

RAPID MONITORING FLIPBOOK OVERVIEW

The flipbook layout allows students/guests to view the image on the front (facing) page while the presenter narrates the corresponding text on the next page.

The image in the top left-hand corner of the presenter's page shows what is on the facing page being viewed by the students/guests.

Please turn the page to start the presentation....

RAPID MONITORING

& BE A MARINE BIOLOGIST FOR A DAY



FACING PAGE:



Students or guests should have a **Rapid Monitoring survey slate** or **Be a Marine Biologist for a Day (BAMBFAD) survey slate** to refer to while working through the flipbook.

BE A MARINE BIOLOGIST FOR A DAY (BAMBFAD)

- Based on the Rapid Monitoring survey.
- Aligned with the Australian Curriculum and scaffolded for different year levels.
- **Primary & Middle school:** typically complete the timed swim component.
- **Senior students (15+):** usually undertake the full Rapid Monitoring survey.
- Simplified survey slates are available for younger students as an alternative to the Rapid Monitoring slate.

ACKNOWLEDGMENT OF COUNTRY

We acknowledge the expertise, wisdom, and enduring connections that have informed the guardianship of the Reef for millennia.

We pay our respects to the Traditional Owners as the first managers of this Land and Sea Country, and value their traditional knowledge, which continues to inform the current management and stewardship of the Reef for future generations.



Nautilus Shell Artwork © 2023 by Laurence Gibson, Yalanji Arts, Mossman Gorge.

FACING PAGE:

ACKNOWLEDGMENT OF COUNTRY

We acknowledge the expertise, wisdom, and enduring connections that have informed the guardianship of the Reef for millennia.

We pay our respects to the Traditional Owners as the first managers of this Land and Sea Country, and value their traditional knowledge, which continues to inform the current management and stewardship of the Reef for future generations.



ACKNOWLEDGMENT OF COUNTRY

(You are welcome to use your own wording).

We acknowledge the expertise, wisdom, and enduring connections that have informed the guardianship of the Reef for millennia.

We pay our respects to the Traditional Owners as the first managers of this Land and Sea Country, and value their traditional knowledge, which continues to inform the current management and stewardship of the Reef for future generations.

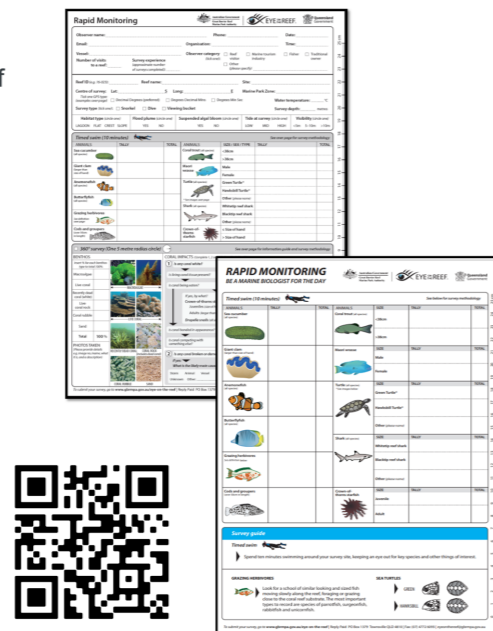
FACING PAGE:

EYE ON THE REEF

The Reef Authority's Eye on the Reef program enables anyone who visits the Great Barrier Reef to collect and contribute data that will help inform how it is managed.

You can help by:

- Collecting citizen science data as part of a **Rapid Monitoring survey**.
- Uploading your collected survey data to the **Eye on the Reef**.
- You can also contribute by submitting sightings in the **Eye on the Reef App**.



Eye on the Reef – Citizen Science

The Reef Authority's Eye on the Reef program enables anyone visiting the Great Barrier Reef to collect data that helps inform Reef management.

Download the free Eye on the Reef App to:

- Record reef health observations
 - Submit animal sightings
 - Report incidents
-
- Visitors can also contribute through the Rapid Monitoring survey, designed for anyone to participate.
 - Survey data can also be submitted through the Eye on the Reef App.

RAPID MONITORING SURVEY

Collects information on:

- Reef health indicators.
- Protected and iconic species.
- Emerging reef health issues.

Is used to:

- Monitor the same site regularly to identify trends and changes over time.
- Provide a snapshot of reef health at less frequently visited sites.

Rapid Monitoring

Observer name: _____ Phone: _____ Date: _____
 Email: _____ Organisation: _____ Time: _____

Vessel: _____ Observer category (tick one): Reef visitor Marine tourism industry Fisher Traditional owner

Number of visits to a reef: _____ Survey experience (approximate number of surveys completed): _____ Other (please specify): _____

Reef ID (e.g. 16-Q23): _____ Reef name: _____ Site: _____

Centre of survey: Lat: _____ S Long: _____ E Marine Park Zone: _____
 Tick one GPS type: Decimal Degrees (preferred) Degrees Decimal Mins Degrees Min Sec Water temperature: _____ °C

Survey type (tick one): Snorkel Dive Viewing bucket Survey depth: _____ metres

Habitat type (circle one)	Flood plume (circle one)	Suspended algal bloom (circle one)	Tide at survey (circle one)	Visibility (circle one)
LAGOON FLAT CREST SLOPE	YES NO	YES NO	LOW MID HIGH	<5m 5-10m >10m

Timed swim (10 minutes)

