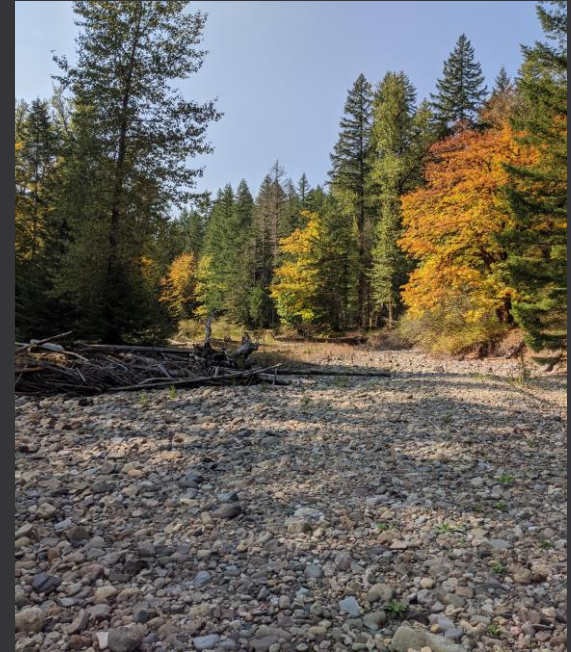




Streamflow Duration Assessment Methods: Method Development for the Pacific Northwest



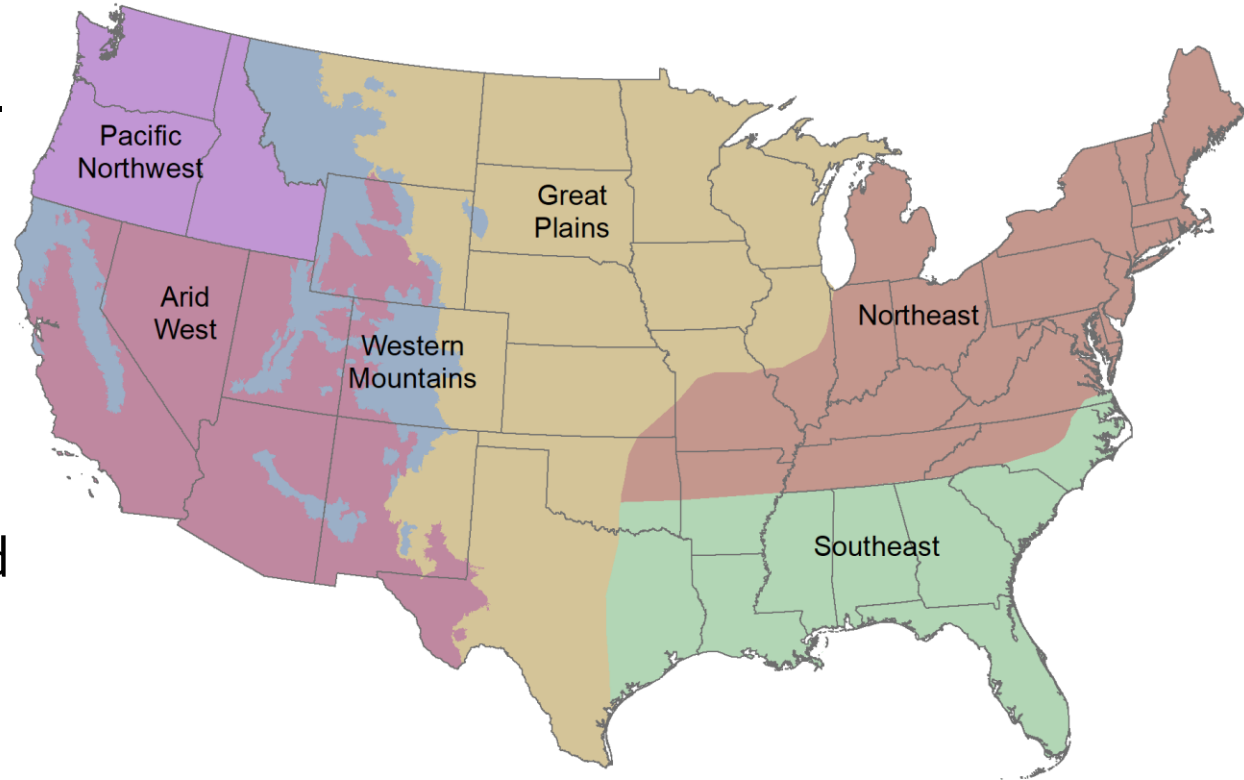
Virtual Training
2024



SDAM Regions

The Pacific Northwest (PNW) was the first regional SDAM developed through EPA's cooperative partnership with the U.S. Army Corps of Engineers and others.

