



DEPARTMENT OF
ECOLOGY
State of Washington

IAA No. C1800154
FWS Project #s FRES48020112010/FRES48020112020

INTERAGENCY AGREEMENT (IAA)

BETWEEN

THE STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY

AND

U.S. FISH AND WILDLIFE SERVICE

THIS INTERAGENCY AGREEMENT ("Agreement" or "IAA") is made and entered into by and between the state of Washington, Department of Ecology, hereinafter referred to as "ECOLOGY," and the U.S. Fish and Wildlife Service hereinafter referred to as the "USFWS," pursuant to the authority granted by Chapter 39.34 RCW.

THE PURPOSE OF THIS AGREEMENT is for USFWS to determine an optimal media depth and longevity of bioretention media for effective stormwater treatment. Performance effectiveness and longevity of bioretention media will be evaluated across simulated 10 water years in approximately 2 calendar years through water chemistry and biological toxicity tests.

WHEREAS, ECOLOGY has legal authority (RCW 90.48 and WAC 173-220) and USFWS has legal authority (RCW 90.48) that allows each party to undertake the actions in this agreement. The USFWS also has the authority to enter into this agreement under the Endangered Species Act as well as the Fish and Wildlife Coordination Act.

THEREFORE, IT IS MUTUALLY AGREED THAT:

1) SCOPE OF WORK

USFWS shall furnish the necessary personnel, equipment, material and/or service(s) and otherwise do all things necessary for or incidental to the performance of the work set forth in Appendix A, Statement of Work and Budget, attached hereto and incorporated herein.

2) PERIOD OF PERFORMANCE

The period of performance of this IAA shall commence on **June 1, 2018** and be completed by **September 30, 2020**, unless terminated sooner as provided herein. Amendments extending the period of performance, if any, shall be at the sole discretion of ECOLOGY.

3) COMPENSATION

Compensation for the work provided in accordance with this IAA has been established under the terms of RCW 39.34.130 and RCW 39.26.180(3). This is a performance-based agreement, in which payment is based on the successful completion of expected deliverables.

The source of funds for this IAA is **General Fund/ Private-Local account for Stormwater Action Monitoring.**

The parties have determined that the cost of accomplishing the work identified herein will not exceed \$396,076.00, including any indirect charges. Payment for satisfactory performance of the work shall not exceed this amount unless the parties mutually agree via an amendment to a higher amount. Compensation for services shall be based on the terms and tasks set forth in Appendix A, Statement of Work and Budget. ECOLOGY will not make payment until it has reviewed and accepted the completed work.

4) BILLING AND PAYMENT PROCEDURE

Payment requests shall be submitted on state form, Invoice Voucher A19-1A. Invoices shall describe and document to ECOLOGY's satisfaction a description of the work performed, the progress of the work, and related costs. Each invoice voucher shall reference the Agreement (IAA) number and clearly identify those items that relate to performance under this Agreement as outlined in the "Budget Detail by Task" table located in Appendix A. Payment will be made within thirty (30) days of submission of a properly completed invoice (form A19-1A) with supportive documentation. All expenses invoiced shall be supported with copies of invoices paid.

Send invoices to:

**State of Washington
Department of Ecology
Attn: Keunyea Song
P.O. Box 47600
Olympia, WA 98504-7600**

Payment requests may be submitted on a quarterly basis or at the completion of the work and acceptance of the deliverables listed in Appendix A. Upon expiration of this Agreement, any claim for payment not already made shall be submitted to ECOLOGY within 30 days after the expiration date or the end of the fiscal year, whichever is earlier.

Payment will be issued through Washington State's Department of Enterprise Services Statewide Payee Desk. To receive payment you must be registered as a state-wide vendor. To register submit a state-wide vendor registration form and an IRS W-9 form at website, <http://www.des.wa.gov/services/ContractingPurchasing/Business/VendorPay/Pages/default.aspx>. If you have questions about the vendor registration process you can contact DES at the Payee Help Desk at (360) 407-8180 or email payeehelpdesk@watech.wa.gov.

