A Day in the Life

EDUCATOR PACKET

This packet provides information on a range of data gathering activities that comprises A Day in the Life. **Please familiarize yourself with the procedures and protocols associated with the five groups prior to the event.**

We depend on our partners to collect reliable and trustworthy data and therefore suggest that if time is limited, biological sampling and chemical analysis be prioritized. Please be sure to fill out the ADIL Google Form or email your results to Jasmine Schwadron jschwadron@teamorca.org within 7 days of collection! Thank you so much for being a part of this citizen science research project and community collaboration to better understand the local waterways.

*Be sure to record **TIME & UNITS OF MEASURE** for each sampling item so that comparisons can be made throughout the estuary.

-THE BASICS-

Sampling site: _____

Latitude: _____Longitude: _____* in decimal degrees (DD): Ex. 41.40338, 2.17403

School Name: _____District: _____

Primary teacher name: _____Email & phone:_____

Environmental partner(s): _____

Number of student participants: _____ Grade level/ages: _____

Number of adults: _____Total # of Participants: _____

Chain of Custody: _____(pre-assigned code) **Date:** _____

Team ORCA CITIZEN SCIENCE
www.teamorca.org

-EQUIPMENT CHECK LIST-

- GPS or Phone App (Latitude/ Longitude in decimal degrees)
- Clipboards
- Pencils/ pens
- Colored pencils*
- Dowel marked in 10cm increments*
- Timer
- Compass
- Calculator
- Floatable object (orange, heavy stick, coconut)
- Anemometer*
- Transect tape (metric)
- Air Thermometer
- Sediment core
- Rubber Mallet
- Tray
- Ruler
- Ziploc bags*
- Clear bins or totes for fish collection
- Bubblers*
- Buckets
- Seine net (and/or other collection tool, i.e. cast net, dip nets, etc.)
- Binoculars*
- LaMotte Low Cost Estuary & Marine Water Monitoring Kit (DO, pH)
- Hanna handheld colorimeter (3)(Alkalinity, Phosphate, Nitrite)- *Nitrate is optional*
- Water thermometer on a string
- Salinity tool (hydrometer, refractometer, probe, etc.)
- Turbidity tool (short sight tube, long sight tube, secchi disc, etc.)
- Device to take photographs (phone, ipad, GoPro)
- Notebook/ Field journal
- Cooler with ice pack or ice
- Glyphosate kit
- Chlorophyll *a* kit

**Not required, but helpful*

-ORDER OF OPERATIONS-

Break students up into 5 groups. *Group 1 and 2 are the highest priority. If you have less than 5 groups, lower priority tasks can be divvied up after higher priority tasks are completed.

Group 1 CHEMICAL ANALYSIS *High Priority

- **Group 1 A**
  - Water Temperature & Dissolved Oxygen
  - PH, Salinity, & Turbidity
  - Fecal Coliform Bacteria
  - Glyphosate
  - Chlorophyll *a*
- **Group 1 B**
  - Phosphates
  - Nitrites
  - Alkalinity
  - *Nitrate - optional & not recommended for elem. students*

Group 2 BIOLOGICAL SURVEY *High Priority

- Aquatic Survey
- Habitat Association Survey

Group 3 PHYSICAL STATION

- Site Background Information
- Tides & Currents
- Weather & Wind

Group 4 SITE DESCRIPTION

- Physical Characteristics
- Site Map
- Sediment Sampling

Group 5 DOCUMENTATION *These students can be embedded in groups 1-4

- Photos (Site, Organisms, & Teammates)

-GROUP 1: CHEMICAL ANALYSIS-

Before beginning, split Group 1 in half.

Carefully read through the directions prior to each procedure.

***Group 1A** is responsible for:*

- *Water Temperature*
- *Dissolved Oxygen (DO)*
- *pH*
- *Salinity & Turbidity*
- *Fecal Coliform*
- *Chlorophyll a*
- *Glyphosate*

***Group 1B** is responsible for:*

- *Nitrite*
- *Phosphate*
- *Alkalinity*
- *Nitrate- optional*

GLYPHOSATE

Glyphosate is an herbicide commonly used by farmers, local governments, and private property owners to control weeds. Understanding how human activity influences the health of the lagoon is an essential step is restoring this important ecosystem. One of the ways ORCA does that is by monitoring the degree to which glyphosate enters and accumulates in the water.

