EPA United States Environmental Protection Agency

US Army Corps of Engineers

ERDC

Southeast Streamflow Duration Assessment Method: Rooted Upland Plants, Fibrous Roots and Particle Size Indicators

Video Training

2025

The SDAMs are based on 12 indicators:

Nine (9) indicators are measured in the **field,** three (3) are **desktop-based**

Five (5) are shared by both SDAMs, plus:

- Two only used in NE SDAM
- Five only used in SE SDAM

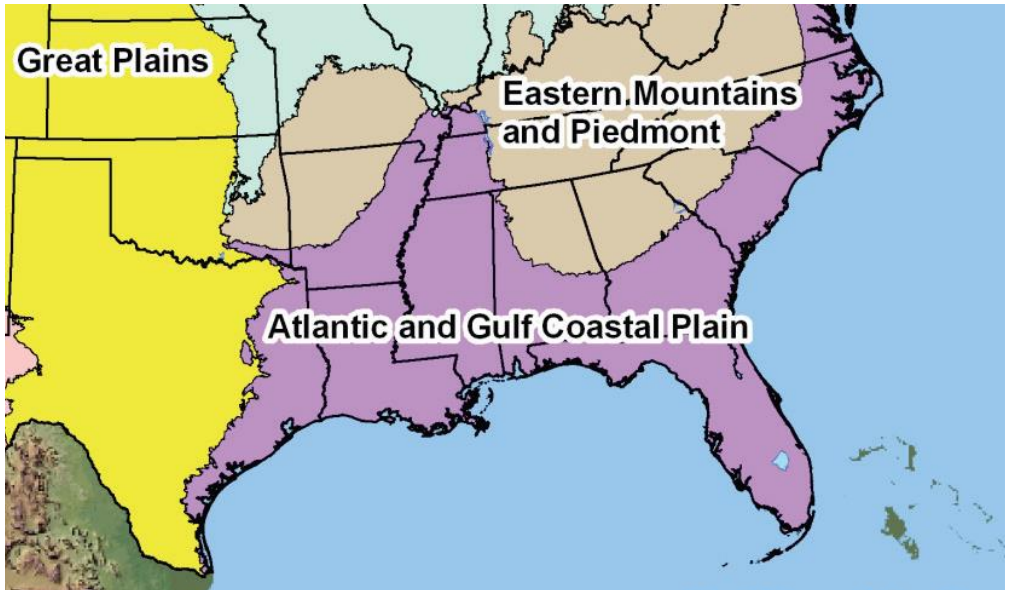
*In recommended order of data collection**

1. Bankfull channel width
2. Entrenchment ratio (NE only)
3. Aquatic macroinvertebrate indicators
   - Benthic Macroinvertebrate Index (BMI) score
   - Total aquatic macroinvertebrate abundance (SE only)
5. Slope (NE only)
6. Shading
7. Prevalence of rooted upland plants in the streambed (SE only)
8. Particle size of stream substrate (SE only)
9. Prevalence of fibrous roots in the streambed (SE only)
10. Drainage area
11. Elevation
12. Average precipitation (May-July) (SE only)

*Note: there is no #4 (1, 2, 3, 5) to account for the two different aquatic macroinvertebrate indicators.