5) ALTERATIONS AND AMENDMENTS

This Agreement may be amended by mutual agreement of the parties. Such amendments shall not be binding unless they are in writing and signed by personnel authorized to bind each of the parties.

6) ASSIGNMENT

The work to be provided under this Agreement, and any claim arising thereunder, is not assignable or delegable by either party in whole or in part, without the express prior written consent of the other party, which consent shall not be unreasonably withheld.

7) ASSURANCES

Parties to this Agreement agree that all activity pursuant to this agreement will be in accordance with all the applicable current federal, state, and local laws, rules, and regulations.

8) CONFORMANCE

If any provision of this Agreement violates any statute or rule of law of the state of Washington, it is considered modified to conform to that statute or rule of law.

9) DISPUTES

Parties to this Agreement shall employ every effort to resolve a dispute themselves without resorting to litigation. In the event that a dispute arises under this Agreement that cannot be resolved among the parties, it shall be determined by a Dispute Board in the following manner. Each party to this Agreement shall appoint one member to the Dispute Board. The members so appointed shall jointly appoint an additional member to the Dispute Board. The Dispute Board shall review the facts, agreement terms, and applicable statutes and rules, and then make a determination of the dispute. The determination of the Dispute Board shall be final and binding on the parties hereto, unless restricted by law. The cost of resolution will be borne by each party paying its own cost. As an alternative to this process, if state agencies, either of the parties may request intervention by the Governor, as provided by RCW 43.17.330, in which event the Governor's process will control. The parties may mutually agree to a different dispute resolution process.

10) FUNDING AVAILABILITY

ECOLOGY's ability to make payments is contingent on availability of funding. In the event funding from state, federal, or other sources is withdrawn, reduced, or limited in any way after the effective date and prior to completion or expiration date of this Agreement, ECOLOGY, at its sole discretion, may elect to terminate the Agreement, in whole or part, for convenience or to renegotiate the Agreement subject to new funding limitations and conditions. ECOLOGY may also elect to suspend performance of the Agreement until ECOLOGY determines the funding insufficiency is resolved. ECOLOGY may exercise any of these options with no notification restrictions, although ECOLOGY will make a reasonable attempt to provide notice.

In the event of termination or suspension, ECOLOGY will reimburse eligible costs incurred by the USFWS through the effective date of termination or suspension. Reimbursed costs must be agreed to by ECOLOGY and the USFWS. In no event shall ECOLOGY's reimbursement exceed ECOLOGY's total responsibility under the agreement and any amendments.

11) GOVERNING LAW AND VENUE

This Agreement is entered into pursuant to and under the authority granted by the laws of the state of Washington and any applicable federal laws. The provisions of this Agreement shall be construed to conform to those laws.

12) INDEPENDENT CAPACITY

The employees or agents of each party who are engaged in the performance of this Agreement shall continue to be employees or agents of that party and shall not be considered for any purpose to be employees or agents of the other party.

13) ORDER OF PRECEDENCE

In the event of an inconsistency in the terms of this Agreement, or between its terms and any applicable statute or rule, the inconsistency shall be resolved by giving precedence in the following order:

- a. Applicable federal and state of Washington statutes, regulations, and rules.
- b. Mutually agreed upon written amendments to this Agreement.

- c. This Agreement, number C1800154.
- d. Appendix A, Statement of Work and Budget.

14) RECORDS MAINTENANCE

The parties to this Agreement shall each maintain books, records, documents and other evidence that sufficiently and properly reflect all direct and indirect costs expended by either party in the performance of the service(s) described herein. These records shall be subject to inspection, review or audit by personnel of both parties, other personnel duly authorized by either party, the Office of the State Auditor, and federal officials so authorized by law. All books, records, documents, and other material relevant to this Agreement will be retained for six years after expiration of this Agreement and the Office of the State Auditor, federal auditors, and any persons duly authorized by the parties shall have full access and the right to examine any of these materials during this period.

