing
Task 2: Evaluate Trainings	High	2020		Ecology Core Grant
Task 3: Develop draft future program elements	Medium	End of 2020		?

Element 3. Low impact development (LID) certificates and program development

Element Goal: The overall goal of this Work Plan Element is to continually improve the design, function, and implementation of Low Impact Development (LID) and other Green Infrastructure (GI) approaches to stormwater management.

Task 1: Operate LID Certification program and maintain accurate records

Task 2: Support and maintain connection between WSC and WSU Extension by continued collaboration through WSU's Water Team. This includes LID programming .

The LID certificate program was set up in previous years and now runs completely on-line through Washington State University's Global Campus. WSC ensures students receive their certificates, maintains a list of approved equivalent training course and certified instructors, enters into instructor agreements and ensures instructor responsibilities are fulfilled.

The LID Certificate program certifies practitioners as a signal that the person has the requisite skills to design, implement and maintain LID installations. There are two certifications available: LID Operations & Maintenance (O&M) and LID Design.

To date, the following number of people have earned certificates through this *on-line* certificate program, started in 2019:

- Design: 26 persons
- O&M: 29 persons

The total number of people that are in the system *currently*, taking classes in a self-paced manner is:

- Design: 59 persons
- O&M: 39 persons

The LID training program started in 2014.

The course work focuses on the rapidly expanding field of low impact development or green stormwater infrastructure. The curriculum provides fundamental, practical, and technical information targeted at the various disciplines engaged in LID implementation. Training topics include: bioretention, permeable pavement, green roof and rainwater harvesting design; site assessment, planning and layout; operations and maintenance for bioretention and permeable pavement installations; NPDES permit requirements; and more.

WSC hosted and managed the LID training program between 2013 and 2017. Design training included hydrologic modeling, rainwater catchment, bioretention, permeable pavement and site assessment. There were 858 Design class entries recorded during this time. Operations and Maintenance (O&M) training included advanced bioretention and advanced permeable pavements. There were 189 O&M class entries recorded during this time. The training combined pre-class video material review, half and full days classes and field work.

Based on our LID Training Needs Assessment, there was a demonstrated willingness to take classes on an on-line platform. Once the Department of Ecology stopped subsidizing the LID Statewide Training Program (which made the fee structure quite affordable), the fair market value of the LID training eclipsed professional's willingness to pay (the cost rose to \$2,000 at these market value rates).

This spurred WSC in the direction of on-line training and we will explore hybrid options which include on-line plus field work in the future.

Task 2A: Support WSU Extension and WSC information exchange, collaboration and program development

WSU Extension, under the direction of Bob Simmons, runs the WSU Water Team which includes water related programming and research in Pullman (CEREO and the Water Research Center via John Yoder), WSU Extension LID outreach which is substantial, and LID program research. The Water Team holds regular meetings in which research and program updates are shared, ensuring bi-directional influence of programs and expanded reach. Extension, WSC and partners are included in these calls, presentations and shared discussion.

The LID program, run by WSU Extension, offers the unique capability to conduct long-term research on full-scale, replicated bioretention facilities and permeable pavement. These approaches are part of a larger suite of land and water management tools that reduce the impacts of stormwater on streams, lakes, wetlands, coastal areas and food. The WSC LID Research and Certification Program includes:

- A living laboratory with full-scale, replicated LID management practices.
- Ongoing long-term research examining:
 1. Flow control and water quality treatment of permeable pavement and bioretention systems.
 2. Physical and biological characteristics of bioretention soil; and
 3. Physical and biological influence of plants on bioretention flow and water quality treatment performance.
- Using research data to refine computational models to predict LID performance at the site and landscape scale.
- Evaluating the ability of LID practices to directly reduce or eliminate the impacts of stormwater pollutants on aquatic organisms.
- Disseminating research to stormwater designers and managers through online resources, technical journals, workshops, fact sheets and curricula; and
- Providing LID training and certification, resources and outreach to a wide variety of audiences.

WSU Extension manages the LID program and has historical connections with helping businesses and residents install LID features and research associated with trees, bioretention and raingardens. WSU Extension (through Bob Simmons) manages an overarching Water Team which includes the LID program at WSC. In conjunction with WSC researchers, the LID program intersects with our partnership work with The Nature Conservancy. An example is the TNC- WSU Stormwater Literature Review of which an updated version will be published in 2020.

