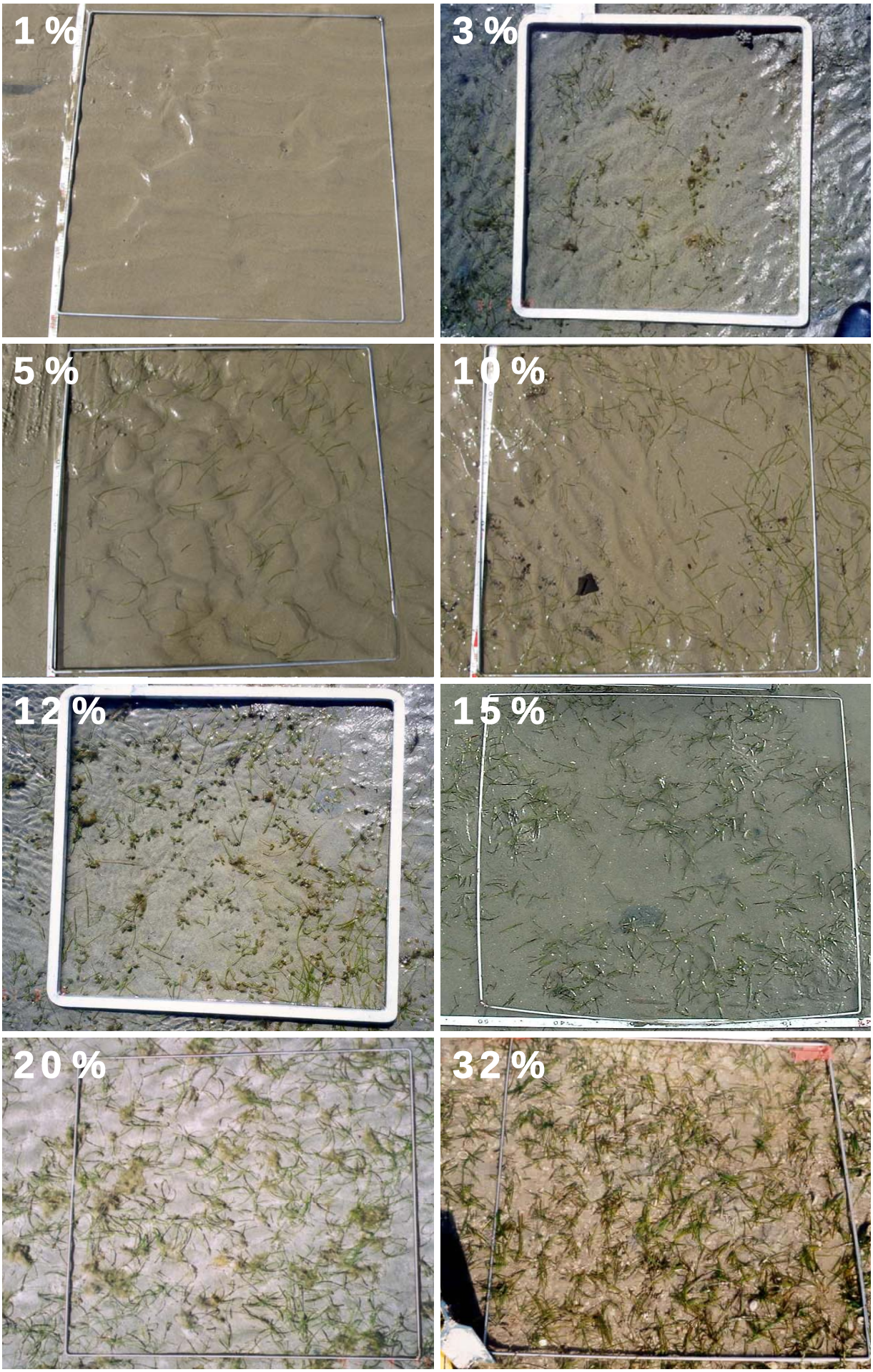
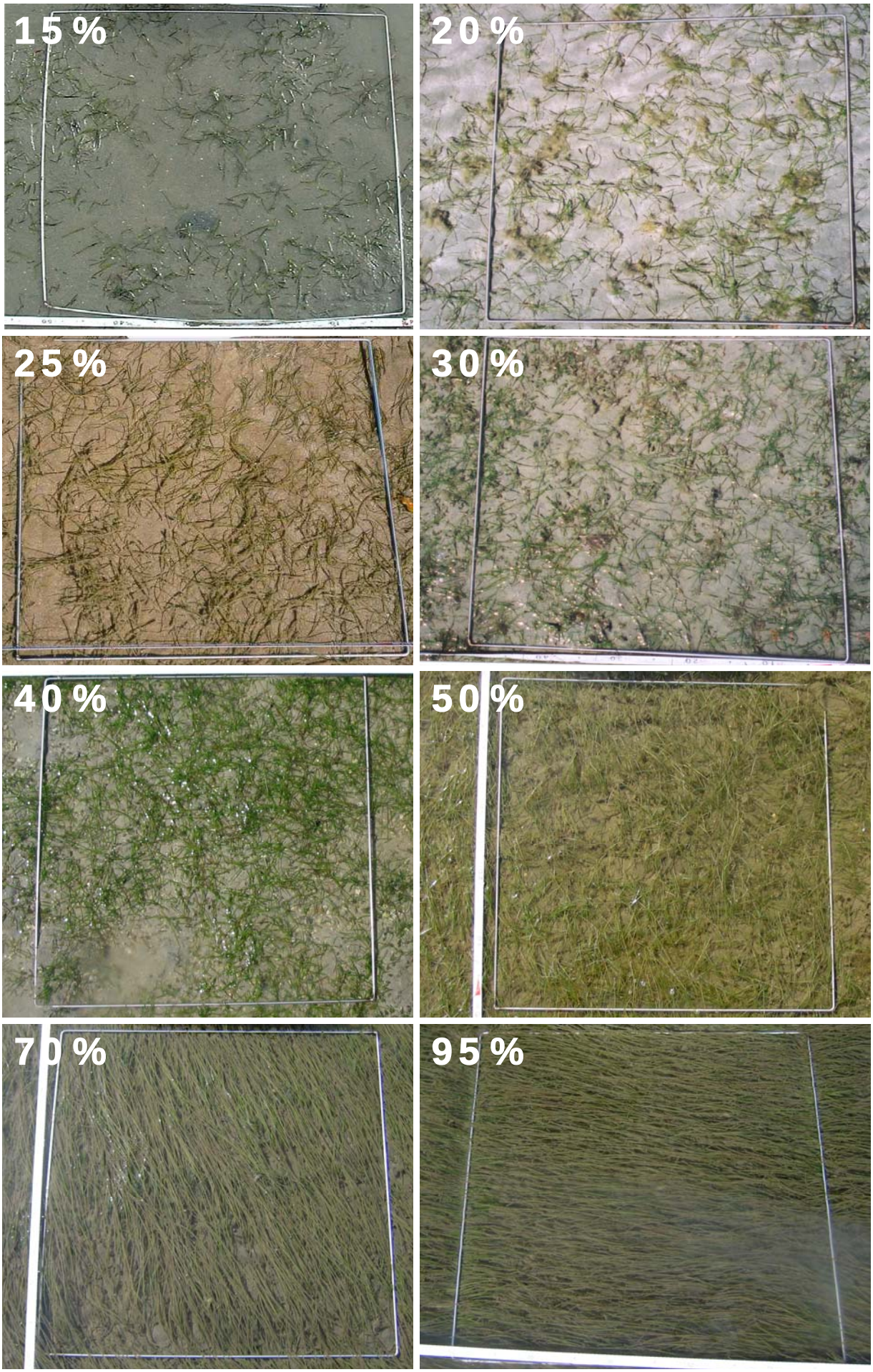
Percent cover standards



