Stream Physical Survey

FASTly
FAITH & SCIENCE TEACHING

Section 1: General Information

Name:_____ Group members:_____

School:_____ Teacher(s):_____

Date:_____ Time: _____ City/Township:_____ County:_____

Test location: _____

River Branch:_____ Tributary: _____

If the access point to this site is a road crossing, does a road ditch discharge directly into the stream at the crossing? ☐ yes ☐ no

Section 2: Weather Conditions

☐ sunny ☐ partly cloudy ☐ cloudy ☐ rain

Any precipitation in the last 5 days? ☐ yes ☐ no If yes, approximate amount:_____

Air temperature: _____˚F Water temperature:_____˚F

Section 3: Stream Habitat

3.1) Water width:

Record stream width in meters **(all sites)**:

site 1_____ + site 2_____ + site 3 _____ = _____ ÷ 3 = _____

Average width for **all** sites

3.2) Depth:

Measuring depth at ***your*** site in meters

	At Bank (0 m)	Water Edge	¼ Across Water	½ Across Water	¾ Across Water	Far Water Edge	Opposite Bank
Horizontal Distance	0 m						
Depth to Ground	0 m						0 m
Water Depth	0 m	0 m				0 m	0 m

Average stream depth in meters for ***your*** site:

_____ + _____ + _____ + _____ + _____ = _____ ÷ 5 = _____

Average depth for **your** site

For all sites:
Average stream depth in meters **(all sites)**:

site 1 _____ + site 2 _____ + site 3 _____ = _____ ÷ 3 = _____

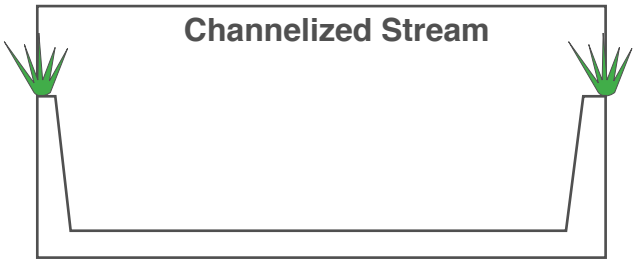
Average depth for **all** sites

Draw your Stream Profile (when looking downstream)

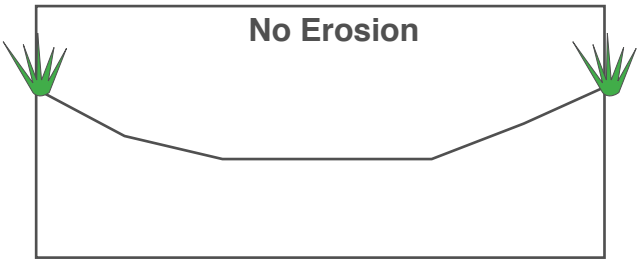
At bank (0 m) Water edge ¼ across water ½ across water ¾ across water Far water edge Opposite bank

When looking downstream, which picture does your stream profile resemble?

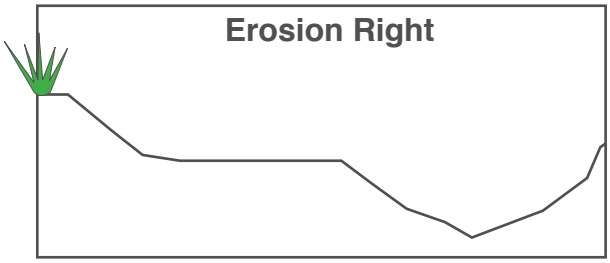
A.
Channelized Stream



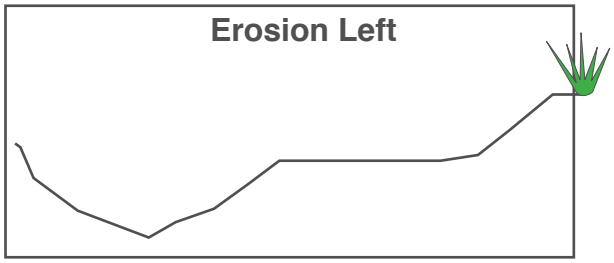
B.
No Erosion



C.
Erosion Right



D.
Erosion Left



3.3) Velocity:

Measuring surface water velocity (meters/second) at ***your*** site:

distance **(m)**: _____ ÷ time **(sec)**: _____

distance **(m)**: _____ ÷ time **(sec)**: _____

distance **(m)**: _____ ÷ time **(sec)**: _____

Test 1 velocity: _____ + Test 2 velocity: _____ + Test 3 velocity: _____ = _____ ÷ 3 = _____

Average velocity for **your** site

Average stream velocity in meters/sec **(all sites)**:

site 1 _____ + site 2 _____ + site 3 _____ = _____ ÷ 3 = _____

Average velocity for **all** sites

3.4) Flow:

Estimate flow at each test site:

Estimated flow at Site 1 = Width (site 1) x Average Depth (site 1) x Average Velocity (site 1) = _____ (m^3/sec)

Estimated flow at Site 2 = Width (site 2) x Average Depth (site 2) x Average Velocity (site 2) = _____ (m^3/sec)

Estimated flow at Site 3 = Width (site 3) x Average Depth (site 3) x Average Velocity (site 3) = _____ (m^3/sec)

Average stream flow for all sites: site 1 _____ + site 2 _____ + site 3 _____ = _____ ÷ 3 = _____ (m^3/sec)

Average flow rate for **all** sites

Section 4: Water Quality

4.1) Has the stream been channelized? ☐ yes ☐ no

4.2) Dams present: ☐ yes ☐ no If yes: ☐ man-made ☐ beaver / log jam

4.3) Water clarity / coloration (describe): _____

4.4) Water odor (describe): _____

4.5) Instream habitat (mark if present)

☐ riffles - shallow fast currents that often create bubbles

☐ runs - deep fast currents

☐ pools - areas of standing water

☐ eddies - areas where water circles back

4.6) Sticks and logs are…

☐ abundant

☐ common

☐ rare

☐ none

4.7) Substrate (Rank relative abundance: 1 = most common, 2 = next most abundant, etc. Leave blank if absent.)