ANIMALS	TALLY	TOTAL	ANIMALS	SIZE / SEX / TYPE	TALLY	TOTAL
Sea cucumber (all species)			Coral trout (all species)	<38cm		
Giant clam (larger than size of hand)			Maori wrasse	>38cm		
Anemonefish (all species)			Turtle (all species)	Male		
Butterflyfish (all species)				Female		
Grazing herbivores (see definition on page 4)			Green Turtle*			
Cods and groupers (lower 50cm in length)			Hawksbill Turtle*			
			Other (please name)			
			Shark (all species)	Whitetip reef shark		
				Blacktip reef shark		
				Other (please name)		
			Crown-of-thorns starfish	≤ Size of hand		
				> Size of hand		

360° survey (One 5 metre radius circle)

BENTHOS: Insert % for each benthos type to total 100%

Macroalgae	
Live coral	
Recently dead coral (white)	
Live coral rock	
Coral rubble	
Sand	
Total	100 %

PHOTOS TAKEN (Please provide details e.g. image no./name, what it is, and a description)

CORAL IMPACTS (Complete 1, 2 and 3 below. Circle Y or N)

1. Is any coral white? Y/N

If yes: BLEACHING

Is coral being eaten? Y/N If yes: PREDATION

If yes, by what? How many seen?

Crown-of-thorns starfish: Juveniles (size of hand or smaller) _____ Adults (larger than size of hand) _____

Drupella snails (all sizes) _____

Is coral banded in appearance? Y/N If yes: DISEASE

Is coral competing with something else? Y/N If yes: COMPETITION

2. Is any coral broken or damaged? Y/N

If yes: What is the likely main cause? (Circle one)

Storm Animal Vessel Anchor Divers Snorkellers Unknown Other: _____

3. Is any fishing? Y/N

If yes: Fishing line _____ Netting _____ Other (please name) _____

IMPACT D (How much is damage?) _____

OTHER THINGS (Mating, Spawning) _____

Survey guide

Timed swim

▶ Spend ten minutes swimming around your survey site, keeping an eye out for key species and other things

▶ While surveying, use the time to find an area that is representative of the survey site and come back to that area to do your 360° survey.

360° survey

▶ Pick an area which represents the sea bed and overall condition of the site you are surveying. Pick a central point in your selected area which is easy to see and identify.

▶ Swim three body lengths away from that central point and then swim around, surveying the whole area within a circle of 5 metre radius around the central point.

EXAMPLE GPS POSITION

Latitude	Longitude
Decimal degrees: 18.6582°	146.489°
Degrees decimal minutes: 18° 39' 49.2"	146° 29' 34"
Degrees min seconds: 18° 39' 29.52"	146° 29' 20.4"

HABITAT TYPE

REEF BACK: Bommies, Reef front, High tide, Low tide

LAGOON FLAT CREST SLOPE

GRAZING HERBIVORES

▶ Look for a school of similar looking and sized fish moving slowly along the reef, foraging or grazing close to the coral reef substrate. The most important types to record are species of parrotfish, surgeonfish, rabbitfish and unicornfish.

SEA TURTLES

▶ GREEN

▶ HAWKSBILL

CORAL IMPACTS

BLEACHING (MINOR) BLEACHING (SEVERE)

CROWN-OF-THORNS STARFISH DRUPELLA

BLACK BAND DISEASE BROWN BAND DISEASE WHITE SYNDROME

CORAL COMPETITION PIGMENTATION RESPONSE ALGAL OVERGROWTH

DAMAGE (MINOR) DAMAGE (MAJOR) RUBBISH

GUIDE TO ESTIMATING % COVER

EXAMPLE

Macroalgae	5 %
Live coral	35 %
Recently dead coral	1 %
Live coral rock	9 %
Coral rubble	0 %
Sand	50 %
TOTAL	100 %

FACING PAGE:

RAPID MONITORING SURVEY

Collects information on:

- Reef health indicators.
- Protected and iconic species.
- Emerging reef health issues.

Used to:

- Monitor the same site regularly to identify trends and changes over time.
- Provide a snapshot of reef health at less frequently visited sites.



RAPID MONITORING SURVEY

The purpose of the Rapid Monitoring survey is to collect information about:

- reef health indicators,
- protected and iconic species,
- emerging reef health issues.

It can be used to monitor the same site regularly and get an idea of trends or changes to that site over time.

Or it can be used to get a basic snapshot of reef health at less frequently visited sites.




RAPID MONITORING SURVEY SLATE

1. Observer and site information

2. Timed swim (10-minutes)


3. 360° survey












4. Coral impacts and other things of interest

Rapid Monitoring   

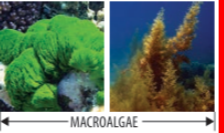




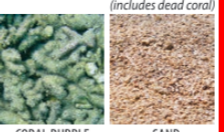
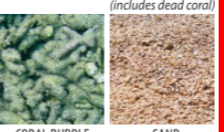



Observer name: _____ Phone: _____ Date: _____
 Email: _____ Organisation: _____ Time: _____
 Vessel: _____ Observer category (tick one): Reef visitor Marine tourism industry Fisher Traditional owner
 Number of visits to a reef: _____ Survey experience (approximate number of surveys completed): _____
 Reef ID (e.g. 16-023): _____ Reef name: _____ Site: _____
 Centre of survey: Lat: _____ S Long: _____ E Marine Park Zone: _____
 Tick one GPS type: Decimal Degrees (preferred) Degrees Decimal Mins Degrees Min Sec Water temperature: _____ °C
 Survey type (tick one): Snorkel Dive Viewing bucket Survey depth: _____ metres

