

Standard Operating Procedure

Massachusetts Division of Marine Fisheries / MassBays National Estuary Partnership Standard Operating Procedure for Citizen Scientist Eelgrass Monitoring

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V.1., Created by T. Evans and J.Carr, 08/2018

V.2., Edited to update shoot collection methods (draft), 2019

V.3. Edited by J.Carr and F. Schenck for final integration into iSeaGrass web app, 08/2020

OBJECTIVE: Annual volunteer monitoring of eelgrass presence and condition. Volunteers take measurements at fixed stations assigned throughout the embayment using a stratified repeated random design, in accordance with the document titled “Eelgrass Monitoring: Development of a Citizen Scientist Monitoring Method - Pilot Study in Duxbury-Kingston-Plymouth Bay”. Sampling is performed at peak Summer biomass according to the following procedure that documents presence/absence, percent cover, sediment, and individual shoot measurements.

I. GEAR LIST:

Shallow draft vessel

Coast guard required safety gear

Boat anchor

GPS unit with accuracy of 4 m or better

Mobile phone or tablet with access to iSeaGrass web app

Monitoring Kit contents:

Clipboard, datasheets, pencils, laminated SOPs

Underwater Splashcam digital camera, reel, and case; charged, with SD card

0.25 m² PVC quadrat drop-frame, line and float

FujiFilm topside point-and-shoot camera, charged, with SD card

Plexiglass site labeler

Secchi disk with line

Metric measuring tape

View Scope bucket

Small Danforth anchor and small mushroom anchor, line and float

Misc: zip ties, duct tape, dry erase marker, absorbent towels

Optional: mask, snorkel and fins for in-water shoot collection

II. SUMMARY

At all stations:

- Navigate to the station using GPS coordinates and anchor the boat, record actual coordinates and other topside information.
- Record secchi disk measurements at two locations on the sunny side of the boat using the view bucket.
- At the four “corners” of the boat, use the drop-frame to take a sample picture and estimate the percent cover within the quadrat using the visual guides.
- Review data to ensure accuracy. If there are any changes, cross out the original and initial the change (if using paper datasheets).
- If not an “indicator” station, raise the anchor and navigate to the next station.

Additional sampling at **indicator** eelgrass stations:

- At each of the four corners of the boat where eelgrass was observed, use the Danforth anchor or swim with mask and snorkel to take a bottom grab sample, collecting at least three shoots per sample.
- Identify the longest leaf from each shoot. Measure the leaves and estimate coverage of wasting disease and epiphytes, and record.
- Lay the shoots on the tote cover and fan the leaves, collect photos of the sample using the topside camera.
- Raise the anchor and navigate to the next station.

III. DETAILED METHODS:

1. Navigating to the station

- Volunteers navigate using their boat's GPS (or a hand held GPS unit, or cell phone if necessary) to get as close to the monitoring station as possible. Stations are defined as the area within a 10-m radius circle of the GPS location, accounting for boat swing and GPS error.
- Once on station, turn the boat into the wind or current, whichever is strongest. Anchor the boat by lowering the anchor off of the bow. Let out the necessary scope.

2. Data collection at all stations: Secchi disk

A Secchi disk is a weighted 20 cm diameter disk painted black and white with an attached line. Ideal weather conditions for accurate secchi data collection include sunny or partly sunny skies; calm winds (≤ 10 knots) and little to no chop (waves on the water). Collect secchi measurements between 10 am and 4 pm. Ideally, water level should be about 50% greater than the secchi depth so that it is viewed through the water column rather than against bottom-reflected light. This may not always be possible in shallow embayments that support seagrass. If the disk hits the bottom, record as such.

