**KINGSTON and CARDINAL STATION SAMPLING ROUTINES**

* Kingston sampling runs are biweekly sampling of long term ecology of the Hudson River
* Cardinal Stations are Castleton, Hudson, Kingston, Poughkeepsie, Fort Montgomery, and Haverstraw. These 6 sites are sampled bimonthly, usually April, June, August, October.

**Field Equipment to pack from boat barn and field gear storage:**

* Current cross, weights, rope with mark at 3.5m, protractor
* Secchi disk
* Rope with marks at 0.5m, 1.0m, 2.0m
* Bilge pump with hoses and weights
* 2L graduated cylinder
* Peristaltic pump with tubing and weights

**Field Equipment to Pack from Lab:**

* Coolers
* Ice Packs
* LI-COR data logger and sensor (light meter)
* 9 - 1L sample bottles for Kingston or 6 each per cardinal station
* Peristaltic pump with tubing and weights
* 5 ml tubes for pharmaceutical sample
* 2 - 60 ml BOD bottles per station for pH
* 3 - 60ml plastic bottles w/ 300ul 1N H2SO4 for NPOC
* 2 - 60ml plastic bottles w/ 500ul 1N H2SO4 for chemistry
* YSI ProSolo meter
* Conductivity meter
* 35 µm zooplankton net
* 75 µm zooplankton net
* 6 Qorpack glass bottles 30mL 4%formaldehyde buffered w/sucrose and sodium bicarbonate
* Squirt bottle filled w/deionized water
* 1 can Seltzer water per station
* Stopwatch
* Time calibrated pump
* 1 Small scintillation vial with 1 ml 20% buffered formaldehyde for bacteria collection
* 60 cc syringe
* 3 Syringe filter holders prefilled with 25mm combusted 934AH filters and 3 prefilled with GF/F filters
* 20 cc syringe
* 2 L bottle filled with DI water to clean peristaltic pump tubing on boat
* Notebook with Pencil
* toolbox

**Laboratory equipment needed**

* 25 mm GFF filters (chlorophyll)
* Chlorophyll tubes
* 934 AH combusted 25 mm filters pre-weighed
* Filter forceps
* Notebook/pen
* Nanopure water
* DIC tubes with caps
* 3 - 60 ml DOC bottles

**Laboratory Set up prior to field collection Kingston/Cardinal**

* Label 3 - 60ml bottles and fill with 300ul 1N H2SO4, for NPOC
* Label 2 - 60ml bottles and fill with 500ul 1NH2SO4 for chemistry (1 filtered and 1 unfiltered)
* Label 3 glass bottles with Station, Date, Micro Fill with 30 ml 4% formaldehyde buffered w/sucrose
* Label 3 glass bottles with Station, Date, Macro, Fill with 30 ml 4% formaldehyde buffered w/sucrose
* Pack small green or pink cooler with pharmaceutical tubes, 2 BOD Bottles for pH – 3 - 60ml NPOC bottles, 2 – 60ml bottles for chemistry, 30 cc syringe, Syringe filter holders, put into large cooler with 1L bottles and Ice Packs
* Pack rest of items into large 2 coolers or formaldehyde cooler
* Pre-weigh 9 - 25mm 934AH filters storing in foil tins
* Prepare Lugols bottle: (1L amber bottle) pipette 10mL acidic Lugols into bottle –leave in hood

**Field Sampling Methods**

* Sampling with Peristaltic Pump
	+ Place peristaltic pump tubing with weights on in water, turn on, and let run for 2 minutes to flush tubing
	+ Rinse 1 L sample bottles with river water twice
	+ Record bottle numbers in notebook
	+ Fill all bottles with tubing at 0.5m depth, cap, and put on ice for transport
	+ Fill all BOD bottles with water and put into small cooler
	+ Sample Microzooplankton
		- Pump 2L of water into 2L graduated cylinder
		- Pour 2L of water through 35μm zooplankton net
		- Pour a splash of seltzer water
		- Pour collected sample from net into Qorpack glass bottle
		- Rinse out net with squirt bottle containing deionized water and pour into sample bottle
		- Collect 3 samples from each site
		- Samples can be dated back at the lab
		- When sampling is complete for the site rinse pump