Habitat type (circle one)	Flood plume (circle one)	Suspended algal bloom (circle one)	Tide at survey (circle one)	Visibility (circle one)
LAGOON FLAT CREST SLOPE	YES NO	YES NO	LOW MID HIGH	<5m 5-10m >10m

Timed swim (10 minutes)  See over page for survey methodology

ANIMALS	TALLY	TOTAL	ANIMALS	SIZE / SEX / TYPE	TALLY	TOTAL
Sea cucumber (all species) 			Coral trout (all species) 	<38cm >38cm		
Giant clam (larger than size of hand) 			Maori wrasse 	Male Female		
Anemonefish (all species) 			Turtle (all species) 	Green Turtle* Hawksbill Turtle* Other (please name)		
Butterflyfish (all species) 			* See images over page			
Grazing herbivores (See definition over page) 			Shark (all species) 	Whitetip reef shark Blacktip reef shark Other (please name)		
Cods and groupers (over 50cm in length) 			Crown-of-thorns starfish 	≤ Size of hand > Size of hand		

360° survey (One 5 metre radius circle) See over page for information guide and survey methodology

BENTHOS	PHOTOS TAKEN
Insert % for each benthos type to total 100%	(Please provide details e.g. image no./name, what it is, and a description)
Macroalgae 	RECENTLY DEAD CORAL 
Live coral 	CORAL ROCK (includes dead coral) 
Recently dead coral (white) 	CORAL RUBBLE 
Live 	SAND 
Coral rubble 	
Sand 	
Total 100%	

CORAL IMPACTS (Complete 1, 2 and 3 below. Circle Y or N)

1 Is any coral white? Y / N
 Is living coral tissue present? Y / N If yes: BLEACHING
 Is coral being eaten? Y / N If yes: PREDATION
 If yes, by what? How many seen?
 Crown-of-thorns starfish
 Juveniles (size of hand or smaller) _____
 Adults (larger than size of hand) _____
 Drupella snails (all sizes) _____
 Is coral banded in appearance? Y / N If yes: DISEASE
 Is coral competing with something else? Y / N If yes: COMPETITION

2 Is any coral broken or damaged? Y / N
 If yes: What is the likely main cause? (Circle one)
 Storm Animal Vessel Anchor Divers Snorkellers
 Unknown Other: _____

3 Is any rubbish present? Y / N
 If yes: Number of pieces in survey area:
 Fishing line _____ Plastic _____
 Netting _____ Rope _____
 Other (please specify) _____

IMPACT DETAILS (How much bleaching, predation, disease, damage? Other impacts?)
 OTHER THINGS OF INTEREST? (Mating, spawning, behaviour, etc.)

To submit your survey, go to www.gbrmpa.gov.au/eye-on-the-reef | Reply Paid PO Box 1379 Townsville QLD 4810 | Fax: (07) 4772 6093 | eyeonthereef@gbrmpa.gov.au

FACING PAGE:

RAPID MONITORING SURVEY SLATE

1. Observer and site information
2. Timed swim (10-minutes)
3. 360° survey
4. Coral impacts and ther things of interest

The image shows a screenshot of the 'Rapid Monitoring' survey form. It is divided into several sections: 'Observer and site information' (top), 'Timed swim (10 minutes)' (middle), '360° survey' (bottom left), and 'Coral impacts and ther things of interest' (bottom right). Arrows from the list on the left point to these corresponding sections in the form.

RAPID MONITORING SURVEY

The full Rapid Monitoring survey is made up of several components:

1. **Observer** and **Site** information.
2. **Timed Swim survey** to record the presence of target species observed in a 10-minute period.
3. **360° survey** to record the % cover of six benthic categories in a 5m radius survey area.
4. **Coral impacts** and **Other items of interest**.

Be a Marine Biologist for a Day program (BAMBFAD):

- Primary and Middle school students complete the 10-minute timed swim only.
- This introduces target species identification and how to record observations.
- If only doing the timed swim, skip ahead to **Part 2: 10-minute Timed Swim** in the flipbook.

PART ONE: Observer and site information.



Rapid Monitoring



Observer name: _____ Phone: _____ Date: _____
 Email: _____ Organisation: _____ Time: _____
 Vessel: _____ Observer category Reef visitor Marine tourism industry Fisher Traditional owner
 Number of visits to a reef: _____ Survey experience (approximate number of surveys completed): _____
 Other (please specify) _____

Reef ID (e.g. 16-023): _____ Reef name: _____ Site: _____
 Centre of survey: Lat: _____ S Long: _____ E Marine Park Zone: _____
 Tick one GPS type: Decimal Degrees (preferred) Degrees Decimal Mins Degrees Min Sec Water temperature: _____ °C
 Survey type (tick one): Snorkel Dive Viewing bucket Survey depth: _____ metres

Habitat type (circle one)	Flood plume (circle one)	Suspended algal bloom (circle one)	Tide at survey (circle one)	Visibility (circle one)
LAGOON FLAT CREST SLOPE	YES NO	YES NO	LOW MID HIGH	<5m 5-10m >10m

PART TWO: Timed swim (10-minutes)



Timed swim (10 minutes) See over page for survey methodology

ANIMALS	TALLY	TOTAL	ANIMALS	SIZE / SEX / TYPE	TALLY	TOTAL
Sea cucumber (all species)			Coral trout (all species)	<38cm >38cm		
Giant clam (larger than size of hand)			Maori wrasse	Male Female		
Anemonefish (all species)			Turtle (all species)	Green Turtle* Hawksbill Turtle* Other (please name)		
Butterflyfish (all species)			* See images over page			
Grazing herbivores (See definition over page)			Shark (all species)	Whitetip reef shark Blacktip reef shark Other (please name)		
Cods and groupers (over 50cm in length)			Crown-of-thorns starfish	≤ Size of hand > Size of hand		

FACING PAGE:

PART ONE: Observer and site information.