<https://vimeo.com/156457823>

<https://extension.wsu.edu/water/low-impact-development/>

<https://s3.wp.wsu.edu/uploads/sites/2164/2017/10/Simmons-GSI-Summit-2018.pdf>

The LID program's outreach, partnership and pilot work with a wide range of Extension, community, non-profit and agency colleagues help to disseminate the Center's work by

- Informing NPDES jurisdictions and industrial stormwater permit-holders on how best to implement LID techniques to meet their permit requirements,
- Informing LID project design and maintenance,
- Providing LID Certification courses
- Providing information to regulatory agencies to inform state-wide stormwater policy, and
- Helping to meet the goals of the Puget Sound Partnership Action Agenda.

The LID Extension model works with homeowners, builders, real estate agents and others to teach them the benefits of LID techniques. This site scale education works to meet the needs of jurisdictions to ensure compliance with MS4 Permits, flooding prevention and system capacity issues due to unchecked development.

WSU Extension and Stewardship Partners have collaborated for over 15 years to increase implementation of Green Stormwater Infrastructure. They have significantly advanced research and public engagement in GSI throughout the Puget Sound region. They seek to build upon their long-term investment in research and outreach capacities by developing supportive relationships with jurisdictions.

Through this collaboration they have developed a suite of GSI programs, supportive infrastructure and relationships including:

Available tools

- Outreach materials <https://extension.wsu.edu/raingarden/> including
 - Video
 - Handbook
 - Factsheets
 - Assessment protocol
 - Online rain garden design, installation and maintenance training program
- Comprehensive websites: <https://www.12000raingardens.org/>
- Sound Impacts - <http://www.soundimpacts.org/about>
- A rain garden/bioretenion assessment protocol to monitor basic functions of rain gardens and retention facilities and assess factors influencing their success and failure. It was developed to allow ease of implementation, repeatability across

large geographic scales and multiple implementers, and provide data of scientific and adaptive management value.

Training Experience and Capacity

- A GSI Training Program for real estate professionals providing licensing clock hours
- Statewide LID Training Program for professionals
<https://www.wastormwatercenter.org/lidswtrainingprogram/>
- Programs to train landscape professionals
- Trained volunteer “Rain Garden Mentors” to assist with homeowner implementation of GSI strategies

Other Capacities and Elements WSU and Stewardship Partners Bring

- Established locally based programs that include watershed stewardship programs and Master gardeners
- Capacity to provide public workshops and trainings
- A direct relationship with the Washington Stormwater Center
<https://www.wastormwatercenter.org>
- The WSU Puyallup Research and Extension Center’s stormwater research facilities <https://www.wastormwatercenter.org/lid-research> including:
 - Instrumented permeable asphalt and concrete
 - A complex of 16 instrumented rain gardens
 - A complex of 20 instrumented soil mesocosms
 - A fish lab
 - Water and soil analysis equipment
 - A wide range of expertise that includes environmental toxicology, hydrology, soils and plant sciences
- The capacity to provide social and community surveys and research
<https://sesrc.wsu.edu/>
- Capacity to engage undergraduate and graduate students and classes...
- Extensive connections and working relationships with organizations doing GSI work in the region.
- Stewardship Partners leads the annual GSI Summit in the Metro Area.
- The Stormwater Center leads the Muni Con Conference, as well as hosts other research updates including the October 2019 Research Summit.

Future needs include:

- Outreach materials <https://extension.wsu.edu/raingarden/> including
 - Video
 - Handbook

- Factsheets
- Assessment protocol
- Online rain garden design, installation and maintenance training program
- Need funding, staff time to promote – possibly tailor and assist with local jurisdiction websites
- Comprehensive websites: <https://www.12000raingardens.org/>
- Sound Impacts – <http://www.soundimpacts.org/about>
- A rain garden/bioretention assessment protocol to monitor basic functions of rain gardens and retention facilities and assess factors influencing their success and failure. It was developed to allow ease of implementation, repeatability across large geographic scales and multiple implementers, and provide data of scientific and adaptive management value.
- Mobile app – for data collection, each parameter linked with how-to instructions, location, flagging criteria, possible maintenance instructions
- Web based database for extensive information about rain gardens and bioretention facilities in each jurisdiction

Training Experience and Capacity

- A GSI Training Program for real estate professionals providing licensing clock hours
- WSU has the ability to provide clock hours but needs funding to set up and provide the training.
- Statewide LID Training Program for professionals
<https://www.wastormwatercenter.org/lidswtrainingprogram/>
- Programs to train landscape professionals
- WSU has the capacity but needs funding to set up and provide the training. More outreach materials to support the training and outreach to this audience.
- Trained volunteer “Rain Garden Mentors” to assist with homeowner implementation of GSI strategies
- WSU has the capacity but needs funding to provide the training and coordinate volunteers.

