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GROUP 1: TIDE MEASUREMENT

What are Tides?

Tides are the 'up and down' motion or 'rising and falling' of water caused by the gravity of the Moon on our Earth. Some bodies of waters experience 2 high tides and 2 low tides each day which is not the case in some parts of the lagoon or even other parts of the world.

Objective:

1) Measure the change in tides for your sampling site, if any.

Materials:

* Pencil
* Clipboards
* Tape Measure
* Long, slender, strong sticks
* Timing device [Ex. stopwatch, watch, etc.]

Procedure: Carefully read all directions before beginning the procedure!

Tide Measurement and Tidal Change:

1. Insert one stick deep into the sediment at exactly the water's edge. Pile stones at the base of the stick to give it extra support in order to hold it upright. Use your best judgement where the water's edge is if there are waves.

***Hint:** *Make sure the stick is not placed in a location that will interfere with other teams!*

2. After 10 minutes, check your tide marker. If the water's edge has moved in either direction, use the second stick (planting it the same way as the first one) to mark the new edge. Do not move the first stick!

3. Measure the distance between the first and second stick to get a change in tide.

4. Continue measuring the tides for approximately 30 minutes

Time	Vertical Tidal Change (between stick #1 & #2)	Rising, falling or unchanged
0	3 cm	falling
10 minutes	11 cm	
20 minutes	13 cm	
30 minutes		

OVERALL VERTICAL TIDAL CHANGE = _____

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3. Using the **metric** measuring tape, record the distance between Student #1 and Student #2

4. Determine current speed three times at three different locations within your site. Average the results to get 'average current speed'. Record results below.

**If you note that the current appears to be different in the main channel than it is near the shoreline area please record this observation. The data from the main channel is the most useful. Please endeavor to get accurate readings from as close to mid-lagoon as possible.*

Don't forget your units!

	Location	Starting time	Stopping time	Distance object traveled (cm)	Direction	Current speed (cm/ sec)	Current Speed (knots)	Ebb, Flow, Slack or Tide
Trial 1				258		4.12		
Trial 2								
Trial 3								
Average	X	X	X	X	X			X

Current speed calculation example

Julia's orange traveled 125 cm in 60 seconds.

Her current speed =

Current speed = 2.08 cm/ second

Convert current speed (cm/ second) to knots

Current speed = 2.08 cm/ second

1 knot = 51.44 cm/ sec

2.08 / 51.44 = ***0.04 knots***

5. Convert current speed (cm/ sec) to knots. Use the conversion example above to assist your calculations. Record your data in the chart.

6. Record ebb, flood, or slack tide in data chart above.

River sites

- ***Ebb tide = current is moving downriver towards the bay***
- ***Flood tide = current is moving upstream***
- ***Slack tide = no change in water movement***

Bay sites

- ***Ebb tide = receding or outgoing tide***
- ***Flood tide = incoming or rising tide***
- ***Slack tide = no change in water movement***

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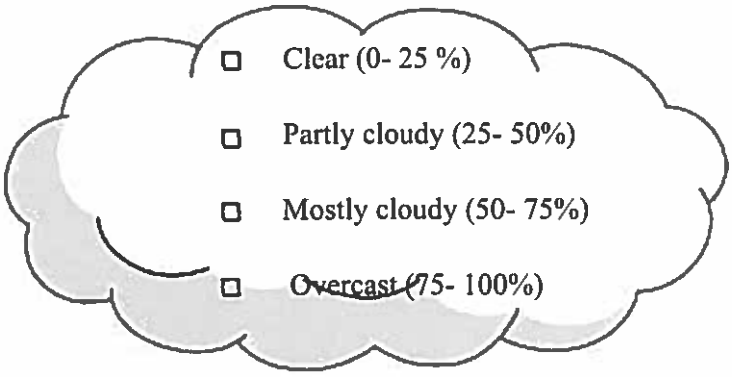
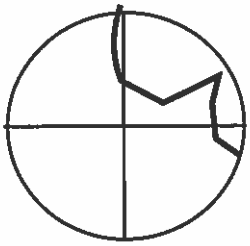
Cloud Cover:

1. Estimate cloud cover





Ex. ~ 25% cloud cover or clear conditions

Wind Direction and Speed:

Wind levels can increase choppiness in the water while adding oxygen to it. This is important for many of the animals that live in the estuary. Wind can affect the movement of surface water, making it difficult to determine current direction and speed.

