Anne Linja - Graduate Student #3

CS5760 - Evaluation 1

2/1/2019

Team #3: Eelgrass Monitoring App, Quadrilateral Cowboys

Table of Contents

2. App: Collect eelgrass sampling data.

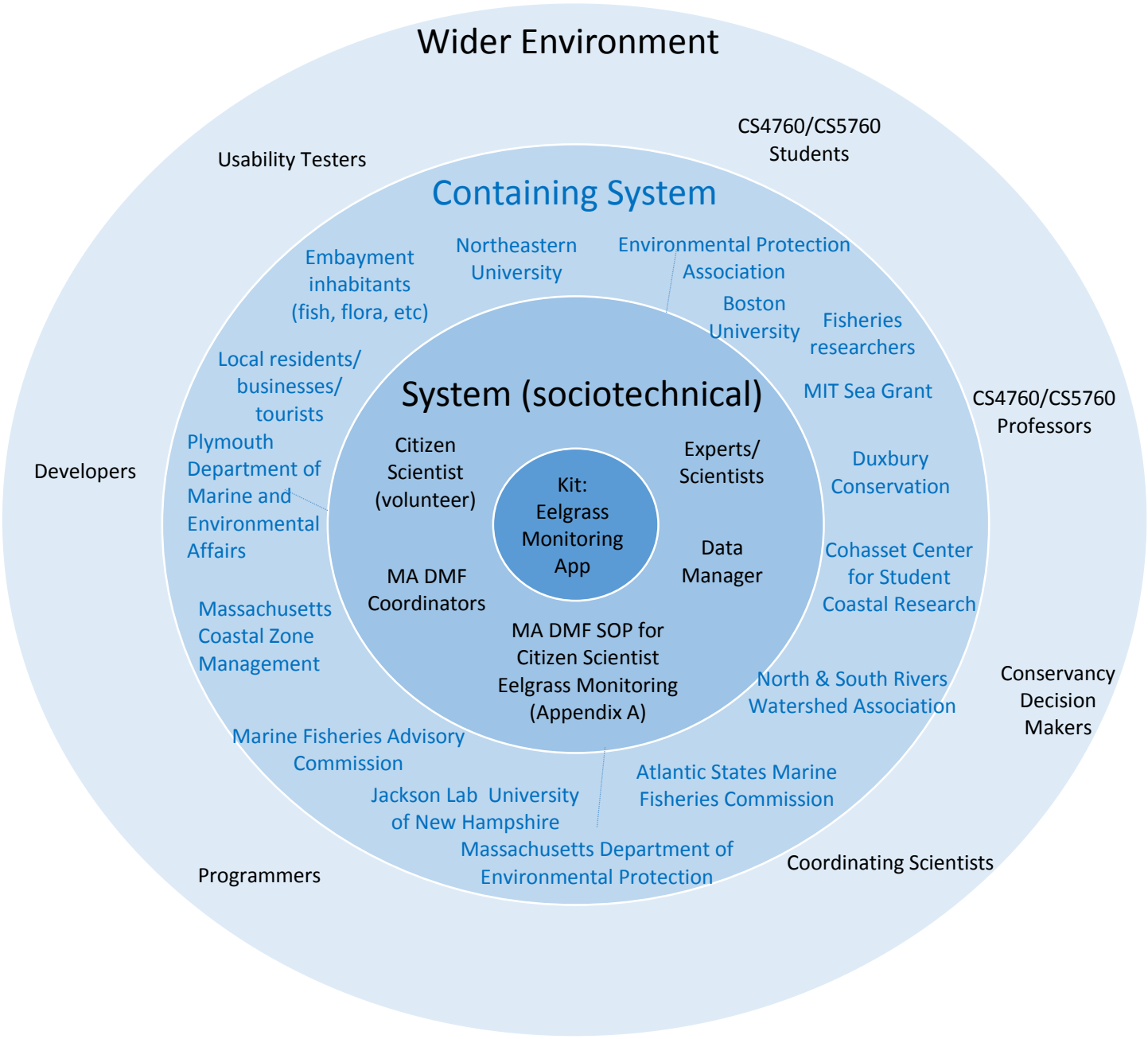
3. Summary:

Seagrasses, such as eelgrass, can be used signify estuary health. According to scientific studies, they enhance biodiversity, attenuate wave energy, stabilize sediments, sequester carbon and nutrients, oxygenate sediments and filter the water column; eelgrass is an integral part of coastal habitat, as it provides shelter and forage for many marine fish species. Massachusetts Bays National Estuary Program (MassBays), local experts, and the Massachusetts Division of Marine Fisheries (MA DMF) have teamed up to develop a protocol (see Appendix A) to track the perceivably declining population of eelgrass. The application we've been asked to create is part of a comprehensive effort to collect data that will supplement mapping programs and enhance understanding of the embayment. The data collected will help the scientists to understand and track changes to the eelgrass in DKP. In the protocol's "as is" state, experts and citizen scientists are assigned an area of the DKP, and go out on boats, record data on paper (see Appendix B), take pictures, and turn this data into the MA DMF coordinator. Now that it has been determined that the protocol is effective, MA DMF would like to replace the paper field datasheet with an app. Data collectors have expressed that they have difficulties writing on a rocky boat, and in cases where the weather is not optimal, the paper datasheet has become a burden.

As outlined in "Eelgrass Monitoring: Development of a Citizen Scientist Monitoring Method" (Carr, 2018) would like to proceed to the next phase of data collection, an app where data collectors would find a simple interface with which to enter the data.

4. Stakeholder Analysis:

5. Onion Model of Stakeholders



6. Description of each stakeholder.

Primary Stakeholders:

- Citizen Scientists, Data Manager, Experts/Scientists, MA DMF Coordinators
    - Volunteers that will use the SOP to collect data, a data manager that will import the csv data from the app into their spreadsheet and report on it, the experts who have established the need for this project and will oversee it, representatives of MA DMF that will act as liaison between volunteers and experts
- MA DMF Standard Operating Procedure for Citizen Scientist Eelgrass Monitoring
    - The protocol for collecting data

Secondary Stakeholders:

- Atlantic States Marine Fisheries Commission, Boston University, Cohasset Center for Student Coastal Research, Duxbury Conservation, EPA, fisheries researchers, Jackson Lab UNH, Marine Fisheries Advisory Commission, MA Coastal Zone Management, MA Department of Environmental Protection, MIT Sea Grant, North & South Rivers Watershed Assn, Northeastern University, Plymouth Department of Marine and Environmental Affairs
    - Local environmental groups that are participating in the project and have interest in the results
- Embayment Inhabitants (fish, flora, etc), local residents/businesses/tourists
    - Will not diminish when eelgrass habitat is thriving

Tertiary Stakeholders:

- Conservancy Decision Makers, Coordinating Scientists, CS4760/5760 Students, Developers, Programmers, Usability Testers, CS4760/5760 Professors,

7. Stakeholders' goal-influence table

Stakeholder	Stakeholder's Goals	Associated Influences
Eelgrass Monitoring App	Replace paper field datasheets used to monitor eelgrass	
Citizen Scientists (volunteer)	Help scientists monitor eelgrass	Past training and assumptions may lead to better/worse data entered into app
Data Manager	Gather, evaluate, and report on monitoring data obtained from paper/app information	Judgments on interpreting data may lead to skewed reporting. Also, assumptions may lead to emphasis on data that may be/not be important to the final conservation decision makers
Experts/Scientists	Create an app that will replace paper field datasheets	As the only liaison between MTU and the parties she represents, needs to completely understand the project's needs, goals and end-product; also

