A 'DAY IN THE LIFE' OF THE HUDSON RIVER ESTUARY
October 10, 2013
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 Day In The Life. Additional activities to support your field experience are available on the event website link above.
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 TIMES & UNITS OF MEASURE SO THAT RESULTS CAN BE COMPARED AT DIFFERENT SPOTS ON THE HUDSON

RECORDING SHEET I - BACKGROUND INFORMATION.

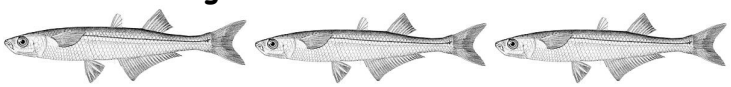
1. Coordinator/contact person_____
   Organization_____
   Street_____
   City_____State____Zip_____
   phone_____fax_____email_____
2. School/group name_____District_____
   Name of teacher/group leader_____
   Street_____
   City_____State_____ Zip_____
   phone_____fax_____email_____
   Number of 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_____

Journaling OR Scientific Recording:
Collecting Field Observations As Data



Recording a number is often not the full story. We learn about plants (flora) and animals (fauna) and their habitat by carefully observing and recording our findings, adding sketches. Through observing we can detect environmental clues that might help us to understand or explain our data. Scientists have been using field notebooks for years to record their notes and drawings of what they observe. These notebooks form a permanent record that they look back at as they learn more or have questions, sometimes years later. As students we can **observe, sketch, and describe** sample locations, species we collect, habitats we find and specifics on our sampling site.

WHAT SHOULD WE RECORD? SAMPLE…

1. Appearance: How big? What is the shape? How many sections? What color?
2. How they relate to each other.
    a. Are they clustered together or found alone?
    b. All the same size or are large and small samples found together?
    c. Were they found with other species?
3. What is the temperature like where they are found?
4. What other measurements did you collect that you can add to the sketch?
5. Did you find them in just one kind of habitat? Describe it… (dry, wet, sandy, rocky, deep or shallow, plants etc.)

Use 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 readings. Describe what you see and WHY you think something is of interest.

STATION_____	STATION_____

Journaling: 2013 Day In the Life of the Hudson River Name_____

STATION_____	STATION_____
STATION_____	STATION_____
STATION_____	STATION_____

Name_____ DITL 2013 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 note your sampling site.

2. What type of **land** do you see around your sample site? Check all that apply.	__Pier __Grassy __Forested __Parking Lot
3. What is the **area's main use**? Check all that apply	__Boating __Picnics __Swimming __Fishing __Jogging __ _____
4. Provide the following **uses as percentage** of 100 (for example 50% is half the usage)	__Urban/residential __Forested __Industrial/commercial __Beach __Other_____
5. Describe the **shoreline** - check all that apply below and in next column: __Sandy __ Muddy __Rocky	__Beach __Covered in vegetation __Banks altered __RipRap (Large rocks) __Wood Bulkhead __Concrete Bulkhead __Pipe entering the water
6. Describe the **water area** at the sampling site	__Depth __Bottom sandy __Bottom muddy __Bottom rocky __Bottom weedy
7. Describe the **water itself**	__Calm __Choppy
8. P**lants** that you have identified & percent of total area covered.	% _____ Plant_____ % _____ Plant_____ % _____ Plant_____ % _____ Plant_____

Name_____ DITL 2013 Observing Surroundings Location_____

Observations

What do 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? Is it overgrown?

From observations you have collected here can suggest of any that might "impact" the data you are collecting here?

The river is used for business and pleasure. Record how it is being used.

9. **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

_____

10. **What else do you see?** Birds? Animals? Butterflies? Dragonflies? What else?

Name_____ DITL 2013 Physical Conditions Data Location_____

(weather, tides, currents)

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 time with a **Tide Meter Stick**, or another marker to see if the water is rising, falling, or staying the same. First record the time, then check the water level using your measuring stick or tape. Check the stick again regularly (every 15 to 30 minutes) and record.	Start time: _____ Water height in cm.___* Check time: _____ Water height in cm.___ Check time: _____ Water height in cm.___ Check time: _____ Water height in cm.___ Check time: _____ Water height in cm.___ *if on a dock measure down from the dock
3. **Currents**: Currents record the direction of water movement. A current moving downriver is called ***ebb***, a current moving upriver it is called ***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 Flood or still? Time its movement for 30 secs and record, then divide by 30 to get per cm/sec. *To determine knots: measure distance orange or stick travels in 30 secs. Divide by 30 for cm/sec and then divide by 51.4 for knots. The formula for knots is (cm/sec)/51.4	Time: _____ Circle: ebb - flood – still* __Cm/30secs___Cm/sec ___Knots Time: _____ Circle: ebb - flood – still* __Cm/30secs___Cm/sec ___Knots Time: _____ Circle: ebb - flood – still* __Cm/30secs___Cm/sec ___Knots Time: _____ Circle: ebb - flood – still* __Cm/30secs___Cm/sec ___Knots * Note if anything about the shoreline could cause the current near shore to flow in a different direction than the current in the middle of the Hudson?
4. **Air Temperature**: How to convert: $^{\circ}C = 0.556 \times (^{\circ}F - 32^{\circ})$ $^{\circ}F = (1.8 \times ^{\circ}C) + 32^{\circ}$	Time:____Air temperature: _____°F ____ °C Time:____Air temperature: _____°F ____ °C Time:____Air temperature: _____°F ____ °C
5. Wind speed: If you use the Beaufort chart record Beaufort force #. If you use a wind meter record number registered AND units.	Time:____Beaufort # __ Wind Meter: __ Units___ Wind Direction (comes from) ____
6. Cloud Cover:	Time: ____ __clear ___partly cloudy__mostly cloudy,__overcast (<25%) (26-50%) (51-75%) (>75%)
7. Rain (Precipitation) Today & Weather for the past 3 days: Rain can effect our readings and so can extreme changes in temperature over a short period. We record weather today and for the last 3 days.	Time: ___Rain ___ If checked note how steadily it rained _____ Briefly describe the weather for the last 3 days: Rain, wind, unusual temperatures?_____