- It began as the SDAM for Oregon, also partnering with the Oregon Department of State Lands.
- Expanded the development study to include Idaho and Washington; thus, the region covered by the PNW method reflects state boundaries.
- Regions delineated for development of subsequent regional SDAMs were based on differences in climate, dominant native vegetation type, hydrology, geology, and topography.



SDAMs in Adjacent Regions

The Pacific Northwest (ID, OR, WA) consists of the Arid West and Western Mountain Ecoregions.

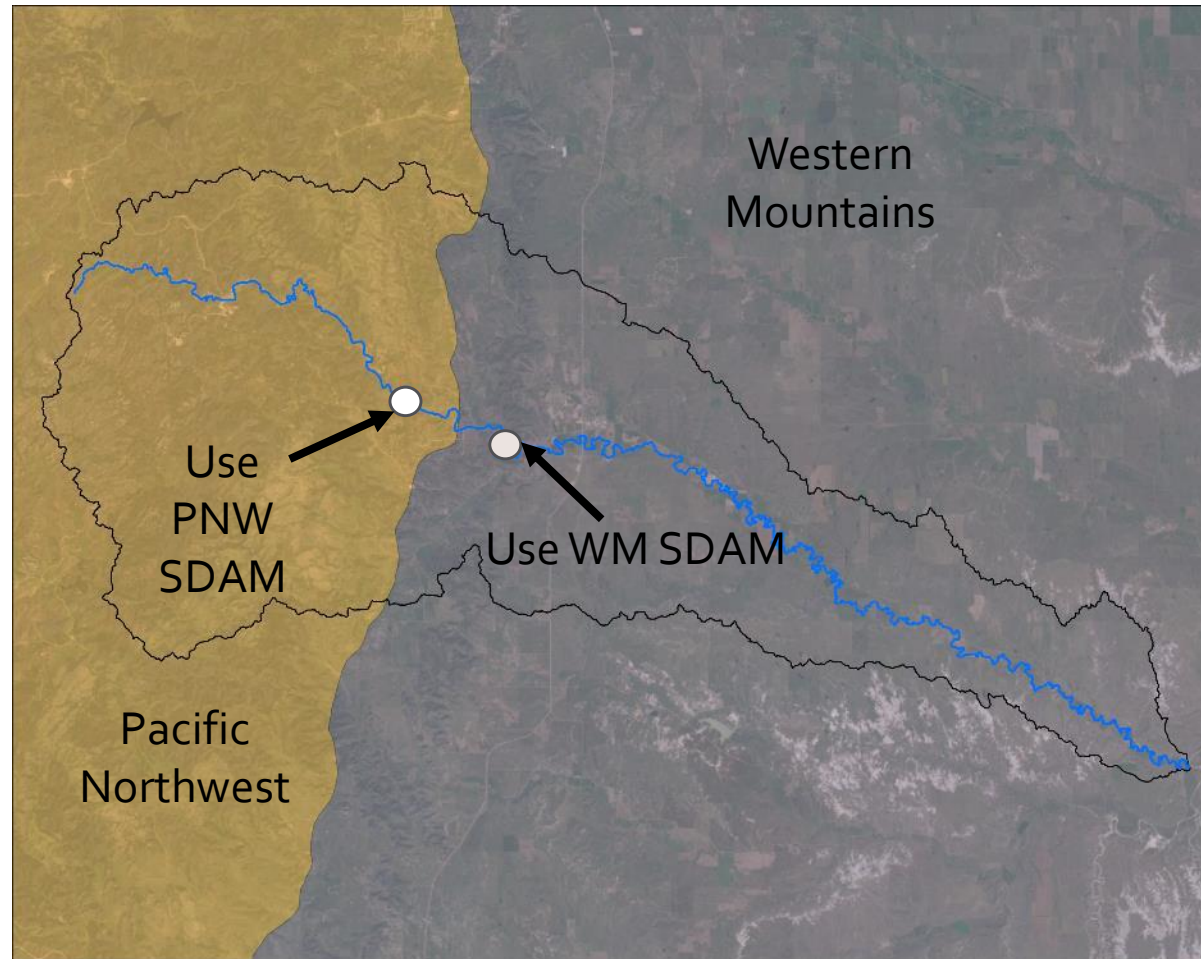


However, the Arid West and Western Mountain SDAMs were not developed to apply in the Pacific Northwest! (and vice-versa)

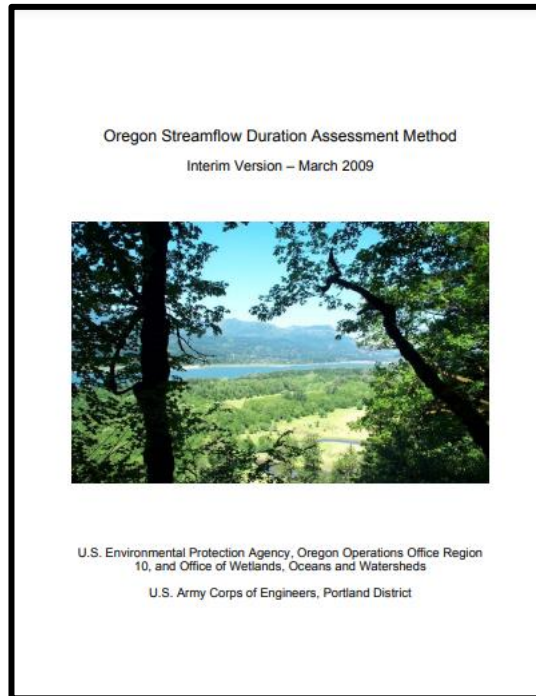


SDAMs in Adjacent Regions

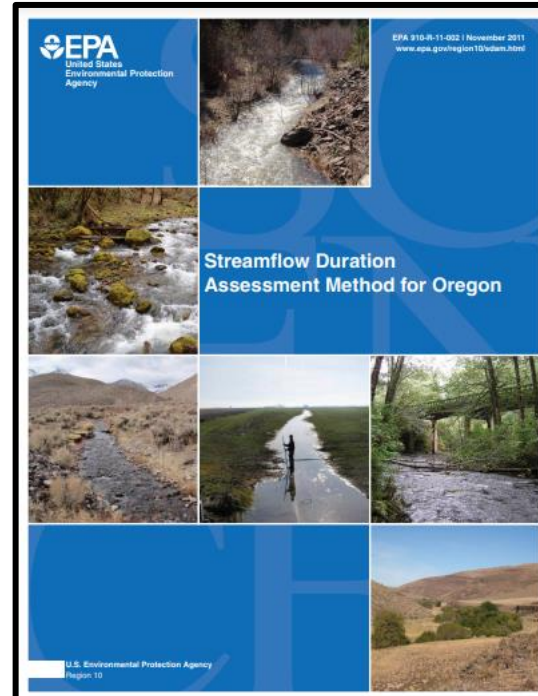
- The location of the assessment reach (not the watershed) determines which SDAM to use.
- The location of contributing catchment does not matter.