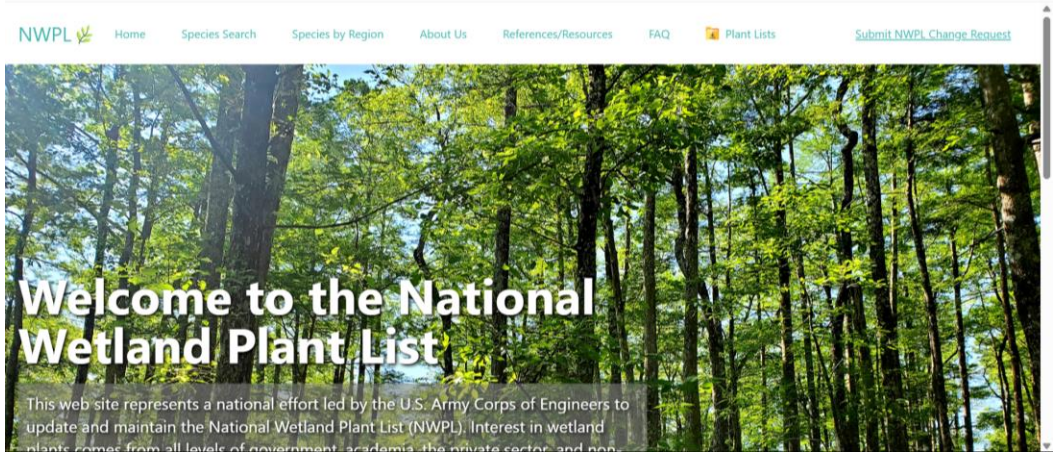
Prevalence of Rooted Upland Plants in Streambed

- An 'upland plant' is a species with a National Wetland Plant List (NWPL) indicator of FAC, FACU, or UPL; also includes those with No Indicator (NI).
- SE region encompasses parts of three NWPL regions.