Glyphosate Collection Procedure

Please collect this sample prior to all other sampling

1) Put on gloves.

2) Confirm your scintillation vial is labeled with the same Sample ID found above. This ID is unique to your location.

3) Open and rinse vial 3 times with lagoon water (i.e. fill and empty your vial 3x to rinse)

4) Covering the mouth of the vial with your gloved thumb or hand, place your arm in water up to your elbow. Uncover the mouth and fill the vial with water.

5) Pour out water until the vial is half- full. Place the lid tightly back on your vial.

6) Place sample back in Ziploc bag and place in a very cold cooler with ice/ice packs until you are able to place the sample in a freezer.

CHLOROPHYLL *a*

Testing for Chlorophyll *a*, a molecule found in all plant cells, is an effective way to quantify algal biomass and obtain an indication of phytoplankton levels in aquatic habitats. High levels of Chlorophyll *a* can cause disturbances in aquatic ecosystems such as low dissolved oxygen, fish reproduction/development issues, and degraded wildlife habitat. You will collect and filter a water sample to be analyzed for Chlorophyll *a* by ORCA scientists. Please put your filtered sample immediately into your cooler along with your glyphosate sample and place into a **freezer** when you are done in the field.

Indian River County sites ONLY: Chlorophyll *a* Collection Procedure- PLEASE SEE FLIPBOOK INCLUDED IN KIT FOR DETAILED INSTRUCTIONS/PICTURES

1. Put on gloves before touching any materials. Rinse the 500 mL sampling bottle three times with sample water elbow-deep below the surface then collect the water sample from elbow-deep below the surface in the provided 500 mL bottle.
2. Rinse the 60 mL syringe with ~5 mL of sample water. Repeat for a total of three rinses.
3. Mix the sample by inverting the sample bottle 5 times.
4. Fill the 60 mL syringe with sample water.
5. Connect the filter holder to the syringe.
6. Gently push all 60 mL of water through the filter.
7. Unscrew the filter holder from the syringe by twisting.
8. Use the 60 mL syringe to dry the filter by pushing air through the filter. With the syringe NOT attached to the filter holder, draw air into the syringe. Attach syringe to holder and push air forcefully through the filter. Do this until no "mist" is aspirated from the filter holder, a minimum of 3 times. DO NOT draw air backwards through the filter. **Syringe should be taken off the filter holder each time the plunger is drawn up.**
9. Remove the filter with **clean** forceps. Only touch the filter on the edges. You may use clean fingers to steady the filter by touching the edge (do not touch the green or brown part).
10. Place dried filter directly into the provided centrifuge vial wrapped in aluminum foil using forceps or a gloved hand. Make sure cap is screwed on and vial is airtight. Make sure aluminum foil is secure around vial. Store in cooler on ice.
11. Store samples in the freezer immediately once returning to your school or facility.
12. Bring filters to ORCA Center for Citizen Science or arrange a pick up for analysis. To arrange a drop-off or pick-up please email Jasmine at jschwadron@teamorca.org. **SAMPLES MUST BE GIVEN TO ORCA WITHIN 2 WEEKS OF ADIL.**

WATER TEMPERATURE

1. In succession, record in situ water temperature in BOTH Fahrenheit and Celsius every 15 or 30 minutes and then average the results. It is best to calculate average water temperature several times throughout the day, especially in shallower, backwater areas, as you may see greater variation over time.

1st Reading	^{o}F
Time:	^{o}C
2nd Reading	^{o}F
Time:	^{o}C
3rd Reading	^{o}F
Time:	^{o}C
Average Water Temperature	^{o}F
Average Water Temperature	^{o}C

To calculate Celsius from Fahrenheit:

° C = (____° F - 32) x 0.556

To calculate Fahrenheit from Celsius:

° F = (1.8 x ____° C) + 32

DISSOLVED OXYGEN (DO)

The amount of DO in the lagoon is one of the most important indicators of its health. Many variables influence DO including temperature, time of day, abundance of vegetation, salinity, 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 when plants are not producing oxygen, organisms in the water are continuing to respire.