Proposed (Unfunded) Tasks: List certificated holders on-line so users can contact them if need be. WSC may consider in-person field training in the future. The Certificate program is funded by Ecology through its Core Budget, but the program is much more extensive as described above.

Element 3. Budget, Schedule, and Resources

Staffing: Ani Jayakaran, Carly Thompson and Jason Berg

Secured Funding: Ecology Core Budget

Table 6. Element 3 priorities, schedule, and funding.

<i>Task</i>	Priority	Schedule		Cost	<i>Funding Source</i>
Task 1: Provide Program Updates and certificates	High	Quarterly		\$56,000	Ecology
Task 2: Ensure communication and research between WSU Extension and WSC	High	Quarterly		?	WSU Extension programs
Task 3: Research	High	Ongoing			See Research Section- various

*The LID budget is funded through Research and WSU Extension and is not funded through Ecology's Core Budget Allocation

Element 4. Emerging technology testing

Goal: The overall goal of this work plan element is to ensure that any private, proprietary technologies that permittees and others are considering adopting meet the treatment and performance requirements set forth in the Stormwater Management Manuals for Western and Eastern Washington. This goal is met through WSC's involvement with the Technology Assessment Protocol – Ecology (TAPE) program.

WSC's work with the TAPE program addresses duties outlined in RCW 90.48.545 to: review and evaluate the effectiveness of emerging stormwater technologies and collaborate with existing stormwater programs such as Stormwater Equipment Manufacturer's Association, Stormwater Testing and Evaluation of Products and Practices, and the Water Environment Foundation.

The emerging technology testing program operates out of the University of Washington-Tacoma (UWT) campus as WSC is a joint program of WSU and UW. UWT also conducts complementary research with WSC regarding water chemistry as it relates to chemicals of emerging concern and other aspects of ecotoxicology.

Staff also actively works to promote the TAPE program and Washington State interests at conferences, regional meetings, and national interests.

Task 1: TAPE program operations and development

The Technology Assessment Protocol – Ecology (TAPE) program provides a process for evaluation and approval of Manufactured Treatment Devices (MTDs) for use for

stormwater treatment in Washington State. Using MTDs with TAPE-program approval assists permittees in achieving and maintaining permit compliance and helps to ensure that local funds are not expended on products that do not provide a water quality benefit.

The Washington Stormwater Center manages the operation and development of the TAPE program in partnership with Ecology.

In this role, the main responsibilities of WSC staff include:

- Providing assistance to vendors interested in or going through the TAPE process.
- Reviewing applications, quality assurance project plans (QAPPs), technical evaluation reports (TERs), and other supporting documents submitted to the TAPE program.
- Coordinating with the Board of External Reviewers (BER) to perform technical reviews of TAPE documents and make recommendations to Ecology on technology certification.
- Serving as an advisory role to Ecology on future development of the TAPE program. Revising TAPE technical guidance documents as needed. Working with the Stakeholders Advisory Group (SAG) to gather direction and input on these revisions and the future of the TAPE program.
- Pursuing potential TAPE testing facilities across the country as well as working with site managers of currently approved facilities to ensure these facilities continue to produce evaluations and data that meet TAPE standards.
- Representing Washington State interests on the development of the Stormwater Testing and Evaluation of Products and Practices (STEPP) Work Team, in an effort to develop a national stormwater technology verification program.

Task 2: Manage TAPE testing facilities

The Lake Union Ship Canal Emerging Stormwater Technology Research Facility is used by stormwater equipment vendors and consultants to test and evaluate emerging stormwater treatment technologies. WSC staff will oversee regular maintenance and clean-up of the Facility, coordinate access and usage for vendors and stormwater researchers, and increase marketing and visibility of the facility.

