A Day in the Life of the Hudson River Estuary
October 4, 2012
http://www.ldeo.columbia.edu/edu/k12/snapshotday/
IF YOU ARE SUBMITTING STUDENT FORMS PLEASE INCLUDE THIS COVER SHEET

The posted sheets contain a variety of data gathering activities. Any combination of these activities can be completed as part of Snapshot Day. Additional activities to support your field experience are available on the Snapshot Day website.
Please be sure to submit your results to Margie Turrin (845-365-8179 (fax) or e-mail mkt@ldeo.columbia.edu) within 24-48 hours of collection! Questions? 845-365-8494. Submit this cover sheet with any set of data sheets your submit. THANK YOU!

PLEASE BE SURE TO RECORD UNITS OF MEASURE SO THAT COMPARISONS CAN BE MADE THROUGHOUT THE RIVER

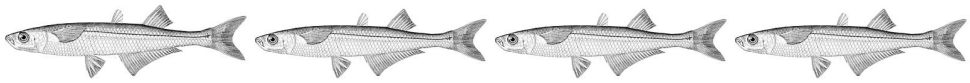
Recording Sheet I - Background Information.

1. Coordinator/contact person_____
   Organization_____
   Street_____
   City_____State____Zip_____
   phone_____fax_____email_____
2. School/group name_____District_____
   Name of teacher/group leader_____
   Street_____
   City_____State_____ Zip_____
   phone_____fax_____email_____
   Number of school participants_____ grade level/age_____
   Adult helpers _____
3. Please tell us where you are sampling. Be as specific as possible.
(Example: swimming beach, Kingston Point, City of Kingston, Ulster County.)
_____
4. Using the map included with your packet, give your location along the Hudson estuary in river miles. (The Battery at the southern tip of Manhattan is River Mile 0; the Federal Dam at Troy is River Mile 153.)
River mile _____

If you have a way to determine the latitude and longitude of your site, enter that data here.
GPS Latitude_____ Longitude_____

Scientific or Naturalist Journaling
(making field observations)

John Muir, a famous naturalist and conservationist, wrote "When we try to pick out anything by itself we find that it is bound fast by a thousand invisible cords that cannot be broken, to everything in the universe."
Through journaling we hope to observe, record and better understand some of these relationships.



How do we learn about our natural environment? We **observe.** Direct observation and careful description helps us compare species, habitats and different geographical regions.

Recording a number is often not the full story. We can learn about plants (flora) and animals (fauna) by carefully observing and then recording our findings, complete with drawings or sketches. We can also learn to detect environmental clues that might help us to understand or explain our data.

For example at your fish station make note of:

1. Their appearance. How big are they? How are they shaped? What appendages, if any, do they have? What color are they?
2. How they relate to each other.
    a. Do they cluster together or are they found alone?
    b. Are large and small, young and full grown, samples found together?
    c. Are they often found with one or two other specific types of plant or animal?
3. What is the water temperature like where they are found? The water chemistry?
4. Did you find them in just one kind of habitat – describe the habitat? (dry, wet, sandy, rocky)

You will be keeping a journal during Snapshot Day. Use the back of this sheet to record anything you feel is noteworthy or important. Take time to sketch, write or put down a few notes at each station or activity, not just the facts. Describe what you see, sketch things, and try and write down WHY you think something is of interest.

This is my Journal for Day in the Life _____!
Your name

Name_____ DITL 2012 Observing Surroundings Location_____

Let's look at your sampling site. At this station we will describe the site and any plants in and around your collection area. Include plant materials in the water, as well as along the water's edge.

1. Sketch your sampling site. Be sure to include a compass rose showing N/S/E/W and locate the River on your sketch, and mark where your sampling site is.

2. What is the surrounding land type at your site. Is it pier? Forested? Grassy? Parking lot? What is it mainly used for? picnics, boating, swimming, fishing? (circle choices)

3. Provide the following uses as a percentage of 100 – (for example 50% is half the usage):

Urban/residential___ forested___ Beach___ Industrial/Commercial___ Other___

4. Shoreline – is it Sandy, muddy or rocky? (Circle all that applies). Check all that apply:

___ Beach ___ Covered in vegetation ___ Banks altered ___ Rip Rap (large rocks) ___Bulkhead (with wood timbers) ___ Piping noted entering the river

5. Describe the water area where you are sampling:

Depth_____ Bottom sandy___ muddy ____rocky____ weedy_____

Water: Calm____or Choppy____

6. Name some plants that you have identified and percent of the total area they cover:

Plant Name	% cover	Plant Name	% cover
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Name_____ DITL 2012 Observing Surroundings Location_____

Observations

Look around your site and make a list of what you see in the area. Are there flecks of brick on the ground? lumps of coal? water chestnut seeds (devil's heads), shell pieces or full shells? Crab shells?