1. Circle the DO method:

- LaMotte Monitoring Kit
- Other _____

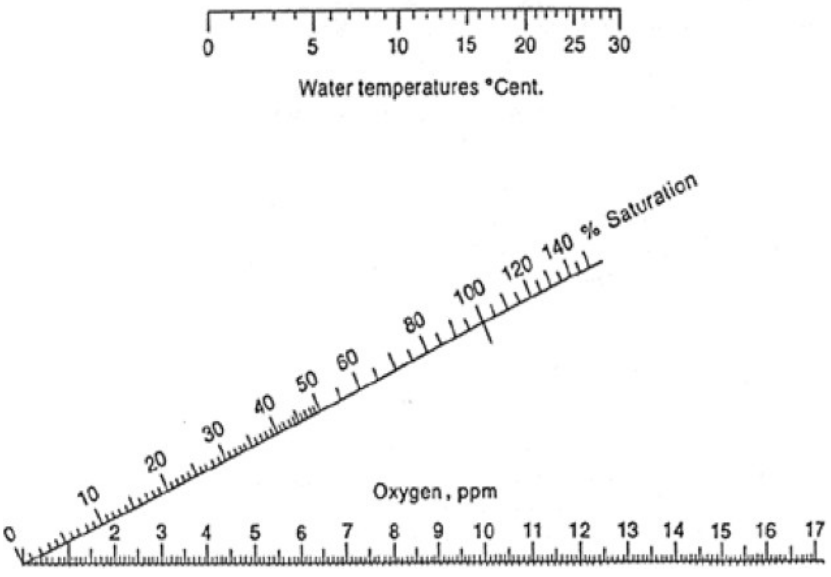
2. Measure DO three times and then average the results. Record measurements below:

	Time	DO	Units	% saturation (see chart below)
1st Reading				
2nd Reading				
3rd Reading				
Average				

PERCENT SATURATION

Pair up the measured mg/l of DO with the temperature of the water (in ° C) and draw a straight line between the two values (use a straight edge).

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.



WATER pH:

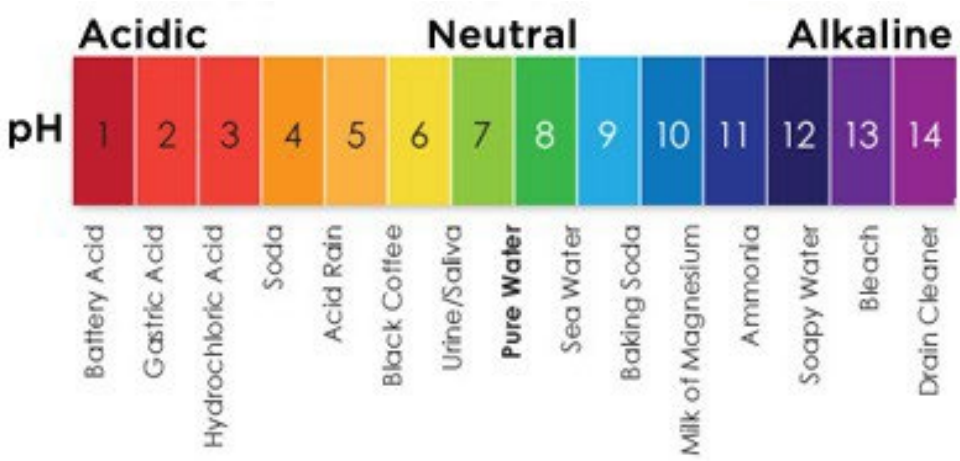
Most aquatic organisms are adapted to survive in a pH range of 6.8 - 8.2.

1. Circle the pH measuring method:

- LaMotte Monitoring Kit *(preferred)
- Litmus paper
- Meter (identify)_____
- Other _____

2. Determine site pH by averaging three different readings, from three different locations.

	Time	PH	Units
1st Reading			
2nd Reading			
3rd Reading			
Average			



SALINITY & 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 estuary or river.