Records and other documents, in any medium, furnished by one party to this Agreement to the other party, will remain the property of the furnishing party, unless otherwise agreed. The receiving party will not disclose or make available this material to any third parties without first giving notice to the furnishing party and giving it a reasonable opportunity to respond. Each party will utilize reasonable security procedures and protections to assure that records and documents provided by the other party are not erroneously disclosed to third parties subject to state public disclosure laws.

15) RESPONSIBILITIES OF THE PARTIES

Each party of this Agreement hereby assumes responsibility for claims and/or damages to persons and/or property resulting from any act or omissions on the part of itself, its employees, its officers, and its agents. Neither party will be considered the agent of the other party to this Agreement.

16) RIGHTS IN DATA

Unless otherwise provided, data which originates from this Agreement shall be "work made for hire" as defined by the United States Copyright Act, Title 17 U.S.C. section 101 and shall be owned by state of Washington, ECOLOGY. Data shall include, but not be limited to, reports, documents, pamphlets, advertisements, books magazines, surveys, studies, computer programs, films, tapes, and/or sound reproductions. Ownership includes the right to copyright, patent, register, and the ability to transfer these rights.

17) SEVERABILITY

If any provision of this Agreement or any provision of any document incorporated by reference shall be held invalid, such invalidity shall not affect the other provisions of this Agreement which can be given effect without the invalid provision, if such remainder conforms to the requirements of applicable law and the fundamental purpose of this Agreement, and to this end the provisions of this Agreement are declared to be severable.

18) SUBCONTRACTORS

USFWS agrees to take complete responsibility for all actions of any Subcontractor used under this Agreement for the performance. When federal funding is involved there will be additional subcontractor requirements and reporting.

Prior to performance, all subcontractor who will be performing services under this Agreement must be identified, including their name, the nature of services to be performed, address, telephone, WA State Department of Revenue Registration Tax number (UBI), federal tax identification number (TIN), and anticipated dollar value of each subcontract. Provide such information to ECOLOGY's agreement manager.

19) TERMINATION FOR CAUSE

If for any cause, either party does not fulfill in a timely and proper manner its obligations under this Agreement, or if either party violates any of these terms and conditions, the aggrieved party will give the other party written notice of such failure or violation. The responsible party will be given the opportunity to correct the violation or failure within fifteen (15) business days. If failure or violation is not corrected, this Agreement may be terminated immediately by written notice of the aggrieved party to the other

20) TERMINATION FOR CONVENIENCE

Either party may terminate this Agreement without cause upon thirty (30) calendar day prior written notification to the other party. If this Agreement is so terminated, the parties shall be liable only for performance rendered or costs incurred in accordance with the terms of this Agreement prior to the effective date of termination

21) WAIVER

A failure by either party to exercise its rights under this Agreement shall not preclude that party from subsequent exercise of such rights and shall not constitute a waiver of any other rights under this Agreement unless stated to be such in a written amendment to this Agreement signed by an authorized representative of the parties.

22) AGREEMENT MANAGEMENT

The representative for each of the parties shall be responsible for and shall be the contact person for all communications, notifications, and billings questions regarding the performance of this Agreement. The parties agree that if there is a change in representatives that they will promptly notify the other party in writing of such change, such changes do not need an amendment.

The ECOLOGY Representative is:	The USFWS Representative is:
Name: Keunyea Song Address: 300 Desmond Dr. SE (FedEx) P.O. Box 47600 (USPS) Olympia, WA 98504-7600 Phone: 360-407-6158 Email: Keunyea.Song@ecy.wa.gov	Name: Jay Davis Address: Washington Fish & Wildlife Office 510 Desmond Dr. SE, Suite 102 Lacey, WA 98503 Phone: (360) 753-9568 Email: jay_davis@fws.gov Fax: (360) 753-9407

23) ALL WRITINGS CONTAINED HEREIN

This Agreement contains all the terms and conditions agreed upon by the parties. No other understandings, oral or otherwise, regarding the subject matter of this Agreement shall be deemed to exist or to bind any of the parties hereto.