From all the observations you have collected here can you think of any "impacts" to the data you are collecting here?

The river is used for business and pleasure. Keep track of how it is being used.

7. **Commercial traffic**: Record any large boats, tugs, or barges traveling on the Hudson. Please record the name and color! A loaded barge is full of cargo and rides lower in the water than a light one.

Time: name color North or Southbound loaded or light

_____

Time: name color North or Southbound loaded or light

_____

Time: name color North or Southbound loaded or light

_____

8. **Recreational Traffic:** List recreational vessels you see on the Hudson (sail, speedboats)

Time: name color North or Southbound loaded or light

_____

Time: name color North or Southbound loaded or light

_____

Time: name color North or Southbound loaded or light

_____

9. What else do you see? Use this section of the sheet to write down anything else you note during the day. For example: birds you see, other animals that might be down at the river?

Name_____ DITL 2012 Physical Setting Data Location_____

(including tides and currents)

Time :_____

1. **Location**: We will be comparing data with other groups along the Hudson, so it is important to note our exact location. Location Name _____
   Using your Hudson River Estuary map, give your location in ***river miles***: _____ and if possible
   GPS Latitude:_____ GPS Longitude: _____

2. **Tides**: Tides cause the water of the Hudson River to rise and fall due to the gravitational pull of the sun and the moon. Tides can be measured over a 30 minute time with a **Tide Meter Stick**, or another marker and find out whether the water is rising, falling, or staying the same. First, record the time, and then check the water level using your measuring stick. Check the stick again regularly (every 15 to 30 minutes) and record.
   Start time: _____ Water height in cm._____(if on a dock measure down from the dock)
   Check time: _____Water height in cm._____ rising falling unchanged **(circle one)**
   Check time: _____Water height in cm._____ rising falling unchanged **(circle one)**
   Check time: _____Water height in cm._____ rising falling unchanged **(circle one)**
   Check time: _____Water height in cm._____ rising falling unchanged **(circle one)**

3. **Currents**: In what direction is the water moving? A current moving downriver is called the ***ebb***, a current moving upriver it is called the ***flood***, and if there is no current it is ***still***. Toss an orange or a solid stick as far as you can out into the river and watch to see which way it moves. Is it Ebb, or Flow? Now time its movement.

   Time: _____Current: ebb flood still (circle one) ___Cm/60 secs __Cm/sec___Knots
   Time: _____Current: ebb flood still (circle one) ___Cm/60 secs __Cm/sec___Knots
   Time: _____Current: ebb flood still (circle one) ___Cm/60 secs __Cm/sec___Knots
   Time: _____Current: ebb flood still (circle one) ___Cm/60 secs __Cm/sec___Knots
   *To determine knots: measure distance orange or stick travels in 60 secs. Divide by 60 for cm/sec and then divide by 51.4 for knots. The formula for knots is (cm/sec)/51.4

   Is there anything about the river or the shoreline that may cause the current near shore to flow in a different direction than the current out in the middle of the Hudson?

4. **Weather Conditions**:

   Time:____Air temperature: _____°F ____ °C

   Time:____Air temperature: _____°F ____ °C

   Time:____Air temperature: _____°F ____ °C

   Wind speed: Beaufort Chart: Force # : ____

   Wind Speed in Km/hr____Knots____**Wind meter**: ___

   Wind direction (direction **coming from**) _____

   Cloud cover: (clear, partly cloudy, mostly cloudy,

   overcast) _____

   Precipitation (rain)? _____ If so, how much? _____

   Briefly describe the weather for the last 3 days: Any rain, wind or unusual temperatures?

Observations

Note on unusual tides or currents, weather shifts or anything you think should be noted.

Name_____ **Location** _____ **Time**_____

Snapshot Day Recording Sheet - SALINITY When we measure salinity we are measuring the amount of salt present in water. Much of this salt is sodium chloride, just like table salt. The main source of salt in the Hudson is seawater pushing in from the ocean. There are only very small amounts of salt in the fresh water entering the river.
* Expected Hudson Range: ~40 ppm in the freshwater section to ~29,000 ppm in harbor*
Put a checkmark in the box next to the measuring method you are using. Follow the instructions for completing the test and then record your results below.

