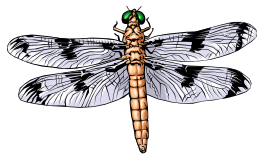


# STREAM STUDY

SOS  
Save Our Streams



Name: \_\_\_\_\_

School: \_\_\_\_\_

Date: \_\_\_\_\_

Location: \_\_\_\_\_

# Safety First

## Do's and Don't of Water Study Projects

### Do

- Observe all local and state laws
- Tell someone where you are going
- Tell someone how long you are going to be gone and when you will return (preferably write it down).
- Ask permission for access to any private property
- Be respectful of the environment
- Leave only footprints, take only pictures (or water)
- Be aware of the hazards of the environment and stream
- Always go with another person or preferably two or three
- Keep accurate and detailed records of all data
- Take a rope that you can throw and floatable objects in case of an emergency.

### Don't

- Do not enter swift or deep water
- Do not enter water that you are unsure of the depth
- Do not go to a stream alone
- Do not step on wet, muddy or mossy banks or rocks

# Riparian Zone Assessment Data

Please give a brief description of the site and describe PFBC land boundaries:

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Any additional comments:

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### Scoring of Riparian Assessment

1. Total all of the scores given for parameters 1-12 \_\_\_\_\_
  2. Total number of parameters scored (count 2 if both right and left bank were scored ) \_\_\_\_\_
  3. Multiply question 2 by 10 to get the total number of points possible \_\_\_\_\_
  4. Divide your total score for question 1 by your total points possible from question 3 \_\_\_\_\_
- This number is your overall score for the riparian area.

### Results:

Score	0-25%	26-55%	56-85%	85-100%
Riparian Rating	Poor	Marginal	Good	Excellent

When comparing sites or when using this assessment for management purposes, remember that it may be helpful to look at the scores for individual parameters as well as the overall score.

# Riparian Zone Assessment Data

**6. Bank Stability**—This concerns the overall stability of the banks. Look at the steepness and the amount of bare dirt visible. Is exposed soil or bare roots visible? Make sure to compare with the photos in the Riparian Assessment Guide.

**7. Water Pathways**—This focuses on breaks in the riparian or bank area, such as rills or gullies. Even a generally very good buffer will be much less effective if it is crossed by several gullies or washouts. Look for trails down to the stream, or depressions in the land that indicate where water would flow in a heavy rain. These can be hidden by thick vegetation, but will still cause problems in heavy rains, so please look carefully.

**8. Channel Modification**—This one simply asks how much the channel has been modified by humans. This includes culverts, bridge foundations, creation of artificial channels, dams, and addition or rip rap or other stabilizers to the banks. **\*\*Score parameters 9-12 ONLY if the stream is LESS than 200 yards wide!**

**9. Shading (Canopy Cover)**—Look at the cover over the entire width of the stream. This can be most easily accomplished by standing in the center of the stream and looking to each side. Don't forget that you are looking for anything that shades the stream from the sun. This may include vegetation that is not very high above the water, such as trees or shrubs that overhang the stream. We are interested in vegetation at the hottest times of the year, so estimate summer vegetation if it is not currently present.

**10. In-stream Cover**—This is cover for fish, not shading of the stream like the previous parameter. What could a fish hide under to escape predators? Look for large rocks, logs or branches in the stream, aquatic vegetation or undercut banks. Deep pools can also provide cover by allowing the fish to get too deep for predators to easily reach them.

**11. Embeddedness**—How deeply are the rocks embedded in the substrate? Measure this in a riffle. A riffle is a shallow reach of swiftly flowing, turbulent water. Partially exposed rocks or gravel may break the surface of the water. Look at the rocks and determine the extent to which they are sunken into the sand, silt or mud of the stream bottom.

**12. Aquatic Vegetation**—Look for plants or algae. This includes those either anchored in the stream, or floating on the top of the stream.

# Physical

Stream Health depends upon many physical conditions, including:

- How fast the water is running and how steep is the slope?
- How much water is flowing?
- What rocks/soil/vegetation is eroding into the stream?
- What is the riparian zone like? Is the stream shaded or in the sun?

## Physical Conditions

Fill in the questions completely!

