Coastal Stream Health Data Sheet

Record information on this sheet as you conduct assessments to determine the overall health of your stream. There are three stream assessments for this investigation: (1) **physical**, rating the condition of the stream habitat based on observed 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 your data with others on maryland.fieldscope.org.

Stream Site and Stream Investigator(s) Information		
Name (Teacher or Observer)	**Date**	**Time of Day**
School or Organization Name	**Group Members**	
Stream Study Site Name (used for stream study permit, example: ERMS15 East HS ScienceTeam)		
Name of Stream	**River or body of water into which this stream flows**	
Latitude_____ degrees NORTH	**Longitude**_____ degrees WEST	

Weather	
Today's Air Temperature _____ ° C or ° F	**Today's Humidity** _____
Today's Cloud Cover clear____ partly cloudy ____ cloudy ____	**Yesterday's Precipitation (amount)** _____
How could yesterday's weather affect today's field study?	
PREDICTION: Do you think this stream is healthy? 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?

Physical Assessment:
Coastal Stream Corridor and Habitat Assessment

Based on Stream Corridor Assessment protocols developed by Kenneth Yetman, DNR, and the Rapid Bioassessment procedures from the U.S. Environmental Protection Agency (EPA), adapted by Amanda Sullivan and Alison Armocida, Maryland 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 in an "S" shape.	Channel straightened in some places but some natural bends still present.	Channel mostly straightened but vegetation still present and no cement.	Channel straightened and flowing along a paved channel.	
Material at the bottom of the stream bed	Mixture of materials with small rocks and firm sand covering most of the bottom. Some vegetation or root mats present.	Mixture of soft sand, mud, or clay. Some vegetation or root mats present.	All mud or clay or sand bottom. No root mats or submerged aquatic vegetation.	Clay or rock. No vegetation or root mats.	
Erosion	Banks only slightly above the level of the water.	Banks somewhat higher above the level of the water.	Banks significantly above the level of the water.	Banks extremely high compared to water level.	
Attachment sites for Macroinvertebrates	Plenty of submerged leaf litter and wood.	Some submerged wood and leaf litter.	No wood but some leaf litter present.	No wood or leaf litter present.	
Shelter for Fish	Lots of pools, undercut banks, and submerged, logs and snags present in the water.	Some pools, wood, and undercut banks present. Some submerged cover objects present.	Few pools, wood, and undercut banks present. Few hiding places available.	No pools, wood, or undercut banks or hiding places present.	
Riparian Buffer Width (estimation)	More than 50 feet of trees and brushy vegetation extending out from EACH bank of the stream.	20 - 50 feet of trees and brushy vegetation extending out from EACH bank of the stream.	5 - 20 feet of trees and brushy vegetation extending out from EACH bank of stream.	0 - 5 feet of trees and brushy vegetation extending out from EACH bank of the stream.	

[continued, next page]

MARYLAND DEPARTMENT OF NATURAL RESOURCES

Characteristic	Good (4)	Fair (3)	Marginal (2)	Poor (1)	Score
Bank stability – Are the banks of the stream eroding, or could they erode easily?	Lots of roots and vegetation or large rocks on the vertical portion of the bank all the way down to the level of the water.	Roots and vegetation or large rocks covering the vertical part of the bank 2/3 of the way down to the level of the water.	Roots, vegetation and/or large rocks going only 1/3 of the way down the vertical part of bank towards the level of the water.	Steep banks of bare soil with no plants or roots or large rocks.	
Sediment Deposition along the stream bank	Very little sand or other sediment visible above the water in the stream.	Sand or sediment visible in small patches on the banks of the stream.	Sand and sediment visible in beach-like areas at most bends in the stream and along about half of the stream banks.	Sand and sediment visible along most of the stream banks and sometimes in patches visible above the water as islands in the stream.	
Depth combinations - Within 30 feet upstream and 30 feet downstream from where you are standing *There are no pictures for this category.*	Stream has a mix of (1) large (bigger than half the width of the stream), shallow pools, (2) large, deep pools, (3) small, shallow pools, and (4) small, deep pools.	Stream has 3 of the four types of pools.	Stream has 2 of the four types pools.	Stream has only one type of pool or is the same depth all along its length.	

Add all scores to get a total.

Total Score for Stream _____

Analysis:

If the total score is: then the Overall Stream Rating is:

31 – 40 Good

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

21 – 30 Fair

This stream has good habitat for many different species of invertebrates 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.

11 – 20 Marginal

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

0 – 10 Poor

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

Coastal Stream Corridor Habitat Rating _____

Biological Assessment: Fish Survey

Collection method:

Fish trap or Seine net (circle method used).