SALINITY

Salinity is the measure of 'total salts', 'conductivity', or more specifically the concentration of Chloride ions (Cl^-). In freshwater parts of the lagoon, 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 lagoon, you may measure salinity in parts per thousand (ppt): one part per thousand equals 1000 mg/ L.

1. Circle the salinity measuring method:

Hydrometer Refractometer * Other: _____

Scan here for a short video tutorial on how to measure salinity.

2. Record salinity 3 times at 3 different locations within your site and then average the results.

Time	Reading 1	Reading 2	Reading 3	Average

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.

1. Circle the turbidity measuring method:

Secchi disc (cm) LaMotte Monitoring Kit

Scan here for a short video tutorial on how to use a secchi disk to measure turbidity.

Long sight tube (cm) Short sight tube (JTU) Probe/Meter (identify)

Probe/Meter _____(units) Other _____(units)

2. Record turbidity 3 times at 3 different locations within your site and then average the results.

Time	Reading 1	Reading 2	Reading 3	Average	Units

FECAL COLIFORM BACTERIA

Mammals produce fecal coliform bacteria and when found in water, can reliably indicate the presence of human sewage, agricultural waste, and/or pet waste. Specific tests can identify which source of fecal coliform is present.

1. Record fecal coliform levels using the LaMotte Monitoring Kit.

***Note: This test requires 48 hours* A teacher or partner organization should keep vial to complete test after 48 hour waiting period. A yellow color change is positive and a red color change is negative**

	Location of Collection	Time of Collection	Negative or Positive
LaMotte Monitoring Kit			

NUTRIENTS

Nitrogen (nitrate, nitrite or ammonium) and phosphorus are the most critical nutrients because of their role in stimulating primary production. It is important to remember that in a healthy, well-balanced ecosystem, nutrients are required for organisms to grow, survive and decompose. Nutrients are constantly being recycled between living and non-living parts of an estuary ecosystem. Nutrients only become a problem when the amounts entering the ecosystem are too great – this is called eutrophication. Eutrophication can have devastating impacts on a marine environment. Nutrients come from a variety of agricultural, urban and industrial sources.

PHOSPHATE

Phosphate is a nutrient required for plant and animal growth. High levels of phosphate can results in the overgrowth of plants, increased bacterial activity and decreased dissolved oxygen levels.

Scan here for a video tutorial

1. Record phosphate levels using the Hanna handheld colorimeter. Measure phosphate three times at three different locations and average the results.

Time	Reading 1	Reading 2	Reading 3	Average	Units

NITRITE

Nitrite is a key intermediate between NO3− and NH4+, so there are several potential pathways, both oxidative and reductive, that might lead to its accumulation in sea water. Nitrites come from fertilizers through run-off water, sewage, and mineral deposits. Unfortunately it can also stimulate the grown of bacteria when introduced in high levels into a body of water.

Scan here for a video tutorial

1. Record nitrite levels using the Hanna handheld colorimeter. Measure nitrite three times at three different locations and average the results.

Time	Reading 1	Reading 2	Reading 3	Average	Units

ALKALINITY

The buffering capability of water to resist acidification.

Scan here for a video tutorial

1. Record alkalinity levels using the Hanna handheld colorimeter. Measure alkalinity three times at three different locations and average the results.

Time	Reading 1	Reading 2	Reading 3	Average	Units

NITRATE- OPTIONAL

Nitrate is necessary to build protein in all aquatic plants and animals. Excess levels of nitrate cause increased plant growth and decay, enhanced bacterial decomposition, and consequently a decrease in dissolved oxygen.

Scan here for a video tutorial

1. Record nitrate levels using the Hanna handheld colorimeter. Measure nitrate three times at three different locations and average the results.

Time	Reading 1	Reading 2	Reading 3	Average	Units

-GROUP 2: BIOLOGICAL SURVEY-

This sampling should NOT BEGIN until WATER SAMPLES have been collected and TURBIDITY has been checked by Group 1.

Carefully read all directions before beginning the procedure.

An aquatic biological survey quantifies (counts) and identifies each species of fish and macro-invertebrate caught during a collection. Generally, greater the biodiversity indicates a healthier sampling site.