Coastal - *low*

Percent cover standards



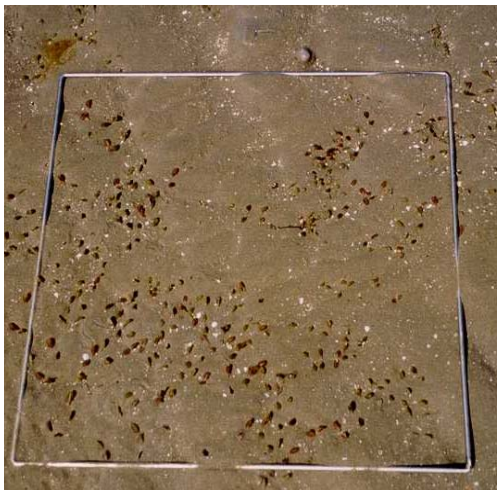
Coastal - *high*

Percent cover standards

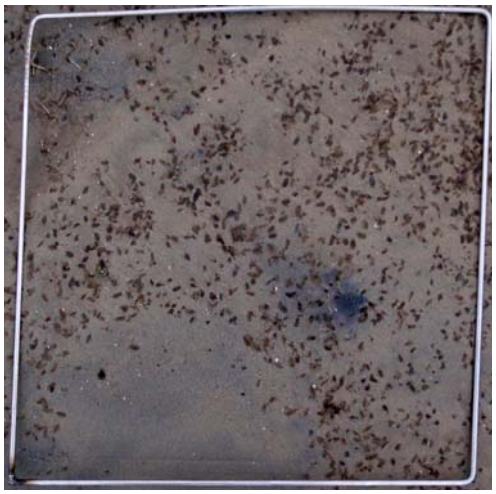
2%

5%

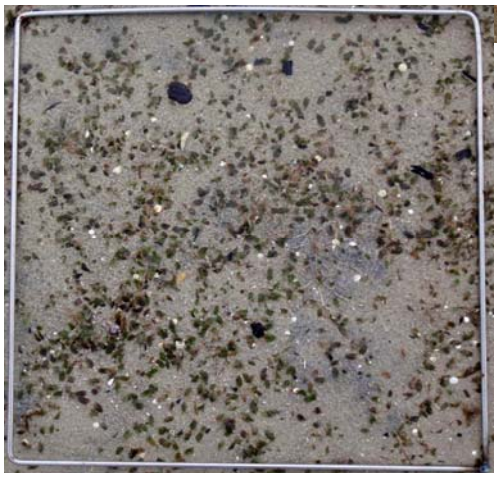
7%



17%



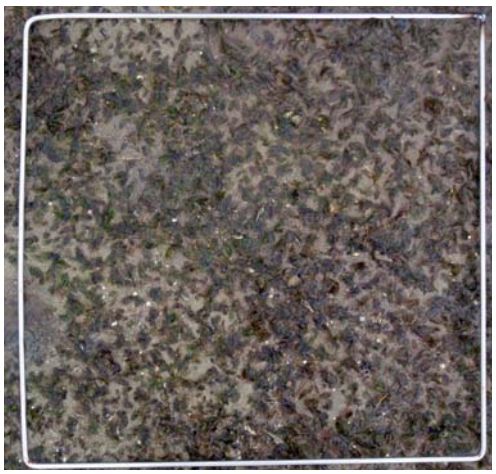
25%



38%

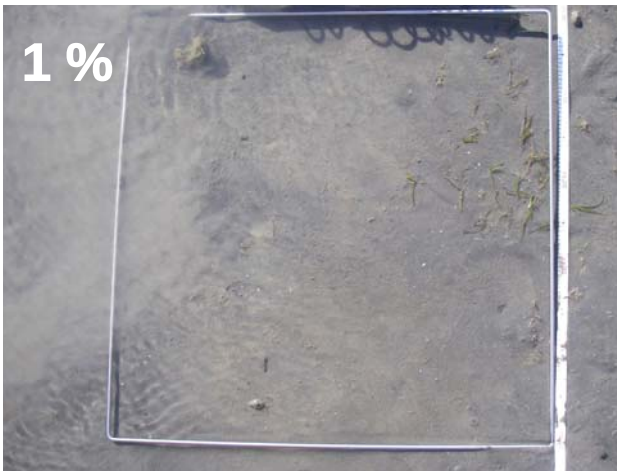
60%

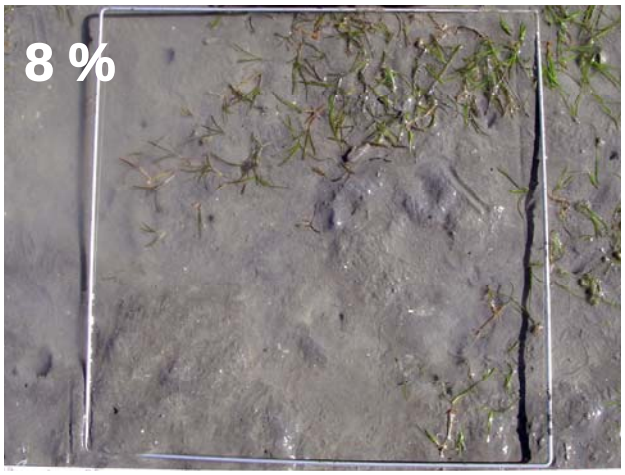
70%