If using a **seine net**, what is the length of the net? _____
What size is the net's mesh? _____

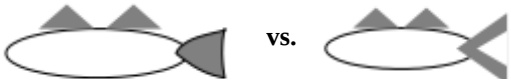
If using a **fish trap**, what size is the mesh? _____

Record the number of samples collected from each of the habitat areas in the table →

When comparing fish and identifying species:

- Pay attention to mouth shape and position:

- And dorsal (back), caudal (tail), and other fin shapes:



Habitats Sampled	
Habitat	**# traps or seines**
Aquatic vegetation	
Submerged objects, logs, snags, other cover	
Pools	
Undercut Banks	
Main channel	
Other habitat (specify):	
TOTAL	

Sort all of the fish you catch in your traps and seines into different bins or buckets. Keep all fish species (types) together. Count how many of each type of fish and record below. Identify the fish species if possible.

Diversity Data			
Species type	**Number of fish**	**Species type**	**Number of fish**
1.		13.	
2.		14.	
3.		15.	
4.		16.	
5.		17.	
6.		18.	
7.		19.	
8.		20.	
9.		21.	
10.		22.	
11.		23.	
12.		24.	

Fish Data Analysis

Instructions: Use the data you collected in your fish samples to determine a stream rating based on the biological factors. There are two parts: Measure of Dominance (below), and Species Richness (on the next page). You may choose to do one or both of these. They are slightly different analyses, but tell you similar information about the stream. You will use the results from these ratings to determine an overall **Biological Rating**.

Measure of Dominance:

This is the number of species that comprise 90% of the catch, which is a reflection of the overall population in the stream. *Note: Space is provided to record more species than you are likely to find.*

1. Calculate the **total number of all fish caught**: _____
2. Determine the **number of individuals of each species** caught:

Species 1_____	Species 2_____	Species 3_____	Species 4_____	Species 5_____	Species 6_____
Species 7_____	Species 8_____	Species 9_____	Species 10_____	Species 11_____	Species 12_____
Species 13_____	Species 14_____	Species 15____	Species 16_____	Species 17_____	Species 18_____
Species 19_____	Species 20_____	Species 21____	Species 22_____	Species 23_____	Species 24_____

3. Divide the **number of individuals of each species** by **the total number of fish caught** to determine what **percentage of the catch** each species represents.

Number of individuals of a species ÷ Total number of fish caught = Percentage of the catch

% Species 1 ____	% Species 2 _____	% Species 3 ____	% Species 4_____	% Species 5 _____	% Species 6 ____
% Species 7 ____	% Species 8 _____	% Species 9 ____	% Species 10_____	% Species 11_____	% Species 12____
% Species 13____	% Species 14 ____	% Species 15____	% Species 16_____	% Species 17_____	% Species 18____
% Species 19____	% Species 20 _____	% Species 21____	% Species 22_____	% Species 23_____	% Species 24____

5. Add the species percentages from highest to lowest until you reach 90%.
6. Count the number of species that comprise 90%: _____

Use the table below to determine the Stream Rating:

If the number of species that comprises 90 % is:	Then the stream rating is:
5 – 8	Above Average
3 – 5	Average
1 – 2	Below Average

Write your **Stream Rating**, here: _____

[continued, next page]

Species Richness:

Total Number of Species Collected _____

If the total number of species is:	Then the stream rating is:
9 – 15 +	Above Average
5 – 8	Average
0 – 4	Below Average

Write your **Stream Rating**, here: _____

Biological Water Quality Rating:

For each fish analysis that you calculated above, circle the Stream Rating(s) you determined.

Species Richness:	Above Average	Average	Below Average
Measure of Dominance:	Above Average	Average	Below Average

If you did more than one analysis, and you got different ratings, decide on an average or combined score, making your best conclusion based on your analysis.

Write that rating here: _____

In order to use this with the physical and chemical assessments to determine an Overall Stream Health Rating, you will need to convert your biological assessment to one of the below ratings.
Circle your answer here and **copy that to the table on the last page of this data sheet**.
This is your **Biological Rating**:

Above Average = **Good** Average = **Fair** Below Average = **Poor**

Chemical Assessment: Water Quality Testing

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

(2) Record your data here:

DATA	**Water Temperature** (°C)	**Salinity** (ppt)	**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)	**Chloride** (mg/L)
Trial 1											
Trial 2											
Trial 3											

