

# A Functions-Based Stream Assessment Method



To Support Compensatory Mitigation  
Decisions in Oregon

**Tracie Nadeau**, U.S. Environmental Protection Agency, Region 10

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# How is aquatic resource mitigation currently handled in Oregon?

- USACE and Oregon Department of State Lands collaboratively, but independently, administer a permit process to protect, conserve & provide for the best use of Oregon's aquatic resources. EPA co-administers the CWA 404 program with USACE.
- Mitigation is currently acreage-based; not relying on function assessments, not consistently mitigating for stream impacts, and not taking a watershed approach
- EPA, Corps, DSL have shared goals for improving the regulatory programs & mitigation outcomes

**Joint Permit Application**

This is a joint application, and must be sent to both agencies, who administer separate permit programs. Alternative forms of permit applications may be acceptable; contact the Corps and DSL for more information.

Date Stamp

	<b>U.S. Army Corps of Engineers Portland District</b>		<b>Oregon Department of State Lands</b>
<small>Corps Action ID Number</small>		<small>DSL Number</small>	
<b>(1) APPLICANT AND LANDOWNER CONTACT INFORMATION</b>			
	<small>Applicant</small>	<small>Property Owner (if different)</small>	<small>Authorized Agent (if applicable)</small> <input type="checkbox"/> Consultant <input type="checkbox"/> Contractor
<small>Contact Name</small>			
<small>Business Name</small>			
<small>Mailing Address 1</small>			
<small>Mailing Address 2</small>			
<small>City, State, Zip</small>			
<small>Business Phone</small>			
<small>Cell Phone</small>			
<small>Fax</small>			
<small>Email</small>			
<b>(2) PROJECT INFORMATION</b>			
<small>A. Provide the project location.</small>			
<small>Project Name</small>	<small>Tax Lot #</small>	<small>Latitude &amp; Longitude*</small>	
<small>Project Address / Location</small>	<small>City (nearest)</small>	<small>County</small>	
<small>Township</small>	<small>Range</small>	<small>Section</small>	<small>Quarter/Quarter</small>
<small>Brief Directions to the Site</small>			

# How will a stream function assessment method improve the mitigation process?

- Assist in determining ecological match for impacts
- Encourage applicants to strive for high degree of avoidance and minimization of impacts, and function/value replacement at mitigation sites
- Increase consistency in project evaluation
- Inform mitigation (restoration) designs
- Improve mitigation performance standards and outcomes
- Improve tracking of function/value gains and losses