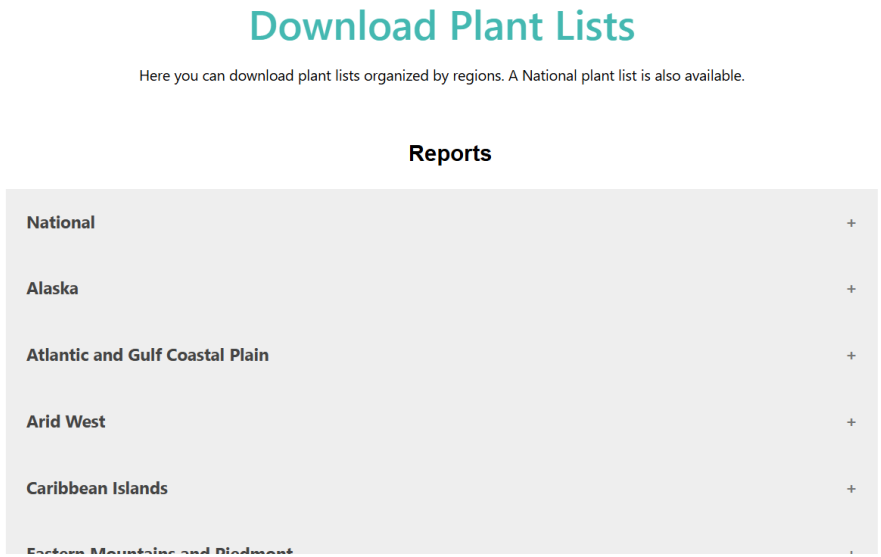


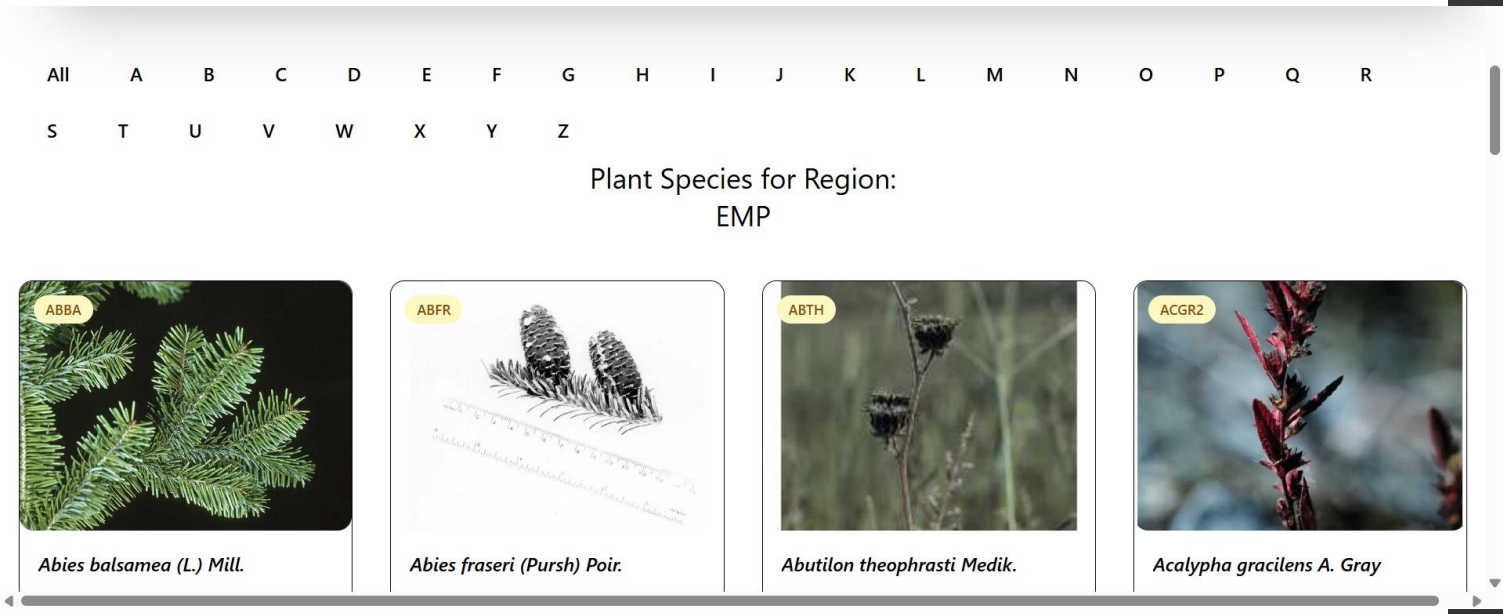
- Must be rooted anywhere in the streambed. <u>Plants rooted on upland islands, or the streambank do not count</u>, including those that may extend over the streambed.
- Higher scores are indicative of **lower** prevalence of rooted upland plants in the streambed!

Find regional floras to know what upland species to expect



- The NWPL website has species lists by NWPL Region and resources to help identify common species from the All Things Wetland Plants series.
- Plant lists have likely also been developed for nearby public lands (e.g., national parks, national grasslands) and state native plant societies may have other useful resources.