Proposed (Unfunded) Tasks:

- Expand the parameters of interest beyond TSS, dissolved metals, phosphorus, and TPH. The program would still only certify/approve for those parameters but would verify the data collected for other pollutants.

- Research the best way to address/assess the maintenance cycle of TAPE technologies.

Element 4. Budget, Schedule, and Resources

Staffing: Carla Milesi. This program is staffed and managed by the University of Washington Tacoma Center for Urban Waters. WSC Director provides input as necessary.

Table 7. Element 4 priorities, schedule, and funding.

Task	Priority	Schedule	Cost	Funding Source
Task 1: Manage and operate the program		Ongoing	\$218,594	Ecology, TAPE fees
Task 2: Manage TAPE testing facilities- Ship Canal location		Ongoing	\$21,509	Ecology

Element 4. Budget, Schedule, and Resources

Staffing: Carla Milesi. This program is staffed and managed by the University of Washington Tacoma Center for Urban Waters. WSC Director provides input as necessary.

Element 5. Research

Element Goal:

The overall goal of this Workplan Element is to improve understanding of stormwater impacts on biota, efficacy of best management practices in reducing or eliminating those impacts and improve water quality and animal/human health. These findings help communities to use the most efficacious technologies, tools, approaches and collaboration to address stormwater. The research also focuses on sources of stormwater and potential pollution prevention strategies.

Research conducted by the Washington Stormwater Center (WSC) and its partners is focused on the questions of why stormwater is toxic and how we can provide solutions to protect aquatic ecosystems from polluted runoff. This work encompasses ecotoxicology experiments, best management practices effectiveness and continued experimentation with the Low Impact Development research site located on our Washington State University Puyallup campus.

We look at individual chemicals and toxic substances routinely found in stormwater as well as mixtures of toxins to evaluate the effects on daphnia, zebra fish and salmonid species. This testing allows us to explore the characteristics of runoff and allows us to identify the problems and the effectiveness of solutions such as Green Stormwater Infrastructure.

WSC also conducts a wide range of other research which explores the effectiveness of LID, green infrastructure and other tools which can improve water quality.

We work with a large group of scientists, graduate students and subject matter experts, including other universities, state and federal agencies and tribes, to assist with, and fund, this important work.

2019-2021 Biennial Research

1. Longevity of Bioretention Depths for Preventing Acute Toxicity from Urban Stormwater Runoff

Partner Entities: U.S. F&WS and the Department of Ecology

Duration: 2 years (expected completion Summer 2021)

Description: This project explores the life expectancy of various depths of bioretention soils. The chemical and biological effectiveness of experimental columns in treating urban stormwater runoff will be assessed using analytical chemistry and the health of two fish species: juvenile coho salmon and zebrafish embryos.

Funding Source: Stormwater Action Monitoring (SAM) Program

2. The effectiveness of trees in mitigating stormwater runoff in Western Washington

Partner Entities: DNR, Evergreen State College, Clemson University and the Department of Ecology (as part of the SAM program)

Duration: 2 years (expected completion 2021)

Description: Project aims to quantify how much water is intercepted and transpired by 4 species of evergreen and deciduous trees in the region.

Funding Source: SAM

3. Determine Organics and Bacterial Reductions by Treatment BMP

Department of Ecology

Duration: 1 year (expected completion date is December 2020)

Project aims to determine what BMPs are best suited to remove polycyclic aromatic hydrocarbons and bacteria from influent stormwater.

Funding Source: EPA's National Estuary Program

4. The effect of cured carbon fiber in permeable pavements in removing pollutants from stormwater

Partner Entities: Boeing, IDEA School – Tacoma, City of Tacoma

Duration: 2 years (2021)

Project aims to determine how well cured carbon fiber impregnated in permeable pavements perform in the removal of certain pollutants from stormwater.

Funding Source: Boeing

5. The effects of mulch on stormwater treatment and maintenance effort in bioretention systems

Duration: 2 years (expected completion date is April 2022)

Project aims to determine the role mulch plays in removing pollutants in bioretention systems, their role in suppressing weeds, and the effects of different mulches on changing soil moisture conditions in a bioretention systems.

Funding Source: SAM

6. Investigation of oxidative stress in juvenile Coho salmon exposed to highway runoff

Duration 2 years

Project aims to determine the biochemical mechanisms that cause pre-spawn mortality in coho salmon after exposure to urban runoff.