# What are the SFAM development objectives?

✓ *science-based*

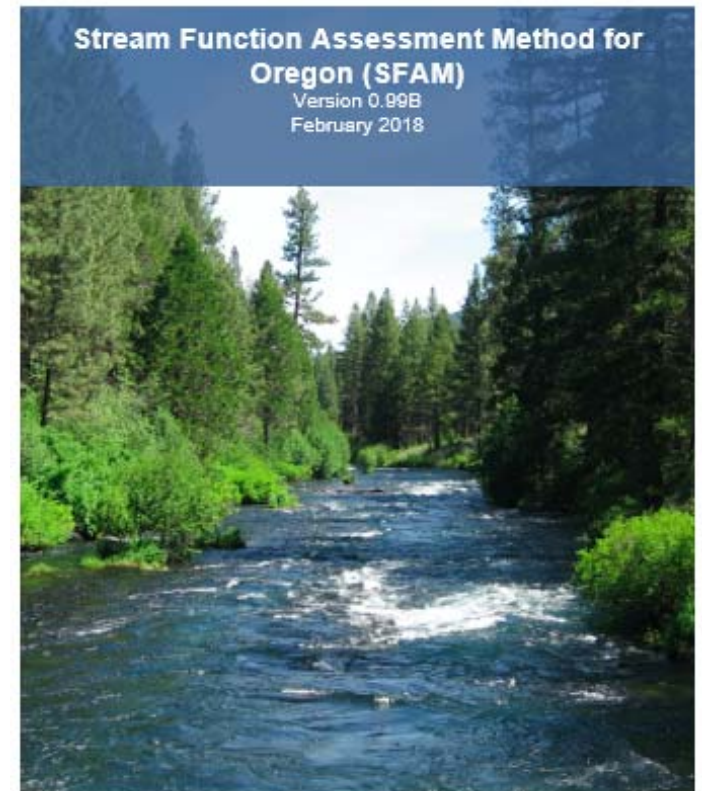
✓ *rapid*

✓ *applicable statewide*

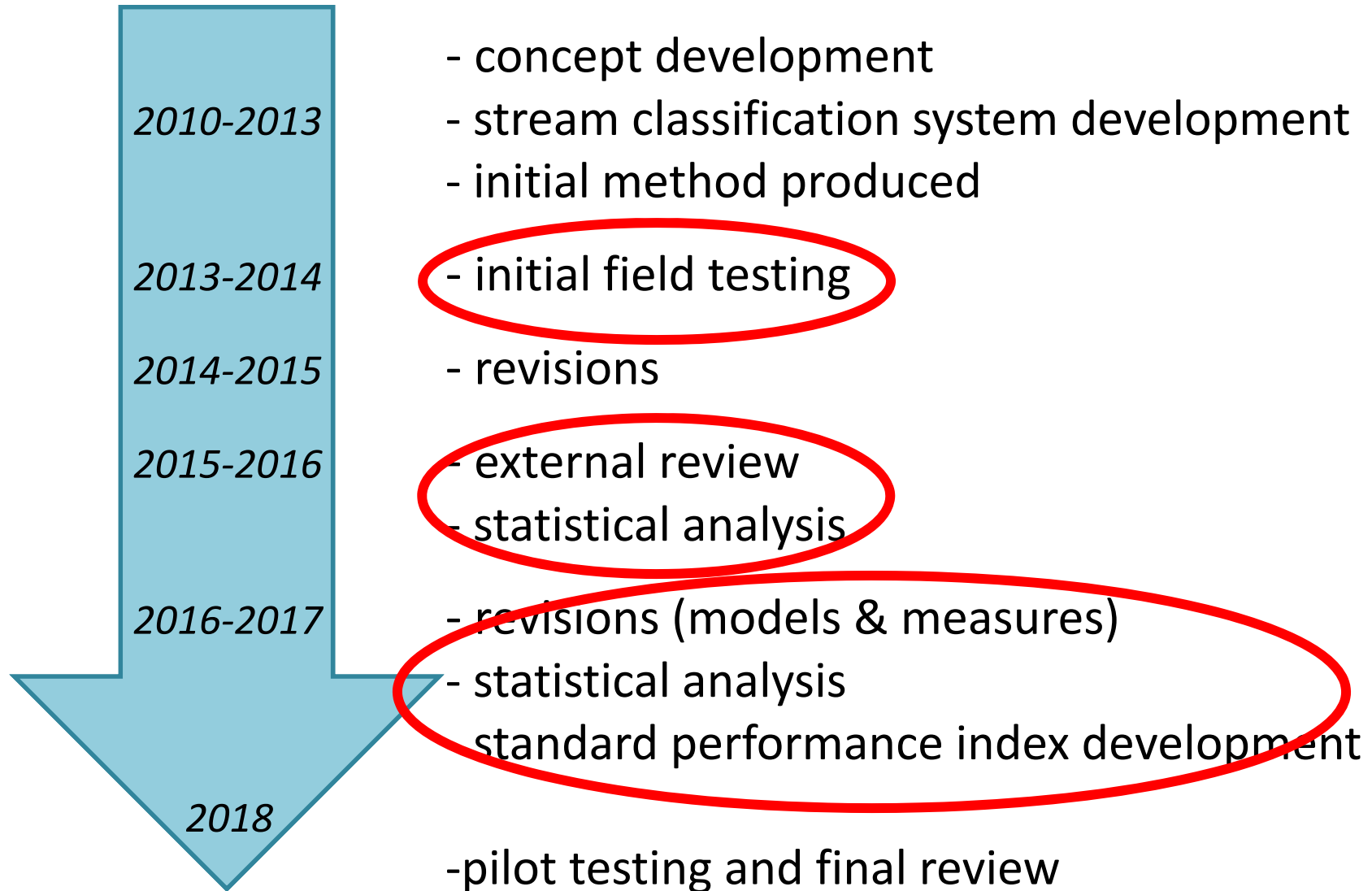
✓ *function-based*

✓ *repeatable*

- Designed and field tested to:
  - quantify functions and values
  - reflect landscape and watershed processes
- Applicable for non-regulatory purposes: assessment, restoration planning, project monitoring



