Stream Health Data Sheet

Record information on this sheet as you conduct assessments to determine overall health of your stream. There are three stream assessments for this investigation: (1) **physical**, rating the condition of the stream habitat based on observable characteristics; (2) **biological**, using living animals present to indicate stream health; and (3) **chemical**, testing the water quality based on the chemical content of the stream. Use all three to get a more thorough rating of your stream's health. You may share your findings and compare data with others on the Maryland Student Stream Health map.

Stream Site and Stream Investigator's Information

Name (Teacher / Observer)	**Date**	**Time of Day**

School or Organization Name	**Group Members**

Stream Study Site Name (used for stream study permit, example: ERMS19 Rocky Gap HS Science Team)

Name of Stream	**River or Body of Water (into which stream flows)**

Latitude	**Longitude**
_____ degrees NORTH	**_____ degrees WEST**

Weather

Today's Air Temperature: _____ ° C or ° F	**Today's Humidity:** _____ %
Today's Cloud Cover:	**Yesterday's Precipitation:** https://water.weather.gov/precip/
_____ Clear _____ Partly Cloudy _____ Cloudy	**_____ Inches**

How could yesterday's weather affect today's field investigation?

PREDICTION: Do you think this stream is healthy or unhealthy? Support your prediction and explain why you think so.

Stream Health Assessment: Instructions

Next, use the three stream assessments in this data sheet to guide your investigations. At the end of each section, you will use your tests and observations to give your stream a rating for that individual assessment. Then, at the end, use the results from all three assessments to determine an overall stream health rating. How does this rating compare with the prediction you made above?

This "Stream Health Data Sheet" was originally created and designed by Amanda Sullivan for "Explore and Restore Maryland Streams", MD Department of Natural Resources, circa 2016. Modifications have been made to the original by Jen Wolfe, 2019.

Physical Assessment: Stream Corridor Assessment

Based on Stream Corridor Assessment protocols developed by Kenneth Yetman, adapted by Amanda Sullivan and Alison Armocida, MD Department of Natural Resources.

Instructions: Observe the stream habitat in and around the water and use the accompanying Stream Corridor Assessment photographs to rank each characteristic. Based on your findings, you will give your stream habitat a rating.

CHARACTERISTIC	Good (4)	Fair (3)	Marginal (2)	Poor (1)	Score
Floodplain Vegetation	Lots of plants, bushes, and trees along banks and floodplain.	Some plants, bushes, and trees along banks and floodplain.	Most trees and bushes are gone.	Very little plant life at all along banks and floodplain.	
Channel Alteration	Channel formed by natural processes and allowed to bend often around rocks and wood.	Channel straightened in some places but some natural bends are still present.	Channel mostly straightened but vegetation still present and no cement.	Channel straightened and flowing along a paved channel.	
Embeddedness – Are there rocks on the bottom covered in silt?	Rocks and cobbles cover almost all of the stream bed. Very little sand or silt between rocks.	Rocks and cobbles cover most of the stream bed. Some sand/silt between and on rocks.	Rocks and cobbles more than halfway buried (embedded) into sand/silt.	Rocks and cobbles entirely buried by sand and silt.	
Erosion	Banks only slightly above the surface of the water.	Banks somewhat higher above the surface of the water.	Banks significantly above the surface of the water.	Banks extremely high compared to water surface.	
Attachment Sites for Macroinvertebrates	Lots of different sized rocks, wood, and plenty of leaf litter.	Only small, gravel sized rocks, some wood and leaf litter present.	No rocks or wood but some leaf litter present.	No rocks, no wood, no leaf litter present.	
Shelter for Fish	Lots of pools, woody debris, and undercut banks present in the water.	Some pools, wood, and undercut banks present.	Few pools, wood, and undercut banks present.	No pools, no wood, no undercut banks present in the water.	
Riparian Buffer Width (Estimate or Measure)	More than 50ft of trees and brushy vegetation extending out from EACH bank of the stream.	20-50ft of trees and brushy vegetation extending out from EACH bank of the stream.	5-20ft of trees and brushy vegetation extending out from EACH bank of the stream.	0-5ft of trees and brushy vegetation extending out from EACH bank of the stream.	