Partners: NOAA, Seattle, USF&W

Funding Source: EPA

7. Orifice Control of Bioretention

Duration: 2 years (expected completion in April 2022)

Project will evaluate a water flow rate controlling outlet (called an orifice) which is part of a bioretention underdrain system. The project will be studying bioretention facilities with smaller orifices controlling the water flow rate and evaluating both water quality and water quantity performance improvements

Funding Source: SAM

8. Wastewater effluent discharge impacts to marine organism assessment

Duration: 2 years (expected completion December 2021)

Partners: UW, NOAA

Funding Source: King County

9. Evaluation of Biofiltration Swale Media Mixes for Maximizing Phosphorus Removal

Current compost-based media mixes for bioretention and bioswale systems have a negative removal of phosphorus from stormwater because the compost degrades over time and leaches phosphorus. Using batch sorption isotherms and column studies, this project will investigate various media that readily adsorb phosphorus. The goal of the project is to develop a more effective media mix with either a lower compost ratio, adding a new material, or creating a layered system.

Duration: 2 years

Partners: WSDOT

Funding Source: WSDOT

9.-12. Stormwater Threats and Clean Water Strategies to conserve and recover Puget Sound Salmon and their Habitats" (NOAA and USFWS have most of the National Estuary Program funding for this project). The following aspects of this overarching grant include the following:

- Elucidating the pathophysiology of pre-spawn mortality (PSM) (Jen McIntyre, Jill Wetzel, Emma Mudrock, Stephanie Blair, Jasmine Prat, Nat Scholz – NOAA-NMFS, Jay Davis – USFWS) -Part of NEP grant

- Relative sensitivity of Coho, Chum and Chinook salmon to urban stormwater runoff (Jen McIntyre, John Stark, Nat Scholz – NOAA-NMFS, Jay Davis – USFWS)
- Mapping future pre-spawn mortality hotspots in Puget Sound region (Julann Spromberg – NOAA-NMFS, Nat Scholz – NOAA-NMFS, John Stark)
- Evaluating sources of toxicity in urban road runoff (Jen McIntyre, John Stark, Emma Mudrock)

Green Infrastructure and Other Research

The following research projects are underway at WSC and reflect research topics that include, but also fall outside, ecotoxicology.

- Quantifying the Impact of Real-World Rain Gardens and Bioretention across Puget Sound and Identifying Key Factors for Success/Failure (Robert Simmons, Ani Jayakaran, Aaron Clark – 12,000 Rain Gardens/Stewardship Partners)(SAM funded)
- Field performance of permeable pavements infused with cured carbon fiber at the IDEA School, Tacoma (Ani Jayakaran, Somayeh Nassiri, John Stark, Karl England, Jessica Knickerbocker – City of Tacoma; Lori Blair, Deborah Taege, Shyla Miller - Boeing)(Boeing funded)
- Increasing Adoption and Integration of Reclaimed Water for Irrigation within Cedar Sammamish Watershed (Doug Collins, Jordan Jobe, Joan Wu, Ani Jayakaran; Jason Hatch – Washington Water Trust)(King Conservation District)
- Biological effectiveness of alternative bioretention blends (Jen McIntyre, Jenee Colton- King County, Curtis Hinman – Herrera)(SAM funded)
- Water treatment residuals for reducing phosphorus from bioretention systems (Jen McIntyre, Cara Poor – University of Portland)(proposal in- not funded yet)
- Fate and transport of micro- and nanoplastics in soils (Markus Flury, Andy Bary, Stephen Taylor, Zhan Wang)(Department of Energy, Pacific NW Laboratories, USDA/NIFA and China Scholarship Council)
- Evaluation of neonicotinoid insecticide effects on aquatic invertebrate communities (Claire Duchet, John Stark, Jen McIntyre, Ben Leonard)(EPA's National Estuary Program)

- Effects of neonicotinoid insecticides on Daphnia (Claire Duchet, John Stark, Jen McIntyre)
- The Farming in the Floodplain Project (FFP) is a new Program at the Stormwater Center and managed in partnership with the Center for Sustaining Agriculture and Natural Resources. We work locally in Pierce County with the Floodplains for the Future Partnership (www.floodplainsforthefuture.org) to integrate agricultural needs into flood risk reduction and habitat restoration efforts (Jordan Jobe)(Department of Ecology, Floodplains by Design)

