Subtidal Seagrass Monitoring Methods and ID Book

This book was developed by Christina Howley and Micha Jackson with input from CSIRO and the Wunambal Gaambera Aboriginal Corporation's Uunguu Rangers through a collaborative research project that is part of the Northern Australia Hub of the National Environmental Research Program.

BACKGROUND

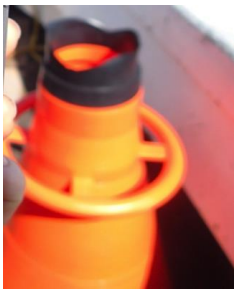
This subtidal seagrass survey method was developed as part of a collaborative research project involving the North Australian Indigenous Land and Sea Management Alliance Limited (NAILSMA), Wunambal Gaambera Aboriginal Corporation's Uunguu Rangers and the Commonwealth Scientific and Industrial Research Organisation (CSIRO). The project is part of the Northern Australia Hub of the National Environmental Research Program, which is supported by the Australian Government.

This method was designed for **subtidal seagrass monitoring** where depth and water clarity make regular monitoring using only a viewing bucket impossible and where in-water monitoring/sampling is not advisable due to the possible presence of dangerous animals like saltwater crocodile and sharks. It is designed to be used in conjunction with a data collection application created using CyberTracker software, the I-Tracker *Seagrass Mapping & Monitoring* application. This application includes data capture requirements for intertidal seagrass monitoring, seagrass mapping, and subtidal seagrass monitoring. This booklet is designed as a support tool for the **subtidal seagrass** monitoring section of the application.

This method assumes that a seagrass meadow has been identified, mapped, and selected for ongoing monitoring. Exact survey start and end points should be determined and used for every survey. A number of quadrats should also be selected between the start and end point, and these same quadrat locations (approximately) should be sampled every time that seagrass monitoring is completed. 10 quadrats may be appropriate for most survey areas, however more or less may be needed depending on the size of the meadow being monitored. Ideally, both a grab sampler and a quadrat sampler fitted with a GoPro or other appropriate underwater camera should be used for every survey.

EQUIPMENT CHECK LIST:

- ☐ Mobile device loaded with I-Tracker *Seagrass Mapping & Monitoring* application
- ☐ GoPro camera and quadrat sampler
- ☐ Spare battery for GoPro camera
- ☐ Sediment grab sampler or core sampler (PVC pipe)
- ☐ Plastic tub
- ☐ Depth sounder
- ☐ Viewing bucket
- ☐ **Subtidal Seagrass Monitoring Methods & ID book** (this book)
- ☐ Paper, clipboard and marker pen



Viewing bucket

GoPro and Quadrat Sampler

Sediment grab sample

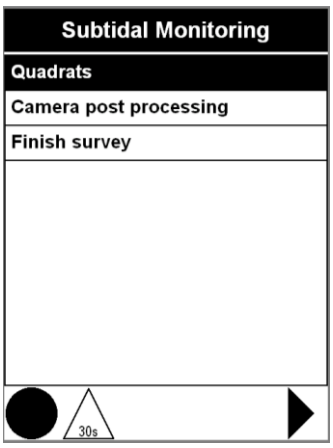
Before the survey starts:

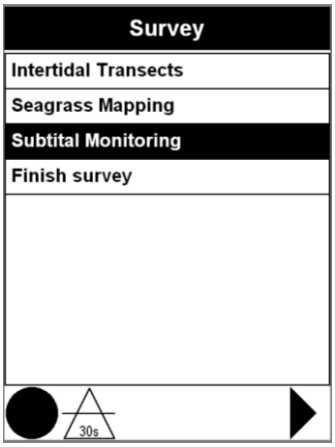
- Complete Equipment check list
- Make sure GoPro batteries are charged

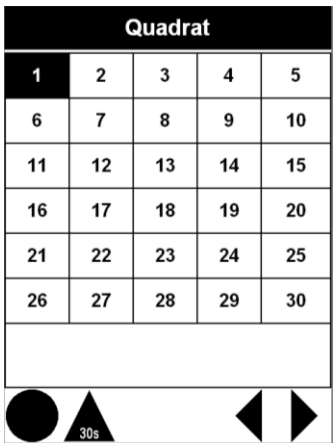
At each quadrat location:

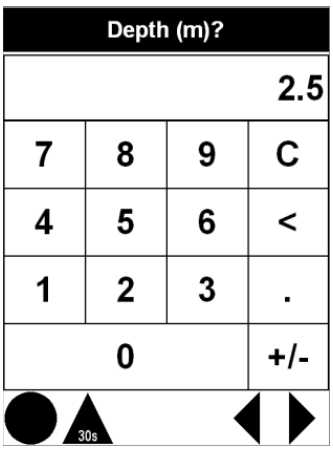
GoPro videos will be taken at pre-determined quadrat locations (points) within the seagrass meadow. The quadrat locations should be approximately the same every time, and should start at a pre-determined Survey Start Point and end at a pre-determined Survey End Point and cover the same transect area. **At each quadrat location the GoPro quadrat sampler will be placed on the bottom 3 times to take 3 seagrass videos**.

1. Drop anchor at the Survey Start Point.
2. Enter the following information into the **Subtidal Monitoring** section of the I-Tracker *Seagrass Mapping & Monitoring* application:
    i. Quadrat number
    ii. Water depth in metres









3. Write **"Q1"** on paper to place under GoPro camera to identify which quadrat point the video is from.
4. Attach Go-Pro to the quadrat sampler. Turn on GoPro video and make sure it is aimed at the square quadrat.
5. Place quadrat paper under GoPro video for a few seconds.
6. Lower GoPro and quadrat sampler over side of boat. Leave until water clears (10-20 seconds). Lift and move GoPro 1-2 metres and set on bottom again until water clears (10-20 seconds). Lift and move GoPro 1-2 metres again. After 10- 20 seconds, lift the Go-Pro camera and quadrat sampler back into the boat. Turn off GoPro video.

IF YOU HAVE A GRAB SAMPLER:

7. Collect sediment core sample/grab sample in plastic tub.

Using the I-Tracker application:

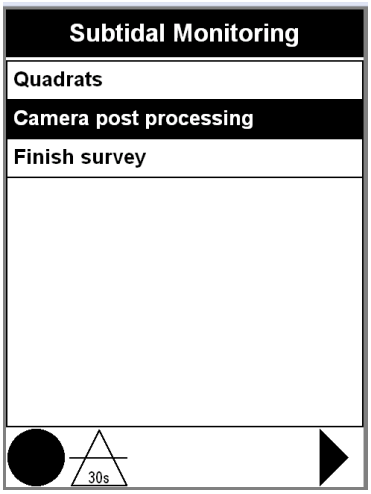
8. Enter primary sediment type (gravel, sand, mud).
9. IF there is more than one type of sediment in the grab enter the secondary sediment type (gravel, sand, mud)
10. IF there are more than two types of sediment in the grab enter the third sediment type (gravel, sand, mud)
11. Check for seagrass in the sediment grab sample and enter which seagrass species are present.
12. Record whether there is any algae (vegetation that is NOT seagrass) in the sample.
13. Record the **Epiphyte**, or 'leaf cover'. This is the percentage of the seagrass leaves that are covered in algae.
14. Measure the length of 3 leaves and enter in cms. Choose leaves of any species EXCEPT Ho, Hc or Hd (these leaves are very small and the length doesn't change). Try to choose leaves that represent the average length (ie don't pick the longest or shortest ones).
15. Move boat 50 m within the monitoring area and drop anchor.
16. Repeat steps 1 –14 making sure you increase the quadrat identification number (Step 3), then move another 50 m.
17. Repeat until you have completed a total of 10 quadrats, ending at **Survey End Point**.

18. Do a ‘Finish survey’ to save all sightings.

After you return to camp/the office:

BEFORE YOU CONNECT THE MOBILE DEVICE TO THE COMPUTER:

1. Download the GoPro quadrat videos onto the computer where the I-Tracker *Seagrass Mapping & Monitoring* application is saved
2. On the mobile device, use the ‘Camera post processing’ section to record all of the information about the analysis of the GoPro videos:



3. Following the I-Tracker application, for each video record:
    i. The quadrat number.
    ii. The camera point number (1, 2 or 3 – this corresponds with the first, second and third camera drop at the quadrat).
    iii. The Seagrass Cover: this means the percentage of the quadrat (square) that is covered by seagrass. If there is no seagrass, cover is 0%. If the quadrat is full of seagrass and you can’t see the sand or mud, then seagrass cover is 100%. Enter the seagrass percentage cover using the pictures on page 23 & 24 as a guide.
    iv. Which seagrass species you can see and the percentage of each (make sure you include all species of seagrass that are present; see pages 8 - 22 for help on seagrass species ID).
    v. Total algae: this is how much of the total quadrat (square) is covered by algae- NOT seagrass! (see page 25 for photos of algae cover).

vi. Any comments you have about the quadrat (use the text editor or do a voice recording).