CHARATERISTIC	Good (4)	Fair (3)	Marginal (2)	Poor (1)	Score
Bank Stability – Are the banks of the stream eroding or could they easily erode?	Lots of roots and vegetation or large rocks on the vertical portion of the bank all the way down to the surface of the water.	Roots and vegetation or large rocks/boulders covering the vertical part of the bank 2/3 of the way down to the surface of the water.	Roots, vegetation and/or large rocks/boulders going only 1/3 of the way down vertical part of bank to surface of the water.	Steep banks of bare soil with no plants or roots or large rocks.	
Velocity and Depth – Within 30ft upstream and 30ft downstream from where you are standing There are no pictures for this category.	Stream has areas of (1) fast/deep water, (2) fast/shallow water, (3) slow/shallow areas, or (4) slow/deep areas.	Stream has 3 of the 4 types of speed and depth combinations.	Stream has 2 of the 4 types of speed and depth combinations.	Stream has only 1 type of velocity and depth combination.	

Add all scores to get a total. Total Score for Stream _____

ANALYSIS:

If the total score is:	**Then the overall stream rating is:**
30 - 36	**GOOD**

This stream has excellent habitat with a wide variety of traits. If the water quality is good this stream can support many different species of insects and fish, including those sensitive to pollution and habitat changes. The stream is stable; habitat quality will not get worse unless humans make changes to the area.

23 – 29	**FAIR**

This stream has good habitat for many different species of insects and fish, including some sensitive to pollution and habitat changes. The stream is most likely stable. Minor changes can increase the habitat quality, such as stabilizing erosion or planting vegetation.

16 – 22	**MARGINAL**

This stream can support some species of insects and fish that are tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from impervious surfaces.

9 – 15	**POOR**

This stream may only support a few species of insects that are highly tolerant to pollution. The stream is not stable and will get worse without human restoration. Habitat can be improved by planting vegetation near the stream, stabilizing erosion, or reducing water from paved areas.

Stream Corridor Habitat Rating: _____

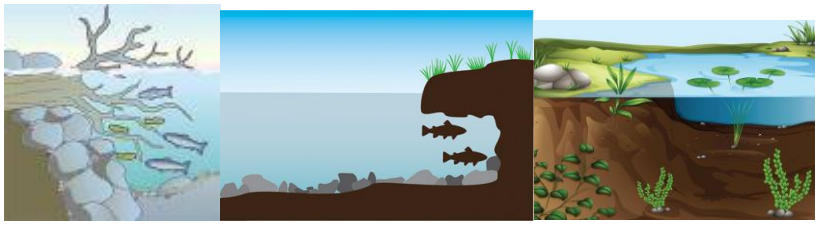
Biological Assessment: Macroinvertebrate Survey

Collection Method

Kick seine or D-Net (circle the method used)

If using a kick seine, collect 3 samples.

If using a D-Net, collect 20 samples and record the number of samples taken from each of the habitat areas in the table to the right.



Benthic Habitat Sampled	
Habitat	**# of Samples**
Riffle	
Root wads/Woody debris/Leaf pack	
Submerged vegetation	
Undercut banks	
Other (Specify):	
TOTAL	**20**

Your Stream's Biotic Index

Check all of the macroinvertebrates that you find in your stream and calculate the stream's water quality rating. (You may also record the number of each captured, but to calculate the rating at the bottom, only count each KIND of animal once, regardless of the quantity found).

✓	Sensitive	✓	Less Sensitive	✓	Somewhat Tolerant	✓	Tolerant
	Case maker caddisflies		Net-spinning caddisflies		Freshwater clams		Aquatic sow bugs
	Mayflies		Crane flies		Freshwater mussels		Black flies
	Stoneflies		Dragonflies		Planarian		Midge flies
	Water pennies		Riffle beetles		Gilled snails		Leeches
	Hellgrammites				Crayfish		Lunged Snails
					Scuds		Damselflies
							Aquatic worms
# of checkmarks _____		# of checkmarks _____		# of checkmarks _____		# of checkmarks _____	
# above x 3 = _____		# above x 2 = _____		# above x 1 = _____		# above x 0 = _____	

Biological Water Quality Rating:

Add up the numbers you calculated for all four categories above. Write the total number here: _____

Circle the rating that corresponds to the total of your columns.