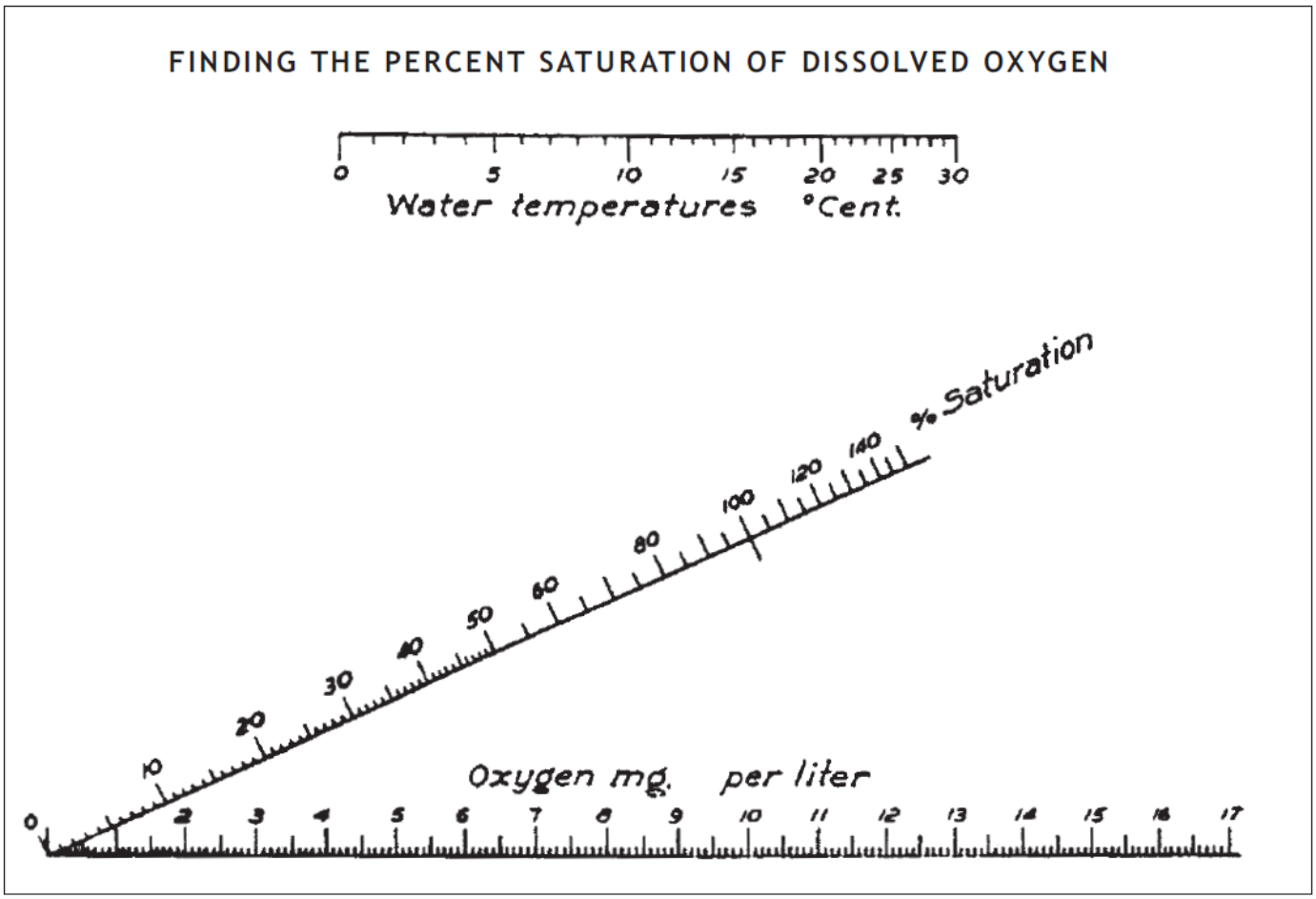
(3) Circle the corresponding value here:

Water Quality Summation for Chemical Tests				
	GOOD	**FAIR**	**MARGINAL**	**POOR**
Dissolved Oxygen (DO) % Saturation *(see conversion chart)*	80 – 120	70 – 80 120 – 140	50 – 70 > 140	< 50
pH (units)	7.0 – 7.5	6.5 – 7.0 7.5 – 8.5	5.5 – 6.5 8.5 – 9.0	< 5.5 > 9.0
Reactive Phosphate (PO_4X^3) (mg/L)	0 – 0.2	0.2 – 0.5	0.5 – 2.0	> 2.0
Nitrate (NO^3) (mg/L)	0 – 3	3 – 5	5 – 10	> 10
Transparency (cm)	> 65.0	65.0 – 35.0	35.0 – 15.5	< 15.5
Turbidity (JTU ~= NTU)	0 – 10	10 – 20	20 – 30	> 30
Total Dissolved Solids (ppm = mg/L)	0 – 150	150 – 250	250 – 350	> 350
Chloride (Cl) (mg/L)	0 – 20	20 – 50	50 – 250	> 250

Based on your tests and observations, how would you rate water quality overall? For example, if you had some excellent, some fair, mostly good, you might give an overall of good. Circle your answer:

Chemical Water Quality Rating: Good Fair Marginal Poor

[continued, next page]



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

Overall Stream Health Assessment

Write your ratings from all three of the above tests, here:

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

	Good	Fair	Marginal	Poor
Stream Corridor Assessment				
Fish Survey			-----N/A----	
Water Quality Tests				

Overall Stream Health:

MARYLAND DEPARTMENT OF NATURAL RESOURCES