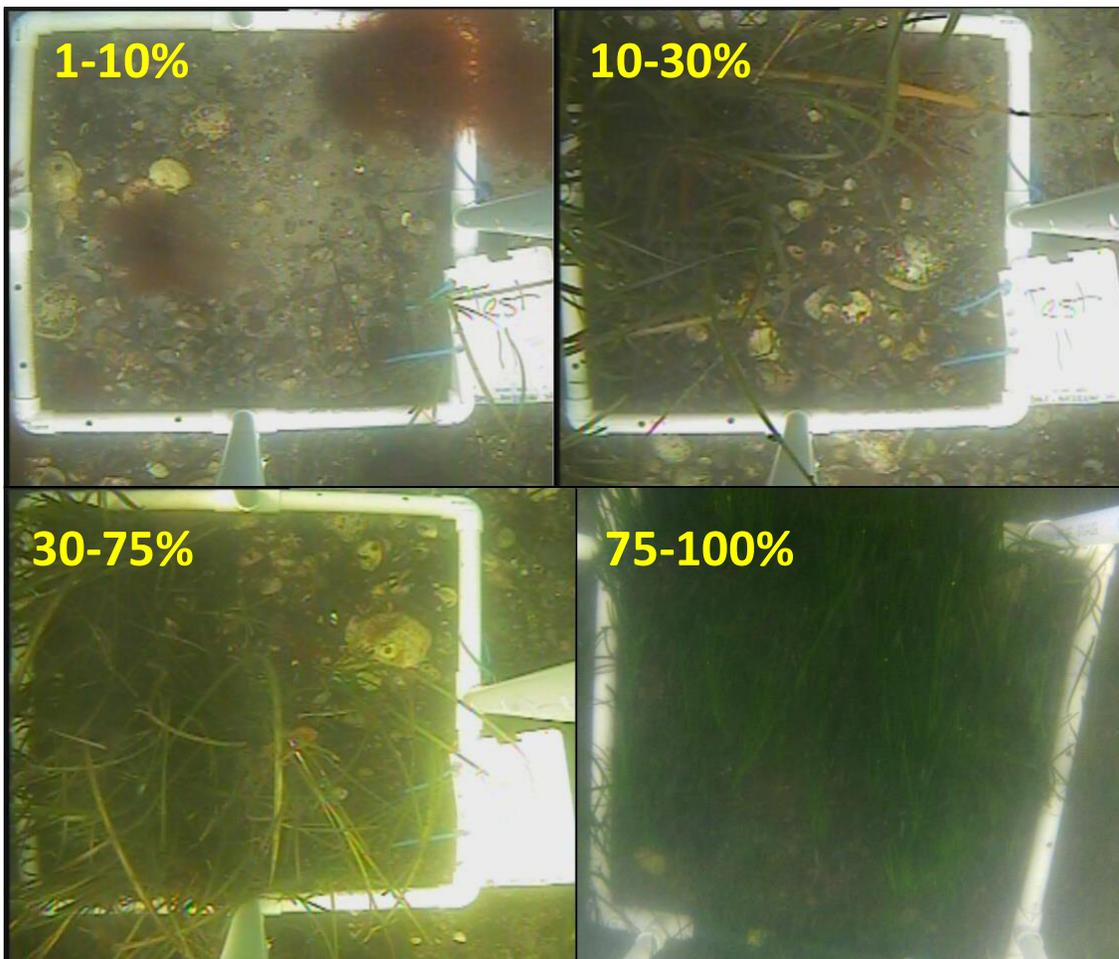
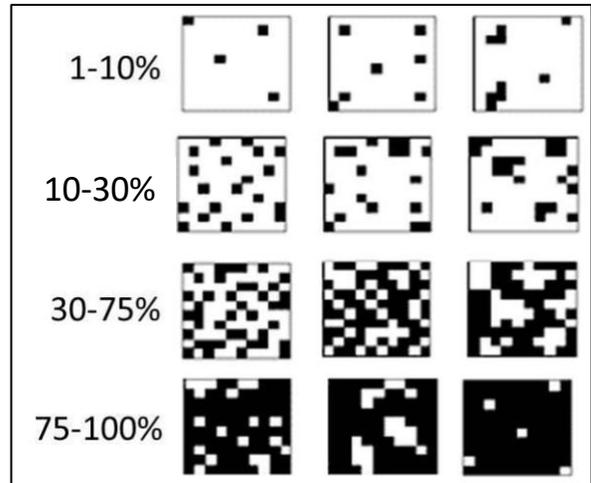
- Record the time, weather observations, water depth and other trip information.
- Remove your sunglasses, as they will give you an inaccurate reading (but be sure to wear regular corrective lenses if you need them).
- Unwind several meters of the Secchi disk rope from the holder.
- Lean over the sunny side of the boat if using a view bucket and submerge the bottom 1-2" of the bucket into the water. If not using a view bucket, use the shaded side of the boat.
- Another volunteer slowly lowers the secchi disk into the water until the viewer can no longer see it. Slowly raise the disk. When the secchi disk reappears, mark the rope at the surface of the water with a clothespin.
- Bring the secchi disk back on board and measure the length of the line from the disk to the clothespin location with your measuring tape and record. Repeat and record.
- If two different people will regularly be making secchi measurements, both should take the first few measurements to ensure that the results are similar.
- Useful website with tips: <https://www.nalms.org/secchidipin/>