The signatories to this Agreement represent that they have the authority to bind their respective organizations to this Agreement.

IN WITNESS WHEREOF, the parties below, having read this Agreement in its entirety, including all attachments, do agree in each and every particular as indicated by their below signatures.

**State of Washington
Department of Ecology**

U.S. Fish and Wildlife Service

By: Polly Zehm 8/16/18
Signature Date

By: Rollie White 8/17/2018
Signature Date

Print Name: Polly Zehm

Print Name: Rollie White

Title: Deputy Director

Acting Title: Assistant Regional Director -
Ecological Services

Approved as to form only:
Office of Attorney General

APPENDIX A STATEMENT OF WORK AND BUDGET

Project Title: Longevity of bioretention depths for preventing acute toxicity from urban stormwater runoff

Background

Research by NOAA Fisheries, the U.S. Fish and Wildlife Service (USFWS), and Washington State University (WSU-Puyallup), collectively known as the Puget Sound Stormwater Science Team (PSSST), has shown that untreated urban stormwater runoff can significantly impact the health of fish and biological communities. Years of field surveys have documented geographically widespread mortality among coho adults returning to urban streams (pre-spawn mortality). Moreover, direct exposures to untreated roadway runoff are acutely lethal to adult, juvenile, and newly hatched coho, as well as the macroinvertebrate species juvenile salmon rely on for prey. Lastly, untreated stormwater causes a wide range of deleterious sublethal effects in salmon, invertebrates, and highly studied aquatic species, such as zebrafish.

In recent years, the team has published several peer-reviewed studies showing that most or all of the described adverse health impacts on aquatic species can be prevented by pre-treating urban runoff with standard bioretention soil mix (60:40 soil:compost) in experimental columns. While these initial results are encouraging, the columns were developed for research purposes and have not been optimized for municipal stormwater management in Puget Sound.

Two important questions that the proposed research will answer are: 1) How long can the 60:40 bioretention soil media prevent toxic effects to aquatic animals, and 2) What soil depths are necessary to provide treatment. Using experimental bioretention columns, this project will explore the potential life expectancy of various depths of bioretention soils. To accomplish this, stormwater runoff will be treated in the columns across an 18-month period representing an accelerated timeline of 10 water years. Chemical and biological effectiveness will be evaluated using analytical chemistry and the health of two fish species; juvenile salmon and a sensitive, high-throughput early life stage fish model (zebrafish embryos). Endpoints will include survival for juvenile salmon and sublethal changes in morphometrics for zebrafish embryos.

Stormwater treatment installations with a shallower infiltration depth, if effective, would be less expensive to install and maintain, would expand the options for use (i.e., places with limited gradient drop), and could reduce the export of pollutants (e.g., nutrients). The findings will inform the design and retrofit of existing stormwater management facilities. This project may inform Phase I municipal permit S5.C.6.a.i.3 Structural Stormwater Controls, Minimum Performance Measures, Retrofit of Existing Treatment and/or Flow Control Facilities. It will also inform BMP T7.30, "Bioretention Cells, Swales, and Planter Boxes," of Volume V of the 2012 Stormwater Management Manual for Western Washington as amended in 2014, a primary treatment practice.

One of the outcomes of this study will be providing cost-effective bioretention depth that provide biologically significant improvements in water quality.

Task 1: Develop Quality Assurance Protocol Plan (Total Cost = \$29,505)

Prepare a Quality Assurance Protocol Plan (QAPP) for approval by Dept. of Ecology using Ecology's QAPP Template/Checklist provided by Ecology. Unless Ecology's Quality Assurance (QA) officer or the Program QA coordinator instructs otherwise, USFWS will follow Ecology's *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies*, July 2004 (Ecology Publication No. 04-03-030).