PART TWO: Timed swim (10-minutes)

Rapid Monitoring

Observer name: _____ Phone: _____ Date: _____
 Email: _____ Organisation: _____ Time: _____
 Vessel: _____ Observer category (tick one): Reef visitor Marine tourism industry Fisher Traditional owner
 Number of visits to a reef: _____ Survey experience (approximate number of surveys completed): _____
 Reef ID (e.g. 16-023): _____ Reef name: _____ Site: _____
 Centre of survey: Lat: _____ S Long: _____ E Marine Park Zone: _____
 Tick one GPS type: Decimal Degrees (preferred) Degrees Decimal Mins Degrees Min Sec Water temperature: _____ °C
 Survey type (tick one): Snorkel Dive Viewing bucket Survey depth: _____ metres
 Habitat type (circle one): LAGOON FLAT CREST SLOPE Flood plume (circle one): YES NO Suspended algal bloom (circle one): YES NO Tide at survey (circle one): LOW MID HIGH Visibility (circle one): <5m 5-10m >10m

Timed swim (10 minutes)

ANIMALS	TALLY	TOTAL	ANIMALS	SIZE / SEX / TYPE	TALLY	TOTAL
Sea cucumber (all species)			Coral trout (all species)	<38cm		
Giant clam (larger than size of hand)			Maori wrasse	>38cm		
Anemonefish (all species)			Turtle (all species)	Male		
Butterflyfish (all species)				Female		
Grazing herbivores (see definition on page)				Green Turtle*		
Cods and groupers (over 50cm in length)				Hawksbill Turtle*		
				Other (please name)		
				Whitip reef shark		
				Blacktip reef shark		
				Other (please name)		
				Shark (all species)		
				Crown-of-thorns starfish		
				≤ Size of hand		
				> Size of hand		

PART ONE: OBSERVER AND SITE INFORMATION

The first part to complete is the observer and site information. Fill out information about:

- Observer (yourself), organisation (if applicable) and your survey experience.
- The reef and site you are surveying, and the environmental conditions at the site.

PART TWO: TIMED SWIM (10-MINUTES)

- During the timed swim you will record the presence of target species by tallying how many you see in 10 minutes.

Are your students using the correct slate?

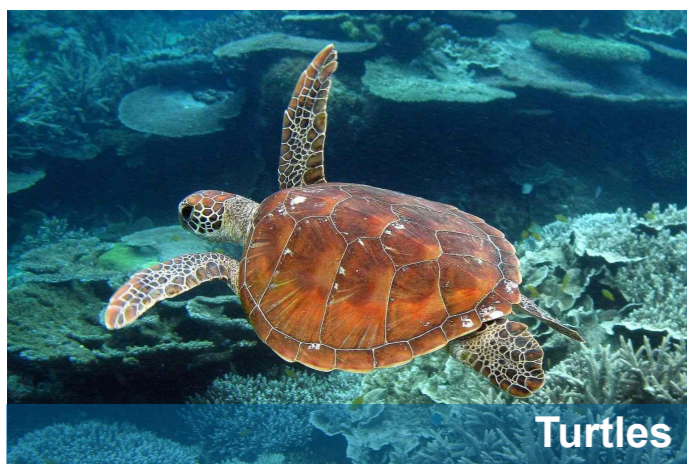
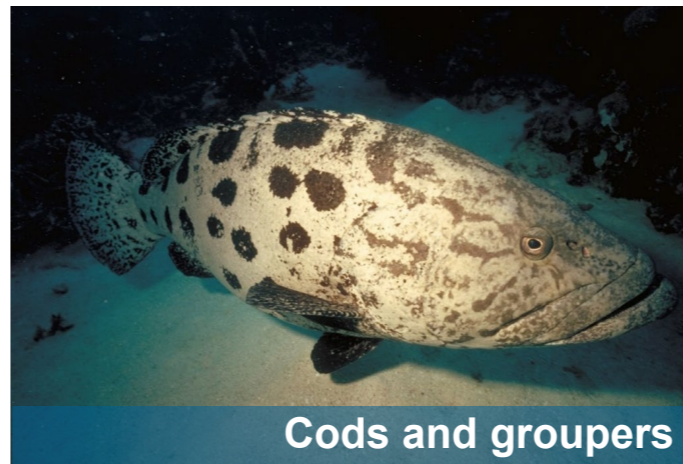
- Single species BAMBFAD slate for young primary students. Snorkel buddy pairs record one target species only. Class results are combined to capture all target species.
- Full BAMBFAD slate for older Primary & Middle school students. Snorkel buddy pairs record all target species.
- Rapid Monitoring survey slate for Senior students (15+ years). Snorkel buddy pairs record all target species and complete the 360° survey.