1. Record wind direction using either the "water on the face method" or "flag method"

   _____

***Remember:** Wind direction is determined by the direction the wind is blowing from*

2. Circle the descriptive word that best describes the conditions of the water.
   Virtually flat Calm Rippled Choppy

3. Measure wind speed by using either an anemometer and the Beaufort Scale

   A. Using the anemometer, record wind speed _____ knots or _____mph

   B. Using the Beaufort Scale (please refer to the next page), figure out which Beaufort Force # best describes wind speed _____

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GROUP 2: PHYSICAL CHARACTERISTICS OF THE SITE

What are the physical characteristics of a site?

The physical characteristics of a sampling site are the geographic features. This includes trees, shrubs, dunes, lagoon, buildings, parking lot, etc.

Objective: 1) Describe the shoreline of your sampling location
2) Create a site map
3) Work with the Documentation Team to take photos of your site from several angles

Materials: * Pencil * Clipboards * GPS unit/ Phone with capabilities

Procedure: Carefully read all directions before beginning the procedure!

Shoreline Description:

1. Walk down to the shoreline. This is going to be your sampling site.

   A. Identify the latitude and longitude of your sampling site 27.64062 - 80.369762

   B. **Check** all of the characteristics that apply.

Sandy	Bulkhead	Vegetated (grasses, shrubs)
Road Ending	Rocky	Pipe entering lagoon
Gentle beach slope	Steep slope	Pier
Riprap (large amounts of rocks piled up)	Garbage	Oyster reef

* What are some other noteworthy features or characteristics of your sampling site (ex. muddy)

Boat Ramps, Baseball Field, Dog Park, mangroves

C. Lagoon bottom is predominately **(circle one)**

Sandy *Muddy* *Rocky* *Weedy* *Muck* *Unable to determine*

D. What percentage of the lagoon bottom is covered in vegetation?

☒ 0- 25% ☐ 25-50% ☐ 50-75% ☐ 75-100%

E. What percentage of the lagoon surface is covered in vegetation?

☐ 0- 25% ☒ 25-50% ☐ 50-75% ☐ 75-100%

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GROUP 2: MAP OF THE SITE

Sketch a Site Map:

Locate your sampling site. Sketch a detailed map of your location. Include features found within 100 feet on either side of you. Be sure to include any physical characteristics that may help others identify your sampling site and label them accordingly.

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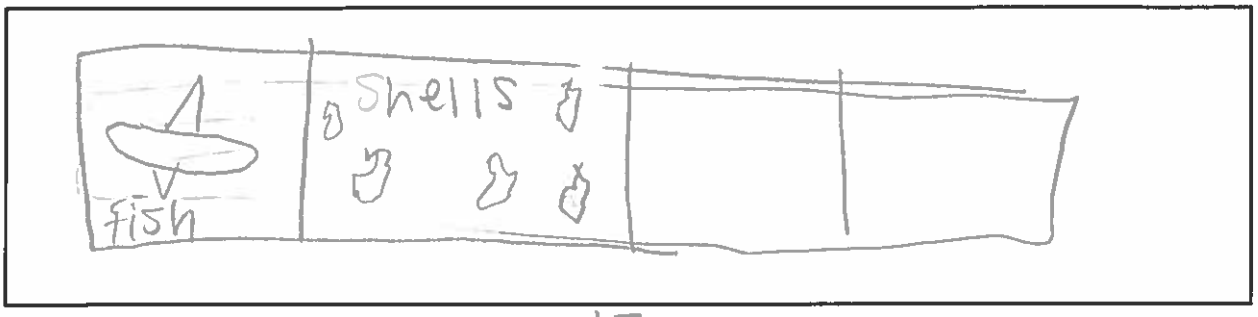
1. Carefully, withdraw the sediment corer from the water. Keep the core upright as you move it to collection tray or bin for observation. Position one hand on the bottom of the corer and the other on the top (see photo above) to keep the sample steady.