3. Camera set up and operation: Follow the laminated camera guide included in the camera case.

4. Data collection at all stations: pictures and percent cover data

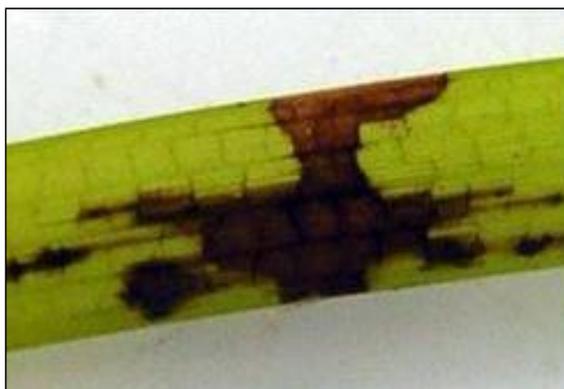
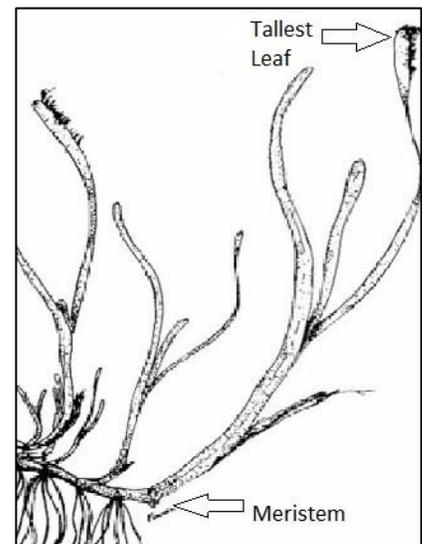
- Four samples will be collected off the four corners of the boat.
- Beginning on the windward and up-current side of the boat, with the camera on, lower the drop-frame over the side. Once it hits the bottom leave it there for several seconds to allow sediment to settle. View the camera screen to ensure the quadrat landed flat.

- Look at the monitor and ensure that the image is of the whole quadrat and the bottom (and/or eelgrass) is clearly visible. On the DVR unit, press the “OK” or “record” button to take a picture. If you are unsure if a picture was taken, press the “Preview” button on the DVR unit to view the last image captured.
- Record the timestamp from the picture.
- Record sediment type as mud, clay, sand, gravel and/or cobble (all that apply) and note other benthic characteristics (mussels, debris, algae or other observation).
- Estimate the percent cover of eelgrass using the following bins (**0%**, **1-10%**, **10-30%**, **30-75%**, **75-100%**) and the provided coverage guide (right).
- Repeat at the remaining 3 corners of the boat.
- If this is an indicator station, continue to step (5).