		needs to convey those to app developers
MA DMF Coordinators	Oversee that data is being collected as per protocol, and that data is collected properly	Need to establish boundaries of what will/will not be accepted as far as data input, and ensure that it being done per the protocol
MA DMF Standard Operating Procedure for Citizen Scientist Eelgrass Monitoring	Standard Operating Procedure for Eelgrass Monitoring Program	Is the one document that all eelgrass monitoring volunteers need to read, understand and follow. Is the "end all" if experts are not available to answer questions or resolve conflicts
Atlantic States Marine Fisheries Commission	Use collected data to promote and protect fisheries resources	Need to make sure that the reported data fits their needs in order to accomplish their mission
Boston University	Use collected data to understand how coastal ecosystems respond to stressors	Need to make sure that the reported data fits their needs in order to accomplish their mission
Cohasset Center for Student Coastal Research	Keep track of where healthy and unhealthy eelgrass is in Cohasset Harbor; to identify diseased eelgrass and prevent its spread	It would be easy to collect only data that pertains to their mission. Need to focus on the big picture of the project, not just their needs.
Duxbury Conservation	Use collected data to conserve Duxbury	Need to make sure that the reported data fits their needs in order to accomplish their mission
Embayment Inhabitants (fish, flora, etc.)	Identification of data so that it can continue to thrive	
Environmental Protection Association	Use the collected data in its efforts to protect the environment from harm and the extinction of necessary biodiversity	Need to make sure that the reported data fits their needs in order to accomplish their mission
Fisheries researchers	Use the collected data to promote and protect fisheries resources	Need to make sure that the reported data fits their needs in order to accomplish their mission
Jackson Lab-University of New Hampshire	Use the collected data to continue its research on the physical and biological components of coastal ecosystems, especially as it pertains to the Great Bay Estuary	Need to make sure that the reported data fits their needs in order to accomplish their mission
Local residents/businesses/tourists	Ensure a healthy, natural environment; address conservation needs	Be available to assist scientists in all aspects of the project

Marine Fisheries Advisory Commission	Use the collected data to continue their mission to ensure the nation's living marine resource policies and programs meet the needs of commercial and recreational fishermen, and of environmental, consumer, academic, tribal, governmental and other national interests	Need to make sure that the reported data fits their needs in order to accomplish their mission
Massachusetts Coastal Zone Management	Use the collected data to continue their charter of policy, planning, and technical assistance on coastal and ocean issues within the Executive Office of Energy and Environmental Affairs and implement the state's coastal program under the federal Coastal Zone Management Act	Need to make sure that the reported data fits their needs in order to accomplish their mission
Massachusetts Department of Environmental Protection	Use the collected data to continue their mission of ensuring clean air, land and water	Need to make sure that the reported data fits their needs in order to accomplish their mission
MIT Sea Grant	Use the collected data to continue their mission of promoting the conservation and sustainable development of their marine resources through research, education, and outreach	Need to make sure that the reported data fits their needs in order to accomplish their mission
North & South Rivers Watershed Association	Provide resources (volunteer citizen scientists) to the program and continue their effort of protecting natural resources (bay habitat)	Send volunteers that are truly interested in the project
Northeastern University	Use collected data to continue their mission of understanding the causes and consequences of biodiversity within and across species	Need to make sure that the reported data fits their needs in order to accomplish their mission
Plymouth Department of Marine and Environmental Affairs	Use collected data to continue their mission to provide services that protect	Need to make sure that the reported data fits their needs in order to accomplish their mission

	the safety of people and vessels who use our waterways and waterside facilities, including our rivers, ponds, and lakes; to provide for the protection, preservation, enhancement and safe use of the Town's natural resources, including beaches, conservation lands, and preserved open spaces; and to address environmental issues that threaten or may negatively impact the health, welfare, and quality of life of their citizens.	
Conservancy Decision Makers	Use the collected data to help with conservation decisions	Need to make sure that the reported data fits their needs in order to accomplish their mission
Coordinating Scientists	Develop a program to gather the necessary data, and use the collected data to learn about the habitat and any extinction dangers	Need to work together. Various experts in this project have different specific missions; they'll need to make sure that the big picture is done properly so that their detailed missions can be assisted by this project
CS4760/5760 Students	Develop an app in accordance with the Scientist's requirements, and learn about the process of planning, prototyping (paper and app), feasibility assessment, designing, development, project planning and management, testing and launching	Need to understand priorities of the users and present work that fulfills the project's requirement. It's easy to put in what the developers might think is a nice feature, but we need to remember that the goal is to provide what they're looking for, only offer suggestions for anything else.
Developers	Use the parameters set forth by the scientist and the rest of the team to develop a successful app	Need to make sure that the reported data fits their needs in order to accomplish their mission
Programmers	Use their skills to code the app according to the teams design	Follow the requirements as per the scientist's request, and make sure the process flow follows correctly, and that usability is assured
Usability Testers	Evaluate the app by testing it with real users who are	Run vigorous, complete testing; gather data describing how the