2. If possible, slide the sediment core out of the tube onto the tray or bin.

A. Sketch a detailed picture of the sediment sample

***Remember:** Be sure to include the different layers, plants, animals, and other items you see*



B. Total <u>length</u> of your sediment core 45 **cm**

C. Length of oxidized layer (if present) 10 **cm**

D. Length of anoxic layer (if present) 30 **cm**

* ***Interesting Fact:** The anoxic layer may have a sulfur-like or 'rotten egg' smell. This is from bacteria that thrive in anoxic zones and produce hydrogen sulfide (H_2S) as a respiratory waste product.*

F. Observe and dissect the sediment core. Fill out the chart below based on your findings.

	Absent	Rare	Common	Abundant	Additional Comments
Clay (feels thick & dense)	X	✓		✓	
Mud (smooth between fingers)			✓		
Sand (gritty; fine sand paper)			✓		
Gravel (pea-sized sediment)	X				
Pebbles (larger than pea-sized)	X				
Bivalve Shells (Ex. clam, oyster)			✓	X	
Snail Shells (single shell)	X				
Macroinverts (Ex. worm, crab)	X		✓		
Muck (black in color; thick ooze)					
Plant Material (Ex. leaves; grass)				✓	

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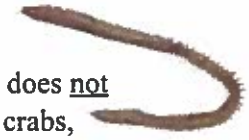
GROUP 3: AQUATIC BIOLOGICAL SURVEY

What is an Aquatic Biological Survey?

During an aquatic biological survey, the investigator identifies and counts each species of fish or macro-invertebrate that is caught during collection. This gives the scientist a better idea as to species diversity and overall health of a given site along the lagoon.



What is a macro-invertebrate?

A macro-invertebrate is an organism that is easily visible without magnification and does not have a vertebrate or backbone! Examples of common, aquatic macro-invertebrates include crabs, horseshoe crabs, barnacles, clams, oysters, snails, shrimp, jellyfish, sand hoppers, worms, and much more!

Objective: 1) Conduct an aquatic biological survey to get a total number of each species caught, largest individual species, and overall total number of species

2) Calculate Catch Per Unit Effort (CPUE)

Materials:

* Pencil
* Clipboards
* Measuring tape
* Binoculars
* Collection buckets
* Reference guide
* Net(s) for collection (seine *{Preferred}*, dip nets, plankton, cast, etc.)

Procedure: Carefully read all directions before beginning the procedure!

Fish & Macro-invertebrate Inventory Using a Seine Net:

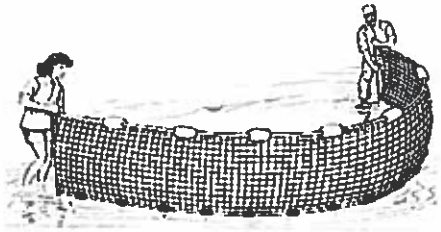
1. Students in Group #3 must have all of the Aquatic Biological Survey rules reviewed with them prior to starting this station. Below are a few of the most important rules!