Good: >22 **Fair: 17 – 22** **Marginal: 11 – 16** **Poor: <11**

Explore and Restore Maryland Streams ratings correspond with the Maryland Biological Stream Survey (MBSS) and Maryland Stream Waders ratings of streams found on the Stream Health website. Stream sites rated **Good** are shown there in green, **Fair** in yellow, and **Marginal/Poor** in red.

Sizes shown are for mature larvae/nymphs or adult animals, but individuals in earlier stages of development may be significantly smaller

Explore & Restore Maryland Streams
Key to Stream Macroinvertebrates

Companion to the Explore & Restore Stream Health Data Sheet

MARYLAND DEPARTMENT OF NATURAL RESOURCES

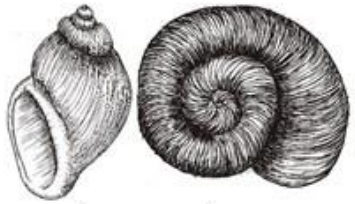
NO LEGS

Shell

Single

Gilled snail
Spiral, open on right

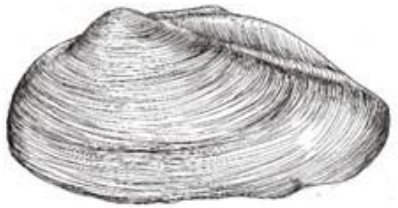
Lunged snail
Spiral with opening on left or coiled



Double

Clam
Small, whitish tan or brown

Mussel
Large (up to 5"), elongate, dark in color



No shell

Leech
Suckers, expands and contracts, soft, slimy body

Midge
Dark head, body white, gray or reddish

Aquatic worm
Small, hair-like or thicker like earthworm, can reach 2 ½" long

Black fly
Black head, shaped like a bowling pin

Crane fly
Plump, grub-like, often can see guts

Planaria
Flat, triangular head, soft, unsegmented body

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Maryland Department of Natural Resources; Resource Assessment Service and Chesapeake & Coastal Services
580 Taylor Avenue; Annapolis, Maryland 21401; http://dnr2.maryland.gov/education/Pages/Biological_Assessment.aspx

Sizes shown are for mature larvae/nymphs or adult animals, but individuals in earlier stages of development may be significantly smaller

Explore & Restore Maryland Streams
Key to Stream Macroinvertebrates

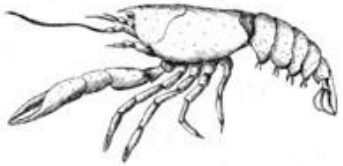
Companion to the Explore & Restore Stream Health Data Sheet

MARYLAND DEPARTMENT OF NATURAL RESOURCES

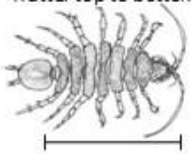
LEGS

10+ legs

Crayfish
Lobster-like, can reach 6" long



Aquatic sowbug
Two long antennae, flatter top to bottom

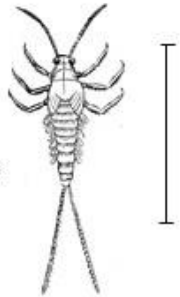


Scud
Shrimp-like, swims on side

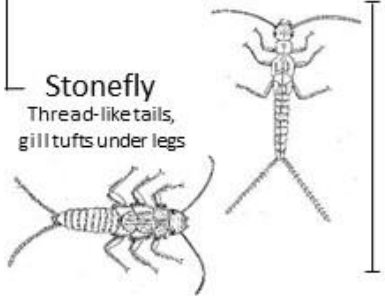
3 pairs of legs

2 tails

Mayfly
Thread-like tails, gills along abdomen

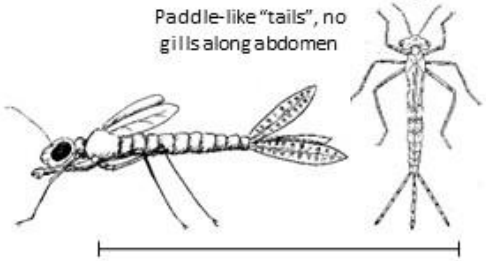


Stonefly
Thread-like tails, gill tufts under legs

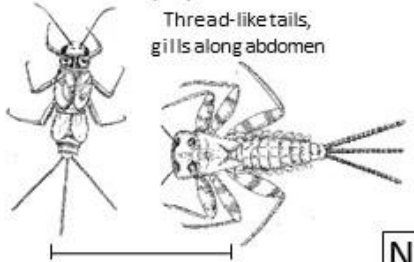


3 tails

Damselfly
Paddle-like "tails", no gills along abdomen



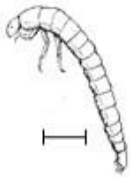
Mayfly
Thread-like tails, gills along abdomen