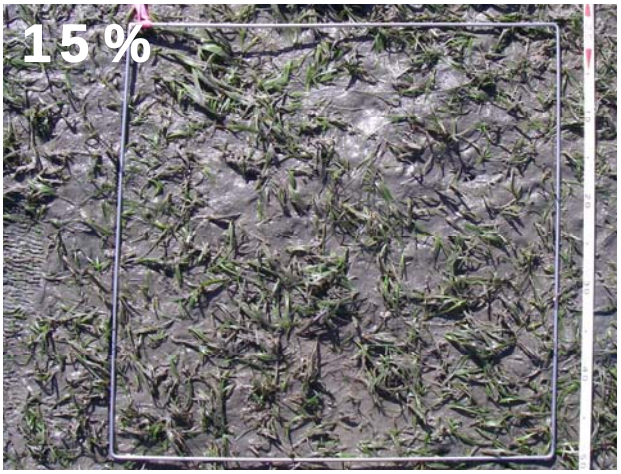


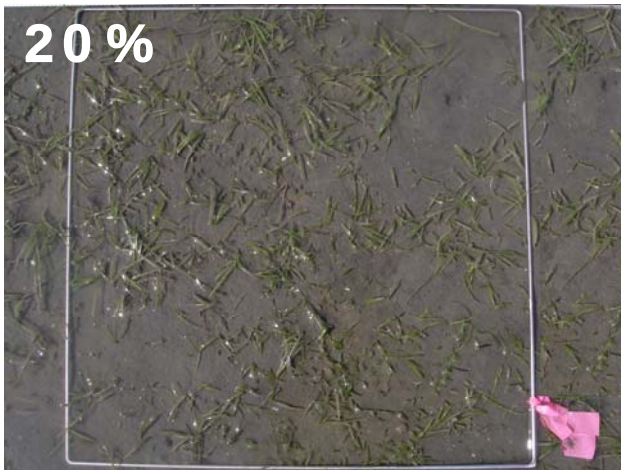
Coastal – *H. ovalis*

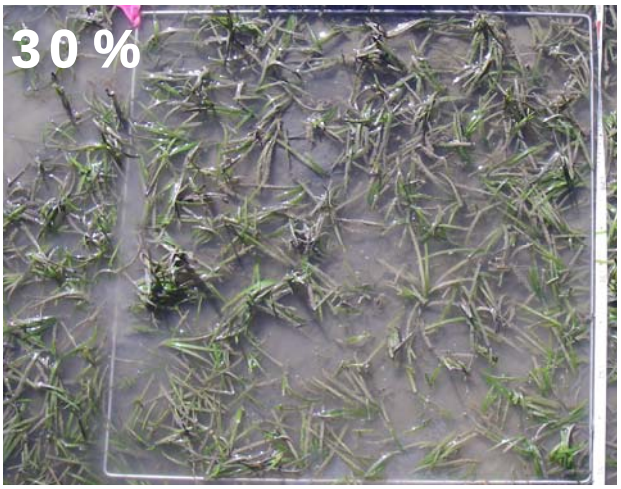
Percent cover standards

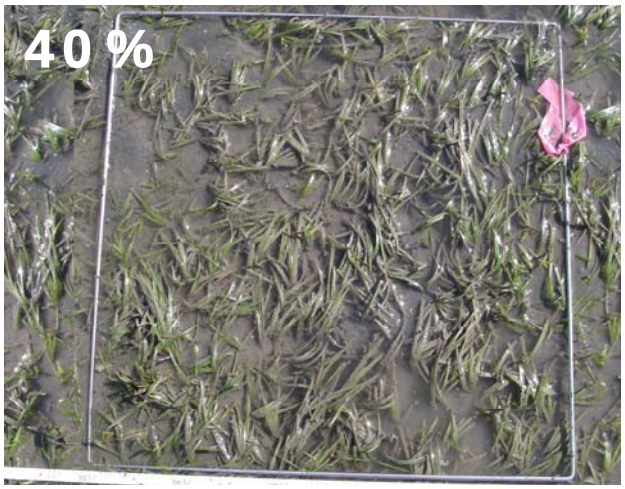


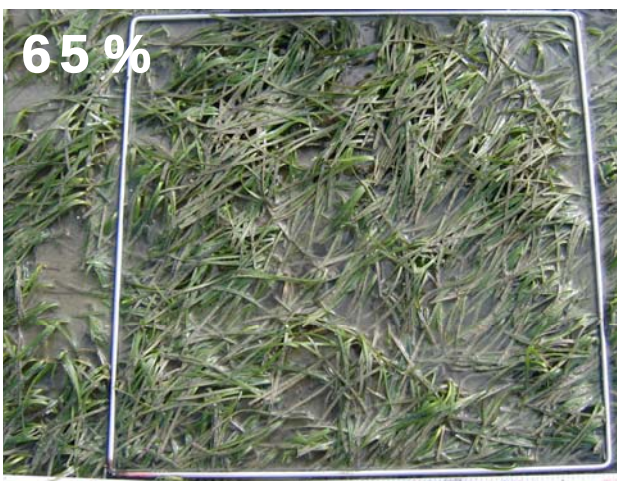


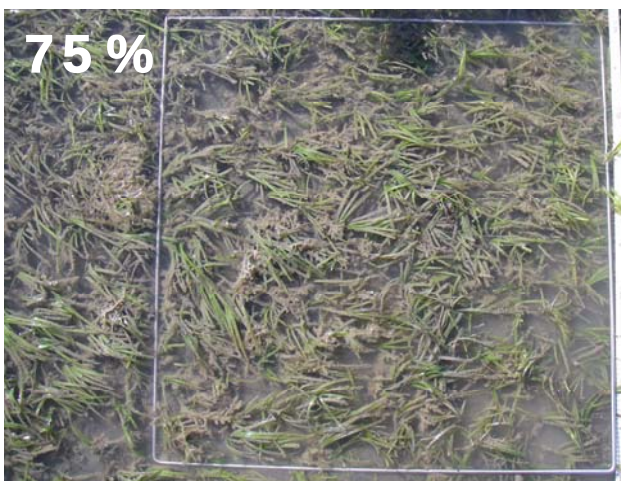






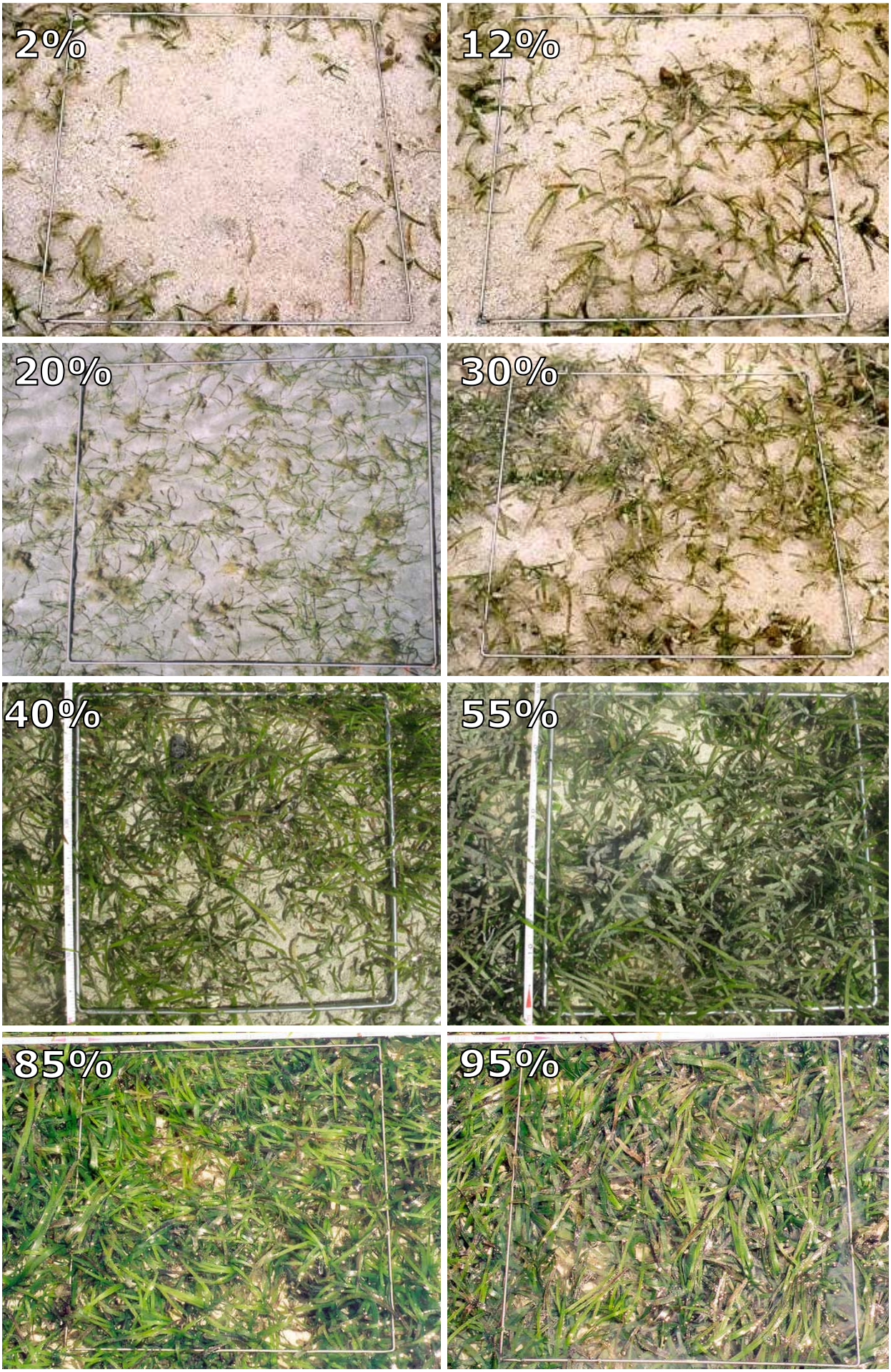






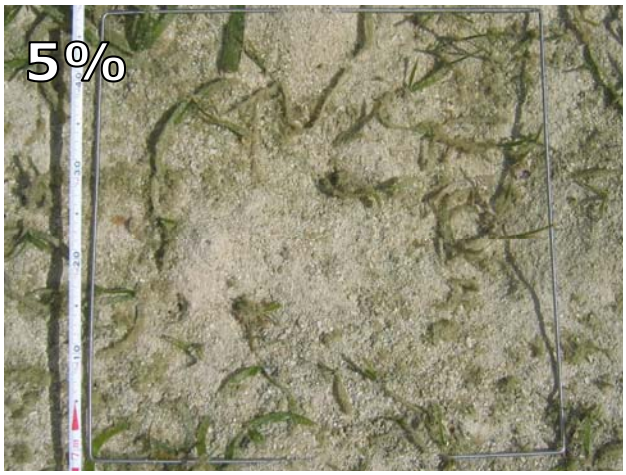