### Location

Watershed: \_\_\_\_\_ Stream: \_\_\_\_\_

Location: \_\_\_\_\_

Date: \_\_\_\_\_ Time: \_\_\_\_\_

### Weather Conditions

Sky:	Sunny	Partly Cloudy	Cloudy
Wind:	Windy	Breezy	Calm
Humidity	Very Humid	Mildly Humid	Dry

### Stream Conditions

**Water Temp:** \_\_\_\_\_ °C      **Air Temp:** \_\_\_\_\_ °C

**Odor:** (mark an X next to any odor you detect coming from the water)

___ Chemical	___ Chlorine	___ Oil/gas
___ Medical	___ Rotten eggs	___ Fishy
___ Sewage	___ Other	

**Water Color** (circle the color that applies to the water)

Clear	Gray	Milky	Brown
Black	Blue	Green	Red
Rust	Straw	Yellow	Cloudy
Tan	Muddy	Other	Clear /particles

### Color Intensity

Slight      Moderate      Intense

## Macroinvertebrate Stream Study Water Quality Index

Record the type and quantity of organisms present. Add each column and multiply by eh number provided. Record the water quality rating in the space provided.

<p><b>Sensitive</b></p> <p><input type="checkbox"/> Caddisfly larva</p> <p><input type="checkbox"/> Mayfly larva</p> <p><input type="checkbox"/> Gilled snail</p> <p><input type="checkbox"/> Riffle beetle adult</p> <p><input type="checkbox"/> Stonefly</p> <p><input type="checkbox"/> Water penny larva and adult</p> <p><input type="checkbox"/> Planaria</p> <p><input type="checkbox"/> Hellgrammite</p>	<p><b>Somewhat Sensitive</b></p> <p><input type="checkbox"/> Riffle beetle larva</p> <p><input type="checkbox"/> Clams/limpet</p> <p><input type="checkbox"/> Mussels</p> <p><input type="checkbox"/> Crane fly larva</p> <p><input type="checkbox"/> Crayfish</p> <p><input type="checkbox"/> Damselfly larva</p> <p><input type="checkbox"/> Whirligig beetle larva</p> <p><input type="checkbox"/> Dragonfly larva</p> <p><input type="checkbox"/> Scuds</p> <p><input type="checkbox"/> Sowbugs/isopod</p> <p><input type="checkbox"/> Fishfly/dobsonfly larva</p> <p><input type="checkbox"/> Alderfly larvae</p> <p><input type="checkbox"/> Giant water bug</p> <p><input type="checkbox"/> Water scorpion</p>	<p><b>Tolerant</b></p> <p><input type="checkbox"/> Aquatic worms</p> <p><input type="checkbox"/> Blackfly larva</p> <p><input type="checkbox"/> Leaches</p> <p><input type="checkbox"/> Fishing spider</p> <p><input type="checkbox"/> Midge Larva</p> <p><input type="checkbox"/> Lunged (pouch) snail</p> <p><input type="checkbox"/> Water strider</p> <p><input type="checkbox"/> Pond snail (orb)</p> <p><input type="checkbox"/> Mosquito larva</p> <p><input type="checkbox"/> Predaceous diving beetle (all adult beetles)</p> <p><input type="checkbox"/> Water boatman</p> <p><input type="checkbox"/> Backswimmer</p> <p><input type="checkbox"/> Rat Tailed Maggot</p> <p><input type="checkbox"/> Blackfly larvae</p>
<p>Boxes checked</p> <p>X 3 = _____</p> <p>Index Value</p>	<p>Boxes checked</p> <p>X 2 = _____</p> <p>Index Value</p>	<p>Boxes checked</p> <p>X 1 = _____</p> <p>Index Value</p>

**Water Quality Rating:**  
(Add all boxes above)

Total Index Value = \_\_\_\_\_

**Circle one of the following.**

- \* Excellent (> 22)
- \* Fair (11-16)
- \* Good (17-22)
- \* Poor (<11)

## Chemical

Stream health depends upon a balance of many chemical conditions including:

- What mineral are dissolved in the stream?
- What is the pH of the stream?
- How much oxygen is available in the stream (DO)?