	entering data as per the "Field Datasheet" form (Appendix B). Identify issues with problems, inconsistencies, confusion. Provide an evaluation result document to the undergrad team.	volunteers will use the program and test it from their perspective
CS4760/5760 Professors	Give students the resources, and guide their knowledge so that the students can successfully complete the requirements set forth by the professors. Act as a resource for help when needed.	Help students learn and influence them with real-world scenarios and processes

8. Summary of the Stakeholder Goal Influence Table

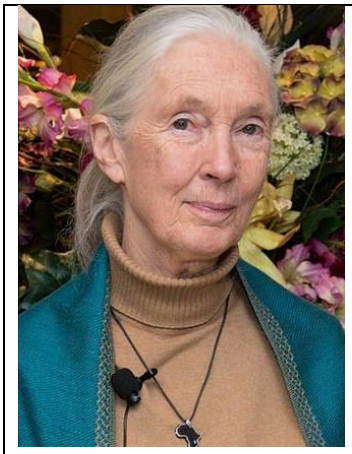
All individuals and groups local to the DKP Embayment have an interest in a thriving embayment habitat. Eelgrass is a key indicator for a healthy and prosperous aquatic environment. Therefore, they have a stake in the finished product, the Eelgrass Monitoring App.

It is in their best interest, and they are influenced by, the ability to track eelgrass data accurately. The app that's replacing the paper Field Datasheet needs to be easy, straight-forward, and accurately collect, and report on, the volunteer's input.

The development team is influenced by Michigan Technological University's standards. The undergrad students, along with Shashank and me, represent not only the university community, but also the individuals on the team. If we can successfully create the app to match Jill Carr's specifications, and meet the standards of the other environmental groups represented with this project, then we will have been influenced by success, and great learning experience along the way. Also, getting an A in the class would be nice, and I'm sure this influences the work we do.

9. Personas:

a. Citizen Scientist (Primary)



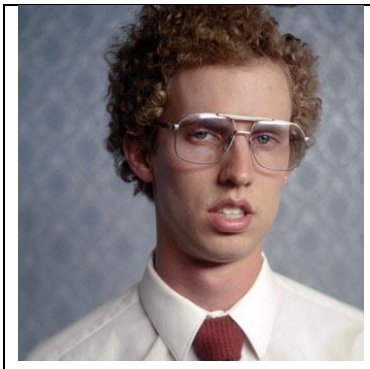
Name: Alexa Denniston
Age: 67
Hometown: Duxbury, MA

Alexa would like to enjoy her retirement by helping others. She loves the outdoors, and volunteering to help the DKP Bay, where she used to fish as a child. She can't imagine the bay without a healthy habitat, and wants to be a part of the solution by helping to gather data to help the cause.

She's a great helper because she's there regularly, so she can help the other volunteers when the coordinators are busy.

The coordinators love it when Alexa is there, as she goes out onto the boats with them and helps them to ensure accurate data. Alexa is happy to help, but she's not really a computer person, so it helps when the program is easy to use and to see.

Data Manager (Primary)



Name: Spencer Durgan
Age: 27
Hometown: Mesa, AZ

Spencer is not used to being around so much water. He had to drive a couple hours to get to the lake near his house in Arizona. When he heard about this internship with the MA DMF, he thought, "Why not? Sounds easy enough. Just take the numbers from the csv file and open it in Excel."

Spencer's had a few write-ups recently. His supervisor told him that it's important that the data is checked before saving the Excel sheet. One person used a fraction, and when it came to Excel, it didn't import properly, and they had to waste an hour going back to figure out the volunteer meant.