No obvious tails

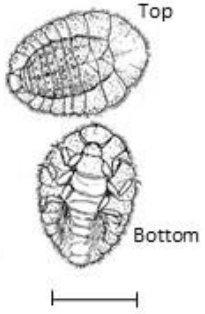
Riffle beetle

Larva- Brown, hardened body, no gills on abdomen

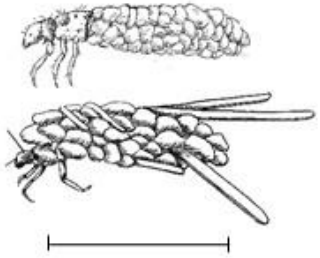


Adult- small, dark, crawls on bottom

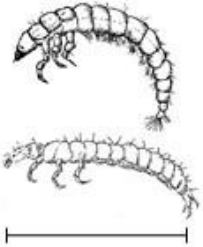
Water penny
Flat, oval disk



Casemaker caddisfly
May be housed in a case of sticks, stones, sand or leaves

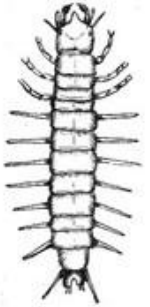


Net spinning caddisfly
Dark head, tan, green or orangish body, gill tufts may be present on abdomen, 1 or 3 armored plates behind head



Dragonfly
Large eyes, bullet shaped or leaf-like body

Hellgrammite
Large pinching jaws, feelers down sides, can reach 4" long



Chemical Assessment: Water Quality Testing

(1) Follow instructions provided with each test kit to test different parameters.

(2) Record your data here:

	Water Temperature (C°)	Dissolved Oxygen (DO) (mg/L)	Dissolved Oxygen (DO) % Saturation *See conversion chart*	pH	Phosphate (mg/L)	Nitrate (mg/L)	Transparency (cm)	Turbidity (JTU ~ = NTU)	Total Dissolved Solids (TDS) (ppm = mg/L)	Conductivity (µs/cm)
Trial 1										
Trial 2										
Trial 3										