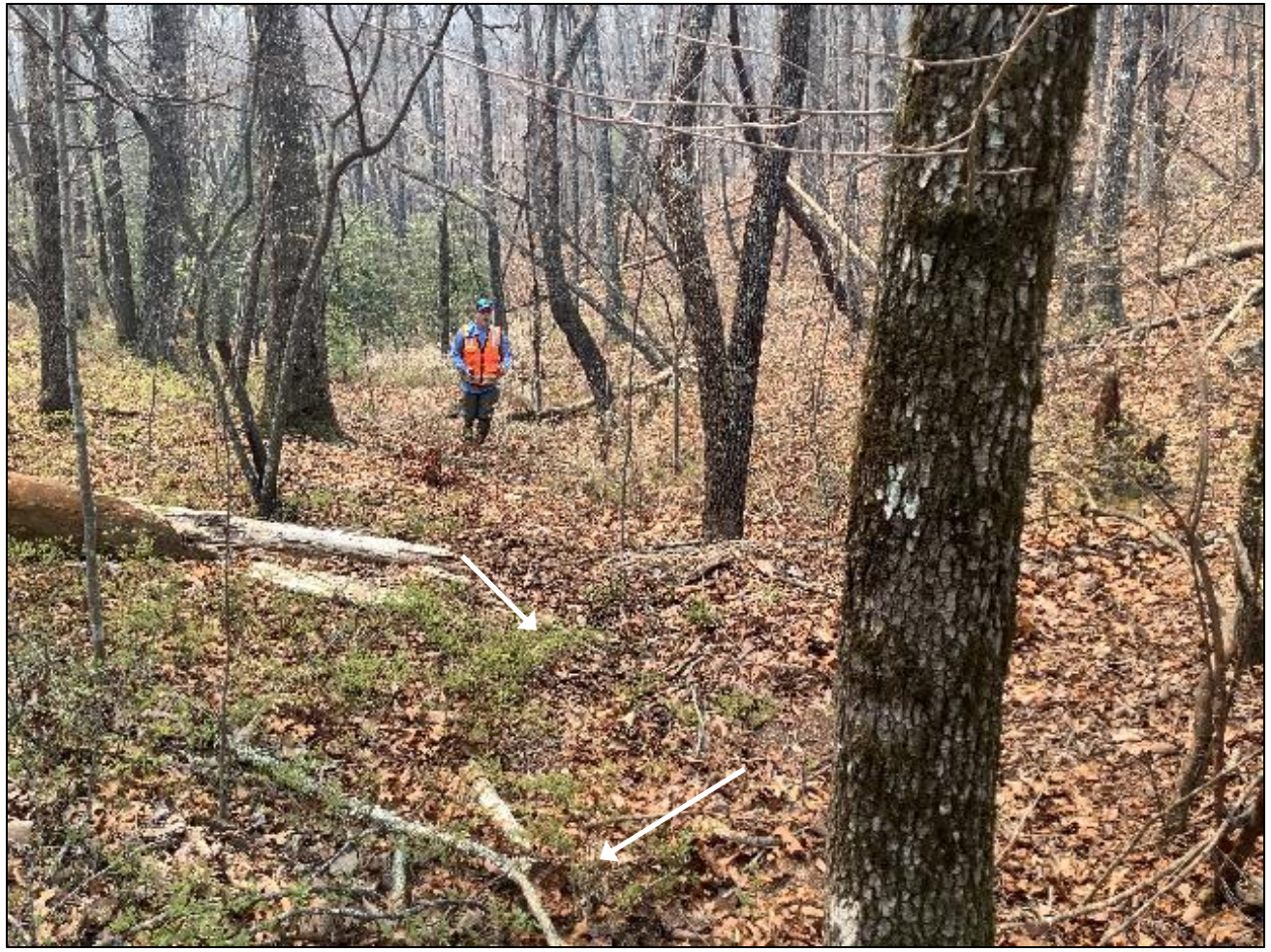


Prevalence of rooted upland plants in the streambed

Prevalence of Rooted Upland Plants in Streambed

Indicator is based on a visual estimate of upland plant abundance and distribution within the streambed and scored on an ordinal scale; half scores are not allowed:

- **Poor (0): Rooted upland plants are prevalent within the streambed (greater than 75%).**



Vaccinium angustifolium (lowbush blueberry; FACU) is prevalent within streambed

Prevalence of Rooted Upland Plants in Streambed

Indicator is based on a visual estimate of upland plant abundance and distribution within the streambed and scored on an ordinal scale; half scores are <u>not</u> allowed:

- Poor (0): Rooted upland plants are prevalent within the streambed (greater than 75%).
- **Weak (1): Rooted upland plants are consistently dispersed throughout the streambed (20-75%).**

Cunila origanoides (common dittany; NI) is widely dispersed throughout the streambed.

Prevalence of rooted upland plants in the streambed

Prevalence of Rooted Upland Plants in Streambed

Indicator is based on a visual estimate of upland plant abundance and distribution within the streambed and scored on an ordinal scale; half scores are <u>not</u> allowed:

- Poor (0): Rooted upland plants are prevalent within the streambed (greater than 75%).
- Weak (1): Rooted upland plants are consistently dispersed throughout the streambed (20-75%).
- **Moderate (2): Few rooted upland plants are present within the streambed (less than 20%).**

Few *Laportea canadensis* (wood nettle; FAC in the EMP region) in streambed.