***Respect all animals and equipment**
***Do not stand on the seine net**
***When the seine net is hauled to the beach, students are to kneel at its edge gently picking out the fish first and then other invertebrates (crabs, barnacles, shellfish, etc)**

2. Prior to seining, answer the following questions:

A. Length of the seine net 3.5 feet/ meters Width of the seine net 1.2 feet/ meters
Mesh size 30 mm

B. Names of those using the seine net Gifford middle School Students



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3. While the seine is being pulled;

Remember: *Be sure to* ask *for assistance if you are unsure how to use a seine properly*

A. Record the distance the seine is pulled 7 m (units)

B. Fill buckets with water

4. Haul seine to the shoreline.

A. First, collect all fish and gently place into buckets

B. Second, collect all macro-invertebrates and gently place into buckets

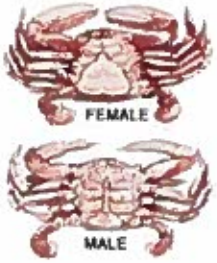
Remember: *Work quickly to get all living organisms into buckets or bins of water*

5. Use the reference guides to help identify each organism to the best of your abilities. Fill out the data chart. Have your Documentation Team take pictures of each species that you observe, especially those that you are unsure about!

Remember: *If you have trouble identifying organisms to the species level, list them in the most specific level of classification possible. Many killifish species also look similar to one another. If you are unsure, group them together as 'killifish'.*

6. Record the total number of each species counted during each seine pull in the data chart

7. Measure the largest individual of each species. For most species it will not be possible to determine gender, but for those that you can (ex. crabs) it is useful to know the ratios of the sexes of the samples.



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Collection Method #1

*Record length of collection net and mesh size of the equipment used

Seine net **{preferred testing method}** _____

Optional Methods: Dip net _____ Crab Trap_____ Cast Net_____ Other_____

Length of Pull 7 m

Do not include in total!

	Species	Total # of individuals	Size of largest individual	Units (mm, cm)
Ex.	*Blue Crab (2 males)*	*2*	*8.5*	*cm*
1	Small fish	15		cm
2	CraBS	1	7.5	cm
3	ShrimP	1	3	cm
4	invertebrates	7	1/2	cm
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
	Total fish in collection #1	24		

Comments: _____

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Collection Method #2

*Record length of collection net and mesh size of the equipment used

Seine net **{preferred testing method}** _____

Optional Methods: Dip net _____Crab Trap_____Cast Net_____Other_____

Length of Pull 4.55 m

Do not include in total!

	Species	Total # of individuals	Size of largest individual	Units (mm, cm)
Ex.	*Atlantic Silverside*	*16*	*10*	*cm*
1	Small Fish	13	4.5	cm
2	Oyoster	14	4.5	Cm
3	Sheep head	1	1	Cm
4	Shrimp	2	1.5	cm
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
	Total fish in collection #2			

Comments: _____

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GROUP 3: HABITAT ASSOCIATION SURVEY

What is a Habitat Association Survey?

A habitat association survey is an important record of the various organisms (birds, mammals, etc.) that are observed at your study site.

Objective: 1) Identify and count organisms at your study site during your visit

**Note: If you are unsure of an organism, please describe it in the notes section below*

Materials:
* Pencil
* Binoculars
* Clipboards
* Reference guide

Procedure: Carefully read all directions before beginning the procedure!

Wildlife Inventory :

1. Spend some time observing the area around your study site. Using binoculars if possible, identify and count birds, mammals or other organisms seen during your visit to your study site. Record the organisms in the chart below. These are in addition to any organisms caught using nets in the lagoon. Other teams' observations of animals should be included as well.

	Location	Species	Count
1		White ibis	13
2		Blue Jay	2
3			
4		Northern mocking Bird	1
5		Blue harren	1
6		osprey	1
7		Red macrove	
8		live oaks	
9	Boat Ramp	Sable Palms	
10			
11			
12			

* Description of unknown organisms: _____

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GROUP 4: WATER TEMPERATURE, DISSOLVED OXYGEN, & PH

Water temperature, dissolved oxygen, and pH are important factors to study when learning about a specific study site. Organisms are adapted to survive in specific range of temperatures, pH, and dissolved oxygen (DO) before they become stressed.

Objective: 1) Record water temperature in BOTH Fahrenheit and Celsius
2) Measure dissolved oxygen
3) Measure pH

Materials: * Pencil * Clipboards
* Water thermometer * LaMotte Water Quality Kit (DO & pH) **{required method}**
* pH reference guide (optional)

Procedure: Carefully read all directions before beginning the procedure!