Support for Survey Completion:

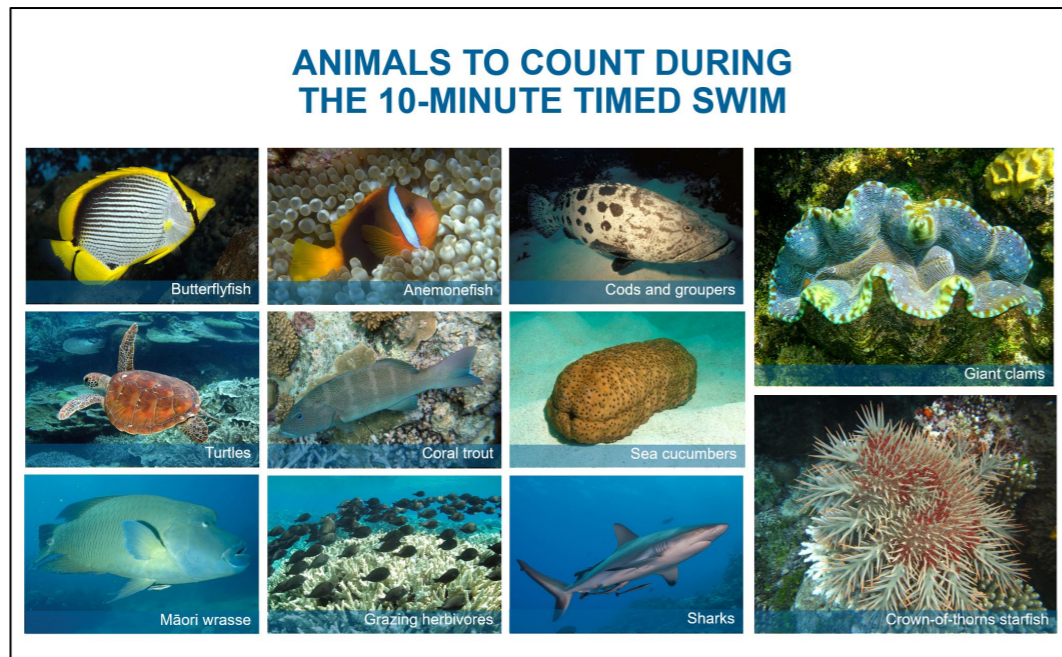
Assist students or guests by providing relevant information where needed. Use available resources to identify survey details, including:

- Great Barrier Reef Marine Park Zoning Map
- Eye on the Reef App
- Vessel skipper (for Reef ID, Reef name, and Marine Park Zone).

ANIMALS TO COUNT DURING THE 10-MINUTE TIMED SWIM



FACING PAGE:



Why do we only count these species?

- Reef health indicators
- Endangered status
- Contribute to reef health
- Iconic species
- Commercial value
- Popular with tourists

ANIMALS TO COUNT IN THE TIMED SWIM

These are the target species that we record during the 10-minute timed swim:

1. Butterflyfish
 2. Anemonefish
 3. Cods and groupers
 4. Giant clams
 5. Turtles
 6. Coral trout
 7. Sea cucumbers
 8. Māori wrasse
 9. Grazing herbivores
 10. Sharks
 11. Crown-of-thorns starfish
- You are unlikely to see all 11 target species during the timed swim.
 - You may only see a few of the target species.
 - Do not include animals seen after the timed swim in your count.

SEA CUCUMBERS

Soft cylindrical body.

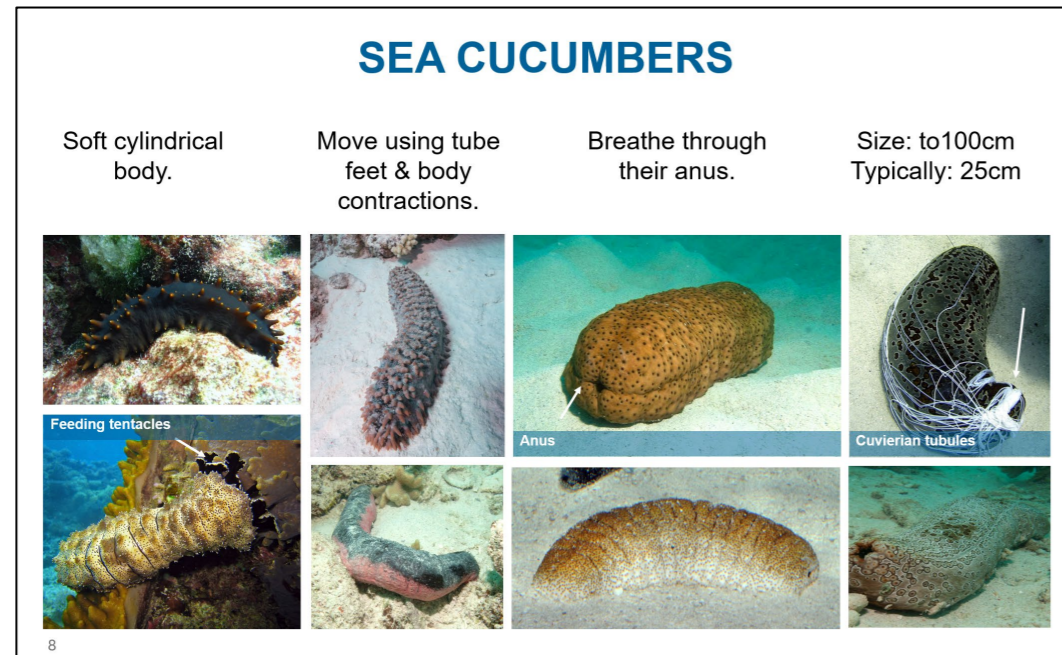
Move using tube feet & body contractions.

Breathe through their anus.