Prevalence of Rooted Upland Plants in Streambed

Indicator is based on a visual estimate of upland plant abundance and distribution within the streambed and scored on an ordinal scale; half scores are not allowed:

- Poor (0): Rooted upland plants are prevalent within the streambed (greater than 75%).
- Weak (1): Rooted upland plants are consistently dispersed throughout the streambed (20-75%).
- Moderate (2): Few rooted upland plants are present within the streambed (less than 20%).
- **Strong (3): Rooted upland plants are absent within the streambed.**

The only rooted plants in the streambed are hydrophytes (*Justicia americana*, water willow; OBL)

Record on the field form

- SE indicator, appears on combined and SE field forms only.
- We recommend taking at least two photos:
  - One showing vegetation in the channel.
  - One showing vegetation in surrounding uplands.
- Does NOT allow half scores, due to corresponding percentages.

7. Prevalence of rooted upland plants in streambed (SE only)

____ (0-3)	Evaluate the prevalence of rooted upland plants (i.e., plants rated as FAC, FACU, UPL, or not listed in the regionally appropriate National Wetland Plant List) in the streambed. 0 (Poor) Rooted upland plants are *prevalent* within the streambed (>75%). 1 (Weak) Rooted upland plants are *consistently dispersed* throughout the streambed (20-75%). 2 (Moderate) There are *a few* rooted upland plants present within the streambed (<20%). 3 (Strong) Rooted upland plants are *absent* from the streambed.

Upland Species	Notes	Photo ID

Notes on rooted upland plants:

Prevalence of rooted upland plants in the streambed

Knowledge check!

True or false: There is only one National Wetland Plant List region applicable to the SE SDAM.

A. True

B. False

Knowledge check!

True or false: There is only one National Wetland Plant List region applicable to the SE SDAM.

A. True

B. False

There are three NWPL regions that apply to the SE SDAM, depending on where your reach is located. Plant species may have different wetland indicator status in different regions. Woodnettle (*Laportea canadensis*) is FACW or FAC depending on region.

Prevalence of rooted upland plants in the streambed

Knowledge check!

Which of these may be considered upland plant species for the SE SDAM? Select all that apply.

A. Ferns
B. Sphagnum moss
C. Club moss
D. Woody trees and shrubs
E. Filamentous algae
F. Grasses, sedges, and rushes
G. Liverworts
H. Horsetails

Knowledge check!

Which of these may be considered upland plant species for the SE SDAM? Select all that apply.

A. Ferns

B. Sphagnum moss

C. Club moss

D. Woody trees and shrubs

E. Filamentous algae

F. Grasses, sedges, and rushes

G. Liverworts

H. Horsetails

The National Wetland Plant List only includes vascular plants. Mosses and liverworts aren't included in the NWPL, although they may be used as wetland indicators in other applications.

Knowledge check!

True or false: Upland plants must be rooted in stream thalweg to count for the 'Prevalence of Rooted Upland Plants in the Streambed' indicator.

A. True

B. False

Knowledge check!

True or false: Upland plants must be rooted in stream thalweg to count for the 'Prevalence of Rooted Upland Plants in the Streambed' indicator.

A. True

B. False

Upland plants must be within the streambed, but do not need to be confined to the stream thalweg.

The SDAMs are based on 12 indicators:

Nine (9) indicators are measured in the **field,** three (3) are **desktop-based**

Five (5) are shared by both SDAMs, plus:

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*In recommended order of data collection**

1. Bankfull channel width
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5. Slope (NE only)
6. Shading
7. Prevalence of rooted upland plants in the streambed (SE only)
8. Particle size of stream substrate (SE only)
9. Prevalence of fibrous roots in the streambed (SE only)
10. Drainage area
11. Elevation
12. Average precipitation (May-July) (SE only)

*Note: there is no #4 (1, 2, 3, 5) to account for the two different aquatic macroinvertebrate indicators.

Particle size of stream substrate

Particle Size of Stream Substrate

- Response to erosional and sediment transport forces that are a result of streamflow. Stronger particle size differentiation is associated with longer streamflow duration.
- Compare particle size/sediment texture between bottom of channel and areas outside the channel. Bedrock counts!
- May be able to visually assess, though some features with finer sediments may require other methods (pebble count, sand gage reference card).
- May be difficult to assess when channel ice is present.