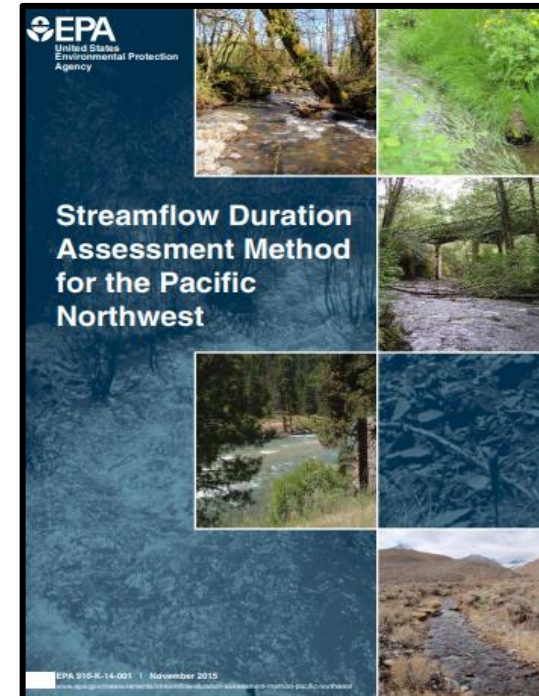
Method development



2009



2011

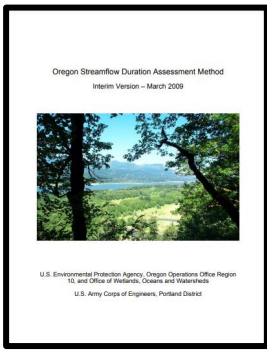


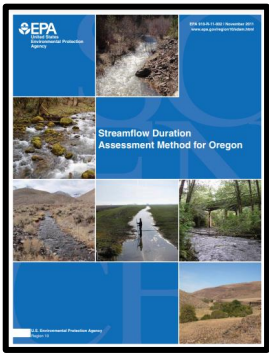
2015

[Nadeau et al. \(2015\)](#)

Interim (OR) Method development

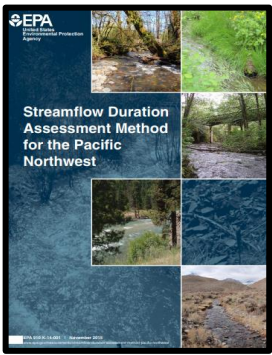
- Identified candidate indicators through a) existing SDAMs (NCDWQ 2005), b) review of scientific literature, c) field validation, and d) Xerces Society report “Using Aquatic Macroinvertebrates as Indicators of Streamflow Duration”
 - 7 geomorphological (e.g., slope, sinuosity)
 - 5 hydrological, both direct and indirect (e.g., presence of baseflow [direct], organic debris lines or piles [indirect])
 - 9 biological (e.g., fish presence, presence of perennial macroinvertebrate indicator taxa)
- Identified candidate study reaches through reviewing hydrologic databases, consulting local experts, and field reconnaissance.
- Two year plus trial period to garner feedback from user community while statewide validation study completed; DSL, Corps, EPA provided training statewide to support informed use and feedback.