Make sure you record one 'Camera post processing' record for EACH video; this means that you will have three records for Q1, three records for Q2 and so on.

4. Do a 'Finish survey' to save all sightings. Once you have done this, plug the mobile device into the computer where the I-Tracker *Seagrass Mapping & Monitoring* application is saved to download all of your survey and camera post processing records.

SEAGRASS SPECIES

Ho *Halophila ovalis* (complex)

- Small round or oval shaped leaf (1 – 3 cm)
- No hairs on leaf surface
- Preferred dugong food
- Found at shallow intertidal and deep sub-tidal waters

Hu *Halodule uninervis*

- Thin flat leaf or wide leaf with one vein down the centre
- Leaf usually 2-7 cm long
- Trident leaf tip
- Rhizome usually pale, with clean black leaf scars
- Dugong preferred food
- Found on shallow/intertidal sand or mud banks

Si ***Syringodium isoetifolium***

- Long leaf is round like a spaghetti noodle (not flat)
- Leaf usually more than 7 cm long
- Leaf tip tapers to a point
- Leaves 7-30 cm long
- Found on subtidal reef flats and sand banks

Th ***Thalassia hemprichii***

- Short black bars of tannin cells in leaf blade
- Thick rhizome with scars between shoots
- Hooked/curved shaped leaves
- Leaves 10-40 cm long
- Common on shallow reef flats

Cr ***Cymodocea rotundata***

- Flat, strap-like leaves 2 - 4mm wide
- Rounded, smooth leaf tip
- Smooth rhizome
- Well-developed, flaky leaf sheath
- Found on shallow reef flats

Cs *Cymodocea serrulata*

- Linear strap-like leaves, 5-9 mm wide
- Serrated leaf tip (tiny knife-like edges)
- Leaf sheath is triangular with a narrow base
- Leaf scars do not form a continuous ring around the stem
- Found on shallow subtidal reef flats and sand banks

Zc *Zostera muelleri* ssp *capricorni (Zostera capricorni)*

- Long strap-shaped leaves
- 5 veins down the length of leaf
- Cross veins which form a mesh across leaf blade
- Rounded leaf tip
- Leaf grows straight from rhizome ie. no stem
- Found on shallow and intertidal mud/sand flats

Ea *Enhalus acroides*

- Very long ribbon-like leaves 30-150 cm long
- Thick rhizome with long black bristles and cord-like roots
- Found on shallow/intertidal sand/mud banks (often adjacent to mangrove forests)

Hs ***Halophila spinulosa***

- Fern like leaves
- Found at subtidal depths

Image from Seagrass Watch http://www.seagrasswatch.org/

Hp *Halodule pinifolia*

- Fine, delicate leaves up to 20 cm long
- 1 central vein
- Black central vein splits into two at the rounded leaf tip
- Usually pale rhizome, with clean black leaf scars
- Found on intertidal sand banks

Image from Seagrass Watch http://www.seagrasswatch.org/

Hc *Haolphila capricorni*

- Small oval leaves that are hairy on one side
- Central vein on leaf with 9-14 cross veins
- Usually found deeper than 10 m near coral reefs

Image from Seagrass Watch http://www.seagrasswatch.org/

Hd *Haolphila decipiens*

- Small oval leaf blade 1 – 2.5 cm long
- 6-8 cross veins
- Leaf hairs on both sides
- Leaves usually longer than wider
- Found at subtidal depths

Image from Seagrass Watch http://www.seagrasswatch.org/

Ht *Haolphila tricostata*

- Erect shoots 8-18 cm long
- Leaves with 3 veins
- 2-3 leaves at each node
- Leaves 'whorl' around stem
- Found at subtidal depths (>10 m)
- Only found in Qld