☐ TITRATOR STRIPS measure chloride by color change (to white) along a scale.

On strip's scale, white color ends at _____. Find this number on the conversion table.

Read the chloride concentration that goes with this number. Write it here:_____mg/L Cl^-

☐ DROP COUNT TEST KITS usually measure chloride using color change as a liquid chemical is added to the sample drop by drop.

How many drops were needed for the sample to change color? _____ drops

Number of drops times conversion factor (from instructions) equals chloride concentration.

_____ X _____ = _____ mg/L Cl^-

☐ HYDROMETERS measure water's density (its specific gravity) using a floating object. As salinity increases, density increases, and the object floats higher.

If using a hydrometer with a pointer, record salinity here: _____ parts per thousand (ppt)

If using a glass hydrometer floating in a water sample:
1. Record the temperature of the water sample _____ ° C
2. Record the specific gravity (to the fourth decimal place) from the hydrometer scale where the stem breaks the water's surface. Read at water level, not at the top of the meniscus. _____
3. Record salinity from the specific gravity conversion table: _____ parts per thousand (ppt)

☐ REFRACTOMETERS measure how light is bent—refracted—as it enters water. Refraction varies with density, which in turn varies with salinity (density increases with salinity).

Read salinity where the shadowline crosses the display scale: _____ parts per thousand (ppt)

☐ METERS measure how well water conducts electricity (better as salinity increases). They may show conductivity, salinity, or chloride concentration; be sure to specify units.

Reading _____ Units of measurement _____

Name_____ DITL 2012 Chemical Description Location_____

1. **pH – Expected Range - Most fish prefer 6.5 to 8**.5 - pH measures how acidic or basic (alkaline) a solution is. pH is measured on a scale from 0 to 14. The middle of the scale, 7.0, is neutral, below 7.0 is acidic and above 7.0 is basic. Seawater tends to be more of a base than neutral, so the higher your salinity the higher your pH may be. There are NO UNITS used with pH.
   Circle equipment used for the test:
   Test Strips color match test kit meter pH pen

   Time: _____ Reading 1: _____ Reading 2: _____ Reading 3: _____
   Time: _____ Reading 1: _____ Reading 2: _____ Reading 3: _____
   Time: _____ Reading 1: _____ Reading 2: _____ Reading 3: _____
   Time: _____ Reading 1: _____ Reading 2: _____ Reading 3: _____

2. ***Salinity - Expected Range - ~40 ppm in freshwater section up to 29,000 ppm in harbor**.
   A measure of the amount of salt present in the water (we are measuring the chloride) It is measured in PPT (parts per thousand) OR in smaller amounts as PPM (parts per million) or mg/l. Some people measure in PSU or practical salinity units. Others measure Conductivity as mS/cm (Microsiemens), uS/cm (millisiemens), or PSU. **Circle equipment used for the test:**
   Drop count test kit meter refractometer test strips hydrometer

   Time: _____ Reading 1: _____ Reading 2: _____ Reading 3: ____ (note correct units)
   Time: _____ Reading 1: _____ Reading 2: _____ Reading 3: ____ (note correct units)
   Time: _____ Reading 1: _____ Reading 2: _____ Reading 3: ____ (note correct units)
   Time: _____ Reading 1: _____ Reading 2: _____ Reading 3: ____ (note correct units)
   *(NOTE THERE IS AN INDIVIDUAL CALCULATION SHEET FOR SALINITY)

3. **Water temperature Healthy Expected High in October would by < 25°C**
   Record water temperature in degrees Celsius or degrees Fahrenheit. TO convert between the two
   °C = 0.556 X (°F - 32°)
   °F = (1.8 X °C) + 32°

   * Time: _____ water depth (feet):_____
   Reading 1: _____ °C _____°F
   Reading 2: _____ °C _____°F
   Average: _____ °C _____ °F

   * Time: _____ water depth (feet):_____
   Reading 1: _____ °C _____°F
   Reading 2: _____ °C _____°F
   Average: _____ °C _____ °F

   * Time: _____ water depth (in feet): _____
   Reading 1: _____ °C _____°F Reading 2: _____ °C _____°F Average: _____ °C _____ °F

Observations
Describe the area where you are collecting water – was it in direct sun? shade? Covered with plants? Water very still? What else should we know about your sampling?