Materials:

* Pencil
* Measuring tape/ruler
* Collection buckets
* Bubblers (optional but recommended)
* Clipboards
* Binoculars
* Reference guide
* Net(s) for collection (seine, dip nets, plankton, fish pot etc.)

BIOLOGICAL INVENTORY USING A SEINE NET

1. Measure the length, width, and mesh size of your seine net. This can be done prior to ADIL or during the ADIL event.

Scan here for a short video tutorial on how to seine.

Length of the seine net _____meters / feet

Width of seine net _____meters / feet

Mesh size _____mm

* *If you used ORCA's equipment bin, the dimensions can be found on the seine net pole.*

2. Determine who will be seining and who will be on the shoreline filling buckets and bins with fresh seawater.

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 _____ (units).
***To measure the distance, one student should stand on shore at the starting location between the two students.**
B. Fill bins with fresh, cool seawater.
C. Be ready to help sift though the haul.

4. Haul seine to the shoreline.

A. Working quickly, <u>collect all fish and gently place into buckets</u>

B. Second, collect all <u>macro-invertebrates and gently place into buckets</u>

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



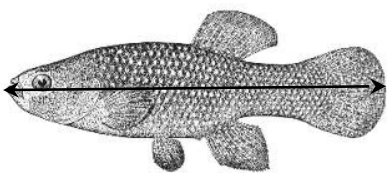
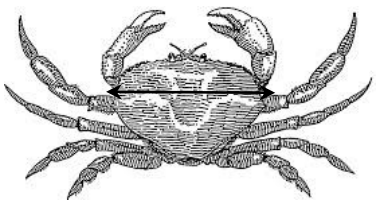


5. To the best of your abilities, identify each organism, at the species level, using the reference guides. Fill out the data chart. Have your Documentation Team take pictures of each species that you observe, especially those that you are unsure of! For unknown species, name them as "Mystery fish 1, 2,3..."

6. Count the <u>total of each species</u> pulled from the seine net.

7. Measure the largest individual of each species. *(optional)*

Scan here for a short video tutorial on how to measure biodiversity.

Examples of how to measure fish length or shell length.

COLLECTION # 1 **Use a separate sheet for each seine OR note what was caught in each seine by noting the haul number.*

1. Which collection method did you use?

_____Seine Net (list dimensions and mesh size)

_____Cast Net _____Dip Net _____Other (please identify)

FISH SPECIES CAUGHT

	Fish Species	# of Individuals	Size of Largest	Units
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				

MACRO-INVERTEBRATE SPECIES CAUGHT

	Macro-invertebrate Species	# of Individuals	Size of Largest	Units
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				

COLLECTION # 2 **Use a separate sheet for each seine OR note what was caught in each seine by noting the haul number.*

1. Which collection method did you use?

_____Seine Net (list dimensions and mesh size)

_____Cast Net _____Dip Net _____Other (please identify)

FISH SPECIES CAUGHT

Fish Species	# of Individuals	Size of Largest	Units
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

MACRO-INVERTEBRATE SPECIES CAUGHT

Macro-invertebrate Species	# of Individuals	Size of Largest	Units
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

COLLECTION # 3 **Use a separate sheet for each seine OR note what was caught in each seine by noting the haul number.*

1. Which collection method did you use?

_____Seine Net (list dimensions and mesh size)

_____Cast Net _____Dip Net _____Other (please identify)

FISH SPECIES CAUGHT

	Fish Species	# of Individuals	Size of Largest	Units
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				

MACRO-INVERTEBRATE SPECIES CAUGHT

	Macro-invertebrate Species	# of Individuals	Size of Largest	Units
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				

CATCH PER UNIT EFFORT (CPUE) **Optional*

In fisheries and conservation biology, the catch per unit effort is an indirect measure of the abundance of a target species. Changes in the catch per unit effort are inferred to signify changes to the target species' true abundance.

CPUE

Let's use a 50 ft. net for the example. Take length of net (50 ft.) X length of pull (example 7 yards X 3 = 21 ft.) then convert it to meters - 50 ft. X 21ft X 12 (for inches per foot) = total inches. Divide by 39.37 inches for inches in a meter = 320 meters. Then divide your catch by 320 to get catch per meter seined. This figure should be computed for each seine event.