**Conduct chemical tests and record results in the table below?**

Test	Chemical Importance	Results	Interpretation of Results High, Low or OK.
Alkalinity			
D. O. (dissolved oxygen)			
Hardness			
Iron			
Nitrates			
pH			
Phosphates			

# Riparian Zone Assessment Data

## Drain Pipes

Are contributing (as opposed to withdrawing) drainpipes present in the stream? \_\_\_\_\_ If so, how many? \_\_\_\_\_

Overall, how would you rate this site? (circle one)

Poor            Marginal            Good            Excellent

Suggestions for improvement of site \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Please draw a simple sketch of the area assessed

# Biological

The following questions will help determine stream health:

- What kinds of organisms are found?
- Where are they living (under rocks, leaves, stream bed, etc)?
- How many species of living things are present?
- Various jobs of the macroinvertebrates are: predators, parasites, grazers, shredders, collectors/filterers, or symbionts.

## Species Survey

Species	Job	Quantity
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

You can perform a stream quality index on a later page.

What can you infer about stream health from the species found?

Where were most of the macroinvertebrates found (rocks, leaves, etc.)? \_\_\_\_\_  
\_\_\_\_\_

Why do scientists study macroinvertebrate life to determine the health of a stream environment? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Name two adaptations a stream macroinvertebrate may have which will help it to survive in water? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# Riparian Zone Assessment Instructions

## Riparian Assessment Instructions

Before going out in the field, read over these pages. They will give a general guide for how to conduct the assessment, as well as more detailed descriptions of what to look for to assess each parameter.

- Use the accompanying *Riparian Assessment Guide* to determine a score for each parameter.
- Record data on the *Riparian Area Assessment Data Sheet*.
- Check with your Service Provider if you have any questions.
- Be Careful and have fun!

### Steps for conducting the assessment:

1. Locate your site. Site locations will be available from your Service Provider. If you have any difficulties locating your site, please contact your Service Provider.

**PLEASE** make sure that you have permission to access the land that you are assessing! In Pennsylvania, a streambed is owned by the adjacent landowner and is not public property. If you are on private property and do not have permission, you are trespassing and may be subject to fines or other legal action.

2. Fill out the top portion of your data sheet.

The **Site** will be a specific name, for example the Good Hope Dam Access on the Conodoguinet Creek. Good Hope Dam Access will go in the first blank. The **Site ID** will be filled in later, leave this space blank.

The **Stream Name** is the name of the stream or river where your assessment is taking place, such as Conodoguinet Creek. If your site includes a confluence of two streams, give the name of the larger stream or river. The **Date** and **Time** are the date and time that the assessment is conducted.

**Water stage conditions** is simply a general description of the water conditions at the time of the survey (high, low, muddy, etc.—how does the water compare to “normal” for that stream?)

**Volunteer Names** are the names of the persons doing the assessment.

# Riparian Zone Assessment Data

## Assessment Parameters

The next 12 parameters will be scored using the descriptions and pictures in the *Riparian Assessment Guide*.

**\*\*\*Remember, only do both sides and all of the channel parameters if the stream is LESS than 100 yards wide.**

**1. Riparian Buffer Width**—This is the distance from the top of the bank to the first disturbance, up to 50 yards away. Studies show buffers wider than 50 yards does not add significant benefits. Determining the difference between buffer area and a disturbance is something like the old adage: if it’s not part of the solution, it’s part of the problem. Keep this in mind as you determine where the buffer ends and the disturbance begins. The buffer is meant to protect the stream. It filters nutrients and sediments to keep them out of the stream. Land covered by vegetation generally does this. Land covered by pavement, gravel roads, or buildings does not. Also, a lawn or agricultural field that has fertilizers or pesticides applied, or is plowed or tilled is contributing to the problem and is a disturbance. For example, an untended grassy park is a buffer, while a carefully tended and fertilized lawn is a disturbance. Also, a forested area is a buffer, but a forested area that is being harvested, full of roads and soil disturbance counts as a disturbance. If you are not sure about a possible disturbance, make a note in the comments section and draw a quick sketch of the area in the box provided.

**2. Riparian Vegetation Type**—Using the pictures in the *Riparian Assessment Guide*, score the overall vegetation type for this area or section of the assessment. Again, if the riparian area abruptly changes, do a separate assessment for each area.