Particle Size of Stream Substrate

ABSENT

Indicator is based on comparison of in-channel to out-of-channel sediments. This indicator is scored on an ordinal scale, where half scores are allowed:

- **Poor (0): The channel is poorly developed, very little to no coarse sediment is present. There is no difference between particle size in the stream substrate and adjacent land.**

Particle Size of Stream Substrate

WEAK

Indicator is based on comparison of in-channel to out-of-channel sediments. This indicator is scored on an ordinal scale, where half scores are allowed:

- Poor (0): The channel is poorly developed, very little to no coarse sediment is present. There is no difference between particle size in the stream substrate and adjacent land.
- **Weak (1): The channel is poorly developed through the soil profile. Some coarse sediment is present in the streambed but is discontinuous. Particle size differs little between the stream substrate and adjacent land.**

Particle size of stream substrate

Particle Size of Stream Substrate

MODERATE

Indicator is based on comparison of in-channel to out-of-channel sediments. This indicator is scored on an ordinal scale, where half scores are allowed:

- Poor (0): The channel is poorly developed, very little to no coarse sediment is present. There is no difference between particle size in the stream substrate and adjacent land.
- Weak (1): The channel is poorly developed through the soil profile. Some coarse sediment is present in the streambed but is discontinuous. Particle size differs little between the stream substrate and adjacent land.
- **Moderate (2): There is a well-developed channel, but it is not deeply incised through the soil profile. Some coarse sediment is present in the streambed in a continuous layer. Particle size differs somewhat between the stream substrate and adjacent land.**

Particle size of stream substrate

Particle Size of Stream Substrate

STRONG

Indicator is based on comparison of in-channel to out-of-channel sediments. This indicator is scored on an ordinal scale, where half scores are allowed:

- Poor (0): The channel is poorly developed, very little to no coarse sediment is present. There is no difference between particle size in the stream substrate and adjacent land.
- Weak (1): The channel is poorly developed through the soil profile. Some coarse sediment is present in the streambed but is discontinuous. Particle size differs little between the stream substrate and adjacent land.
- Moderate (2): There is a well-developed channel, but it is not deeply incised through the soil profile. Some coarse sediment is present in the streambed in a continuous layer. Particle size differs somewhat between the stream substrate and adjacent land.
- **Strong (3): The channel is well-developed through the soil profile with relatively coarse streambed sediments compared to the riparian zone soils: coarse sand, gravel, or cobbles in the piedmont; cobbles or boulders in the mountains, and medium or coarse sand in the coastal plain. Particle size differs greatly between the stream substrate and adjacent land.**

Particle size of stream substrate

Record on the field form

SE indicator, will only be on SE and combined field forms.

6. Particle size of stream substrate

____ (0-3) *Half scores (0.5, 1.5, 2.5) are allowed.*	Compare substrate on the channel bed to the banks and adjacent floodplain. 0 (Absent) The channel is poorly developed, very little to no coarse sediment is present. There is no difference between particle size in the stream substrate and adjacent land. 1 (Weak) The channel is poorly developed through the soil profile. Some coarse sediment is present in the streambed but is discontinuous. Particle size differs little between the stream substrate and adjacent land. 2 (Moderate) There is a well-developed channel, but it is not deeply incised through the soil profile. Some coarse sediment is present in the streambed in a continuous layer. Particle size differs somewhat between the stream substrate and adjacent land. 3 (Strong) The channel is well-developed through the soil profile with relatively coarse streambed sediments compared to the riparian zone soils: coarse sand, gravel, or cobbles in the piedmont; cobbles or boulders in the mountains, and medium or coarse sand in the coastal plain. Particle size differs greatly between the stream substrate and adjacent land.
Notes on particle size of stream substrate:	