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

2013 SALINITY Recording Sheet: 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 (~35,000 ppm) pushing in from the ocean. There are only 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 2013 Chemical Description Location_____

pH – Expected Range - Most fish prefer 6.5 to 8.5 - pH measures how acidic or basic (alkaline) a solution is and is measured on a scale from 0 to 14. Neutral is 7.0, Acidic is lower than 7.0 and Basic is higher than 7.0. 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: _____

- ***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). Ocean salinity is measured in 'Parts per thousand' (PPT). Fresher water with smaller amounts in 'Parts per million' (ppm) or mg/l. There are other measures of salinity: 'Practical salinity units' (PSU), Conductivity as mS/cm (millisiemens) or uS/cm (Microsiemens)

  Circle equipment used for the test (what each measures is listed below each equipment):

  Drop count test kit (chloride) Quantab strips (chloride) meter (PPT or mS/cm) refractometer (PPT) hydrometer (PPT)

  Time: _____ Reading 1: _____ Reading 2: _____ Reading 3: _____ (note correct units)
  Time: _____ Reading 1: _____ Reading 2: _____ Reading 3: _____ (note correct units)
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  Time: _____ Reading 1: _____ Reading 2: _____ Reading 3: _____ (note correct units)

  *(NOTE THERE IS AN INDIVIDUAL CALCULATION SHEET FOR SALINITY)

- **Water temperature Expected High Temperature 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 your water collection site –
___direct sun
___shade
___Covered with plants
___Water very still

What else should we know about your sampling?

Name_____ DITL 2013 Chemical Description Location_____

- **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 _____

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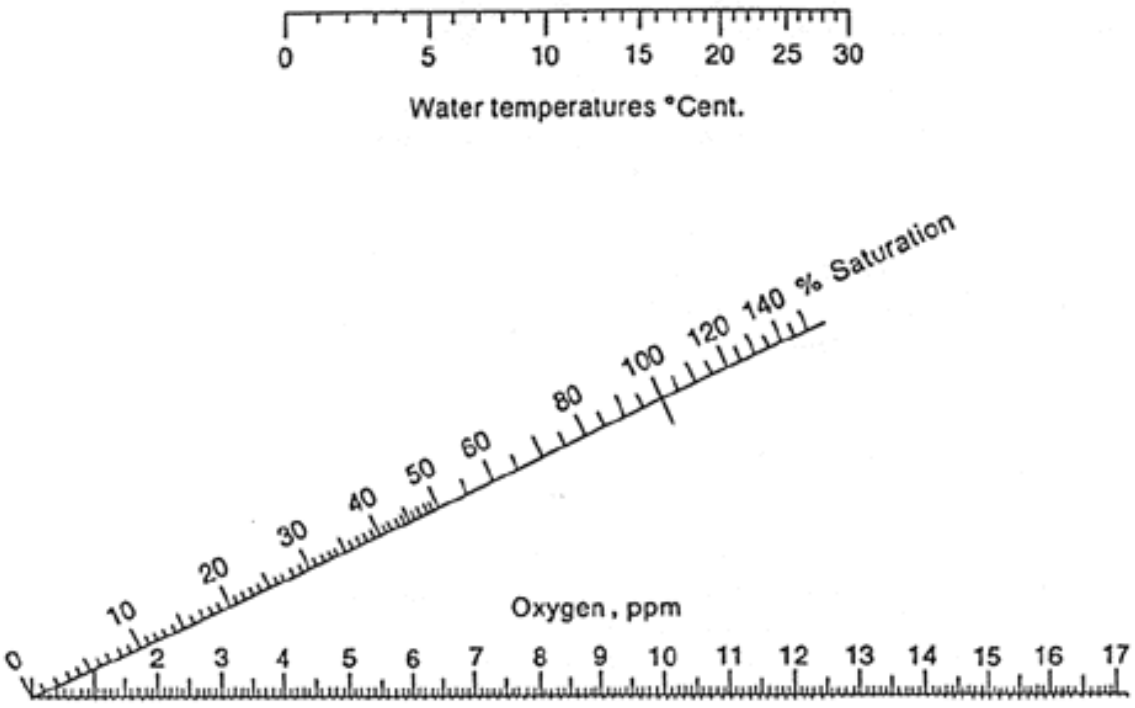
* Time: _____Water temperature in °C ____ DO (mg/l) or PPM: ____% saturation _____

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

Source of chart: http://wateronthewebb.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.



