EPA United States Environmental Protection Agency

US Army Corps of Engineers

ERDC

Western Mountains Streamflow Duration Assessment Method: Shade

Video Training

2025

The Western Mountains SDAM is based on 10 indicators:

All indicators are measured in the **field**

In recommended order of data collection

1. Bankfull channel width
2. Aquatic macroinvertebrate indicators
   - Abundance of perennial indicator taxa
   - Abundance of Ephemeroptera, Plecoptera, and Trichoptera
4. Slope
5. **Shading**
6. Number of hydrophytic plant species
7. Prevalence of rooted upland plants in the streambed
8. Differences in vegetation
9. Riffle-pool sequence
10. Particle size or stream substrate sorting

Shading

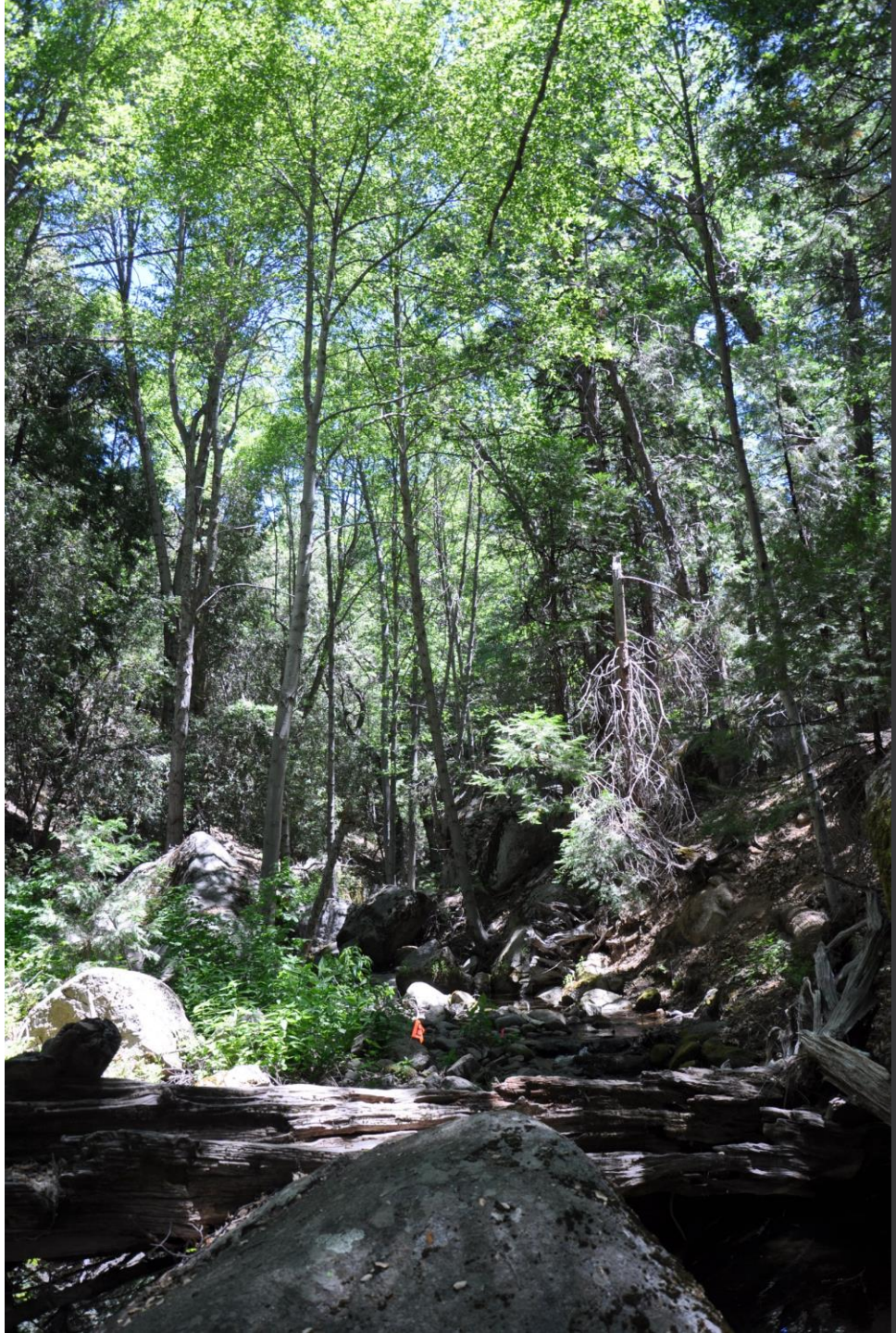
Shade is a **response** to streamflow duration