Size: to 100cm
Typically: 25cm



FACING PAGE:



Fun Facts:

- Sea cucumbers are related to sea stars and sea urchins. They are in the Phylum **Echinodermata**.
- They occupy an ecological niche like earthworms on land, helping to recycle nutrients.
- They breathe by drawing water in and out of their anus.
- For defence, they can eject sticky tubules and internal organs to deter predators.
- Some species are commercially harvested for food (called trepang or bêche-de-mer).

SEA CUCUMBERS

Why do we count them?

- Sea cucumbers act like the vacuum cleaners of the sea.
- They digest organic matter from sand, helping remove nutrients and keep the seabed clean.
- They don't migrate, so if they go missing, it tells us something is wrong.

Where to look:

- Usually found on the sandy seafloor.
- Sometimes on coral rock and coral crevices.
- Some burrow under the sand and are difficult to spot.
- Look for a cylindrical caterpillar-like animal.
- If there is little or no sand at your site, you might not see many.

Additional information:

- They come in a variety of colours and sizes.
- Some species can grow over 1 metre long, but most are around 50-60 cm in length.
- Record all that you see.

GIANT CLAMS

Maximum

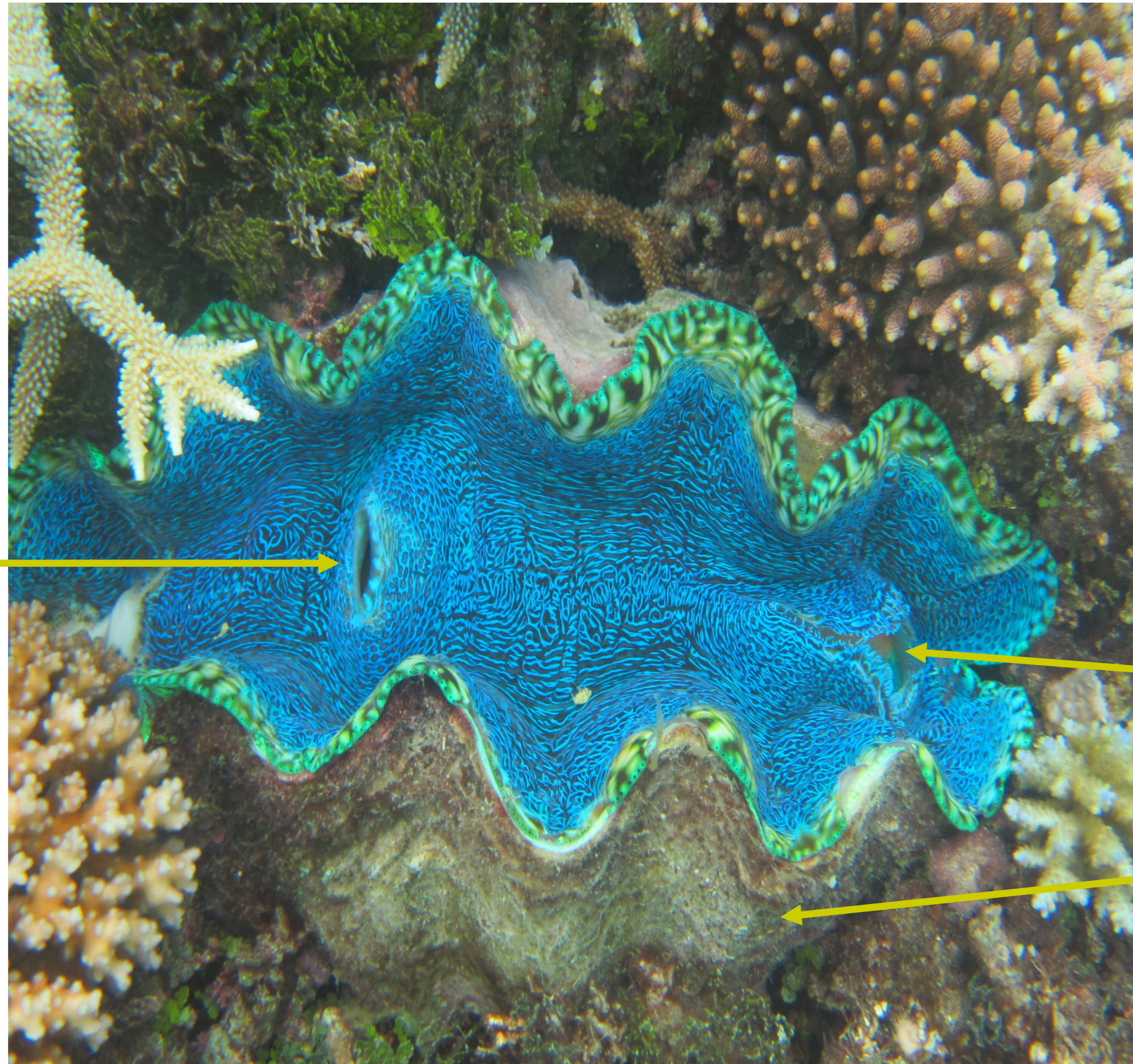
Size: 140cm

Weight: 250kg

Age: 70+ yrs

Exhalant
Siphon.

Record all
giant clams
larger than
your hand.



Do NOT count
burrowing clams.

Inhalant
siphon.

Shell is two
thick wavy
valves.