Completed Research

- Effectiveness studies of permeable pavements – flow control, treatment, and maintenance (Ani Jayakaran, John Stark, T.J. Knappenberger - Auburn University)
- Field test of plants and fungi on bioretention performance over time (Jen McIntyre, John Stark, Claire Duchet, Jill Wetzel, Jay Davis – USFWS)
- Evaluating the toxicity of runoff pollutants from roofing materials (John Stark, Jen McIntyre, Lisa Rozmyn, Nancy Winters, Taylor Haskins)
- Identification and treatment of toxicants in road runoff using WSDOT compost-amended bioswales (Jen McIntyre, Benjamin Leonard, Ed Kolodziej – UW-Tacoma)
- Optimizing Green Stormwater Infrastructure efficacy by integrating hydrologic, cultural and socioeconomic elements in a watershed spanning the urban agricultural continuum (Ani Jayakaran, Joan Wu, Michael Brady, John Stark, Jolie Kaytes, Michael Sánchez, John Harrison, Danna Moore, Stephanie Hampton)(WSU Grand Challenge Seed Grant)
- Monitoring temperature and water level in a restored agricultural ditch in the Puyallup River watershed (Ani Jayakaran)(PCC Farmland Trust)
- Carbon fiber pilot study to evaluate the possible strengthening, pollutant removal and flow rate effects of carbon composites in permeable pavements (John Stark, Lisa Rozmyn, Jen McIntyre, WSU Engineering, Boeing)(Boeing funded)

Element 5. Budget, Schedule, and Resources

Table 8. Element 5 priorities, and funding.

Project	Priority	Cost	Funding Source

*Researchers are evaluating a research and science workplan, drawing from some elements of the Puget Sound Partnership's Biennial Science Workplan.

Element 6. Puget Sound Recovery Program support.

Element Goal: The overall goal of this Work Plan Element is to bring the best available science and effective approaches to stormwater management to the forefront of Puget Sound Recovery Planning processes.

Task 1: Participate in Strategic Planning Process

WSC participates on the Stormwater Strategic Initiative lead through technical reviews, managing the standing Stormwater Advisory Team, managing meetings and providing underlying science and gray literature inputs to overall processes. The Washington Stormwater Center is uniquely suited to support the Puget Sound Partnership and EPA's National Estuary Program (NEP) in the broader effort to achieve ecosystem resiliency. WSC staff actively participate in Stormwater Strategic Initiatives and development of Implementation Strategies to reduce Toxics in Fish; improve Benthic Index of Biotic Integrity (B-IBI) scores in streams, protect Habitat, and recover Shellfish beds.

Priorities include completing the BIBI and Toxics in Fish Implementation Strategies, incorporating street sweeping and other research findings into implementation plans, working with the Stormwater Strategic Advisory Team to identify priority policies and strengthen our work in integrated stormwater and land use planning.

Proposed (Unfunded) Projects:

WSC would like to analyze the findings from this NEP project to integrate project level research, findings and Implementation Plan results to amplify WSC's work and maintain an ability to service Puget Sound permittees and form new research relationships with the Puget Sound Institute and Puget Sound Ecosystem Monitoring Program. Current staffing is inadequate for the work required to fulfill these roles.

Element 6. Budget, Schedule, and Resources

Staffing: John Stark, Heidi Siegelbaum with research review (Jen McIntyre, Ani Jayakaran and Jordan Jobe)

Secured Funding: This position is funded by EPA's National Estuary Program through WSC's IAA with the Department of Ecology.

Unfunded: Full time commitment to the Stormwater SIL, including the ability to create a bi-directional flow of information and research between WSC and the Puget Sound Partners including PSEMP, the Partnership, other agencies and the Science Panel.

Table 9. Element 6 priorities, schedule, and funding.

<i>Task</i>	Priority	Schedule	Cost	<i>Funding Source</i>
1. Participate in Strategic Planning	High	Ongoing	\$46,593	EPA
2. Review draft products	High	Ongoing	\$55,000	EPA
3. Share information bi-laterally	Med	Ongoing	\$15,531	EPA

Contact for this work plan: Lisa.Rozmyn@wsu.edu or Heidi.Siegelbaum@wsu.edu

Lisa: (253) 445-4552
Heidi: (253) 445-4502