Image from Seagrass Watch http://www.seagrasswatch.org/

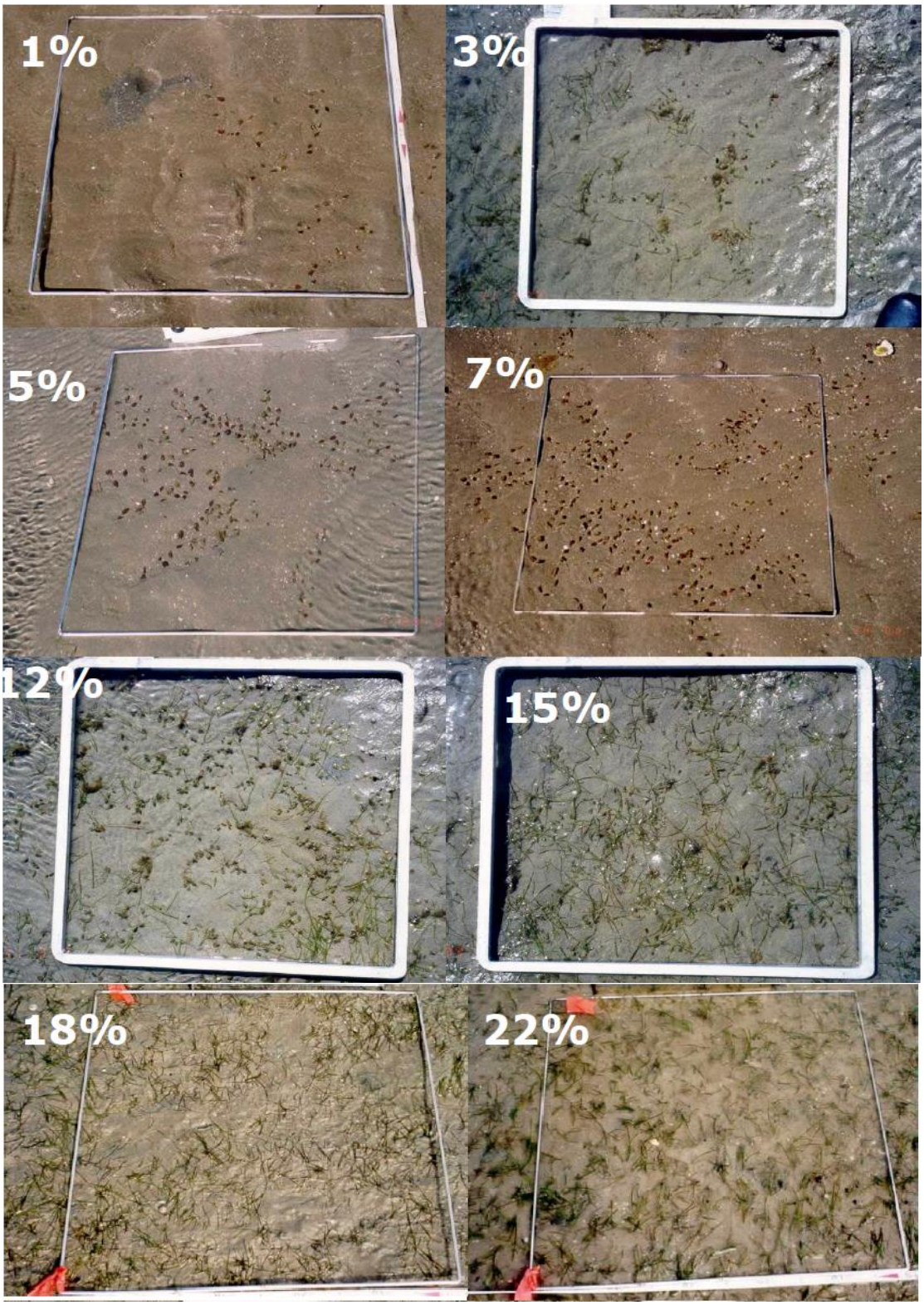
Tc *Thalassodendron ciliatum*

- Cluster of ribbon-like curved leaves at the end of an erect stem
- Round, serrated leaf tip
- Tough, woody rhizomes with scars
- Very coiled, branched roots
- Typically found in rocky areas