**3. Riparian Vegetation Thickness**—Estimate the percent of the ground covered by vegetation. Pretend you are a bug on a piece of grass one inch above the ground and record the percent of the soil covered from that height. Remember that you are looking directly at the ground, not the “canopy cover” from a few feet off the ground.

**4. Bank Vegetation Type**—Assess the same way as Riparian Vegetation Type.

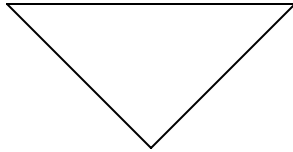
**5. Bank Vegetation Thickness**—Again, this is like Riparian Vegetation Thickness. Look directly at the ground and determine what percent is covered by vegetation and rather than bare dirt.

# Physical

## Stream Characteristics

**Slope:** (circle one) Steep Gentle Sloping Relatively Flat

**Shape of Stream Bottom:** (circle one)



**Stream Bottom** (circle one column)

Some large rocks Mostly medium rocks Some gravel	Some medium rocks Mostly gravel Some silt	Few medium rocks Some gravel Mostly silt
--	---	--

## Riparian Area

The riparian area is the area around the stream that influences stream health. Check all that apply on either list.

### Healthy Riparian Zone

- Shady, cool water
- Lots of vegetation on bank
- Some leaf debris in water
- Small, gravelly stream
- Many roots along bank
- Little or no litter

### Unhealthy Riparian Zone

- Little shade, warm water
- Little Vegetation on bank
- Little leaf debris in water
- Wide, mud bottom stream
- Few roots along bank
- Much litter

## Physical Measurements

Width: \_\_\_\_\_ feet/inches \_\_\_\_\_ meters/cm

Measure the distance to the water's edge at both sides of the stream.

Avg. Depth: \_\_\_\_\_ feet/inches \_\_\_\_\_ meters/cm

- Measure depth of water every foot or across the stream
- Average of the above measurements \_\_\_\_\_

### Velocity:

- Time trial A \_\_\_\_\_ sec.
- Time trial B \_\_\_\_\_ sec.
- Time trial C \_\_\_\_\_ sec.
- Time trial D \_\_\_\_\_ sec.

$$\frac{A + B + C + D}{4} = \text{Average Time}$$

$$\frac{X \text{ meters}}{\text{Avg. time}} = \text{Velocity} \text{ _____ m/sec}$$

# Riparian Zone

## Assessment Instructions

- Mark where in the watershed your site is located. For those of you familiar with stream classification, 1<sup>st</sup> and 2<sup>nd</sup> order are head-water streams, 3<sup>rd</sup>-5<sup>th</sup> order are mid-watershed streams, and above that is downstream. These classifications are of course dependant upon the size of the watershed you are concerned with—the Youghiogheny watershed will be classified differently than a smaller watershed, but this is mostly a generalization to determine whether you are—in the headwaters, or lower in the watershed.
  - Measure the length of the assessed site. Take the measurement in the middle of the stream following the contour of the bank. This is to ensure that all of the river meanders are measured, rather than simply measuring the “straightest distance between two points.” Although measuring with a tape is preferred, an estimate is acceptable if a tape is not available. Make sure to indicate that the distances for the assessment will be estimates.
  - Take a GPS reading at the upstream and downstream boundaries of your site. Record latitude and longitude in degrees, minutes, seconds on the data sheet. If a GPS unit is not available, mark the location of the site on a topo map and attach a copy of the map to your assessment when you turn it in.
  - Determine the average stream width. Measure the width of the stream at the upstream and downstream boundaries of the area you are assessing, as well as at the approximate midpoint of your assessment area. Measure from water's edge to water's edge. Average these numbers for the average stream width.
3. Conduct the assessment using your **Riparian Assessment Guide**.
- q Look over the entire assessment area. If the riparian area seems to be similar throughout, you will conduct one assessment and complete one data sheet. If there is a distinct change in the area (part of it is thick forest, part of it is row-crop agriculture) you will do a separate assessment for each section, and will turn in a separate data sheet for each section. **Make sure to indicate on the top of the data sheet that there is more than one assessment for the site.** For example, “assessment number 2 of 3 for this site.”