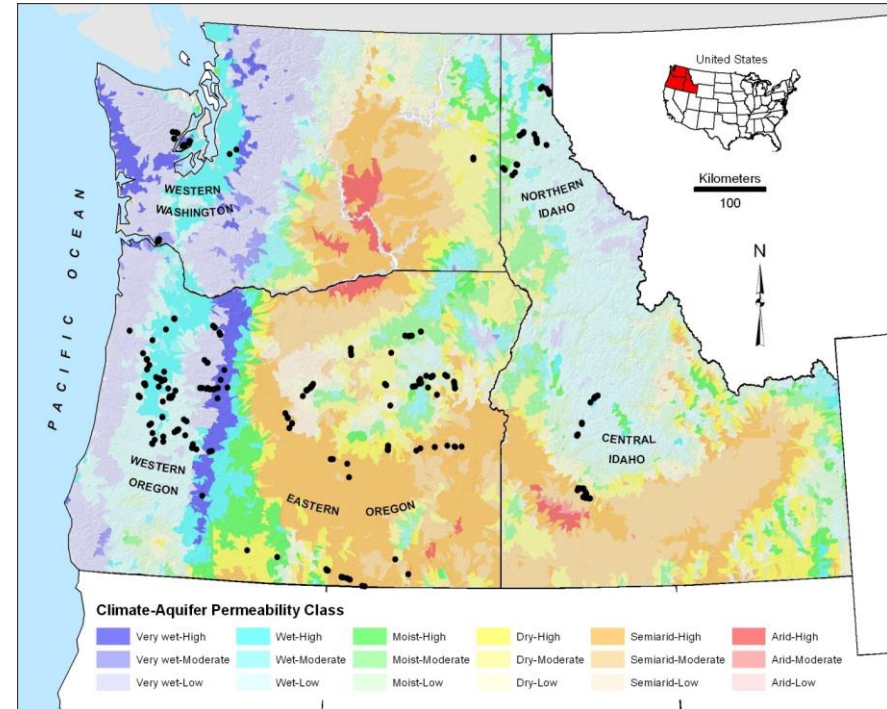
Final (Oregon) Method

- Collected indicator data at 178 study reaches.
- Distributed east and west of the Cascades.
- Wet and dry season data collection:
 - OR_east: 41 ephemeral, 35 intermittent, 12 perennial
 - OR_west: 29 ephemeral, 28 intermittent, 33 perennial
- Created machine learning statistical model(s) to predict streamflow-duration class from 43 candidate indicators.
- Refined and simplified the final method based on agency experience with Interim method and user/public comment.



SDAM for the Pacific Northwest

- Collected indicator data at 86 additional study reaches in ID and WA.
- Wet and dry season data collection:
 - ID_central: 10 ephemeral, 13 intermittent, 7 perennial
 - ID_north: 7 ephemeral, 13 intermittent, 8 perennial
 - WA_west: 9 ephemeral, 8 intermittent, 11 perennial
- Created machine learning statistical model(s) to predict streamflow duration class from 43 candidate indicators.



The SDAM PNW is based on 5 indicators:

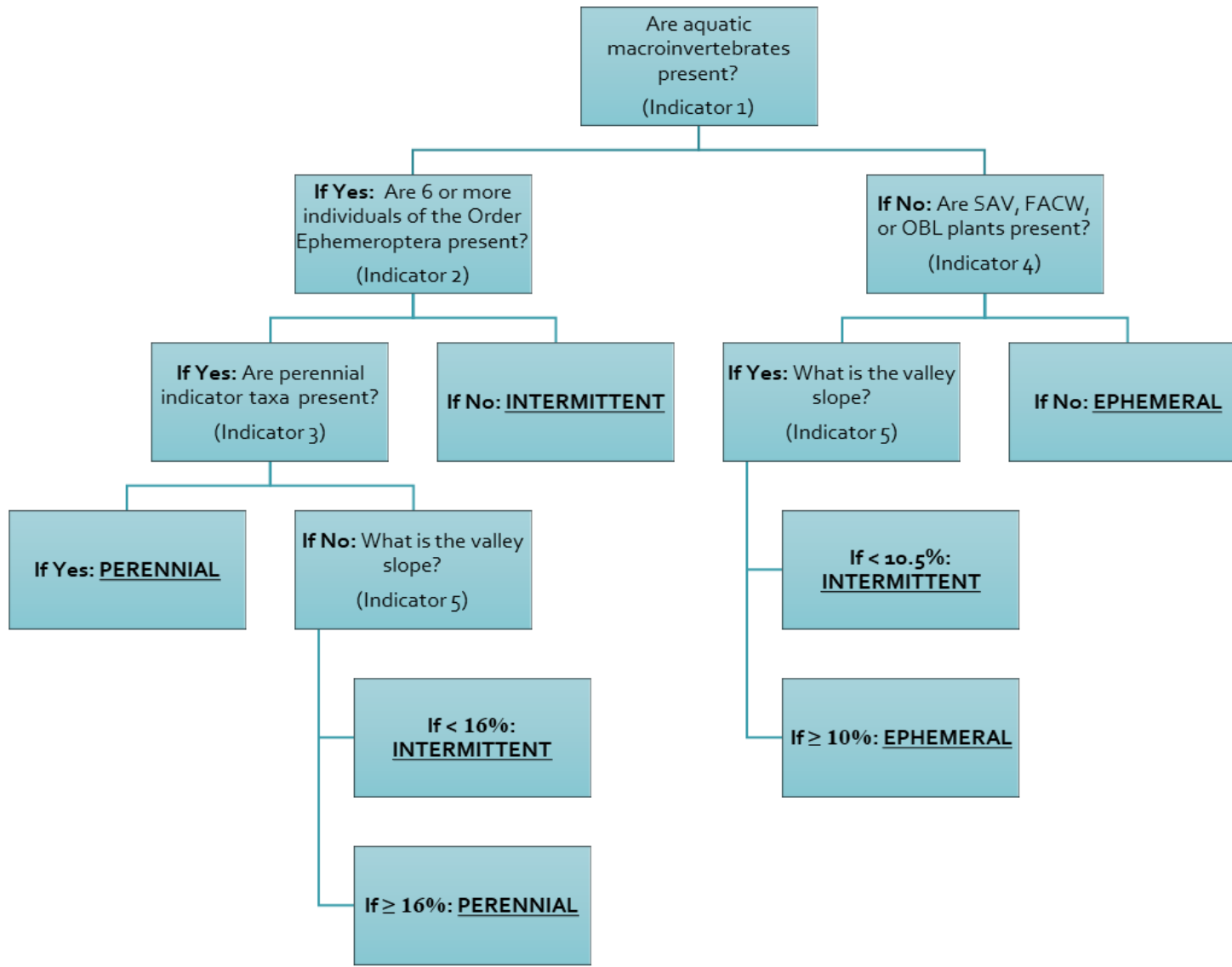
All indicators are measured
in the **field**