But he's happy as long as he's helping the environment. He doesn't worry about those pesky details that the data management supervisor is freaking out about.

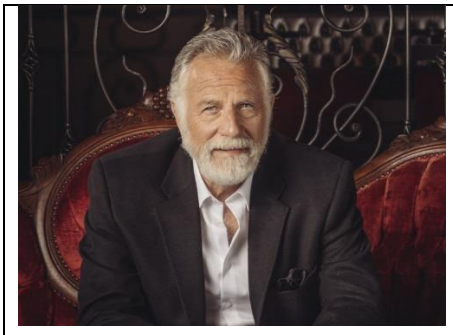
b. Plymouth Department of Marine and Environmental Affairs (Secondary)

Name: Chester Monreal
Age: 72
Hometown: Plymouth, MA

Chester has been the chairman of the board for the Plymouth Department of Marine and Environmental Affairs for the past 10 years. He's very concerned about what happens with this project and the safety of the volunteers, visitors and scientists.

He's big on saving the natural resources and believes that this project will help his organization by providing valuable data. He doesn't want to get involved in the details of the data collecting; he says that if the app works like it should, he'll just look at the data once it's all been put together.

Local business (Secondary)



Name: Xavier Xylophone
Hometown: Kingsbury, MA

Xavier is the proud owner of '2X Beer, Tackle and Bait Shop'. He takes quite an interest in his community - both the residents and the tourists, because his revenue depends on it. When he heard they were going to start studying the DKP embayment, he was first in line to help out.

He knows that if the EPA is involved, there's big money to be had. If the town gets money to help beautify the bay, then that means more customers for him. He only wishes that he could guarantee that the EPA would decide to fund the project.

He had an idea, if he could get some high schoolers to volunteer to help collect data, and plant a seed in them so they think the bay is in dire straits, they might fudge the results a little, making it seem like the future is grim for the bay, and the EPA would step in with funding in no time. After all, it's not like he's cheating anyone, the funding's out there just waiting for a recipient. There's got to be some way to make the bay seem just a little worse than it is with this new app.

10. Simplified Hierarchical Task Analysis

1. Goal of project: to better understand and track changes to eelgrass bed extent and condition in DKP.
    a. Consult with other experts
        i. Consult with local experts/scientists to discuss if there's a need to study eelgrass
    b. Identify an effective process
        i. Create Eelgrass Monitoring Development of a Citizen Scientist Monitoring Method
    c. Identify resources that will be needed
        i. Volunteers
        ii. Coordinators
        iii. Trainers
        iv. Hardware (camera, measuring tape, etc.)
        v. Data managers
        vi. Project Supervisor
    d. Create Standard Operating Procedure
    e. Create Field Datasheets
        i. Identify data that's needed
        ii. Identify how data will be formatted, entered and collected
    f. Collect data
        i. Take paper field datasheets and input data in Excel
    g. Confirm that the procedure is working as expected
    h. Develop an app for data collection
        i. Work with MTU students to explain the project
        ii. Design prototype
        iii. Get feedback, implement changes
        iv. Usability Testing, get feedback, implement changes
    i. Confirm that app is exporting data as expected
        i. Data formatted properly
        ii. Data exporting in csv file, and importing into Excel properly?
        iii. Test for "beyond boundary" input (letters in number fields, missing input, different decimal entries)
        iv. Address issues, finalize app's error tolerance and error messages, implement changes
        v. Document the app, and any instructions.
        vi. Actual volunteers test app and provide feedback
        vii. Implement changes as needed
        viii. Update the documentation and any instructions.
    j. Debrief
        i. What worked? What didn't? What are different ways we could have approached the design that would have been better/worse?
    k. Decide on follow-up steps

11. Summary of HTA Simplified View

The HTA described on the last page begins as any other new app - with a gap. There was a gap, something missing, a need to be able to find a way to ensure a healthy bay habitat. Experts met, and decided on a process (monitor eelgrass) and a platform (volunteers measure and enter data on paper field datasheets) to accomplish this.