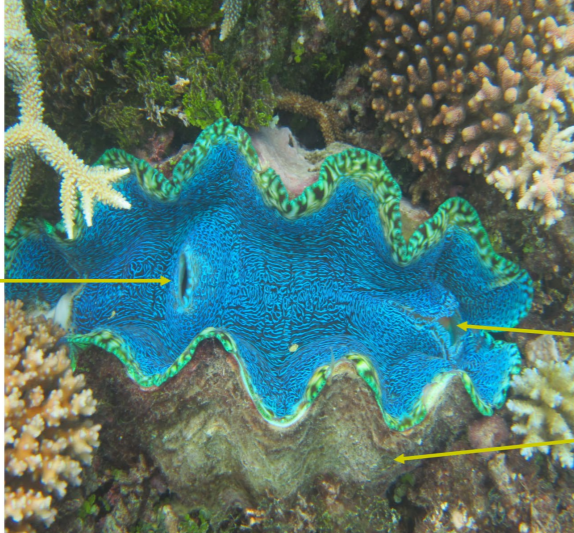
FACING PAGE:

GIANT CLAMS

Maximum
Size: 140cm
Weight: 250kg
Age: 70+ yrs

Exhalant Siphon.

Record all giant clams larger than your hand.



Do NOT count burrowing clams.

Inhalant siphon.

Shell is two thick wavy valves.

9

Fun Facts:

- Giant clams are molluscs, related to sea snails, octopus and squid. They are the World's largest species of bivalve (molluscs with two- shells).
- Most of their energy comes from symbiotic algae living in their tissues which produce nutrients via photosynthesis.
- They are also filter feeders, getting energy from filtering the water for food. They do this by drawing water in through an inhalant siphon and expelling it through an exhalant siphon.
- The colours and patterns in a clam's skin are produced by both symbiotic algae and light refraction in iridocyte cells.

GIANT CLAMS

Why do we count them?

- Giant clams are protected.
- They are iconic reef species.
- Giant Clams can bleach when stressed.
- Because they are long-lived and don't move, a decline in numbers may indicate reef health issues.

Where to look:

- Found on the seafloor to a depth of 20 metres.

Additional information:

- Reminder: only count giant clams larger than your hand.
- Don't count burrowing clams in coral or coral rock. These are much smaller than giant clams and only grow to around 20 cm.
- Empty clam shells can signal past stress events such as bleaching, flood plumes or extreme weather.