Biological indicators

1. Presence of aquatic macroinvertebrates
2. Presence of 6 or more Ephemeroptera (mayflies)
3. Presence of perennial (macroinvertebrate) indicator taxa
4. Wetland plants in or near streambed

Geomorphological indicator

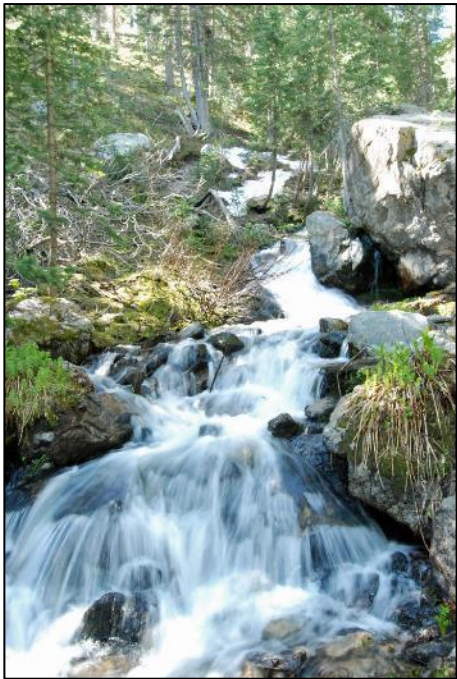
5. Slope



**Classifications
are based on a
decision tree**

SDAMs classify stream reaches into 3 main categories

Perennial



Intermittent



Ephemeral



At Least Intermittent

SDAM PNW includes 2 “single indicators” which can result in an “at least intermittent” classification

Indicators are measured in the **field**

Biological indicators

1. Presence of one or more fish (non-mosquito fish)
2. Presence of aquatic life stages of certain herpetofauna

ACCURACY (%)	SINGLE INDICATOR	
	Herpetological life history stages	Fish
ALL	<i>Presence I/P streams</i> 48.5	42.8
	<i>Presence Accuracy</i> 97.1	100

Knowledge check!

Which of the following indicators are part of the PNW SDAM? Select all that apply.

- A. Total aquatic macroinvertebrate abundance
- B. Slope
- C. Bankfull channel width
- D. Sinuosity
- E. Hydrophytic plants
- F. Differences in vegetation
- G. Riffle-pool sequence

The PNW SDAM is based on 5 indicators, including the 2 circled answers, plus:

- Presence of aquatic macroinvertebrates
- Presence of 6 or more Ephemeroptera (mayflies)
- Presence of perennial (macroinvertebrate) indicator taxa

And two “single indicators:”

- Presence of fish
- Presence of aquatic life stages of certain herpetofauna



**For more information about
SDAMs, visit:**

<https://www.epa.gov/streamflow-duration-assessment>