If you pull the net in just to close a circle the formula is: Net Length (ft.) ___X 12 = total inches / 39.37 (inches in a meter) =_____Then divide your catch by this number for your CPUE.

Collection 1: Time_____Catch Total _____Length of Pull _____CPUE_____

Collection 2: Time_____Catch Total _____Length of Pull _____CPUE_____

Collection 3: Time_____Catch Total _____Length of Pull _____CPUE_____

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.

Materials:
* Pencil
* Binoculars
* Clipboards

SURVEY

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 river. Other teams' observations of animals should be included as well. (Ex. Great Blue Heron, Seagull, Tiger Beetle, Dragonfly, Butterfly)

Species	Tally	# of Individuals
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

-GROUP 3: PHYSICAL STATION-

*Carefully read all directions before beginning the procedure!

SITE INFORMATION

Site Name: _____ County: _____

Latitude: _____ Longitude: _____

Chain of Custody: _____ Partner:_____

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 water experience 2 high tides and 2 low tides each day, but that is not always the case.

Materials:

* Pencil
* Tape Measure
* Clipboards
* Timer
* Two long, slender, strong sticks
* Dowel marked in 10cm increments (optional method)

Scan here for a short video tutorial on how to measure the tidal change.

TIDE MEASUREMENT

This can be determined by using the 'multiple stick method' (described below) or a wooden dowel marked in 10cm increments.

1. **Insert one stick deep into the sediment at exactly the water's edge. Use your best judgment where the water's edge is if waves are present.** *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 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, and then continue measuring the tidal change throughout your time.**

Time	Rising, Falling, unchanged	Height in cm	Rate of Tidal Change (cm/min)

4. **Overall, is the tide rising, falling or remaining unchanged?** _____

CURRENTS

A current is the internal movement of water, sometimes described as a push or pull on the water. Scientists will often measure the direction the current is flowing and calculate current speed.

Materials:

* Pencil
* Calculator
* Tape Measure
* Compass
* Clipboards
* Timer
* Floatable objects (oranges, heavy stick, coconut)

CURRENT DIRECTION

1. **Toss a floatable object into the middle of the lagoon to allow the current to move the object.**
2. **As a group, observe which direction the object moves. This is also the water current direction!**
3. **Using the compass, determine the water current direction (east, west, etc.). _____**
4. **What type of object did you use to measure current direction? _____**

CURRENT SPEED

Scan here for a short video tutorial on how to measure the current speed.

1. **At the starting point, Student #1 stands at the water's edge and tosses the floatable object into the water.**
2. **Allow the object to float/move for 60 seconds. Student #2 will quickly line up with the floating object's position on the shoreline and call stop. This is the stopping point.**
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. Calculate the average current speed in cm/sec. Record results below.**

	Location	Time	Distance traveled (cm)	Direction (N,S,E,W)	Current speed (cm/sec)
Trial 1		***60 seconds***			
Trial 2		***60 seconds***			
Trial 3		***60 seconds***			

Average current speed = _____cm/sec

Current speed calculation example: Julia's orange traveled 125 cm in 60 seconds.
Her current speed= $\frac{125\text{cm}}{60 \text{ seconds}}$

Current speed = 2.08 cm/ second

WEATHER

Weather is an important piece of physical data that helps to provide context for other data. Weather includes current conditions and recent conditions over the last few days that may impact water quality of the lagoon such as rain and extreme temperatures.

Materials:

* Pencil
* Thermometer
* Compass
* Calculator
* Clipboards
* Anemometer (measures wind speed) (optional)

WEATHER CONDITIONS

1. **Briefly describe the weather for the last 3 days: any wind, rain, or unusual temperatures?**