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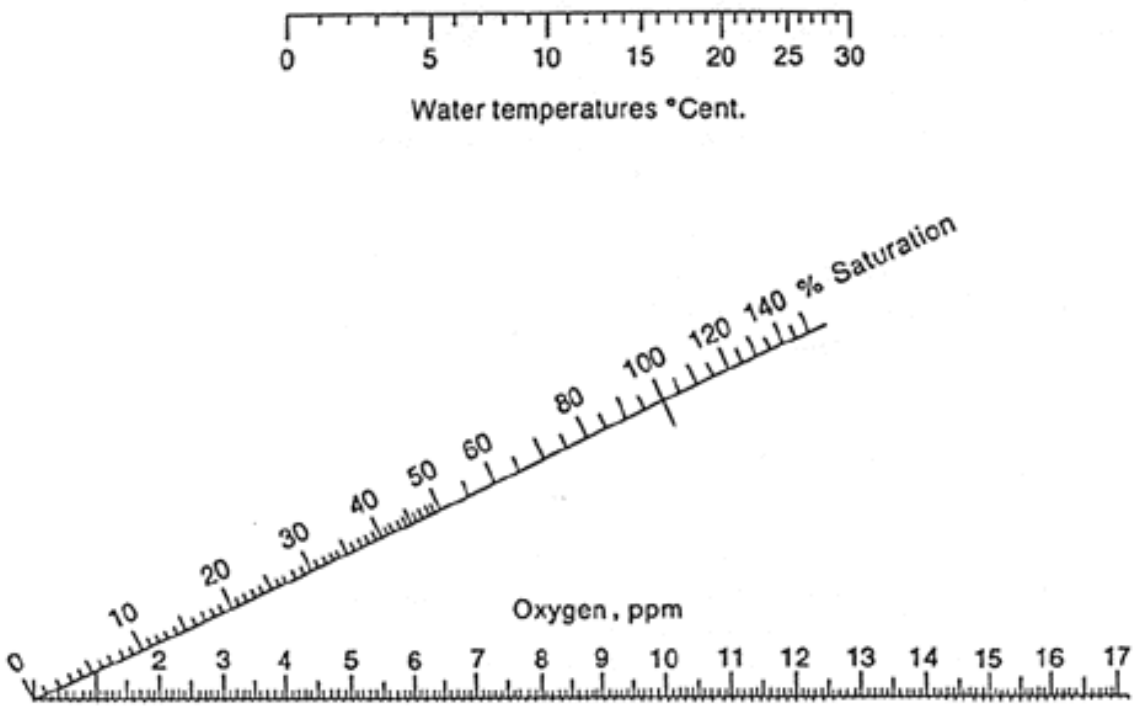

Name_____DITL 2013 Fish and Macroinvertebrates ID Location_____
Use separate sheet for each seine OR note what was caught in each seine by noting seine #.
TIME_____ LENGTH OF NET_____

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

Macroinvertebrates (For crabs include type (blue, mud, Asian etc.) & sex (M/F)

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

Observations & Sketches:
Carefully sketch one species **OR** Describe your catch i.e. the diversity, a specific species, the size.

If your group can compute Catch Per Unit Of Effort Please Record This here.
Seine #___ Time____ Catch Total_____ Length of Pull_____ Computed CPUE_____

Name:_____ 2013 Turbidity/Sediments/Chlorophyll Location:_____

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, animals, salt, sand and mud. Measure the turbidity at your site on the river – be careful if you are collecting water for a site tube NOT to step in the water as you collect it or you will add turbidity to your sample.
   Time: _____ Circle equipment used

1)Secchi disk (cm) 2) Long Sight tube (cm) 3) Short Site Tube (JTU) 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** make up the surface of the riverbed. Small pieces of sand, minerals and organic matter move by water through the system and either their weight or a slowing of the water lets them sink to the bottom of the river. There they provide a place for plants to take root. Take a sample of sediment from the bottom of the Hudson. The sediment represents a period of time…but the amount varies in different places in the river – some places are collecting (accumulating) others are losing (eroding) sediment.

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					Oil creates a slight smell, a slickness and a sheen
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					very fine material - grey color & rich dense feel
Mud					smooth feel between fingers - brown color
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					industrial byproduct - chunky look, light, air filled
Living vegetation:					
Length of Core:					Length of Oxidized core top (if present):
If Bagged - Number On Core Collection Bag					

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

<--BOTTOM TOP -->

form updated 8/11/13