Estuary – *Zostera*

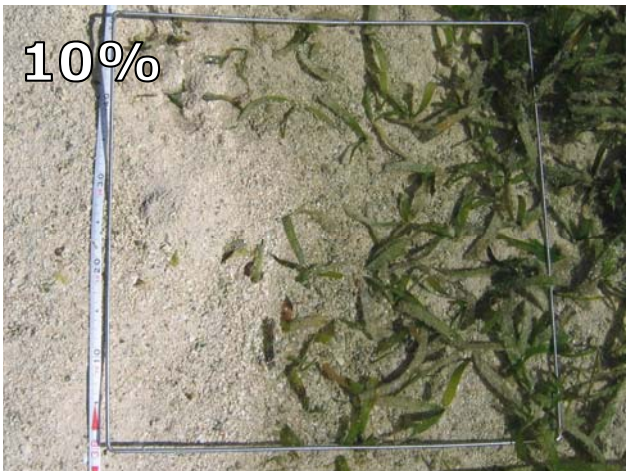
Percent cover standards

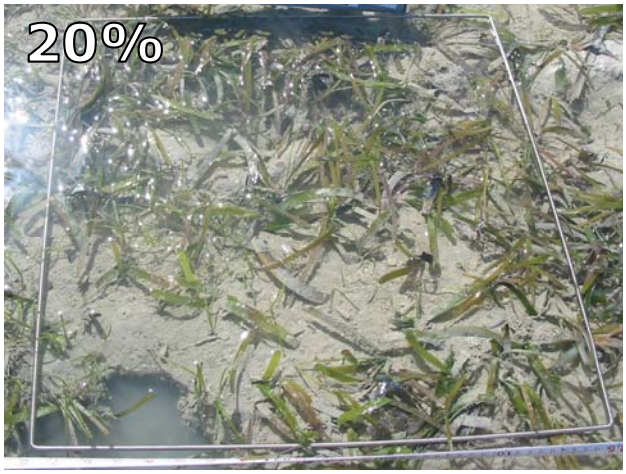


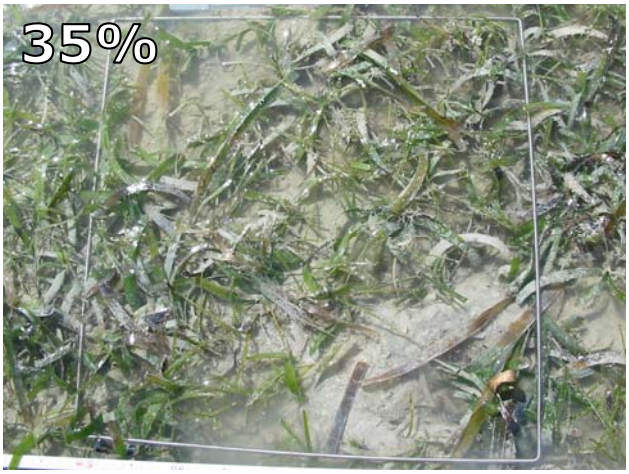
Reeftop –*Cymodocea/Halodule*

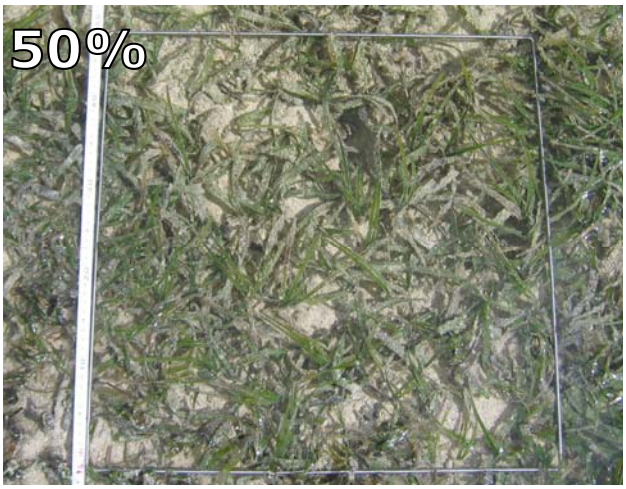
Percent cover standards

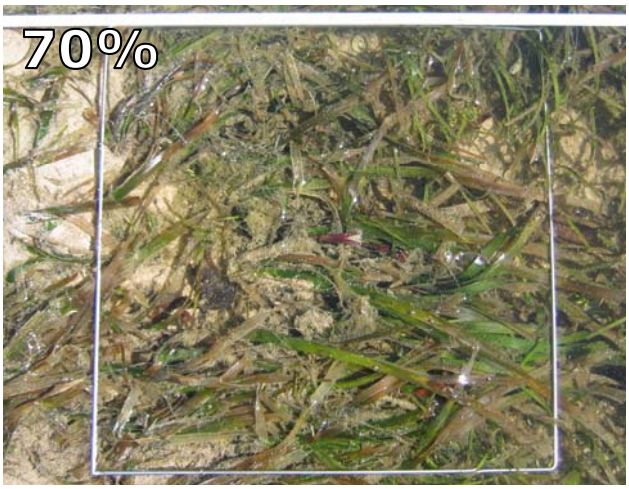


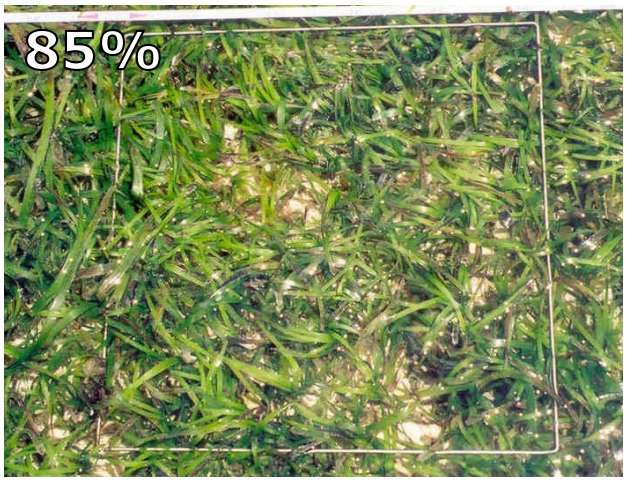