_____

_____

_____

AIR TEMPERATURE

1. **Record air temperature in BOTH Fahrenheit and Celsius.**

   ***Note:** Place your thermometer in a shady location, if possible*

Time _____Air Temperature _____°F Air Temperature _____°C

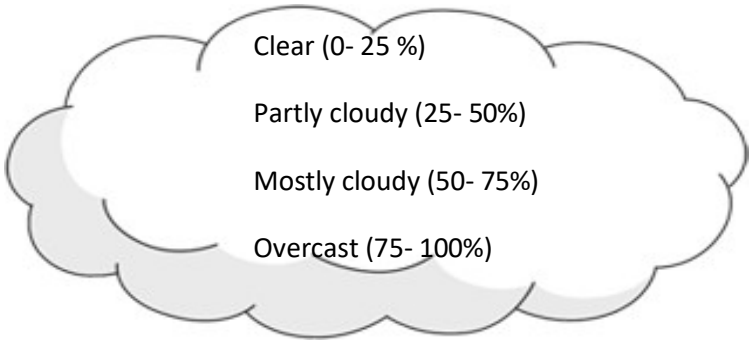
*If your thermometer is not able to read both Fahrenheit and Celsius, then you will need to use the conversion calculations to assist you.

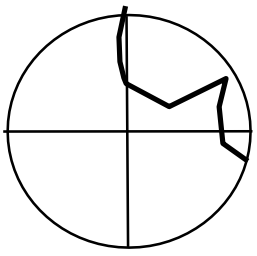
To calculate Celsius from Fahrenheit: *° C = (____° F - 32) x 0.556*

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

CLOUD COVER

1. **Estimate cloud cover (CIRCLE one below)**





Ex. Approximately 25% cloud cover

WIND DIRECTION & SPEED

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

1. **Record wind direction as the direction the wind is coming (blowing) from_____**

2. **Circle the descriptive word that best describes the conditions of the water.**

   Virtually flat Calm Rippled Choppy

Scan here for a short video tutorial on how to measure wind speed and direction.

3. **Using the Beaufort Scale (see below) figure out which Beaufort Force # best describes wind speed. _____**

Optional: Using an anemometer, record wind speed: _____knots or _____mph

_____

Beaufort Scale

Beaufort Scale	Wind Speed knots / mph	Wave Height feet	Description	Effects Observed
0	< 1 / < 1	-	calm	calm, water is like a mirror
1	1-3 / 1-3	0.25	light air	wind shown by smoke drift but not by wind vane; no foamy crests
2	4-6 / 4-7	0.5-1.0	light breeze	wind felt on face; leaves rustle; small wavelets
3	7-10 / 8-12	2-3	gentle breeze	leaves and twigs in constant motion; wind extends light flag; scattered whitecaps
4	11-16 / 13-18	3.5-5.0	moderate breeze	raises loose paper; small branches are moved; numerous whitecaps
5	17-21 / 19-24	6-8	fresh breeze	small trees begin to sway; many whitecaps, some spray
6	22-27 / 25-31	9.5-13	strong breeze	large branches in motion; large waves forming; whitecaps everywhere
7	28-33 / 32-38	13.5-19	near gale	Whole trees in motion; white foam from breaking waves

Devised by British Rear- Admiral Sir Francis Beaufort in 1805 based on observations of the effects of wind on ocean water.

-GROUP 4: SITE DESCRIPTION-

**Carefully read all directions before beginning the procedure!*

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.

Materials:
* Pencil
* Colored pencils (optional)
* Clipboards

SHORELINE APPEARANCE

1. Walk down to the shoreline. Check all of the characteristics that apply to the appearance of your shoreline.

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

2. What are some other noteworthy features or characteristics of your sampling site? (Ex. Are people fishing, swimming, launching boats, picnicking, or other activities)

3. Circle the predominant lagoon bottom type.

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

4. What percentage of the lagoon <u>bottom</u> is covered in vegetation? Check one.

_____*0-25%* _____*25-50%* _____*50-75%* _____*75-100%*

*If possible, identify the type of vegetation or provide photo evidence?

_____

5. What percentage of the lagoon <u>surface</u> is covered in vegetation? Check one.

_____*0-25%* _____*25-50%* _____*50-75%* _____*75-100%*

*If possible, identify the type of vegetation or provide photo evidence?

_____

SKETCH A SITE MAP

Locate your sampling site. Begin sketching 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.