1. **Water Temperature:**

Record in *situ* water temperature in BOTH Fahrenheit and Celsius every 15 or 30 minutes and then average the results (see chart below)

Note: It may help to have the thermometer securely tied to a string or lanyard for ease of use.

	Location	Time	Temperature °C	Temperature °F
Trial 1				
Trial 2			30	82
Trial 3				
Average	X	X		

*If your thermometer is not able to read both Fahrenheit and Celsius, then you will need to use the conversion chart to assist you.

To calculate Celsius from Fahrenheit: ° C = (____ ° F - 32) x 0.556

To calculate Fahrenheit from Celsius: ° F = (1.8 x ____ ° C) + 32

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2. **Dissolved Oxygen (DO):**

The amount of DO in a lagoon is one of the most important indicators of its health. Many variables influence DO including temperature, time of day, abundance of vegetation, and wind conditions. DO measurements are read in units of **mg/L**, **ppm** and/or as **percent saturation**. Plants and wind can add oxygen to the water and animal respiration can subtract oxygen from the water. Therefore, at night plants do not produce oxygen, and the organisms in the water continue to respire.

A. ***Circle*** the DO measuring method(s)

Drop count test kitampules Digital Titratormeter LaMotte Water Quality Kit **{required}**

Other_____

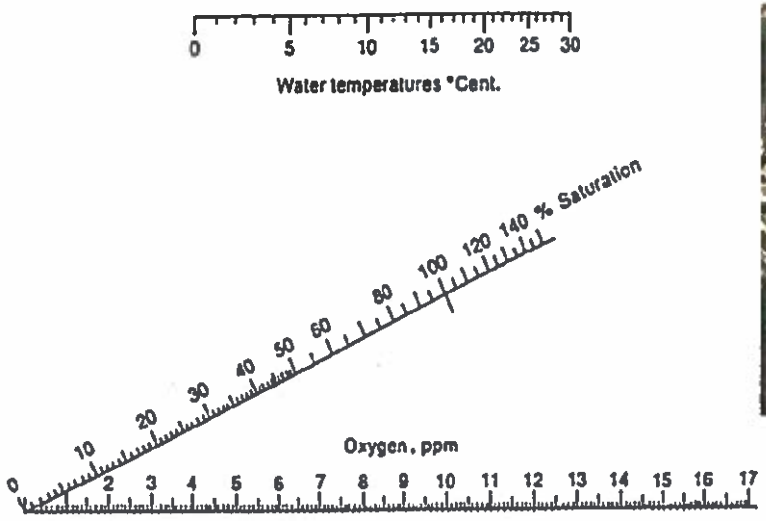
**Note:* Be sure to eliminate all air bubbles before testing!!!

Don't forget your units!

	Location	Time	Temperature °C	DO mg/L or ppm	% saturation (see chart below)
Trial 1					
Trial 2			30°C	5ppm	37%
Trial 3					

B. **Determining percent saturation:**

For a relatively quick and easy determination of the percent saturation value for dissolved oxygen at a given temperature, use the saturation chart below. Pair up the measured mg/l of DO with the temperature of the water (in ° C), Draw a straight line (use a straight edge) between the two values. The % saturation is the value where your drawn line intercepts the angled saturation scale. Waterways with a saturation value of 90% or greater are generally considered healthy.