# SFAM development history



# Defining stream functions & values

*Function = the processes that create and support a stream ecosystem*

*Value = the ecological and societal benefits that riverine systems provide*

- 11 functions were selected to represent the majority of stream and riparian processes necessary to sustain healthy stream ecosystems
- Each function has an associated value
- Functions are categorized within 4 functional groups

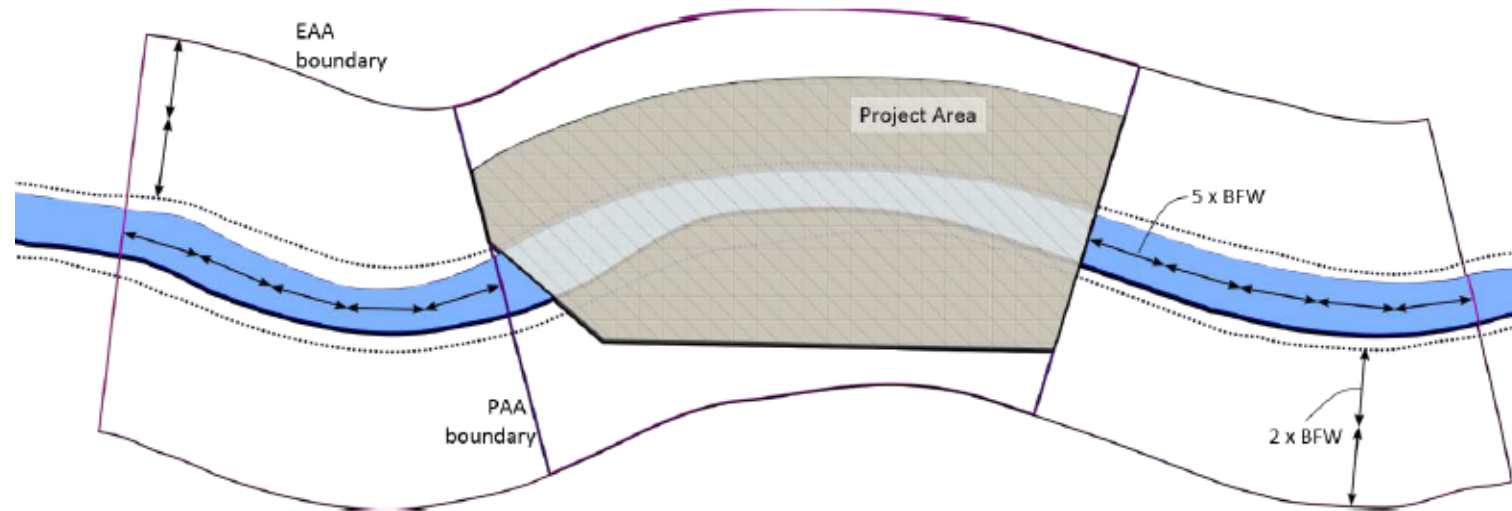
Function Group	Specific Functions/Values
Hydrologic	Surface Water Storage Sub/Surface Transfer Flow Variation
Geomorphic	Sediment Continuity Substrate Mobility
Biologic	Maintain Biodiversity Create and Maintain Habitat Sustain Trophic Structure
Water Quality	Nutrient Cycling Chemical Regulation Thermal Regulation

# Measuring stream functions & values

- Functions are difficult to directly measure within regulatory parameters, must be quantified using measures
- 16 measures evaluate specific features characteristic of, or inherent to, the function and may indicate the extent to which a particular function is active
- 16 value measures determine the opportunity to provide a particular function and the local significance of that function



# What is the assessment scale for SFAM?



## Assessment Area Delineations:

**Project Area (PA):** Spatial extent of direct project impacts.

**Proximal Assessment Area (PAA):** Assessment area for functions likely to be directly affected by action in the PA. Includes the entire channel, both streambanks, riparian area, and upland adjacent to the PA.

**Extended Assessment Area (EAA):** Assessment area for functions that may be expressed at a reach scale.





# Ecological function

## Surface water storage

(regulate discharge, replenish soil moisture, create low velocity habitat & refugia)

# Function measures

- ✓ Quantifiable
- ✓ Rapid
- ✓ Repeatable
- ✓ Sensitive

side channels present?



variable channel bed?



incised channel?



wood in stream?



...