Name_____ DITL 2012 Chemical Description Location_____

4. Dissolved oxygen (DO) Healthy Expected Range 5.0-11.0 mg/L

The amount of dissolved oxygen in the water is one of the most important factors in telling how healthy that ecosystem is. Many variables affect DO, including temperature, time of day, presence of plants, and wind conditions. DO measurements are given in mg/l and as percent saturation. 100% saturation means that the water cannot hold any more oxygen at that temperature. If more oxygen is added (such as by a high wind or a waterfall) the oxygen will go from the water into the air. **Circle equipment used for the test:**

meter drop count kit other

For test temperature use average from #3 above. For % saturation calculation use chart on bottom of page.

* Time: _____Water temperature in °C ____ DO (mg/l) or PPM: ____% saturation _____

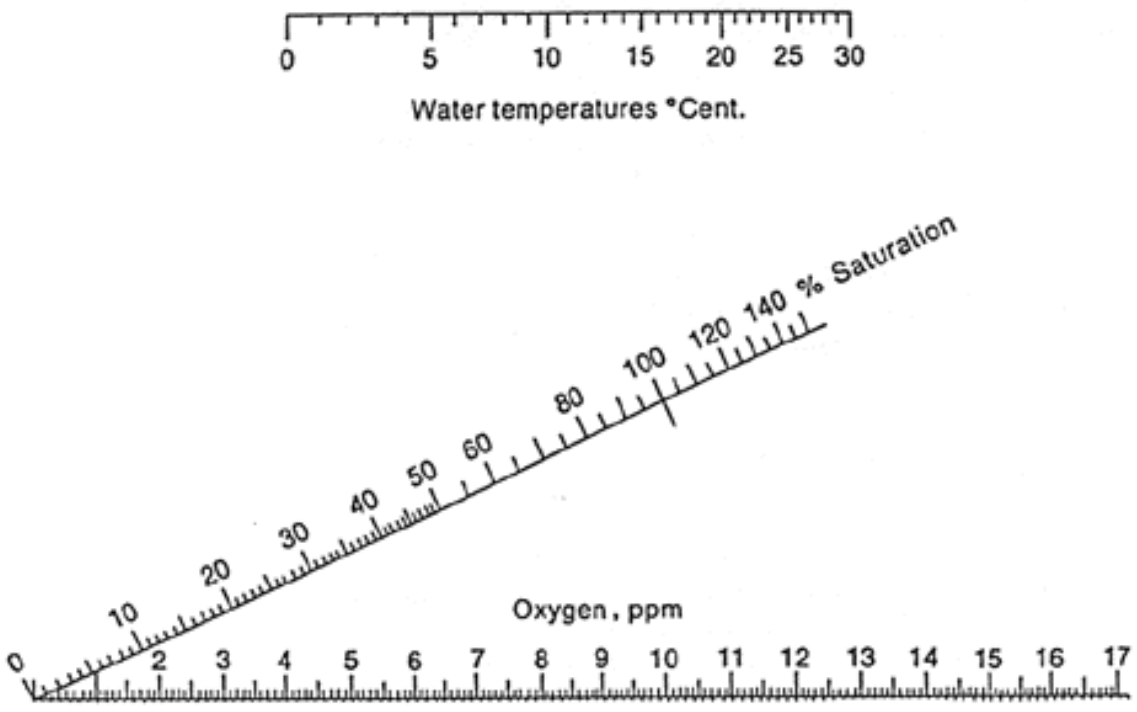
* Time: _____Water temperature in °C ____ DO (mg/l) or PPM: ____% saturation _____

* Time: _____Water temperature in °C ____ DO (mg/l) or PPM: ____% saturation _____

5. % Saturation of Dissolved Oxygen (DO) Healthy Expected Range 90% or above

Source of chart: http://watertheweb.org/under/waterquality/oxygen.html

For a quick and easy determination of the percent saturation value for dissolved oxygen at a given temperature, use the saturation chart below. Locate your DO reading on the bottom scale (ppm equals mg/L). Locate the temperature of the water in degrees C on the top scale. Draw a straight line between the temperature and DO. The % saturation is the value where the line intercepts the saturation scale.