- Longer streamflow duration leads to more lush riparian growth, which can provide shade

It may also be a **control**

- Shade cools temperature and reduces evapotranspiration

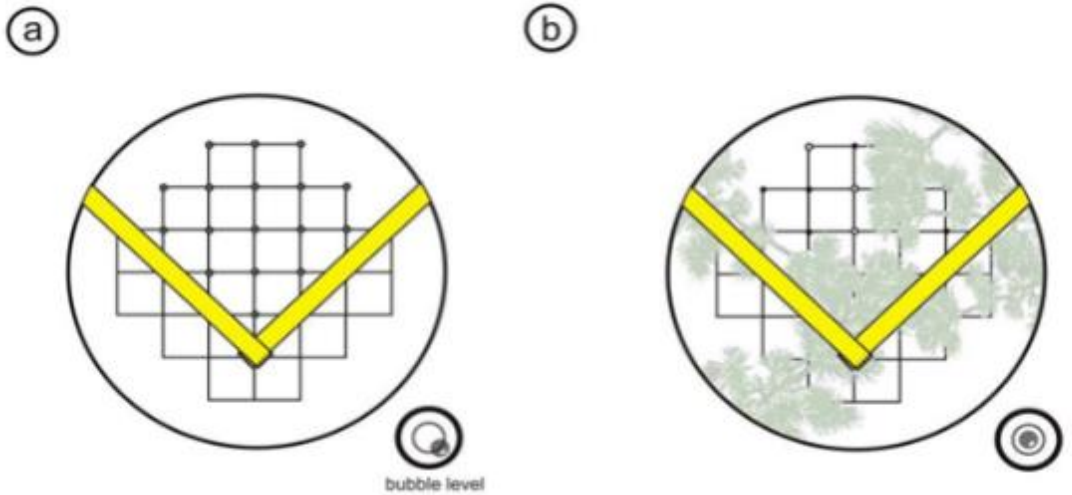
Only used in the Western Mountains SDAM



Shading

Determine extent of stream shading using **convex spherical** densiometer

- Modified as shown (17-point intersections should be in the 'V')
- The 'V' of the tape should be oriented towards observer's face on mirror
- Readings should be taken 0.3m (1 ft.) above water or dry streambed surface at center of each transect
- Keep level
- Count number of point intersections obscured
  - Natural and man-made are treated the same; tree branches, leaves, buildings, stream banks, light poles, etc can all create shade
- Leaves may not be fully developed if assessments occur outside the peak growing season. In these circumstances, estimate the coverage that would be provided by fully developed leaves at the peak of the growing season.



Shading

Take measurements at 3 transects

- Downstream edge of assessment reach
- Middle of assessment reach
- Upstream edge of assessment reach

At center of each transect, take four readings:

- Facing upstream
- Facing the right bank
- Facing the left bank
- Facing downstream

Observer should revolve around densiometer (not the other way around)

Record on the field form

Record number of **covered** points at each intersection (up to 17)

- 17 points * 4 measures per transect * 3 transects = 204 maximum possible points

Calculate the percent shaded:

- 100 *(# covered points / 204) = % shading

5. Shading (WM only)

At the center of three transects, use a convex spherical densiometer to record the number of points covered by trees, canyon walls, buildings, or other structures that provide shade (up to 17 points per location). Calculate percent shading as the percentage of points covered by such structures (total points covered divided by 204).

Percent shading: _____

	Downstream transect	*Middle transect*	*Upstream transect*
Facing upstream	/17	/17	/17
Facing right bank	/17	/17	/17
Facing left bank	/17	/17	/17
Facing downstream	/17	/17	/17

Notes on shading:

Knowledge check!

What kind of densiometer do I need to measure shade for the Western Mountains SDAM?

Convex Densiometer

Concave Densiometer

GRS Densitometer

A convex spherical densiometer

For more information about SDAMs:

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