A Standard Operating Procedure was created, and it worked for some time. There then came a time where they saw that the process was working just fine, and it was then that they decided to progress to the next step - an app.

After meeting with Prof. Pastel, the project was passed down to Team 3 for development. Team 3 met with Jill Carr, the DKP Bay responsentative and she explained their "as is" process, and how she would like to proceed with an app.

The design team next works on the app, in an iterative process, where an idea is presented, tested, reworked, and presented again until the final product passes all testing, including usability testing, and is ready for release. The app is then documented, and instructions should be written.

The project, however, doesn't end there. The true users of the app then use it, and provide feedback. The app is updated with their feedback. It's not until the true end-users and the environemental groups involved are satisfied that the project is over.

At that point, the app can be complete, or possible upgrades might be necessary, and the process starts all over again.

12. Appendix A: Standard Operation Procedure for data collectors.

Appendix G: Standard Operating Procedure

Massachusetts Division of Marine Fisheries Standard Operating Procedure
Citizen Scientist Eelgrass Monitoring

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

Point of Contact:
Jillian.Carr@state.ma.us
MA DMF Annisquam River Field Station
30 Emerson Ave.
Gloucester, MA 01930
978-282-0308

OBJECTIVE: Volunteer monitoring of eelgrass extent and condition annually in DKP. Volunteers will 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 will be performed at peak biomass in August according to the following procedure.

I. GEAR LIST:

Shallow draft vessel
Coast guard required safety gear
Boat anchor
GPS unit with accuracy of 4 m or better
Monitoring Kit contents:
- Clipboard, datasheets, pencils, laminated SOPs
- Underwater digital camera, reel, and case
- 0.25 m^2 PVC quadrat drop-frame, line
- SD card and charged battery for camera
- Secchi disk, line
- Measuring tape
- View Scope bucket
- Small Danforth anchor and small mushroom anchor, line
- Misc: zip ties, duct tape

II. SUMMARY

<u>At all stations:</u>

- 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 four cardinal directions around 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 not an "indicator" station, raise the anchor and navigate to the next station.

<u>Additional sampling at **indicator** eelgrass stations</u>:

- At each of the four cardinal directions around the boat where eelgrass was observed, use the Danforth anchor 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 underwater 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 unit 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.

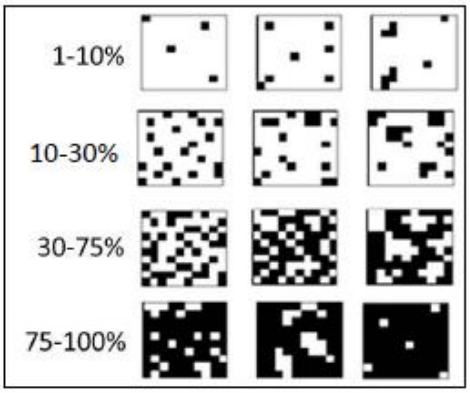
2. Data collection at all stations: Secchi disk