_____ Silt

_____ Sand

_____ Gravel (0.25" - 2")

_____ Cobble (2" - 10")

_____ Boulder (>10")

4.8) Aquatic plants:

Are any of these plants very abundant? ☐ yes ☐ no

If present describe:
-- Free-floating or attached by root?
-- Color?
-- Broad-leaved or thin-leaved?

Section 5: Surrounding Land

5.1) Trash in stream along banks? ☐ yes ☐ no

5.2) Dominant watershed soil type: ☐ clay ☐ loam / sand ☐ organic

5.3) Riparian Vegetation (Rank relative abundance: 1 = most abundant, 2 = next most abundant, etc. Leave blank if absent.)

_____ Trees
_____ Shrubs
_____ Herbaceous plants
_____ Grass
_____ Bare
Other (please describe):_____
Other (please describe):_____

5.4) Stream Shading: ☐ 100 - 76% ☐ 75 - 51% ☐ 50 - 26% ☐ 25 - 0%

5.5) Bank Erosion: ☐ extensive ☐ moderate ☐ little/none

5.6) Estimated width of riparian vegetation corridor (meters): _____

5.7) Surrounding land use: (Rank relative abundance: 1 = most abundant, 2 = next most abundant, etc. Leave blank if absent.)

_____ Woodland _____ Wetland

_____ Open field _____ Farmland

_____ Residential _____ Commercial

_____ Other (please describe): _____

5.8) Any obvious pollution sources in water or on land? ☐ yes ☐ no
If yes, please describe:

5.9) During the sampling and evaluation, did you observe any fish or wildlife?
☐ yes ☐ no
If yes, what did you see?

5.10) Other observations:

5.11) Attach any photos to survey form (downstream, upstream, and others of interest).

Teacher Resources

Materials List:

- Pen or pencil
- Air thermometer or weather app (air temp)
- Water thermometer
- Tape measure (stream width)
- Meter stick(s) (depth)
- Flow meter or a stick that floats
- Stop watch device or phone (velocity)
- Waders
- Gloves

Sections One and Two can be done inside the classroom to save time.

Section Three: Stream Habitat

Make these observations on-site.

Terms:

- Erosion: banks being washed away by fast water. Look for exposed soils or "slumping" of banks.
- Stream channelization: stream made straight by mechanical means. Floodwalls or dredging are directly due to human activity. Too much stormwater can result in gushes of high-energy water, which also causes channelization. This is caused indirectly, due to human development and increased impervious surfaces in urban areas.

Activity:

Split students into three groups to collect three separate width and depth averages. It's helpful to have some chaperones or older kids familiar with the research to keep an eye on the different groups.

1. Measuring width: One person at the bank holds the 0 meter end of the measuring tape; the other person carefully walks across the stream with the measuring tape. That person attaches the measuring tape to the opposite bank, or stands and holds it.

2. Measuring depth: A person walks across the creek, measuring depth with the meter stick at incremental points (0 meter at bank, at water edge, ¼, ½, ¾, far water edge, and opposite bank). The student in the creek yells out the depth from the measuring stick (i.e., depth from creekbed to top of water), for students on the bank to record (table 3.2). Take the average of the water depths (3.2).

3. Measuring velocity:

    - If available use a flow meter (there is an example here: https://www.pasco.com/prodCatalog/PS/PS-2130_pasport-flow-rate-temperature-sensor/)

    - To measure velocity without a flow meter, stretch a 10 meter section of the tape measure parallel to the creek with the 0 meter end upstream and the 10 meter end downstream. Drop a stick in the creek at the 0 meter mark. When the stick gains momentum and reaches the 5 meter mark, have a student yell "start," and begin timing. Stop timing when the stick crosses the 10 meter mark. You will know how long it takes for the stick to travel 5 meters. Simplify the fraction to how many meters per second. Have each group of the three do this three times, take an average, and write it in the space provided in 3.3.

Section 4: Water Quality

Find evidence of these possibilities on-site:

- Man-made dams: intentionally placed structures to slow down or block water flow, resulting in ponding
- Riffles: shallow fast currents that often create bubbles

- Runs: deep fast currents
- Pools: areas of standing water
- Eddies: areas where water circles back
- Substrate: substance on creek bottom
- Basic structure of aquatic plants: free floating or rooted; wide leaves or narrow leaves

Section 5: Surrounding Land

Look for these on-site and make observations:

- Soil type: If unknown, you can find this on the wesbite through the USDA: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm
    - ≈ On the website, click the button to start WSS (web soil survey).
    - ≈ Enter address.
    - ≈ Create AOI (area of interest).
    - ≈ Click soil map tab.
- Riparian: area of land adjacent to waterway
- Herbaceous: non-woody plant
- Surrounding land use: forest, meadow, agricultural, residential, urban