5. Additional data collection at **indicator** stations: Eelgrass length and width measurements, and stressor indices

- If eelgrass was present at a given corner of the boat, collect shoot samples by tossing the Danforth anchor out about 5 feet from the boat and gently dragging it several feet, attempting to collect at least three eelgrass shoots. Slowly pull it up, deploying again as necessary. This will be repeated at each of the four corners of the boat that contained eelgrass during the drop-frame sampling (e.g. if all four corners had eelgrass, then four shoot samples will be collected, each containing three shoots, totaling 12 shoots from that station). Alternatively, participants are welcome to snorkel for sample collection. This option requires the use of a personal mask, a boat which can accommodate entry and exit from the water, and a captain who is comfortable with participants swimming from their boat. If this option is used, the swimmer should safely free-dive down to the eelgrass and pick one shoot at a time by pinching the plant below its meristem (see figure below) and applying an upward pulling/twisting motion. Grabbing clumps of shoots should be avoided; as should grabbing from the leaves which can lead to plant damage and incomplete samples.
- From the sample, select three intact shoots and place the shoots on the white tote lid along the ruler, fanning the leaves. Use the FujiFilm topside camera to collect an overall photograph of the entire sample, with the ruler in view, as well as any close-up photographs of wasting disease, epiphytes, or other observations that are of interest.
- Identify the longest leaf in each of the three sample plants. Measure the length and width of the leaf using the measuring tape. Length is measured from the meristem to the leaf tip (see below), and width is measured across the widest part of the leaf. If the tallest leaf is broken indicate this with an asterisk (*) or in the notes. Record the measurements.
- Estimate cover of epiphytes (encrusting algae or tunicates) and wasting disease on the three leaf samples and assign none, low, med. or high (see two guides below).
- Discard plants overboard and repeat at remaining corners. (Note: If colleagues or scientists request sampling collection, samples should be placed in clean, clearly labeled zip-lock bags and stored on ice in a cooler until transfer to the requester).



Wasting disease (left) and epiphyte coverage (right) on eelgrass. Photos from Cornell Cooperative Extension/SeagrassLI.org

INDEX FOR MEASURING COVERAGE OF WASTING DISEASE AND EPIPHYTES

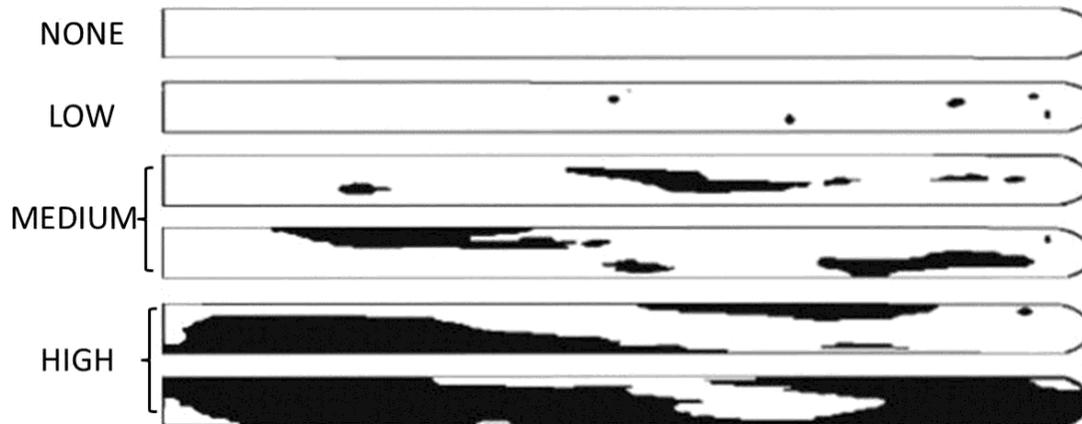


Image altered from Burdick et al. 1993.

6. Cleaning and storage

- At the end of each field day, inspect all equipment to ensure everything is accounted for and in similar condition to when it was received at the beginning of the day. If any items are missing, damaged, or altered in any way, note the change(s) and inform the organizer.
- Rinse all gear that came in contact with salt water, taking particular care with the camera and lowering frame. Soak the camera in a tub of warm water.
- Be careful not to allow any cables, connections, or electronic equipment from the waterproof box to come into contact with water. The two plugs attached to the camera cable reel must also remain clean and dry at all times.
- Inspect the camera case to make sure it has remained clean and dry after each use. If necessary, carefully clean that monitor screen with a paper towel. If water is present in the box, remove it as soon as possible with a dry paper towel and inspect all electronic equipment to ensure no damage occurred.
- Allow all gear to dry and store in a cool, dry place.
- Recharge batteries if needed, and give SD card to the organizer.
- If you collected data via the iSeagrass web app, use the button at the bottom of your trip screen to upload the data when your phone connects to the internet via cellular data or wifi.
- If you collected data via paper data sheets, give the data sheets to the organizer.