<div align="center">Sonde Deployment/Retrieval Methods
Summer 2009</div>

Instruments
- 4 6600 V2-4 YSI sondes with Optical DO, Chl, Phycocyanin, cond/temp, pH probes
- 4 WetLabs ECO-FL CDOM fluorometers
- 1 Turner Phytoflash active fluorometer
- Thermister Chain (brand/model??)

Lakes: Peter and Paul

Deployment sites:
- deploy 2 sondes per lake at the deep hole – site 1 is the primary site, site 2 is a backup of site 1.
- Deploy 1 CDOM per lake at site 1 – hot swap them each week
- Deploy Phytoflash in Peter at site 1 – there will be data missing because it'll be out of the water for a couple of hours, and that's ok

Continuous deployment: The site 1 sonde in each lake will be deployed such that there is continuous data collected at that site. I will also maximize the amount of time that the other sonde is in the lake. To do this, I will deploy both sondes on day 1 of a seven day deployment. Early on day 7, I will retrieve the sonde 2 and bring it back to the lab for maintenance and recalibration. Then later on day 7, I will swap sonde 1 and sonde 2 and bring sonde 1 to the lab for recalibration. Then at the end of day 7, I will redeploy the sonde 1 at the secondary site. This way the primary site always has a sonde, and the secondary site is only without a sonde for 8 hours or so.

Calibrations: Sondes will be calibrated after retrieval from the lake. The values before the calibration will be recorded for this deployment as a check for drift. The value after the calibration will be recorded for the following deployment. Activate wipers before calibrating the optical probes.

Weather Buoy
Hobo Micro Station datalogger with wind speed/direction, air temp, and PAR
Buoy deployed near the center of Peter lake. Data downloaded each week.

<u>Sonde deployment and retrieval</u>

1. the night before: make sure the bubble bath is running (or at LEAST do this first thing the morning of Sonde Day)
2. morning of Sonde Day:
   o make sure bubble bath is running
   o you have sonde Ziploc bags with little yellow wet sponges in the black carrying case
   o you have the sonde bucket with the field book (pre-filled out with what to remove), zip ties, and wire cutters.
3. retrieve:
   o sonde from site 2 from each lake (you'll need to know which sonde is site 2 before you leave the lab)
   o phytoflash from Peter Lake
4. return to lab and **follow Sonde lab procedures below**
5. deploy:
   o newly calibrated sondes into site 1 of each lake (make sure you have it written down which sonde goes in which lake before you leave the lab)
   o calibrated and ready to go CDOM into each lake
6. retrieve:
   o sonde from site 1 from each lake
   o CDOM from each lake
7. return to lab and **follow Sonde lab procedures below**
8. deploy newly calibrated sondes into site 2 of each lake (make sure you have it writing down which sonde goes in which lake before you leave the lab)
9. download data from weather buoy (see procedures below)

<u>Sonde lab procedures:</u>

1. let sonde run in air saturated water for ~1 hour (bubble water in bucket 1 hour prior)
2. make new dye standard: add 50 uL of Stock A (0.5g of 20% Rhodamine into 1L flask, 100mg/L) into a 1L volumetric flask and fill with DI water to make a 10ug/L solution
3. fill up calibration cups with standards (pH4 to line, pH to line, cond to line, rhodamine about half way, DI about ¾ of the way)
4. connect sondes to computers and open the EcoWatch program; if "#" is showing when you open the program, type "menu"; "esc" to go back a menu
5. always activate wipers before calibrating the optical sensors – need to do this each time you put the probes into the standard – removes the bubbles that interfere with the readings
6. **calibrate DO** – record time, temp, DO%, DO mg/L *before calibration for this deployment AND after calibration for next deployment*
   [Calibration (2), DO (4), %sat (1), 1-point (1), enter pressure in mmHg*]
7. **STOP LOGGING BOTH SONDES** [run, unattended, B, yes]
8. **start downloading sonde 1**
   [file (3), upload(2), select most recent file, Proceed (1), comma delim (2)]
9. Rinse sonde 2 probes well with DI water and wipe clean and dry with kimwipes
10. **run sonde 2 in rhodamine dye standard**
    [Run (1), discrete (1), start (1), activate wiper (3), wait until finished wiping, record BGA

*need to use conversion table to convert from GC barometer (mbar) into mmHg)

DATE**,** TIME**,** TEMP**,** COND**,** PH**,**   **,** BGA (cells/uL)**,** BGA (rfu)**,** DO (%sat)**,** DO (ug/L)**,** Chl (ug/L)**,** Chl (rfu)

and Chl values after they've stabilized somewhat as the post readings for the deployment, esc to stop]

11. rinse sonde 2 probes well with DI water and then place in DI cup and begin calibrations making sure to activate wipers
    a. **zero BGA** [calibration (2), BGA (3), 1-point (1), enter 0, activate wipers (3), let run until is stable-ish, enter enter]
    b. **zero chl ug/L** [chl (5), ug/L (1), 1-point (1), enter 0, let run until stable-ish, enter, enter]
    c. **zero chl rfu** [esc, chl rfu (2), enter 0, let run until stable-ish, enter, enter]
12. **run sonde 2 in dye standard** again – this will be for the pre values of the next deployment
    [Run (1), discrete (1), start (1), activate wipers (3), wait until finished wiping, record BGA and Chl values after they've stabilized somewhat, esc to stop]
13. **start downloading data from sonde** 2
    [file (3), upload (2), select most recent file, Proceed (1), comma delim (2)]
14. sonde 1 should be done downloading, follow the same procedures as for sonde 2 (steps 8 through 11)
15. now both sondes have been downloaded and the fluorometers and DO calibrated – now calibrate conductivity and pH
16. rinse probes of sonde 2 well with DI and wipe clean and dry with kimwipes
17. place conductivity standard cup onto sonde 2 and tighten. Invert sonde and secure in the sonde holder. Make sure that the standard is covering the entire conductivity probe
18. **calibrate conductivity** [calibrate (2), conductivity (1), SpCond (1), enter in 0.05, let run until stable, record value as post value for this deployment, enter – make sure it now reads 0.05, enter)
19. remove conductivity cup, rinse probes well with DI, put on pH 7 cup, invert sonde and secure in holder
20. **calibrate pH**
    a. calibrate (2), pH (2), 2-point (2), enter in 7, let it run until it stabilizes, record value as post pH 7 value, enter, enter (it should now be asking for second pH value)
    b. removed pH 7 cup, rinse well with DI, attach pH 4 cup and invert and secure in holder, enter in 4, let run until stable, enter enter
21. repeat steps 15 - 19 for sonde 1. Some of these steps can be done while working on sonde 2 (e.g. run cond on sonde 1 while pH on sonde 2)
22. change batteries if needed – change every other week. Unscrew 2 battery cover, dump old batteries, add 8 new C-cell batteries, replace battery cover
23. check the wipers and replace if necessary
24. clean the sondes. Use the small brushes to carefully clean around the probes, the probe guard, and the sides of the sondes
25. sondes are now ready for deployment procedures.

DATE**,** TIME**,** TEMP**,** COND**,** PH**,**   **,** BGA (cells/uL)**,** BGA (rfu)**,** DO (%sat)**,** DO (ug/L)**,** Chl (ug/L)**,** Chl (rfu)

Sonde deployment procedures:

- place sonde into water tub (bubbled w/ air)
- program sonde and begin logging [run (1); unattended (2); enter in filename (5) [mddyy]lakeID][siteID][sondeID] e.g. 72408R2B for 7/24/08, Peter site 2, sonde B; enter in site (6) – type siteID (1 or 2); start logging (C)
- let sonde run in water tub for at least 1 hour
- record deployment info in fieldbook and sonde log
- place Ziploc bags with moist sponge over the field cup of each sonde and place sondes carefully into carrying case
- deploy sondes (write down beforehand where things are going!)

Weather Buoy Procedures:

- need to bring the field laptop with PC cable and a screwdriver with you into the field
- carefully unscrew the cover off the access port – it is very easy to drop this plug so be careful (it does float, but still)
- attach the PC cable to the laptop and insert the other end into the jack inside the access port
- open the HoboWare program
- click the Readout Device button on the toolbar
- to check status, hit the button w/ the heart beat thing
- connect with datalogger
- data should start downloading
- it will ask you to save the file – keep the same filename but add the date (mmddyy_) to the front of it.
- it will then show you what is available to plot, press the plot button
- then it will ask you if you want to export the file, say yes. Change the default filename by deleting the ".dsec" part of the name and the "0" e.g. it will be 072407_UNDERC-Peter Lake 2008.desc.csv
- pull out the PC cable and carefully replace the port cover. It is difficult to get it in so be careful not to drop it into the lake (although… it does float, but still…)

CDOM:

- Data Download:
  - connect datalogger to computer; there is a place to attach a 9v battery on this cord—wait to attach it
  - open ECOView program
  - select com port (big yellow button): to figure which com port you're plugged into, control panel → system → hardware tab → device manager → port
  - select device (big yellow button): there are device files on the desktop e.g. FLCD-1007
  - go to raw data tab (you want to have this open when you connect the battery)
  - connect the 9v battery to the cord (only have the battery connected when programming the datalogger or when downloading data)

- o device readings will start showing up (which tells you that you're connected); hit "stop data" as soon as you see stuff
- o transfer data tab
  - ▪ receive data
  - ▪ it will only download to the desktop, so you're going to have to do that and then move the file to a folder later
  - ▪ download as file type "all files"
  - ▪ name file: (deploy#)_(mmddyy→date the file started…)_CDOM_(lake ID)(CDOM#).txt(→you have to type "txt" in)
- o make sure that the data file looks good and all data is there
- o meter setup tab
  - ▪ erase memory
- o clean sensor face with soft sponge

- - prepare for field:
  - o don't prepare for field until just before you're heading out the door
  - o meter setup
    - ▪ settings should be set at Av (55), #sample (20), #cycles (16960), cycle interval (5 min)
    - ▪ make sure logging is on
    - ▪ make sure memory is at 0%
    - ▪ check time; hit "get date/time/setup", then hit "set date & time" (will change to what the date/time is on the computer)
  - o raw data tab
    - ▪ hit "start data" and it starts logging

- - in the field:
  - o remember to take off the white cap!!
  - o make sure its hanging vertically

Phyoflash:

- - data download:
  - o connect datalogger to computer; don't plug in the power source yet
  - o open Hyperterminal program on computer
  - o open "PeterphytoflashYAY"
  - o connect power to the cable
  - o stuff should pop up
  - o select user mode: <1> self contained mode
  - o select configuration: <6> download data; DO NOT PUSH YES YET!!!
  - o transfer → capture text → browse → phytoflash file
    - ▪ name file: (deployment#)_phytoflash_(mmddyy)_(lake→R)
    - ▪ start
  - o hit yes!
  - o data will print out on the screen and will be captured
  - o when it stops, go to transfer → stop text
  - o make sure it downloaded properly (my documents → phytoflash)
  - o then clear data/memory on instrument <7>

- clean sensor
  - unscrew screws
  - clean with soft bristled brush (special brush with yellow handle)
- to start new deployment:
  - <1>
  - change start time <3> and start date <4> (it won't log until the date and time you set, so guesstimate when you'll be on the lake by)
  - save setup <S>
  - start data logger <S>
  - unplug from cord and power source now
- in the field:
  - sometimes air bubbles can get trapped between the sensor face and the cover, so tilt it a bit to the side while under water to let the bubble come out

Thermester Chain:

- download data in the field: make sure you have the cable cord and computer with you
- the port is on the white end of the datalogger (connects to battery or computer)
- plug cable to port
- open iChart on computer
- plug cable to computer
- "open w/o project" → "paul" or "peter" file (not folder)
- click on "turn on live data" button to check if connected
  - if nothing happens, and live data button stays grey, then you're NOT connected
  - to connect:
    - advanced (at top) → iSIC → iSIC
    - switch to com 4 (or whatever com you're connected to); if program doesn't recognize the com port, then unplug from computer and replug in
    - then hit "connect"
  - while still in advanced→iSIC→iSIC
    - "general" tab to read AND RECORD battery life (has to be above 6 to operate)
    - "logging" tab to check AND RECORD memory
  - hit "close"
- to download data
  - hit "interrogate" and it starts downloading
  - wait for it to finish (will download slowish, and then download again but faster)
- to check data:
  - go to down arrow next to "new report" button (looks like a chart w/ magnifying glass)
  - go to "Paul out good" or "Peter out good"
  - scroll right and check to see data looks ok
  - export graph
    - click excel button and it exports automatically
    - open the excel spreadsheet
    - save as → my documents → t-chain data → (lake)_Tchain_(mmddyy)
  - close graph
  - close project (file → close)