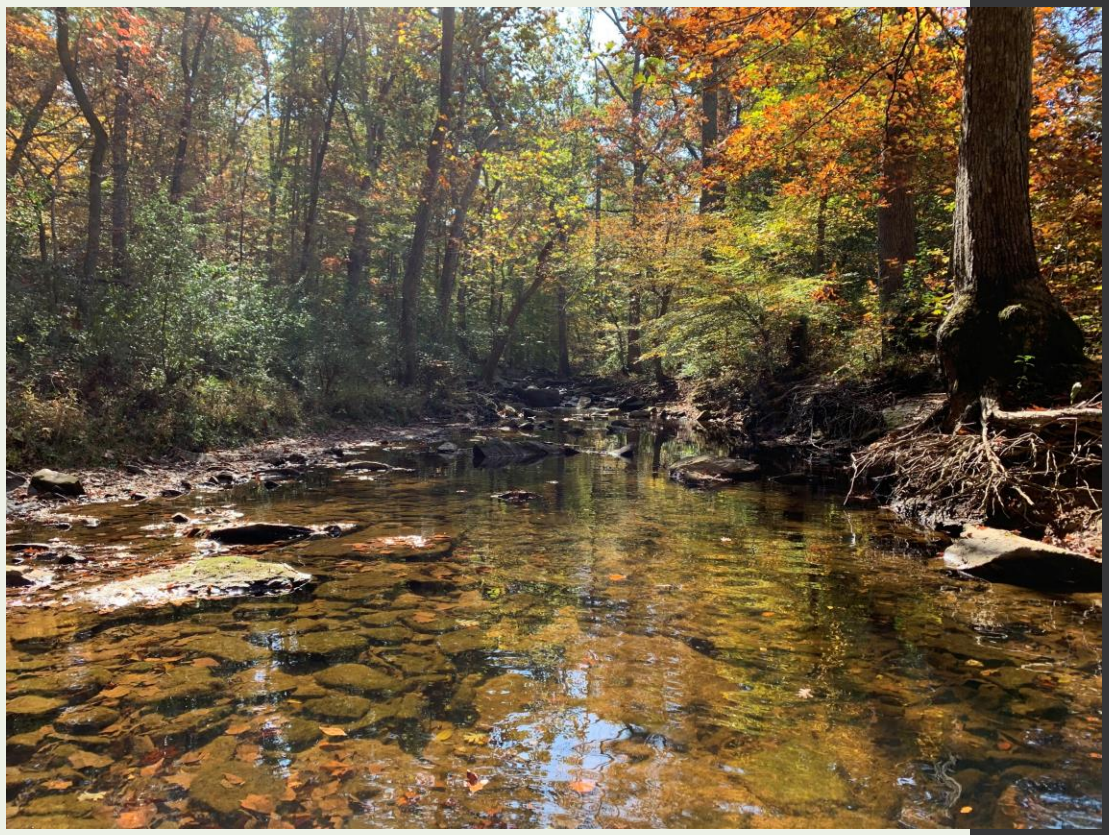
Particle size of stream substrate

Knowledge check!

True or False? The particle size of stream substrate indicator for the Southeast SDAM compares the relative difference in sizes of substrate in riffles and pools.

A. True

B. False



Prevalence of fibrous roots in streambed

Knowledge check!

True or False? The particle size of stream substrate indicator for the Southeast SDAM compares the relative difference in sizes of substrate in riffles and pools.