Deliverable 1.1: Draft QAPP

(\$14,000) Target Date: August 15, 2018

Deliverable 1.2: Final QAPP

(\$15,505) Target Date: September 15, 2018

Task 2: Prepare experimental columns (Total Cost = \$30,531)

Experimental columns (PVC; 4" diameter) will be constructed for testing bioretention depth (18", 15", 12", 9", 6") in triplicate (n = 3). Three additional columns with 18" soil depth (Stormwater Management Manual required soil depth for bioretention) will be used as a clean water control throughout the experiment to test leaching potential from soil media. There will be a total of 18 columns. The bioretention soil mix in each column will overlie a gravel drainage layer (12"), as specified in the Stormwater Management Manual for Western Washington. We will use the 60:40 soil mix unless Dept. of Ecology recommends an alternative mixture be tested. Columns will be situated in a greenhouse on the WSU Puyallup campus and will be insulated to approximate the thermal mass of in-ground installations.

In preparation for constructing bioretention columns, bioretention soil media components (gravel, sand, compost, mulch) will be sourced and acquired locally. Triplicate samples of sand and compost will be analyzed for chemical composition including metals (Cu, Zn, Cd, Pb, As, Ni) and PAHs. Triplicate samples of each of the four components will be leached for 24 h with WSU-Puyallup lab water (conditioned reverse osmosis water). Triplicates will be pooled and assessed for chemistry and acute toxic potential using the zebrafish embryo model. In addition to metals (total and dissolved) and PAHs, water samples will be analyzed for fecal coliform, total suspended solids, dissolved organic carbon, chloride, hardness, alkalinity, pH, ortho-phosphate, nitrite+nitrate. Analytical water chemistry will be conducted at laboratories accredited by the Dept. of Ecology.

Deliverable 2: Report on chemistry and toxicology of bioretention soil media components

(\$30,531) Target Date: October 15, 2018

Task 3: Condition experimental columns (Total Cost = \$33,071)

Three pore volumes of WSU-Puyallup lab water will be used to condition and ‘flush’ the experimental columns prior to their use in treating urban runoff. WSU-Puyallup lab water and a fourth pore volume of water will be collected to characterize the chemistry of water passing through the BSM prior to application of stormwater runoff. As a part of this task, infiltration rate (Ksat) will be calculated for each treatment based on the average for each replicate. Chemical composition (conventionals and metals) will be analysed for influent water and effluent from each bioretention replicate. PAHs will not be analyzed for this task. If possible, the method chosen to determine Ksat, with water flowing from top to bottom, will minimize the problematic bulk movement of fines that was observed in an ongoing SAM bioretention project (Field test of plants and fungi on bioretention performance over time).

Deliverable 3: Report on chemistry of clean water effluent and WSU-Puyallup lab water (\$33,071) Target Date: December 15, 2018

Task 4: Bioretention performance throughout accelerated aging (Total Cost = \$262,382)

Stormwater runoff will be collected from a busy urban road site (e.g., Montlake Blvd W-bound on-ramp to SR-520; AADT 6500) for which we have a record of the expected range of water chemistry values from previous research studies. Runoff will be collected in a stainless steel tote and transported to WSU-Puyallup within 24 h.

Runoff will be applied to each column at a rate within the Ksat limits of the Western Washington Hydrology Manual (WWHM Table 1: 0.5 cm/h to 30.5 cm/h), agreed upon with Ecology. Each column is assumed to receive a volume of runoff equivalent to 20:1 contributing:treatment area.

To accelerate column aging, runoff will be applied at an accelerated rate to achieve 10 water years in 18 months of testing. Runoff will be collected approximately 60 times across the 18-month testing period, each time a separate ‘event’. At 36” of average annual rainfall, each column will receive approximately 6” of runoff per event under this accelerated schedule. Because the water year and the calendar year will be out of sync, a thermal regime in the greenhouse will match that of the water year being simulated in order to approximate the thermal conditions that the microbial community would normally experience during the calendar year.