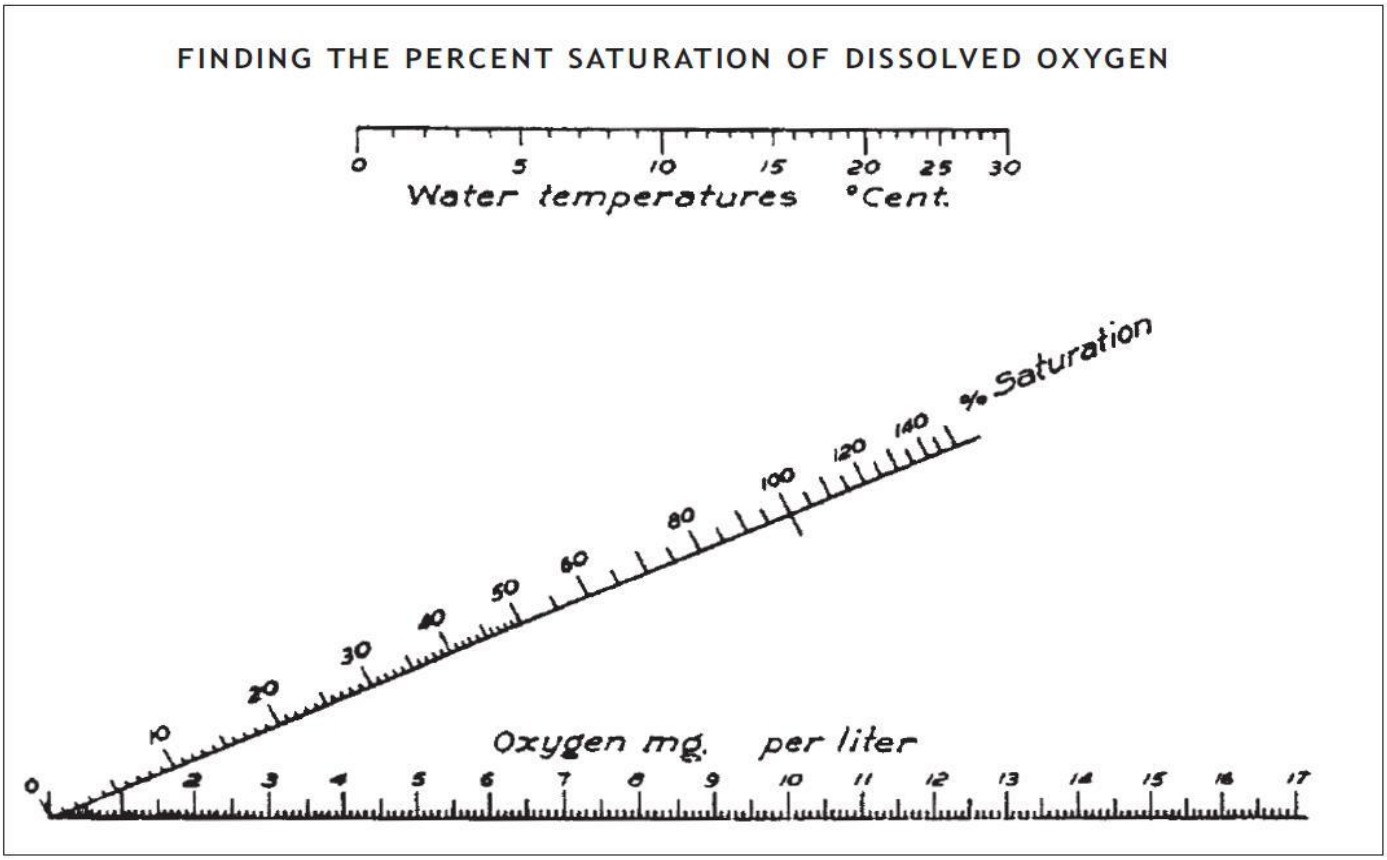
(3) Circle the corresponding value here:

Water Quality Summation for Chemical Tests				
Parameter	**GOOD**	**FAIR**	**MARGINAL**	**POOR**
Dissolved Oxygen (DO) (mg/L)	>=7	>=6 - <7	>=5 - <6	<5
pH (units)	>=7 - <=7.5	>=6.5 - <7.0 >7.5 - <=8.5	>=5.5 - <6.5 >8.5 - <=9.0	<5.5 >9.0
Phosphate (PO_4X^3) (mg/L)	0 - <=0.1	>0.1 - <=0.2	>0.2 - <=1.0	>1.0
Nitrate (NO^3) (mg/L)	<1.5	>1.5 - <=2.6	>2.6 - <=3.8	>3.8
Temperature (°F/°C)	Not to exceed > 68°F/20°C			
Transparency (cm)	>=65	<65 - >=35	<35 - >=5	<5
Turbidity (JTU ~ = NTU)	0 - <=4	>4 - <=10	>10 - <=20	>20
Total Dissolved Solids (ppm = mg/L)	0 - <=150	>150 - <=250	>250 - <=350	>350
Conductivity (µs/cm)	0 - <=170	>170 - <=240	>240 - <=500	>500

Water Quality thresholds above are based on MDE (Maryland Department of the Environment) Maryland specific data updated in 2018.

Based on your tests and observations, how would you rate the overall water quality for this stream? For example, if you had some Good, some Poor, but mostly Fair, you might give an overall of Fair.

Chemical Water Quality Rating: Good Fair Marginal Poor



To read this chart, use a straight edge. Place the straight edge on the mg/L of oxygen you have determined for your site, then place the other end of the straight edge on the water temperature you have measured. The point where the straight line passes through the line labeled "% Saturation" is your percent saturation.

Diagram reprinted with permission from M.K. Mitchell and W. B. Stapp, *Field Manual for Water Quality Monitoring*

Overall Stream Health Assessment

Record your ratings from all three of the tests above (Physical, Biological, and Chemical) here:

Based on your tests and observations, how would you rate the health of your stream overall?

Assessment	Good	Fair	Marginal	Poor
Stream Corridor Assessment – **Physical**				
Macroinvertebrate Survey – **Biological**				
Water Quality Tests - **Chemical**				

Comments:

OVERALL STREAM HEALTH _____

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