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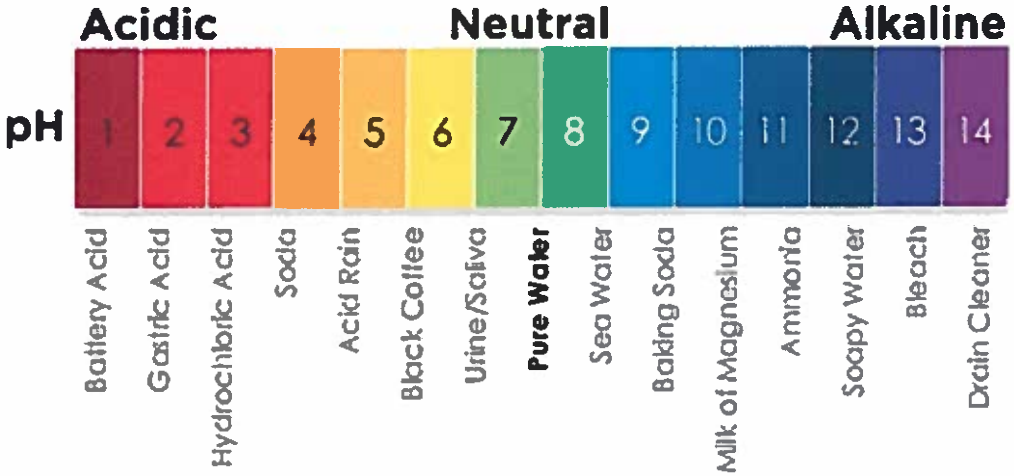
3. **Water pH:**
Most aquatic organisms are adapted to survive in a pH range between 6.8 - 8.0.

A. *Circle* the pH measuring method(s)

Litmus paper pH meter Indicator solution LaMotte Water Quality Kit **{required}** Other_____

B. Test water pH <u>three times at three different locations</u> within your site and average the results. Record results below.

	Location	**Time**	**Reading 1**	**Reading 2**	**Reading 3**	**Average**
LaMotte Water Quality Kit (required)			7	7	7	7
Other Test Method (optional)						



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GROUP 4: SALINITY AND TURBIDITY

Salinity and turbidity are factors that scientists study to better understand a specific study site. Organisms are only adapted to survive in a specific range of salinity and increased turbidity can negatively influence the biodiversity of the lagoon.

Objective: 1) Measure salinity
2) Determine turbidity

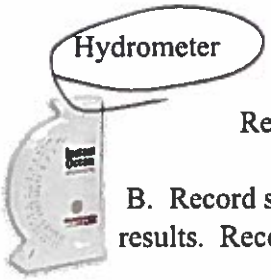
Materials: * Pencil * Clipboards
* Salinity measurement Tool (hydrometer, refractometer, test strip, etc.)
* Turbidity measurement tool (Secchi disc, short sight tube, and/or long sight tube, etc)

Procedure: Carefully read all directions before beginning the procedure!

1. **Salinity:**

Salinity is the measure of 'total salts', 'conductivity', or more specifically the concentration of Chloride ions (Cl^-). In freshwater parts of the river, the unit of measurement may be parts per million (ppm) or milligrams per liter (mg/ L). These two units are equivalent. In saltier parts of the bay, you may measure salinity in parts per thousand (ppt); one part per thousand equals 1000 mg/ L.

A. *Circle* the measuring method(s) used for salinity



Hydrometer Test strips LaMotte Water Quality Kit (requires distilled or deionized water)

Refractometer Other_____

B. Record salinity three times at three different locations within your site and average the results. Record results below.

	Location	Time	Reading 1	Reading 2	Reading 3	Average*
LaMotte Water Quality Kit						35
Other Test Method _____						

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2. **Turbidity:**

Turbidity is a measure of water clarity, which is an important feature of an estuary. Different techniques for determining turbidity use different units of measurement.

A. ***Circle*** the measuring method(s) used for turbidity

Secchi disc Short sight tube/ LaMotte Water Quality Kit

Long sight tube Turbidimeter Other_____

B. Record turbidity three times at three different locations within your site and then average the results. Record results below. Be sure to enter data on the correct line for the technique you use.

Technique	Location	Time	Reading 1	Reading 2	Reading 3	Average	Units
Secchi Disc						48	**Feet or cm**
Short Sight Tube						40	**JTUs**
Long Sight Tube							**cm/meter**
Turbidimeter							**NTUs**