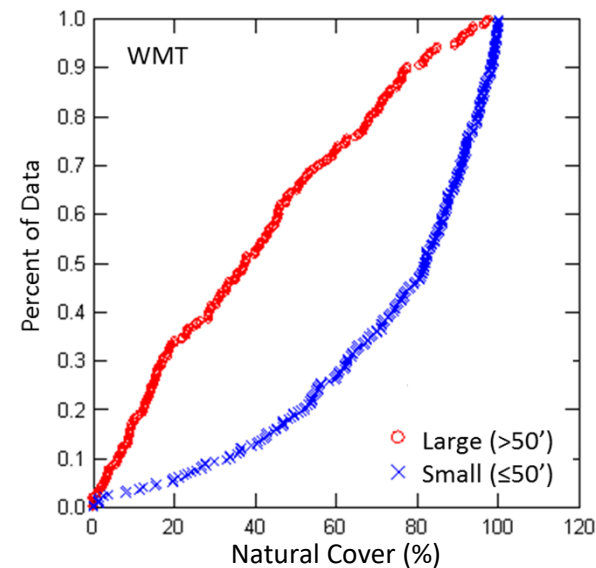
# Developing performance indices

Performance indices were developed to translate measures' metrics (percentages, absolute values, ratios, etc.) into meaningful index values (scale of 0.0 – 1.0)

STEP 1: Identify factors upon which a measure may need to be stratified. The purpose of **stratification** is to account for context and adjust performance expectations accordingly.

*Example: Natural Cover* →

*A comparison of natural cover data from both small and large streams presents evidence to support stratification of performance expectations based on stream size*



# Developing performance indices

Performance indices were developed to translate measures' metrics (percentages, absolute values, ratios, etc.) into meaningful index values (scale of 0.0 – 1.0)

STEP 2: Review literature and evaluate available data to **create meaningful scoring indices**. Development methods varied based on the quantity and type of information available:

## METHOD 1

Substantial literature exists linking metrics to ecological functioning. Indices are based on trends and thresholds expressed in the literature.

## METHOD 2

In the absence of substantial literature, looked for an abundance of raw data (e.g. EPA NARS dataset) that could be used to set expectations.