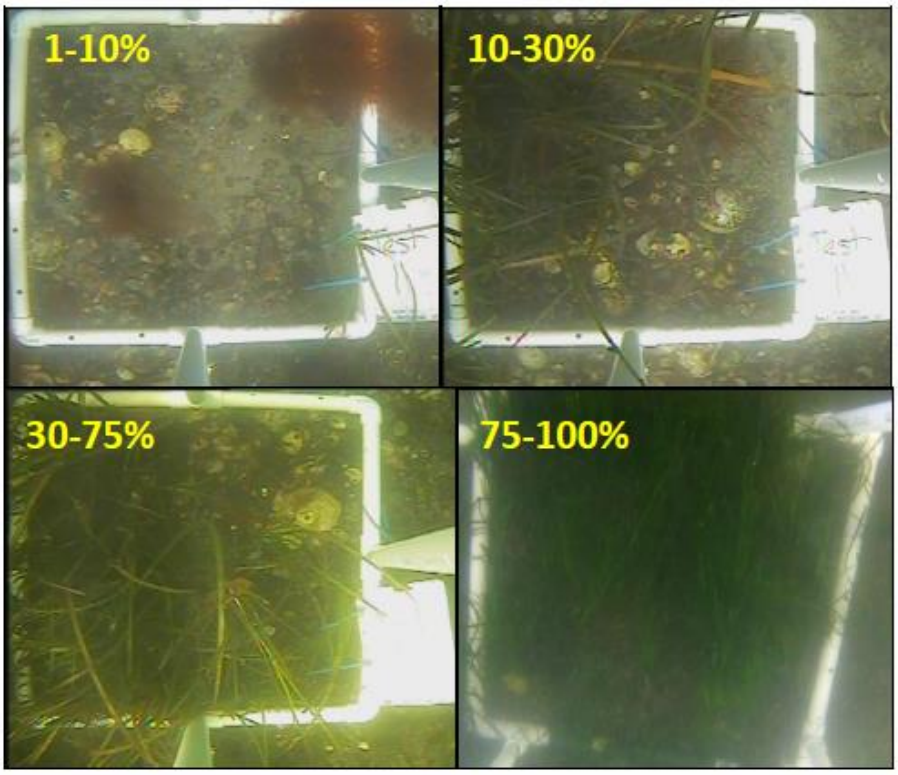
   A Secchi disk is a weighted 20 cm diameter disk painted black and white with an attached line. Ideal weather conditions for accurate secchi data collection include sunny or partly sunny skies; calm winds (≤10 knots) and little to no chop (waves on the water). Collect secchi measurements between 10 am 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 DKP. If the disk hits the bottom, record "bottom" under secchi depth with the water depth indicated.
   - Record the time, weather observations, water depth and other trip information on the datasheet.
   - 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 and submerge the bottom 1-2" of the view bucket into the water.
   - 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 this measurement on your data sheet. Repeat from another location on the boat and record.
   - If you need to re-take a measurement, don't erase the old one, just cross out and initial the suspect data so that it can be used if needed to troubleshoot later.
   - 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: http://www.secchidipin.org/?s=secchi+disk

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.
   - Write the station number and sample ID on the frame labeler (e.g. "101_1" for the first sample at station 101).
   - Beginning on the windward and up-current side of the boat, with the camera on, gently lower the drop-frame over the side. Once it hits the bottom leave it there for 10 seconds to allow sediment to settle. View the camera screen to ensure the quadrat landed flat.

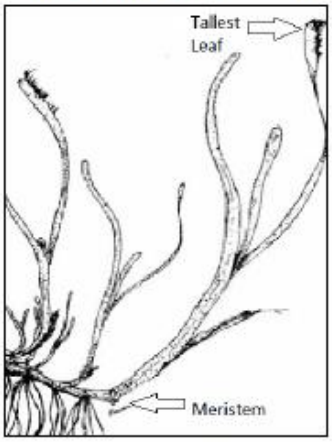
- Look at the monitor and ensure that the image is of the whole quadrat and the bottom (and/or eelgrass) is clearly visible. On the DVR unit, press the center "OK" button to take a picture. If you are unsure if a picture was taken, press the "Preview" button on the DVR unit to view the last image captured.
- Record the timestamp from the picture.
- Record sediment type as mud, clay, sand, gravel and/or cobble and note other benthic characteristics (mussels, debris, algae or other observation) on the datasheet.
- 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, <u>be sure to update the labeler</u>.
- If this is an indicator station, continue to step (5).





5. Additional data collection at **indicator** stations: Eelgrass length and width anchor sample measurements

- If eelgrass was present at a given sample location (e.g. corner of the boat), collect a sample by tossing the 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 to generate four samples, each containing three shoots.
- From the sample, select three intact shoots and place the shoots on the white tote lid, fanning the leaves. Place the Station label in the field of view. Slide the lid under the frame and collect as many pictures as needed to capture the entire sample.
- 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 (*). Record the measurements on the datasheet.
- Estimate cover of epiphytes (encrusting algae or tunicates) on the three leaf samples by looking over all of the leaves for all of the shoots and assigning none, low, med. or high for the entire sample (see guide below).
- Estimate cover of wasting disease on the three leaf sample by looking over all of the leaves for all of the shoots and assigning a none, low, med. or high category for the entire sample (see 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 and data sheets to the organizer.