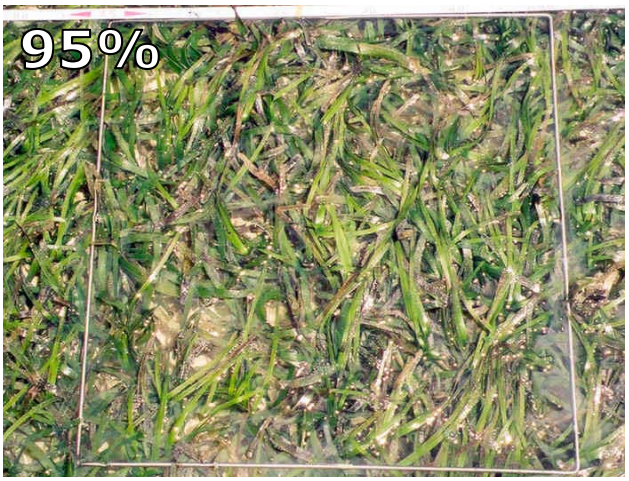








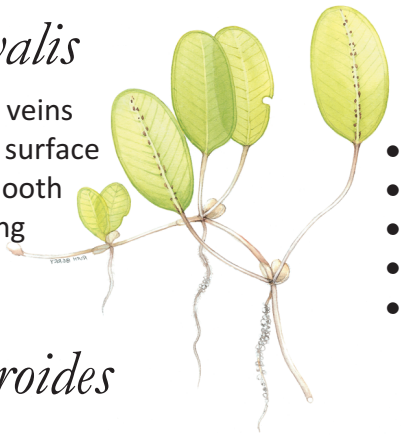




Reeftop – mixed *Thalassia/Cymodocea/Enhalus*

SEAGRASS SPECIES CODES

Ho
Halophila ovalis



- 8 or more cross veins
- no hairs on leaf surface
- leaf margins smooth
- leaf 5-40mm long

Hd
Halophila decipiens

- oval leaf, slightly pointed
- leaf hairs on both sides
- 6-8 cross veins
- leaf margins finely serrated
- leaf 10-25mm long

Ea
Enhalus acoroides

- very long (>30cm) ribbon-like leaves with inrolled leaf margins
- thick rhizome with long black bristles and cord-like roots

Th
Thalassia hemprichii

- ribbon-like, curved leaves 10-40cm long
- leaf tip rounded, slightly serrated
- short black tannin cells, 1-2mm long, in leaf blade
- thick rhizome with scars between shoots