 tubing with 1-2L of DI water

* Dissolved Oxygen and Temperature
	+ Remove YSI DO meter from cooler and leave in a shady place on the boat so temperature of probe can equilibrate
	+ With grey cap on, turn on ProSolo
	+ After 10 -15 minutes probe temperature is most likely equilibrated
* When ProSolo asks you to Calibrate, calibrate if more than 1% off 100
* Place probe about 0.5 meters in water
* Allow a minute or two for temperature to stabilize
* Record %DO, mg/L, barometric pressure and water temperature in field notebook
* Record time and weather (i.e. Clouds/wind/rough temp)
* Conductivity Meter
	+ Place probe about 0.5 meters in water
	+ Make sure meter is measuring **specific conductivity**
	+ Once stabilized record reading in field notebook
* Macrozooplantkon
	+ Place time calibrated pump tubing in water, turn on, and let run for 2 minutes to flush tubing (Tubing only has to be rinsed once at each site)
	+ While time calibrated pump is running place tubing into 75 μm zooplankton net
	+ Pump for 2.5 minutes which should equal ~100L of water
	+ Unscrew cup on bottom of net and add a splash of seltzer water
	+ Using the deionized water in the squirt bottle rinse zooplankton off sides of cup and pour sample into Qorpack bottle
	+ Collect 3 samples from each site
* Bacteria sample
	+ using 20cc syringe add 19 ml whole water into scintillation vial and return to formaldehyde cooler
* NPOC Sample
	+ Fill 60 cc Syringe with River water (0.5m deep) filter water through 934-AH filter into acid filled 60 ml NPOC bottles
* CHEMISTRY Samples
	+ Fill 60 cc Syringe with River water (0.5m deep) filter water through GF/F filter into 60 ml filtered chemistry bottle, then repeat without filtering into unfiltered chemistry bottle
	+ Fill 20 cc Syringe with River water (0.5m deep) and fill pharmaceutical sample tube half way, place in small cooler
* Current Measurement
	+ - Attach a rope to top and weights to bottom
		- Lower current cross into water 3.5m
		- Place protractor on rope and measure angle of rope

**Notes:** Current cross straight down in water =0°, current cross out of water =90°, river flowing towards sea=EBB=logged as negative number, river flowing towards headwater=flood= logged as positive number

* + Secchi Depth Measurements\*
		- Slowly lower secchi disk into water until it just disappears
		- Slowly raise secchi disk until disk just comes into view again, record depth

\*DON’T use secchi in the shadow of the boat (reading won’t be accurate)

* + Light Meter (Photosynthetically Active Radiation light measurements)\*\*
* Plug sensor into channel one (left side) of data logger and record the light on boat deck (verify logger reading channel 1)
* Switch the plug to second position (right side) and push channel button to 2
* Lower sensor to 0.5m depth and record light measurement
* Lower sensor to 1.0m depth and record light measurement
* Lower sensor to 2.0m depth and record light measurement

\*\*DON’T use light meter in the shadow of the boat (reading won’t be accurate)

**IN THE LAB**

**Lab data is recorded in lab notebook and field notebook; all sample labels should now be dated with calendar date (4/1/2017 or APR 1 2017) and with year/day of year (17091 for example)**

* Keep the water samples cool and in the dark (cooler)
* Turn on the pH meter, check calibration
* Turn on the bench top turbidimeter (now using Trilogy)

**SESTON-**

* Materials: 25mm 934-AH glass microfiber filters, filtering manifold, analytical balance, muffle furnace, forceps
* Ash 25mm 934-AH filters in muffle furnace 450°C for 4 hours
* Place each filter needed into numbered tins
* Pre weigh filters only to 5 decimal places and record weight in milligrams
* Filter sample until filter is at maximum capacity and record volume filtered
* Remove filter from manifold using forceps and place on edge in its numbered tin
* Let filter air dry for at least an hour before placing filter flat on bottom of tin
* Dry filters in drying oven for 12 hours
* From second set of filters rinse DIC tubes and DOC bottles then fill DIC tubes slowly to overflow and cap and fill DOC bottles

**CHLOROPHYLL-A NO GRIND**

* Materials: 25mm GF/F glass microfiber filters, methanol, 0.5M NaOH, 0.3M HCl, filter manifold, 15mL centrifuge tubes w/ stoppers, fluorometer tubes, fluorometer, freezer, forceps, 1-5mL pipette, 50 μL pipette
* Prepare basic methanol for extraction, 2mL 0.5M NaOH/ 1L methanol
* Filter 150mL of sample onto 25mm GF/F filter
* Remove filter from manifold fold in quarters using forceps and place in 15mL centrifuge tube
* Filter 250 ml onto 20 micron nitex filters for >20 micron
* Filter filtrate onto GF/F filter for <20 micron
* If the water is turbid not all of the 250 ml of filtrate needs to be filtered; filter until filtration slows significantly and record volume
* Place centrifuge tubes in freezer for later extraction

 **pH and turbidity**

* Turn on pH meter and rinse probe in DI then check in pH 7 standard; recalibrate if off by more than 0.05 pH units
* Rinse probe in Hudson river water
* Place probe in 60 ml BOD bottle, wait ~ 10 minutes, switch to second bottle and read after 10 minutes, then switch back to first bottle and read after 10 minutes.
* Mix water in BOD bottles thoroughly then pour into fluorometer tubes
* Measure turbidity, in-vivo chl, and phycocyanin, on Turner Trilogy fluorometer
* pH and turbidity measurements are recorded in field notebook

**Phytoplankton**

Using 3 of the 1L bottles fill the bottle containing lugols solution full to the neck of the bottle. This bottle should be stored in a dark cabinet

**Storage and cleanup**

All samples should be properly dated

Zooplankton samples should be stored in the hood

DOC and NPOC samples should be stored in the refrigerator

Chemistry samples can be stored on shelf above filtration manifold

Bacteria sample should be stored in the refrigerator in the Findlay lab

Pharmaceutical sample tube number should be recorded and the tube should be placed in the freezer

Extra water may be kept in the refrigerator for a few days just in case it is needed for additional analyses

Plankton nets should be hung up to dry

Filtration flasks and other glassware should be rinsed with deionized water