SEDIMENT

Sediment is solid matter that can be moved and deposited by wind and water. It comes in many forms and sizes and from a variety of sources. Collecting a sediment core and studying the different layers, organisms, and gases in the core is a helpful way of determining the geographic profile of an area. The amount of time represented by your core will range depending upon the location chosen and the processes of weather, current, and sedimentation. In areas with high deposition, it might be only a few weeks represented versus in other areas the same length of core might represent decades. You may notice that the coloration of sediments varies, indicative of varying amount of oxygen. Generally, sediments that are sandy or at the surface of the core are higher in oxygen versus those that are composed of finer particles or at depth that are generally lower in oxygen or anoxic.

Materials:

* Pencil
* Ruler
* Tray/ bin
* Clipboards
* Sediment Corer (tube, rubber mallet)
* Ziploc bag *(optional for taking sample back)*

SEDIMENT CORE COLLECTION

1. With the assistance of an adult, find an area in the water where the sediment is soft enough to push the end of a sediment core into. Push the sediment core into the bottom at least 3/4 of the way down. You may have to try several locations or use the rubber mallet to help get a good length into the substrate. Choose a spot that is not too deep for your team to work.

Scan here for a short video tutorial on how to extract a sediment core.

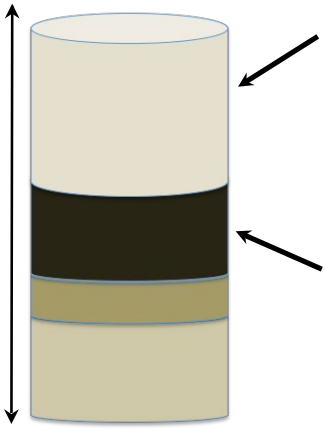
2. Carefully, withdraw the sediment corer from the water. Keep the core upright as you move it to collection tray or bin for observation. Position one hand on the bottom of the corer and the other on the top (see photo below) to keep the sample steady. Let the water drain.

3. Slide the sediment core out of the tube onto the tray or bin.

A. Total length of your sediment core _____cm

B. Length of oxidized layer (if present) _____cm

C. Length of anoxic layer (if present) _____cm



Top Layer: light in color; newly deposited; oxidized

Oxidized = contains oxygen

Lower Layer: dark in color; older; anoxic

Anoxic = very little or no oxygen

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.

4. Sketch a detailed picture of the sediment sample

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

5. 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)					
Sand (gritty; fine sand paper)					
Gravel (pea-sized sediment)					
Pebbles (larger than pea-sized)					
Shell(s)					
Macroinverts (worm, crab, snail, etc.)					
Muck (thick ooze, black in color)					
Plant material (leaves, grass, etc..)					

Other:	

-GROUP 5: DOCUMENTATION-

Review **'Important Recommendations' at the bottom of this section*

Your responsibility is to record images and information about the ADIL event. By taking digital pictures, short videos, asking questions and even interviewing the experts, you will gather information that may prove very valuable to the scientific data collected. You will also have handy images that can be used to demonstrate the groups' accomplishments.

Materials:
* Pencil
*Notebook
* Digital cameras/ Documenting tools

PHOTOGRAPHS OF SITE, ORGANISMS & TEAMMATES

1. **Assign each student in this Documentation group to another group/station to observe.**

2. **Write their names next to the assigned team below:**

Group 1 (Chemical Station)_____

Group 2 (Biological Station)_____

Group 3 (Physical Station)_____

Group 4 (Site Description)_____

3. **Students should document the procedures and discoveries made throughout the day using their artistry and creativity to get interesting angles, compositions and scenery. Keep track of the photos and videos you have taken by writing them down in your journal or on the back of this paper. This is especially valuable when trying to determine unknown species collected at the Biological Station. Feel free to interview your classmates, teachers, environmental partners, and others while participating in ADIL.**

4. **It may not be necessary to write down each and every photograph, so record them in blocks so that when reviewing the images, you have an idea of who or what is in each photo. (For example: "1-7 group preparing at site")**

Important Recommendations

*Take action photos of sampling techniques
*Take close-up photos of fish and invertebrates captured to aid in identification
*When taking photos of small creatures, use a coin or ruler in the shot as a size reference
*Take group photos of each team performing tasks
*Take group photos of the entire class
*Take photos of the experts in action
*Take photos of scenery, other animals, and events occurring nearby