# Riparian Zone Assessment Instructions

## Fill-in-the-blanks

**Land Use Outside the Buffer**—Note the dominant land use in the surrounding area. This is the area beyond the buffer. Choose only one. For example, if you were describing the landscape to a friend, would you describe the area as an agricultural area or as a developed/urban area?

**Substrate Classification**—Determine the percent of the substrate, or stream bottom, falling in each of the size categories listed. Since this is a percent, the numbers should total to 100.

**Livestock Use**—Livestock can severely degrade a stream. If livestock are present, note whether they have access to the stream or if they are fenced out. Next determine whether there are signs of heavy use. These would be fairly obvious, such as large areas of mud along the stream, where the livestock are congregating either in or around the stream. Check only one.

**Drain Pipes**—Even the best riparian areas cannot filter sediment or nutrients out of water being delivered directly to the stream. Look for drainage pipes that may come from urban areas, or agricultural practices, such as tile drainage systems. Try to distinguish contributing from withdrawing—we are only interested in inputs for this assessment.

**Overall rating and suggestions for improvement**—These sections give you the opportunity to give your feelings and/or recommendations for management of this site. Mark and overall score for the area assessed and include any suggestions for improvement. For example, “Limit mowing to further from the bank, increase shading by planting trees in the riparian area.” These suggestions may be helpful to determine future management plans for this area.

**Sketch**—Draw a simple sketch of the area. Include the stream and the riparian area. Indicate what land is owned for the site. For example, if the Fish and Boat Commission owns land on one side of a stream, the sketch would look like this:

# Riparian Zone Assessment Data

Comments:

The following questions are simply fill-in-the-blank, and do not need to be rated.

**Dominant Land Use Outside the Buffer (check only one)**

Urban \_\_\_\_\_ Pasture \_\_\_\_\_ Row-crop agriculture \_\_\_\_\_  
Forest \_\_\_\_\_ Lawn (residential) \_\_\_\_\_

## Substrate Classification

**Class Description Percentage (should total 100%)**

Class	Description	Percentage
Bedrock	Bigger than a car	
Boulder	Basketball to car	
Cobble	Tennisball to basket- ball	
Coarse Gravel	Marble to tennisball	
Fine Gravel	Ladybug to marble	
Sand	Gritty between fingers	
Fines	Smooth, not gritty	

**Livestock Use (check one)**

Livestock have direct access to stream and heavy use is apparent \_\_\_\_\_  
Livestock are not fenced from stream but heavy use not apparent \_\_\_\_\_  
Livestock present in area but fenced from the stream \_\_\_\_\_  
Not applicable, livestock not present \_\_\_\_\_



# Riparian Zone Assessment Data

## Bank

### 4. Bank Vegetation Type

Score: Left Bank \_\_\_\_\_ Right Bank \_\_\_\_\_

Comments: \_\_\_\_\_

### 5. Bank Vegetation Thickness

Score: Left Bank \_\_\_\_\_ Right Bank \_\_\_\_\_

Comments: \_\_\_\_\_

### 6. Bank Stability

Score: Left Bank \_\_\_\_\_ Right Bank \_\_\_\_\_

Comments: \_\_\_\_\_

### 7. Water Pathways

Score: Left Bank \_\_\_\_\_ Right Bank \_\_\_\_\_

Comments: \_\_\_\_\_

## Channel

### 8. Channel Modification

Score: \_\_\_\_\_

Comments: \_\_\_\_\_

### 9. Shading (Canopy Cover)

Score: \_\_\_\_\_

Comments: \_\_\_\_\_

### 10. In-stream Cover

Score: \_\_\_\_\_

Comments: \_\_\_\_\_

**\*\*Assess parameters 9-12 *only* if the stream is *less* than 100 yards wide!**

### 11. Embeddedness (measure in a riffle)

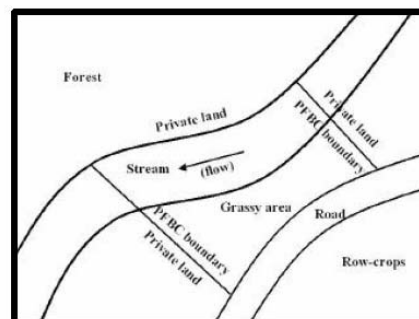
Score: \_\_\_\_\_

Comments: \_\_\_\_\_

### 12. Aquatic Vegetation

Score: \_\_\_\_\_

# Riparian Zone Assessment Instructions



You may also include photos in your assessment, if you would like. One suggestion is to take a photo on each side of the stream, looking across, and one each looking upstream and downstream.