Hs
Halophila spinulosa

- fern like, leaves arranged in opposite pairs
- leaf margin serrated
- erect shoot to 15cm long
- found at subtidal depths

Hu
Halodule uninervis

- trident leaf tip
- 1 central vein
- usually pale rhizome, with clean black leaf scars

Cs
Cymodocea serrulata

- serrated leaf tip
- wide leaf blade (4-9mm wide)
- leaves 6-15cm long
- 13-17 longitudinal veins
- robust/strong rhizome
- triangular shaped sheath

Cr
Cymodocea rotundata

- rounded leaf tip
- narrow leaf blade (2-4mm wide)
- leaves 7-15 cm long
- 9-15 longitudinal veins
- well developed leaf sheath

Zc
Zostera muelleri subsp. *capricorni*

- leaf with 3-5 parallel-veins
- cross-veins form boxes
- leaf tip smooth and rounded, may be dark point at tip
- leaf grows directly from rhizome ie no stem
- rhizome usually brown or yellow in younger parts

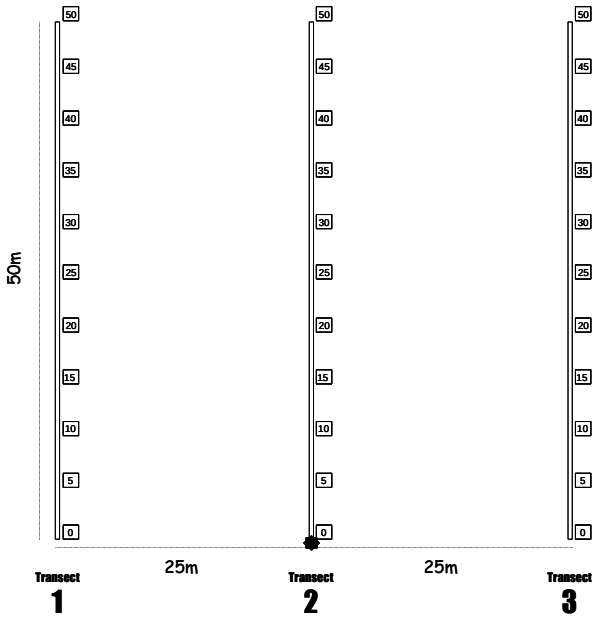
Si
Syringodium isoetifolium

- narrow spaghetti-like leaves
- cylindrical in cross section, 1-2mm diameter
- leaves contain air cavities
- leaf tip tapers to a point
- leaves 7-30cm long
- fleshy white rhizomes

Permanent-transect monitoring protocols

Source: McKenzie et al. 2003 (https://www.seagrasswatch.org/manuals/)

Site layout



Pre-monitoring preparation

Have a Contact Person

Create a timetable of times of departure and arrival back, and what the objective of the day is and what is to be achieved on the day. Give a copy of this to all participants involved in advance so they can make their arrangements to get to the site on time. List on this timetable what participants need to bring.

Have a Contact Person

Arrange to have a reliable contact person to raise the alert if you and the team are not back at a specified or reasonable time.

Safety

- Assess the risks before monitoring - check weather, tides, time of day, etc.
- Use your instincts - if you do not feel safe then abandon sampling.
- Do not put yourself or others at risk.
- Wear appropriate clothing and footwear.
- Be sun-smart.
- Be aware of dangerous marine animals.
- Have a first aid kit on site or nearby
- Take a mobile phone or marine radio

Necessary equipment and materials

- ❑ *3x 50 metre fibreglass measuring tapes*
- ❑ *6x 50 cm plastic tent pegs*
- ❑ *compass*
- ❑ *1x standard (50cm x 50cm) quadrat*
- ❑ *3x monitoring datasheets*
- ❑ *clipboard, pencils & 30 cm ruler*
- ❑ *camera*
- ❑ *quadrat photo labeller*
- ❑ *percent cover standard sheets*
- ❑ *seagrass identification sheet*

Each sampling event

Within the site, lay out the three 50 metre transects parallel to each other, 25 m apart and perpendicular to shore (see site layout). Within each of the quadrats placed every 5m along each transect for sampling, complete the following steps:

Step 1. Take a Photograph of the quadrat

- Photographs are taken of **every quadrat** along each transect. Use a quadrat free of strings and place the photo quadrat labeller beside the quadrat and tape measure with the correct code displayed.
- Take the photograph from an angle as **vertical** as possible, which includes the entire quadrat frame, quadrat label and tape measure. Fill the field of view as best as possible and avoid having any shadows or patches of reflection off any water. Check the photo taken box on datasheet for quadrat.

Step 2. Describe sediment composition

- Dig your fingers into the top centimetre of the substrate and feel the texture. Describe the sediment by noting the grain size in order of dominance (e.g., Sand, Fine sand, Fine sand/Mud).

Step 3. Describe other features and ID/count of macrofauna

- Note and count (whole numbers - never use < or > symbols) any features which may be of interest (e.g. gastropods, hermit crabs, dugong excavating, turtle cropping, crab burrows, worm holes, sediment ripples) within the comments column.
- If water covers half or more of the quadrat, measure depth in cm.