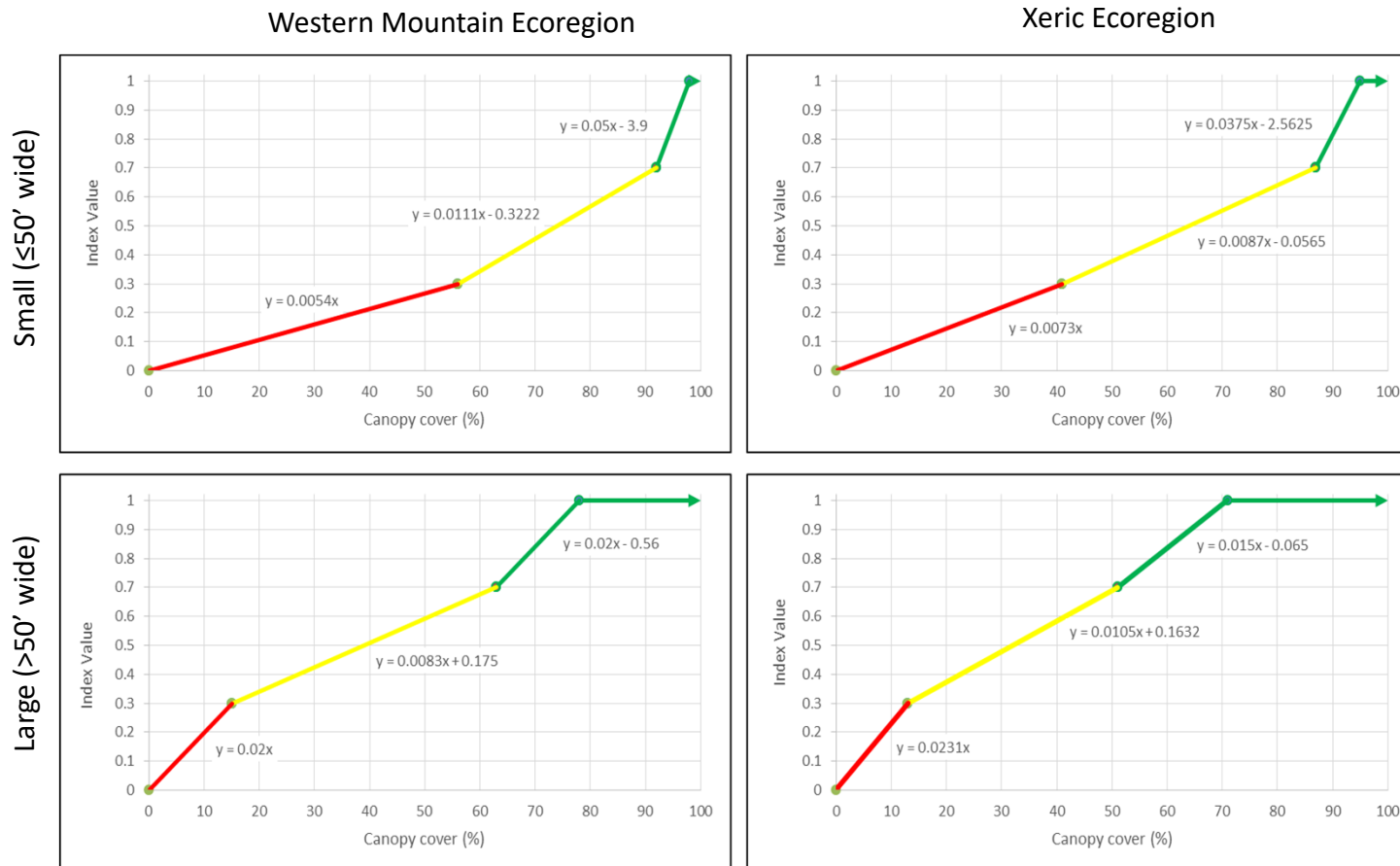
## METHOD 3

In the absence of substantial literature or an abundance of raw data, relied on current scientific understanding of how metrics relate to functioning.

# Example: Natural Cover

*Development method 2 (abundance of raw data)*

Measure: What is the percent of vegetated cover above the stream within the Proximal Assessment Area (PAA)?



# What are the components of SFAM?

- Excel Workbook
- User Manual
- Scientific Rationale
- SFAM Map Viewer



## Aquatic Mitigation

INTRO ARTICLES & STORIES MAPS & TOOLS REPORTS & PUBLICATIONS DATA



Aquatic mitigation seeks to balance alterations made to our aquatic resources with protecting functions such as controlling floodwater, filtering pollution and providing natural habitats for plants and animals.

Source:

STREAM FUNCTION ASSESSMENT METHOD for OREGON							
Name of Project Area:		Enter Data in Yellow Boxes ONLY					
		Subscores Automatically Calculated in Green Boxes					
FUNCTIONS MEASURES TABLE							
Measure	Function Groups	Measure Abbreviation	Qualifiers	Data Entry			Measure Score
Incision	<b>What is the degree of channel incision within the FAA?</b>						
	As part of the longitudinal survey, at 11 evenly spaced locations along the stream within the EAA, measure the Bank Height Ratio (BHR). The BHR is the height from the stream thalweg to the lowest floodplain/terrace divided by the active channel height (see field form). Do not consider inset floodplains.						
Functions informed: Surface Water Storage, Sediment Continuity							
	Hydrology, Geomorphology, Biology	Incision		Enter the average bank height ratio (rounded to the nearest hundredth)			
Canopy Cover	<b>What is the percent vegetated cover above the stream within the PAA?</b>						
	Measure percent cover above the stream, including both overstory and understorey vegetation, by averaging spherical densiometer measurements taken at each transect within the PAA.						
Functions informed: Sub/Surface Transfer, Nutrient Cycling, Thermal Regulation							
	Biology, Water Quality	Cover		Enter a percentage (rounded to the nearest whole number)			
Invasive Weeds	<b>What is the percent cover of invasive weeds within the PAA?</b>						
	Functions informed: Maintain Biodiversity, Sustain Trophic Structure						
	Biology	InvWeed		Enter a percentage (rounded to the nearest whole number)			

The U.S. Army Corps of Engineers and the Oregon Department of State Lands collaboratively but independently administer a permit process to protect, conserve and provide for the best use of m proposed project has reduced adverse effects to aquatic resou called compensatory mitigation, to replace the area, functions

**Stream Function Assessment Method (SFAM) Map Viewer**

The Stream Function Assessment Method allows a rapid assessment of the functions and values of streams. The SFAM tool provides site-specific mapping and reporting information needed to answer a subset of SFAM indicator questions. It also allows SFAM users to upload completed assessments. The SFAM method and supporting documents can be viewed or downloaded from the Department of State Lands website.

