Fieldsheet for The Ohio Sediment Stick

Developed with a citizen's action mini-grant from
Ohio DNR Division of Soil & Water Conservation

Caution! Your safety is important to us! Please take all necessary precautions whenever you use the Ohio Sediment Stick. Always take the water sample from a safe location. If you cannot wade a stream or river because of high flow conditions, or for any other reason, consider using a bucket that you lower from a bridge or other safe overhang into the stream or river to obtain a water sample to pour into the Sediment Stick. (See "Taking a Sample" below).

Purpose To estimate amount of soil sediment impacting a stream by estimating the turbidity of stream water.

Equipment Needed Sediment stick; tape to measure tenths of a foot; float; time keeping device; calculator.

Taking a Sample Either walk up stream to a point of regular flow or position the sample collecting person along the streambank. Hold the stick halfway between the surface and bottom. When the tube is oriented with it's open end upstream, it will fill with water. If high flow conditions exist, consider using a bucket that you lower from a bridge of safe overhang to collect a sample that can be poured into the Sediment Stick. Continue to keep sample in bucket stirred.

Reading the Stick Holding the stick in your shadow and perpendicular to the ground, pour out water until you can just see the 0.4 inch black dot target on the tube bottom. Rock the tube as needed to keep material suspended. Read the height of the water column from the markings on the stick to the nearest 1/4" (inch). Disregard the color of the water (it may be greenish or brownish); it is the suspended soil material that will affect your view of the target. Repeat this procedure once more. Use the averaged height to estimate total suspended solids (TSS).

Estimating Turbidity Water turbidity refers to the material suspended in the water that refracts light. Ohio EPA uses total suspended solids (TSS) to assess turbidity. You can convert Ohio Sediment Stick readings to TSS by using the conversion table on the back of this field sheet. Use the TSS estimate to calculate sediment load in pounds per day using four steps, also on the back.

Ohio EPA research indicates that Ohio Sediment Stick readings predict a laboratory analysis of TSS at 90%. This is not perfect, but accurate enough to estimate changing sedimentation rates in streams that may be attributed to problems in the upper watershed. Repeated monitoring with the stick establishes how sedimentation rates in your stream are changing due to problems in the upper watershed.

Water Rating You can estimate water quality quickly by using the Stick readings. The conversion table on the back of this field sheet is followed by the water quality scale based on analysis of unimpacted stream data for the state of Ohio.

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Sources Ken Moore, Elyria Water Works, Lorain, Ohio, unpublished, 1996
Robert Carlson, Ph.D., Kent State University, unpublished, 1996
Paul Anderson & Robert Davic, Ph.D, Ohio EPA Division of Surface Water, Twinsburg Field Office, 2001, in preparation
Paula Brown, Ohio EPA Modeling Section, Columbus Office, 1998

Estimating Total Suspended Solids: TSS

Use this table to convert Stick readings to an estimate of the weight of solids suspended in the water column. Table is based on research by Anderson and Davic, 2001, in preparation.

I. Total Suspended Solids: TSS
(Turbidity)

_____ mg/l

Stick(in)	TSS(mg/l)	Stick(in)	TSS(mg/l)	Stick(in)	TSS(mg/l)
0.5	1750.5	10.0	33.7	24.0	10.6
1.0	702.1	11.0	29.7	25.0	10.0
1.5	411.4	12.0	26.5	26.0	9.5
2.0	281.6	13.0	23.8	27.0	9.1
2.5	209.8	14.0	21.6	28.0	8.6
3.0	165.0	15.0	19.7	29.0	8.2
3.5	134.6	16.0	18.1	30.0	7.9
4.0	112.9	17.0	16.7	31.0	7.6
4.5	96.7	18.0	15.5	32.0	7.2
5.0	84.1	19.0	14.4	33.0	6.9
6.0	66.1	20.0	13.5	34.0	6.7
7.0	54.0	21.0	12.6	35.0	6.4
8.0	45.3	22.0	11.9	≥ 36.0 =	< 6.2
9.0	38.7	23.0	11.2		

II. Water Quality

_____Excellent
_____Normal
_____Impaired
_____Severely Impaired

This scale is based on Ohio statewide reference site data published by Brown, 1988.
TSS < 10mg/l = excellent water quality
TSS 10-28mg/l = normal water quality
TSS 29-133mg/l = impaired stream
TSS > 133mg/l = severely impacted stream

Estimating Stream Flow: Q

III. Stream Flow

Flow Velocity:

_____ f/s

Step 1: Estimate stream flow velocity in feet per second (f/s).
Measure a length of 10 feet in a straight section of stream channel. Record the time it takes a float to move that 10 feet in the area of deepest flow. To get a reliable estimate, make three readings and take the average.

Reading 1: 10ft ÷ _____seconds = _____f/s
Reading 2: 10ft ÷ _____seconds = _____f/s
Reading 3: 10ft ÷ _____seconds = _____f/s

Total = _____f/s ÷ 3 = _____average f/s velocity

Rate of Flow:

_____ cfs

Step 2: Find the stream cross-sectional area in square ft (ft^2).
In a straight section of stream, measure the width at the water's surface and bottom channel. For averaged depth, take measurements at one-foot intervals and divide by the number of readings.

$(W^s + W^b) \div 2 \times D$ = Area:

_____ft (surface) + _____ft (bottom) = _____ft ÷ 2 = _____ft. (ave.width) x _____ft (depth) = _____ft^2 (area (sq. ft.))

Step 3: Find the rate of flow in cubic feet per second (cfs).
Velocity [step 1] × area [step 2] = rate OR _____f/s (velocity) × _____ft^2 (area (sq. ft.)) = _____cfs (rate)

Estimating Stream Load of Soil Sediment: lbs/day

IV. Sediment Load

_____ lbs/day

Step 4: Convert total suspended solids reading to pounds of sediment per day (lbs/day)

TSS reading × conversion factor × rate (cfs) [step 3] = pounds per day

OR

_____TSS (mg/l) (turbidity) × 5.39 = _____ x _____ cfs (rate) = _____ load lbs/day