For event 1 and for the event ending each water year (approximately every 6th event), influent and effluent will be collected for analytical chemistry and for toxicity testing. Effluent will be collected in glass containers on ice to preserve chemical integrity prior to testing. Effluent from each column will be analyzed for the suite of chemical and microbiological parameters listed in Task 2. Effluent from triplicate columns will be combined for toxicology testing. For the first event, and the events ending water year 5 and WY 10, toxicity testing will include juvenile coho survival. For the remaining water years, toxicity testing will use zebrafish embryos. For all other interim events, there will be no toxicology testing and only a small number of parameters will be monitored in the influent and effluent water (e.g., temperature, pH, conductivity).

After assessing performance at the end of Water Year 2, the number of depth treatments will be reduced from five to three for the remainder of the experiment. USFWS will organize a discussion meeting with Ecology to determine what three depth treatments will move forward. Regular performance reports will be submitted, containing chemistry and toxicology results for the interim water years. Ksat will be calculated at the end of the project for each treatment for comparison with initial conditions. The final Ksat of the 'rejected' soil depth treatments will be assessed at the end of Water Year 2. Influent and effluent water chemistry will be compared with data characterization studies by Dept. Ecology for the NPDES Phase I Stormwater Permit.

Deliverable 4.1: Progress Report 1; Progress reports will include status of the contract tasks and decisions related to the tasks made during calls, team meetings, coordination with the advisory committees, and communications with Ecology as appropriate and may include results and findings to date.

(\$52,476) Target Date: February 15, 2019

Deliverable 4.2: Progress Report 2

(\$52,476) Target Date: May 15, 2019

Deliverable 4.3: Progress Report 3

(\$52,476) Target Date: September 15, 2019

Deliverable 4.4: Progress Report 4

(\$52,477) Target Date: February 15, 2020

Deliverable 4.5: Progress Report 5

(\$52,477) Target Date: May 15, 2020

Task 5: Outreach & Communication (Total Cost \$40,587)

Deliverable 5.1: Draft fact sheet explaining results for stormwater managers, NPDES permit coordinators, and others involved in stormwater management.

(\$5,584) Target Date: June 30, 2020

Deliverable 5.2: Two presentations to share findings with stormwater managers, including a presentation to the Stormwater Workgroup and one regional stormwater conference/workshop.

(\$5,584) Target Date: June 30, 2020

Deliverable 5.3: Draft Final report using SAM template.

(\$19,419) Target Date: August 15, 2020

Deliverable 5.4: Final report

(\$10,000) Target Date: September 15, 2020

Schedule Detail by Task

Calendar Year	2018		2019				2020		
	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep
1. QAPP									
D1.1 Draft									
D1.2 Final									
2. Bioretention Column Preparation									
D2 Report on component chemistry and toxicology									
3. Column Conditioning									
D3 Report on chemistry and toxicology of clean effluent									
4. Bioretention Performance Testing									
D4.1 Progress Report 1									
D4.2 Progress Report 2									
D4.3 Progress Report 3									
D4.4 Progress Report 4									
D4.5 Progress Report 5									
5. Communication & Outreach									
D5.1 Fact Sheet									
D5.2 Presentations									
D5.3 Draft Report									
D5.4 Final Report									

*Schedule (except contract end date) may be revised upon written approval from Ecology

*To revise contract end date, an approved amendment from Ecology is required.

Budget Detail by Task

	Task 1	Task 2	Task 3	Task 4	Task 5	Total by Object
Salaries	\$13,021	\$12,304	\$12,304	\$50,020	\$17,358	\$105,007
Benefits	\$6,811	\$6,336	\$6,336	\$26,180	\$9,200	\$54,863
Testing/Supplies	\$3,000	\$5,000	\$7,000	\$130,000	\$5,000	\$150,000
Travel	\$400	\$400	\$400	\$400	\$400	\$2,000
Subtotal	\$23,232	\$24,040	\$26,040	\$206,600	\$31,958	\$311,870
Indirect/Overhead (27%)	\$6,273	\$6,491	\$7,031	\$55,782	\$8,629	\$84,206
Total Task	\$29,505	\$30,531	\$33,071	\$262,382	\$40,587	\$396,076

*Budget may be shifted between tasks with written approval from Ecology

*Total Budget may not be exceeded without an approved amendment from Ecology