Name_____DITL 2012 Fish and Macroinvertebrates ID Location_____

Use separate sheet for each seine OR note what was caught in each seine by noting seine #.

TIME_____ LENGTH OF NET_____

Fish Species:	# of individuals:	Size of largest (unit)	
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
12. _____	_____	_____	_____

Macroinvertebrates:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Observations & Sketches:

Sketch One Species. Comment on the diversity, of your catch, a specific species, the size. .. – whatever catches your attention....

If your group can compute Catch Per Unit Of Effort Please Record This here.

Seine #___ Time____ Catch Total_____ Length of Pull_____ Computed CPUE_____

Name:_____ DITL 2012: Turbidity Location:_____

USE THE SEPARATE STEP-BY-STEP PHOTO DIRECTION SHEETS TO COMPLETE EACH OF THESE TESTS. RESULTS WILL BE RECORDED ON THIS SHEET.

1. **Turbidity** is a cloudiness of the water. Light can penetrate farther in clear water than it can in turbid water. Estuaries like the Hudson River are naturally turbid. Turbidity can be caused by small plants, and animals, sand and mud. We will measure the turbidity of the river.

Time: _____ Circle equipment used

1)Secchi disk (cm) 2) Short Sight tube (JTU) 3) Long Site Tube (cm) 4)Turbidimeter (NTU)

_____ _____ _____ _____

Reading Reading 2 Reading 3 Average

(Make sure that you **RECORD** the correct unit for the piece of equipment that you are using; feet, cm, meters, JTU's or NTU's)

2. **Chlorophyll** is a measure of the pigment in plants and algae that collects the energy needed for photosynthesis. Measuring chlorophyll gives us an idea of how much plankton is in the river. We need to filter the water and "catch" all the particles in the water on a filter. After filtering 120 mls of water (2 syringes) look at the filter and match the filter color to the chart on the direction sheet. The number you record represents chlorophyll, as well as other plankton and particles in the river.

Observations

Is the water really turbid? How would you describe it in words?

Time: _____ Color chart number best matching your sample_____

3. **Sediments** are small pieces of sand, minerals and organic matter found in water. When the water is calm many of the sediments sink to the bottom of the water and provide a place for plants to take root. We will be taking a sample of sediment from the bottom of the Hudson. This sediment represents a period of time…but the amount of time is a mystery – it varies in different places in the river.

COMPLETE THE CORE SAMPLING SHEET ON THE NEXT PAGE

Examine your sample in the collection tube. Hold it upright just as you collected it. The material at the bottom is older than the material at the top. Do you see any color change or layers in the sample? If the color at the top of the sample is light brown, it is an indication that the surface is still unsettled and moving around in the water mixing oxygen from the water in with the sediments. Measure the length of this layer. Look to see if the lower sediments have become darker, showing that they have been out of contact with the oxygen in the river and are older. This darker, older section will often have a sulfur-like smell. Measure and record this section, too.

Length of entire sediment sample core: _____(note units used)

Length of top layer:_____(note units) Length of second layer:_____(note units)

What is the grain size like? Fine grain (muds/clays)___, larger grain(sand) ____Mix___

Is there a lot of plant material in the core?_____Other Notes_____

DAY in the LIFE PUSH CORE SEDIMENT LOG

GRAB ID#	Site Name	DATE	FORM COMPLETED BY:
			GROUP #

TIME	LATITUDE	LONGITUDE	WATER DEPTH	LOCATION

	Yes	No			Descriptors - Please note additional observations
H_2S smell					H_2S smells of rotten eggs, suggesting anaerobic bacteria
Oil					
Oxidized top*					*oxidation (reaction with oxygen) creates a distinctly lighter colored layer of sediment.
					estimate dimensions of oxided layer, etc. and draw below

	Absent	Rare	Common	Abundant	Additional Comments
Clay					dense feel
Mud					smooth feel between fingers
Sand					gritty feeling between fingers
Gravel					pea sized pieces of stone
Pebbles					pieces of stone larger than pea
Leaves					
Wood					
Shells Oysters (dead/alive?)					
Freshwater mussels (except zebra)					
Zebra mussels					
macroinvertebrates					
Brick					
Coal					
Slag					
Living vegetation:					
Length of Core:					Length of Oxidized core top (if present):
If Bagged - Number On Core Collection Bag					

Sketch of your core with measurements for each section & total core (be sure to label the top and bottom):

form updated 8/10/12