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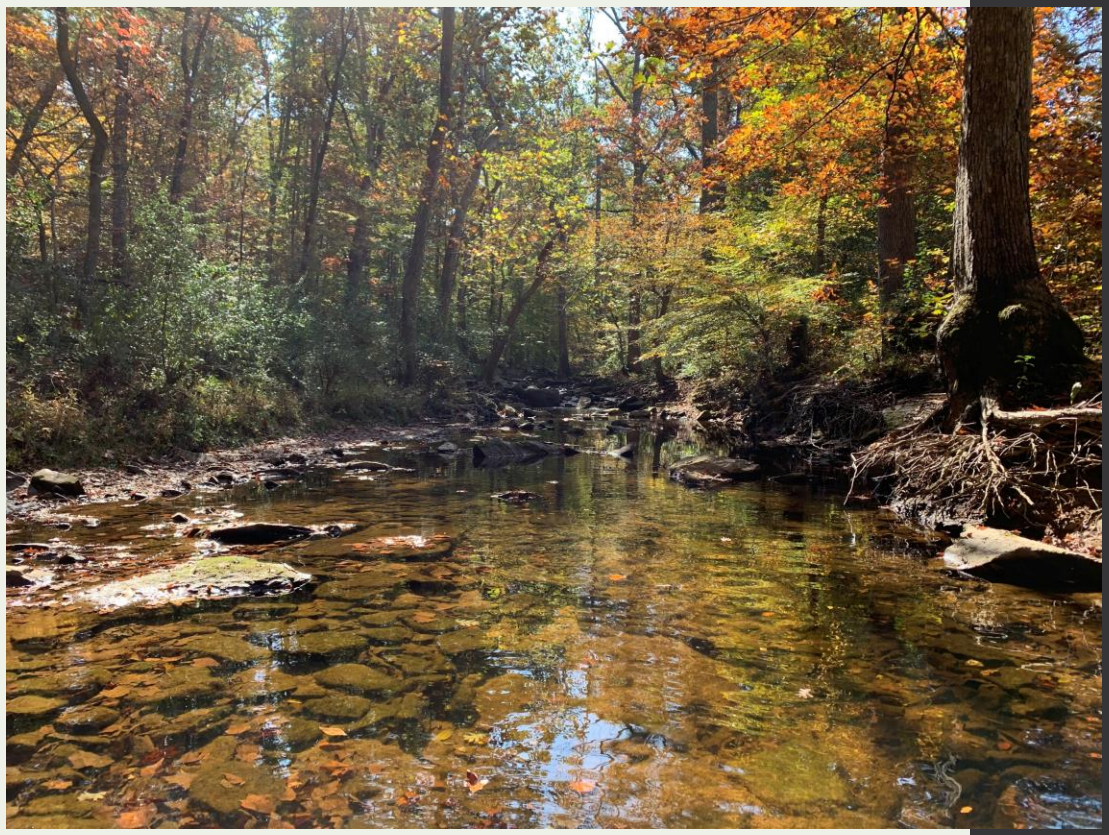
B. False



False – the particle size of stream substrate indicator for the Southeast SDAM compares the sizes of streambed substrate to the sizes of substrate on the stream banks and adjacent uplands.

Prevalence of fibrous roots in streambed

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Prevalence of fibrous roots in streambed

Prevalence of fibrous roots in streambed

- Non-woody, small diameter shallow roots that can form dense masses in first few inches of soil. Relatively easy to tear.
- Reflects incursion of upland species into the streambed, where water and/or high energy flows would typically limit their growth.
- This indicator is based on an estimate of the amount of fibrous roots in the streambed scored on an ordinal scale (0-3), where half scores are allowed.
- Fibrous roots in the streambank or on upland islands do not count for this indicator. Roots of hydrophytes and riparian trees, which are adapted to water flow and are more robust (e.g., harder to tear), should also be ignored for this indicator.
- Higher scores are indicative of **lower** prevalence of fibrous roots in the channel!

Prevalence of fibrous roots in streambed

Count these

Not these!

Record on the field form

SE indicator, will only be on SE and combined field forms.

7. Prevalence of fibrous roots in the streambed

____ (0-3) *Half scores (0.5, 1.5, 2.5) are allowed.*	Evaluate the extent of fibrous roots in the streambed. 0 (Absent) A strong network of fibrous roots is persistent in the stream thalweg and surrounding area. 1 (Weak) A discontinuous network of fibrous roots is present in the stream thalweg and surrounding area. 2 (Moderate) Very few fibrous roots are present anywhere in the streambed. 3 (Strong) No fibrous roots are present.
Notes on fibrous roots:	

Prevalence of fibrous roots in streambed

Knowledge check!

Should users count the roots shown in this photo towards the prevalence of fibrous roots in the streambed indicator?

A. Yes

B. No

Knowledge check!

Should users count the roots shown in this photo towards the prevalence of fibrous roots in streambed indicator?

A. Yes

B. No

These roots are larger, woody roots from riparian trees.

For more information about SDAMs:

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