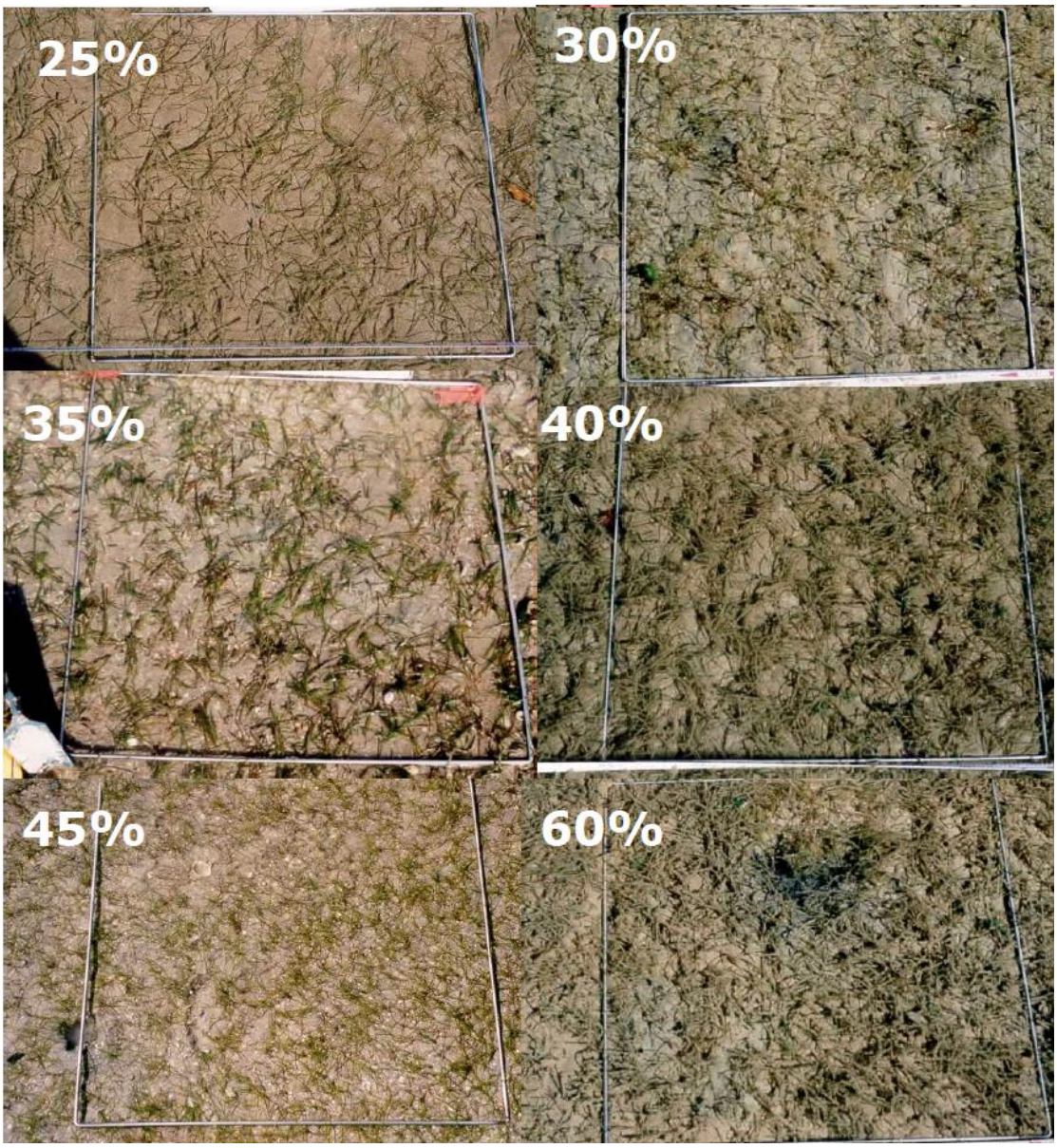
Ca *Cymodocea angustata*

- Similar to Cs
- Leaves 15-20 cm long and 3-6 mm wide, narrows towards the leaf tip
- Leaf tips are rounded and serrated
- Stems each have 2 – 3 leaves
- Found only in WA

SEAGRASS COVER



SEAGRASS COVER (HIGH)



ALGAE COVER