Although digital photos would be most easily incorporated into a database, print photos are also very helpful.

## Scoring—

We are scoring this on a “percentage of points possible” basis. First, total up all of your scores from your assessment. Next, count the number of parameters that you assessed. You are trying to determine the total points possible, so if you assessed both sides of the stream, count two assessment parameters. If you only assessed one side, count one parameter. Multiply this count by ten to get the total number of points possible. Divide the total points by the total points possible. This is your overall score for the site. Compare your score with the table to determine the applicable classification for this riparian area.

**A note of interest**—If you are using this assessment to make any decisions about management or restoration of riparian buffers, it may be helpful to refer to individual parameter scores as well as the overall score. For example, if you are planning on conducting a streamside planting project, it may be more helpful to see which sites in your area scored low for “riparian vegetation thickness”, “riparian vegetation type”, or “shading (canopy cover)” rather than simply looking for sites that scored “marginal” or “poor”.

# Riparian Zone Assessment Data

- \* Assess each condition independently. For example, don't worry about trout habitat while you are assessing bank stability. There is a separate category for that and it will be looked at later. Keep your scoring for each parameter separate and independent from the other parameters.

To score each assessment parameter, scan over the text and photos in the *Riparian Assessment Guide* for each category. Many times, one or two categories can be eliminated quickly. Examine the remaining descriptions until only one category is selected. Decide if the rating should be on the higher end of that category, on the lower end, or somewhere in between. If the decision is borderline between two categories, select the highest score of one category or the lowest score of the other category in question. Use the pictures available as tools. It helps to match the condition you see with the photo most like it.

- Please note that parameters pertaining to the riparian area or the banks will include both a left bank and right bank score. Even if the land owned for the site is only on one side of the stream, we will assess both sides if possible. Parameters pertaining to the channel or the stream as a whole will only have one score.
- **NOTE:** Some rivers are too wide to properly assess both sides and some channel characteristics. If the river is wider than 100 yards, only assess one side. Leave the spaces for the other side blank. Also skip parameters 9-12.
- If you have a partner, each of you should score the parameters separately. Scores can then be compared and, with some discussion, a consensus can be reached on a single score.
- Record any questions or noteworthy observations in the "comments" section of the data sheet.

# Riparian Zone Assessment Data

Site \_\_\_\_\_  
Site ID \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_  
Stream name \_\_\_\_\_  
County \_\_\_\_\_ Water stage conditions \_\_\_\_\_  
Location in the watershed: Headwaters \_\_\_\_\_ Middle \_\_\_\_\_  
Downstream \_\_\_\_\_ Distances reported are: (circle one) measured (tape) measured (range finder) estimated  
Length of segment assessed \_\_\_\_\_ Meters  
Stream width: Upstream \_\_\_\_\_ M; Midpoint \_\_\_\_\_ M; Downstream \_\_\_\_\_ M  
GPS coordinates (D,M,S): Upstream latitude \_\_\_\_\_  
Upstream longitude \_\_\_\_\_  
Downstream latitude \_\_\_\_\_ Downstream longitude \_\_\_\_\_  
If GPS is not available and the site was drawn on a map, please check here \_\_\_\_\_ and include map!

---

**\*\*Assess both sides only if the stream  
is less than 100 yards wide!\*\***

## Riparian Area

### 1. Riparian Buffer Width

Score: Left Bank \_\_\_\_\_ Right Bank \_\_\_\_\_

Comments:

### 2. Riparian Vegetation Type

Score: Left Bank \_\_\_\_\_ Right Bank \_\_\_\_\_

Comments:

### 3. Riparian Vegetation Thickness

Score: Left Bank \_\_\_\_\_ Right Bank \_\_\_\_\_

Comments:

Score: Left Bank \_\_\_\_\_ Right Bank \_\_\_\_\_

Comments: