Best Practices

Initial Setup

COSEE-TEK's citizen science based, water quality monitoring project entitled "The Courtship of EVA & BOB" utilizes an easily constructed, cost effective basic observation buoy (BOB) as a floating platform with capacity to carry a suite of environmental sensors for extended periods of time. The initial design includes a set of eight PVC plates (attached to the white PVC pipes in the figure to the right) to measure settlement of sessile marine invertebrates from the water column. When equipped with passive sampling devices consisting of an ethylene vinyl acetate (EVA) substrate to measure organic contaminants and an Onset HOBO sensor to monitor temperature and light, the buoy can provide a robust data set of water quality in your local watershed. To build your own basic observation buoy (BOB) see the document titled "Basic Observation Buoy (Single Float Design with Settlement Tray Experiment): Material List and Fabrication Instructions. Version 1.0 (8-15-2011). http://www.coseetek.net/resources/index.cfm?FuseAction=ShowResourceDetails&ResourceID=464

In addition to the tools and materials required to build the BOB, the following cost-effective components are necessary to conduct water quality sampling associated with this project.

1) Onset HOBO Pendant Temperature/Light Data Logger (pictured left; http://www.onsetcomp.com/products/data-loggers/ua-002-64)

2) Ethylene Vinyl Acetate plates (in triplicate), mounting cage (pictured below the settling plates in the image above). These EVA plates are spiked by the Vlahos Laboratory at University of Connecticut-Avery Point, shipped in foil wrap, and should be kept in a cool, dark location prior to deployment.

Choosing a BOB location

1) Pick a location that is deeper than the maximum tidal depth so that the buoy doesn't rest on bottom and the settlement and EVA plates aren't exposed to air during low tide.

2) Choose an area that is accessible to teachers & students but not heavily trafficked by the public. A private marina or gated dock is a good example but you must receive permission to utilize these resources. A dock is a great location to deploy the BOB, since you wont require any anchor, rather it can simply be tied to the dock. Its best to keep the BOB inconspicuous to the public eye to limit the chance of anyone tampering with it while deployed.

3) If you have access to a boat and choose to moor the BOB away from a dock or pier, it is best to keep the buoy out of boating channels, use a ample anchor to keep it from moving, and label the float you're your contact info should it be washed away, fouled or hauled up.

Once you have constructed your BOB, selected a location for deployment, requested permission (if necessary), and gathered your supplies, it is time to begin the field monitoring effort.

Tools and supplies for deployment/recovery

Basic Observation Buoy (BOB) , Settlement Plates (x8), EVA plates and mounting cage, Phillips head screwdriver, cable ties (assorted sizes), small pair of wire cutters, pair of adjustable wrenches, paper towels, permanent markers, ziplock baggies, straight edge razor or putty knife, Scotch-Brite scouring pads, digital camera or phone with camera, USB adapter for HOBO pendant, laptop with Onset HoboWare software

New Deployment Procedures

Before deployment, make sure to label the BOB's buoy with your school/institution and a phone number. Then follow the procedures below in this order:

Settling Plates

With a permanent marker, grid and label the 8 gray PVC settlement plates. Suggested naming convention is [ST=short term/ LT=long term][sample #][Date MMDDYYYY] (i.e., ST01_03202013). Label the plates on top because the underside will be covered with marine organisms after deployment. The tops will likely be covered with sediment and algae, but this can be removed by lightly wiping with a scouring pad. The grid is optional but provides a good reference for size / percent coverage when taking pictures of the invertebrate communities settling on the plates throughout the deployment. Using Phillips head bolts and wingnuts, attach the plates to the PVC crossbars in an order that makes sense to you (short term 1-4 on one arm and long term 1-4 on the other).

HOBO Data Logger

Connect the HOBO pendant to a laptop with HOBOware software using the USB coupler. Make sure to orient the ridge on the sampler to the guide on the coupler so that the proper optical data connection can be made. Once connected, check the battery level under "Device Status". If lower than 50%, it is recommended to replace the 3-Volt CR-2032 lithium battery. Note: Battery life is typically over a year if sampling rate is set to a frequency of 1 sample/minute or less. Download any data that has not yet been retrieved from the previous deployment. Once a new session is started, the old data will be deleted. We recommend a sampling rate of 1 sample every 15 minutes. After the logger has started, verify that the logger's light is blinking at least every four seconds. Disconnect the sampler from the coupler and affix the HOBO pendant to the BOB frame with the light sensor oriented upward. The settlement plate crossbars are a good location but make sure not to cover the light sensor with cable ties.

EVA Samplers

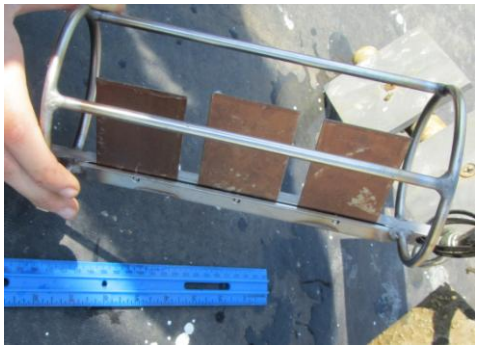
Please refer to accompanying document titled "Field Protocol for Installing EVA Samplers" for detailed procedure.

The BOB is now ready for deployment and should be left in the field for a suggested duration of two weeks during Spring/Summer months up to one month in the late Fall/Winter.

Recovery/Re-deployment Procedures

When recovering the BOB, there are three sets of samples/data that need to be procured; 1) EVA plates, 2) settlement plate photos, and 3) HOBO temperature and light data. There are also several steps to follow to redeploy the BOB for the next sample interval.

EVA Passive Samplers



First, retrieve the EVA mounting cage using wire cutters to remove the tie wraps. Use a Phillips head screwdriver to loosen the clamps on the EVA plates and place each sample into an individually labeled aluminum foil wrapper, together into a ziplock bag, and placed in the cooler. The replacement EVA plates come spiked with organic contaminant analytes and should remain in a dark, cool environment like a lunch cooler until deploying. The new plates should be attached to the cage just before the BOB is deployed to avoid picking up any airborne contaminants on the plates.

Settling Plates – Photographing and Cleaning

When photographing under various light conditions in the field, it is best to minimally have a point-and-shoot digital camera equipped with a flash. While smartphones will work, the optical sensors on many are not as capable as low-cost digital cameras. Use your own discretion but keep in mind that higher resolution/quality of photos will make identification and quantification of small marine invertebrates much easier. You can fashion a simple light box out of a shoebox or plastic container with dark fabric or construction paper lining the inside. When taking photos, it is best to line them up top down with a single plate nearly filling the frame. If the label on the settlement plate is not clear, label a piece of paper or dry erase board with the sample ID and make sure it appears in the photo.

Once you have taken photographs of all short term and long term settlement plates, it is time to replace the short term plates with new ones or, if you don't have spare PVC plates, use a putty knife or flat razor with ScotchBrite to clear the plate and re-label the grid and sample ID. If your long term plates have been out in the field for multiple deployments and 100% of the surface is covered with invertebrates and algae (example seen left), you can take photos, make note of the coverage, clean them off and start anew to assess seasonal changes in long term recruitment patterns. Then, reattach the settlement plates to the buoy and move on to the HOBO sensor.

HOBO Pendant Logger

Connect the HOBO pendant to a laptop with HOBOware software using the USB coupler. Make sure to orient the ridge on the sampler to the guide on the coupler so that the proper optical data connection can be made. Once connected, check the battery level under "Device Status". If lower than 50%, it is recommended to replace the 3-Volt CR-2032 lithium battery. Note: Battery life is typically over a year if sampling rate is set to a frequency of 1 sample/minute or less. Download any data that has not yet been retrieved from the previous deployment. Once a new session is started, the old data will be deleted. We recommend a sampling rate of 1 sample every 15 minutes. After the logger has started, verify that the logger's light is blinking at least every four seconds. Disconnect the sampler from the coupler and affix the HOBO pendant to the BOB frame with the light sensor oriented upward. The settlement plate crossbars are a good location but make sure not to cover the light sensor with cable ties.

Data Management

Once you have downloaded all of your HOBO data, settlement plate photos (preferably renamed by sample ID#), and general field photos, you can send the data to COSEE-TEK for processing and upload on the website in one of two ways;

1) Google Docs: By default, a Google Docs directory has been created for each institution participating in the EVA & BOB Project. You have been granted full administrative privileges to the directory and instructions for uploading and accessing data can be found in the PDF document titled "Accessing shared files and uploading to Google Docs". It is recommended that you have well-organized subdirectories in your folder (i.e., EVA Data, HOBO Data, Settlement Plate Images, Site Photos) to more effectively manage the data.

2) There are some circumstances that prevent one from using Google Docs at their institution including firewalls, limited web access, etc. If you are unable to transfer data via Google Docs, feel free to send the pictures and data via email to coseetek@gmail.com.