Step 4. Estimate seagrass percent cover

- Looking down on the quadrat from above, estimate the total percentage of the seabed (substrate) within the quadrat covered by seagrass leave. Estimate the footprint/shadow provided by the seagrass shoots.
- Always use the percent cover photo standards (calibration sheets) as your guide, estimating cover as accurate as possible, e.g. 27%, 61%. Remember, the lower the cover, the more accurate the measures.
- If cover is below 3%, you can count the seagrass shoots and calculate percent cover using the rule of approx 1 shoot = 0.1%. Please note: this will be greater for shoots of larger sized species.

Step 5. Estimate seagrass species composition

- Identify the species of seagrass within the quadrat and determine the percent contribution of each species (always start with least abundant species, total composition must equal 100%).
- Use seagrass species identification keys provided and use more than 1 feature to identify each species.

Step 6. Measure seagrass canopy height

- Measure canopy height (in centimetres) of the dominant strap-leaf species, ignoring the tallest 20%.
- Measure from the sediment to the leaf tip of 3 shoots, entering all 3 measures onto datasheet.

Step 7. Estimate algae percent cover

- Looking down on the quadrat from above, estimate the total percentage of the seabed (substrate) within the quadrat covered by macroalgae (independent of seagrass cover)
- Macroalgae is **not attached** to seagrass leaves and may be attached to rocks, shells or may be drifting.

Step 8. Estimate epiphyte percent cover

- Epiphytes are algae **attached** to seagrass blades and often give the blade a furry appearance.
- First estimate how much of an average seagrass leaf surface is covered, and then how many of the leaves/shoots in the quadrat are covered. For example, if 20% of the leaves are 50% covered by epiphytes, then quadrat epiphyte cover is 10%. Use the epiphyte matrix to assist you.
- Do not include epifauna with epiphytes. Epifauna are sessile animals attached to seagrass blades –record % cover of epifauna in the comments or an unused/blank column – do not add to epiphyte cover.

Step 9. Take a voucher seagrass specimen if required

- Place seagrass specimen in a labelled plastic bag with a little seawater and a waterproof label. Select a representative specimen of the species and ensure that you have all the plant parts including the rhizomes and roots. Collect plants with fruits and flowers structures if possible.

Step 10. Move to next quadrat

- Repeat steps 1 to 8 for the remaining 32 quadrats

Step 11. At completion of monitoring

- Check data sheets are filled in fully.
- Remove equipment from site (e.g. non-permanent pegs)

At completion of monitoring

Step 1. Wash & pack equipment

- Rinse all tapes, pegs and quadrats with freshwater and let them dry. Do this after every day of monitoring.
- Review supplies for next sampling and request new materials if needed.
- Store gear in a safe and dry place for next sampling event.

Step 2. Press any voucher seagrass specimens if collected

- The voucher specimen should be pressed as soon as possible after collection. Do not refrigerate longer than 2 days.
- Allow to dry in the herbarium press, in a dry/warm/dark place, for a minimum of two weeks. For best results, replace the newspaper after 2-3 days.

Step 3. Submit all data

- Data can be entered into the MS-Excel file downloadable from www.seagrasswatch.org. Email completed files to admin@seagrasswatch.org
- Mail original datasheets, photos and herbarium sheets

Seagrass-Watch HQ
For postal address, see
https://www.seagrasswatch.org/contact/

SEAGRASS-WATCH MONITORING

ONE OF THESE SHEETS IS TO BE FILLED OUT FOR EACH TRANSECT YOU SURVEY

OBSERVER: Beverly Citizen **DATE:** 17 / 2 / 21

LOCATION: Burrum Heads

SITE code: BH1 **TRANSECT no.:** 2

START TIME: 1304 **END TIME:** 1340

START of transect (GPS reading)

Latitude: ..... ° ..... ' ..... **Longitude:** ..... ° ..... ' .....

Quadrat (metres from transect origin)	Sediment (eg, mud/sand/shell)	Comments (eg 10x gastropods, 4x crab holes, dugong feeding trails, herbarium specimen taken)	(√)	% Seagrass coverage	% Seagrass species composition					Canopy height (cm)	% Algae cover	% Epi-cover
					HO	HU	ZC		Water			
1 (0m)	Sand	SC x3 DFT x1 HC x1	✓	40	30	70			0	5,4,7	5	33
2 (5m)	FS/S	GAS x2 Ray pit x2	✓	33	50	50			0	6,6,6	10	18
3 (10m)	CS	HC x3	✓	0					0	–	0	–
4 (15m)	m/S	CH x10	✓	0					1cm	–	17	–
5 (20m)	m/S	Turtle Copping GAS x3	✓	18	5	90	5		1cm	7,5,6	12	57
6 (25m)	m/S/Sh	SC x3 mw x2	✓	36		90	10		1cm	8,6,6	2	95
7 (30m)	Fine Sand	CH x9 GW x1	✓	48	100				3cm	–	0	10
8 (35m)	CS/S	Nothing	✓	0.7		100			2.5cm	6,5,5	0	36
9 (40m)	FS	HC x2	✓	23	96	4			1cm	5.5,5,6	5	38
10 (45m)	S/m	GW x2	✓	41	3		97		1cm	8,8,7	3	90
11 (50m)	Mud	CH x2 SC x1	✓	16	3	7	90		0	7,7,8	38	95

END of transect (GPS reading)

Latitude: ..... ° ..... ' ..... **Longitude:** ..... ° ..... ' .....

FS = Fine Sand
CS = Coarse Sand
m = mud
S = Sand
Sh = Shell

SC = Sea Cucumber
HC = Hermit Crab
GAS = Gastropod
CH = Crab Hole
mw = mud whelk
GW = Green worm
DFT = Dugong feeding trail