**Oregon Rapid Protocol (ORP)**

The Oregon R Protocol (ORP) assessment of wetlands. The specific mappi needed to ans indicator ques users to uploa The entire ORP viewed or dow Department of

Report Generated: August 23, 2017 03:12 PM

**OREGON EXPLORER Stream Function Assessment Method (SFAM) Report**

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**Location Information**

Latitude	44.8354 N	Longitude	-122.3614 W
Level IV Ecoregion	Western Cascades Lowlands and Valleys	Watershed (HUC8)	17000005 North Santiam
HUC10	1700000505 Little North Santiam River	HUC12	170000050503 Upper Little North Santiam River
Linear ft of stream in HUC(8)	2,381,890	Annual precipitation	78 in

Within 300 ft of a Special Protected Area or Wetland Priority Area?  No

Within a HUC12 that has designated Essential Salmonid Habitat?  Yes

Within 2 miles of an Important Bird Area?  No

**Dominant soil type(s)**

Soil Type	Erosion Hazard Rating	Hydric Rating	Percent Area
Cat 3B: Insuff Water	Not rated	Unknown	40.53 %
Camas gravelly sandy loam	Slight	No	33.35 %
Camas gravelly sandy loam	Slight	No	26.12 %

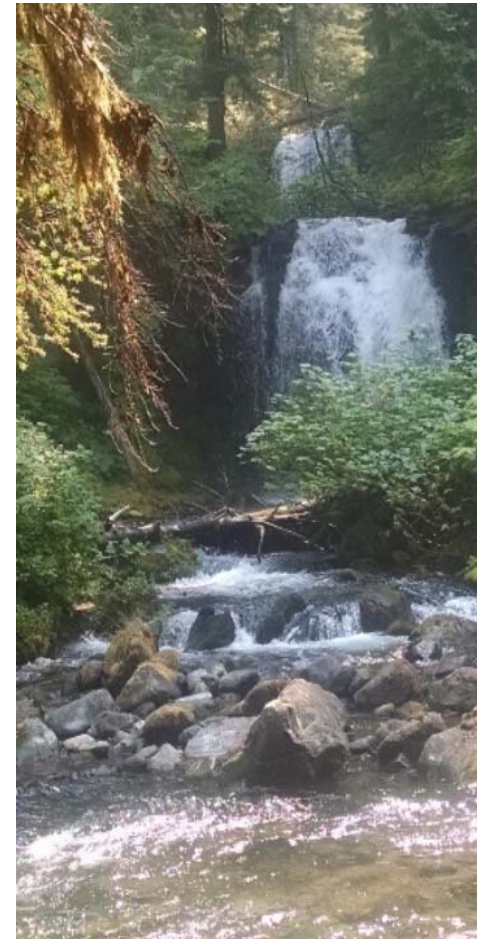
**Stream Type and Classifications**

Stream Classification	Mountain Wet / Locally Mountain Dry	Aquifer permeability	Low
Category 5: approved, (B) is not caused	High	Floodplain influence	No
Category 3B: data are insur	High	Stream order	3
	Moderately_Erodible	Percent Area	100.00 %

Stream classifications and associated attributes are derived from a U.S. Environmental Protection Agency stream classification geospatial data layer developed for Oregon (2015). This layer provides a statewide stream/watershed classification system for streams and rivers of various sizes, based in part on a hydrologic landscape classification system.

# Timeline for SFAM Completion & Implementation

- ODOT pilot application: Jan–Apr 2018
- Internal (agency) and targeted external reviews: Feb-May 2018
- Internal (agency) training: Spring 2018
- Revisions to beta: May-June 2018
- Public release & external training: June 2018
- Aquatic Resources Mitigation Framework will be implemented through ODSL rulemaking, February 2019



# Additional SFAM Development Team Members

- ODSL: *Dana Hicks, Charlotte Trowbridge*
- Willamette Partnership: *Nicole Maness*
- CSS-Dynamac: *Rob Coulombe*
- ESA; Wolf Water Resources: *Nicole Czarnomski*

## Additional SFAM Map Viewer Development Team Members

- Institute for Natural Resources/OSU: *Myrica McCune, Marc Rempel, Jimmy Kagan*
- ODSL: *Charlotte Trowbridge, Dana Hicks*

[nadeau.tracie@epa.gov](mailto:nadeau.tracie@epa.gov)

<http://www.oregon.gov/dsl/WW/Pages/Aquatic-Resources-Mitigation-Framework.aspx>