13. Appendix B: As-Is Collection Sheets (Field Datasheets)

Appendix I: Field Datasheet

Eelgrass Monitoring Datasheet for All Stations

Trip Information

Date: _____ Crew Names: _____ Boat Name: _____

Sampling Station Number (i.e. #1-250, #9000): _____

Actual Lat.: _____ Actual Long: _____ GPS Device: _____

Wind Direction (circle one): N NE E SE S SW W NW

Wind Speed, kts (circle one): 0-5 5-10 10-15 15-20 20+

Sea State (circle one): glass-calm small ripples small waves moderate waves high waves

Cloud cover (circle one): 0% 1-25% 25- 50% 50-100%

Tide (circle one): flooding high slack high ebbing low slack low

Secchi Sampling

Water Depth (feet): _____ Time of Sampling: _____ Secchi Depth (meters) #1: _____

(meters): _____ Secchi Depth (meters) #2: _____

Drop-Frame Data Collection

	Picture taken	Picture Timestamp	Sediment (all that apply)	Eelgrass Percent cover	Notes
SAMPLE 1	Y / N		mud clay sand gravel cobble	0 1-10 11-30 30-75 75-100	
SAMPLE 2	Y / N		mud clay sand gravel cobble	0 1-10 11-30 30-75 75-100	
SAMPLE 3	Y / N		mud clay sand gravel cobble	0 1-10 11-30 30-75 75-100	
SAMPLE 4	Y / N		mud clay sand gravel cobble	0 1-10 11-30 30-75 75-100	

Additional Eelgrass Monitoring Datasheet for Indicator Stations

Station Number (i.e. #9000)

Sample 1

Shoot 1		Shoot 2		Shoot 3		Wasting disease	Epiphyte cover
length (cm)	*width (mm)*	*length (cm)*	*width (mm)*	*length (cm)*	*width (mm)*	*none, low, med., high*	

Sample 2

Shoot 1		Shoot 2		Shoot 3		Wasting disease	Epiphyte cover
length (cm)	*width (mm)*	*length (cm)*	*width (mm)*	*length (cm)*	*width (mm)*	*none, low, med., high*	

Sample 3

Shoot 1		Shoot 2		Shoot 3		Wasting disease	Epiphyte cover
length (cm)	*width (mm)*	*length (cm)*	*width (mm)*	*length (cm)*	*width (mm)*	*none, low, med., high*	

Sample 4

Shoot 1		Shoot 2		Shoot 3		Wasting disease	Epiphyte cover
length (cm)	*width (mm)*	*length (cm)*	*width (mm)*	*length (cm)*	*width (mm)*	*none, low, med., high*	

Notes:

14. Notes from meeting with Scientist

1st meeting with Eelgrass Scientist 1/25/2019

Jill Carr - Marine Fisheries Habitat Specialist

End user levels - volunteer public, data reviewers

Which data is mandatory optional?

Pics uploaded? Yes, she'd like this, but take from within app?

Timeline?

Use this for resource management decisions

What the next step? Paper prototype for next meeting

Wishlist by Jill: GPS coordinates and test GPS vs what they wrote down

What data will be extracted? Need for format? Masking?

MDMF Mass: manage commercial and recreational fish and fisheries habitat

Protocol Doc for volunteer public to report eelgrass and sample

On boats - 250 stations, but don't like handwriting on rocky boat, so need app

As is: data: paper - excel

Maybe can we use weather underground to ID current conditions?

Data will need to go from web into csv

Untrained volunteers so need simple and ease of access

GPS points - need this stored

No need for individual ID, just teams

Can be offline & then update, nice, but Pastel said it'd be hard so web access OK

Process 4 times per station

Station number - alpha numeric

Each station of form is its own page

Help bubble would be nice with phrases from her SOP