ANEMONEFISH



Clown anemonefish



Maroon anemonefish



Yellow-finned anemonefish



Clark's anemonefish



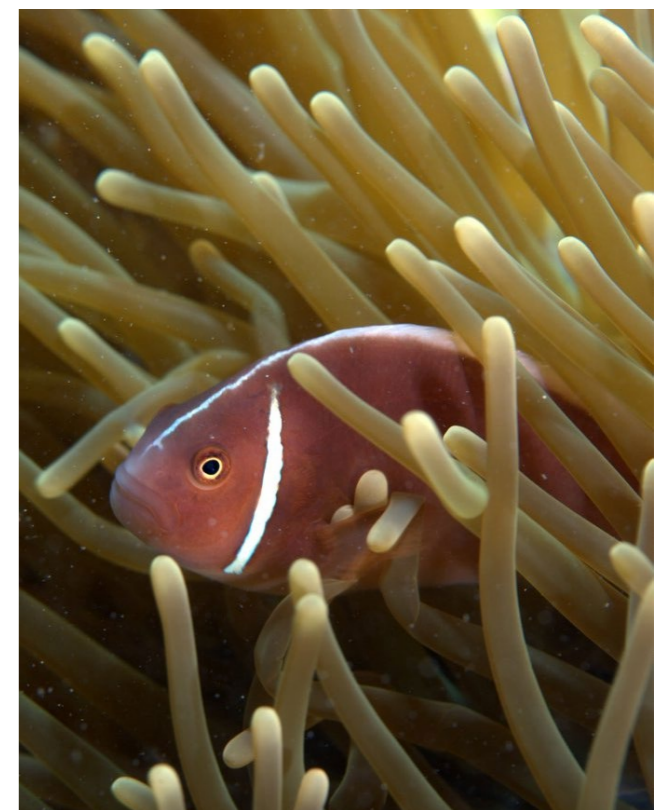
Red and black anemonefish



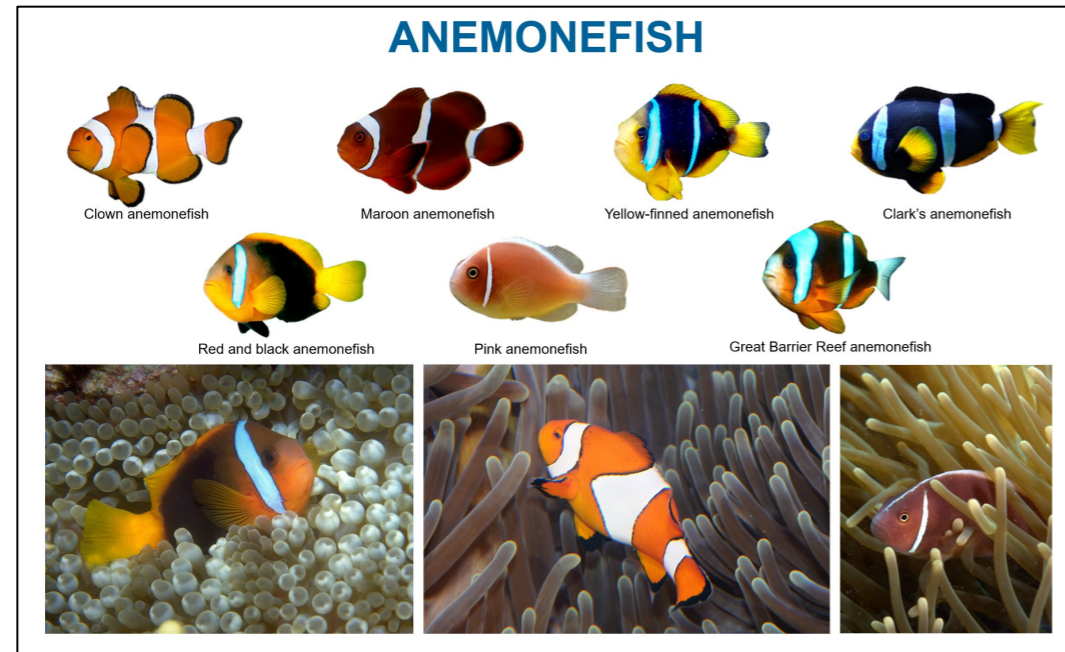
Pink anemonefish



Great Barrier Reef anemonefish



FACING PAGE:



Fun Facts:

- Anemonefish live in a symbiotic (mutually beneficial) relationship with anemones.
- The anemone provides protection with its stinging tentacles, and the anemonefish cleans, defends and provides food to the anemone.
- Each anemone hosts a family group of non-related anemonefish.
- The largest fish is the female, the second largest is the breeding male, all others are immature males.
- If the female dies, the dominant male changes gender to female (this can take up to a month).

ANEMONEFISH

Why do we count them?

- Anemonefish only live in sea anemones.
- They are an iconic reef fish (e.g. *Nemo* in the animated movie *Finding Nemo*).
- Anemones are long-lived and are susceptible to bleaching.
- If anemones go missing or die, anemonefish will have nowhere to live.
- Seeing anemonefish can be a sign that the reef is not heavily impacted by human activity or environmental stressors.

Where to look:

- Anemonefish are territorial, usually found within 1m of their host anemone, often hidden amongst the coral and coral rock.
- When threatened, anemonefish will hide in the anemone for protection.

Additional information:

- Remember to count the anemonefish (not the anemone).
- There are 7 species of anemone fish found on the Great Barrier Reef.
- Count all species that you see.

BUTTERFLYFISH

Usually in pairs, or small schools.

Size: < 30 cm



Blue-spot butterflyfish



Saddled butterflyfish



Redfin butterflyfish



Klein's butterflyfish



Long-nosed butterflyfish



Merten's butterflyfish



Golden-striped butterflyfish



Racoon butterflyfish



Schooling bannerfish



Black-backed butterflyfish

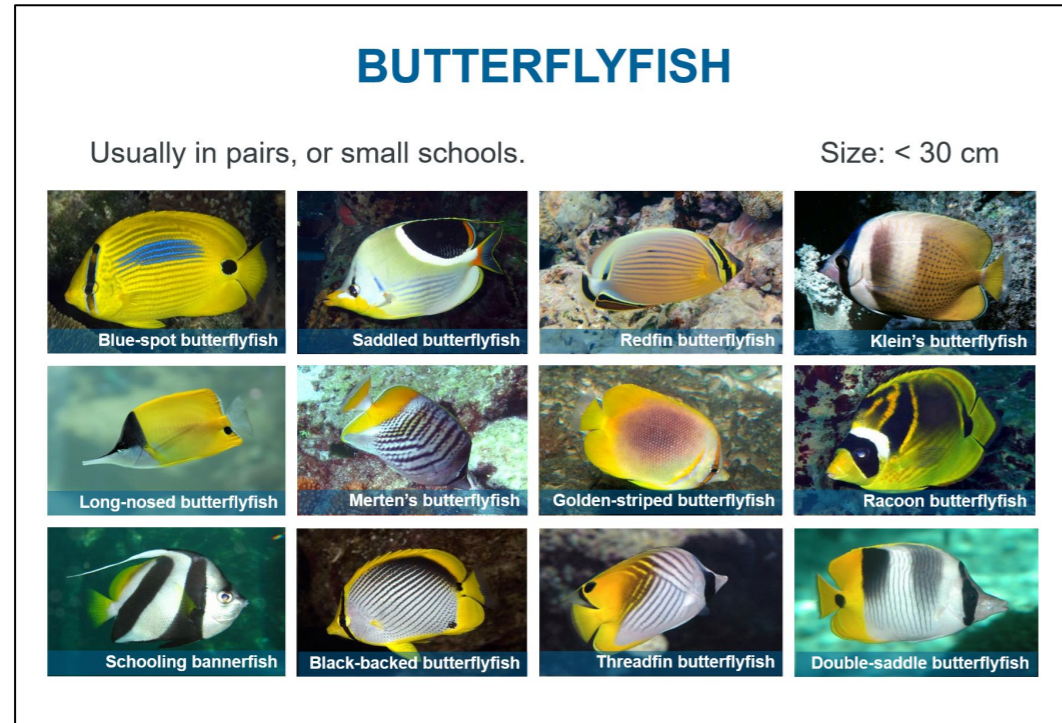


Threadfin butterflyfish



Double-saddle butterflyfish

FACING PAGE:



Fun Facts:

- Most species patrol a home range by the day.
- At night they sleep in reef crevices, and their colours fade to blend with the reef.
- Some species communicate using sounds such as tail slaps, fin flicks and jumps.
- Their swim bladder and lateral line help detect and amplify these sounds.
- Many butterflyfish form lifelong pairs.

BUTTERFLYFISH

Why do we count them?

- Most butterflyfish eat coral (corallivores).
- Over one-third are *obligate corallivores* (they rely on coral for food), with a diet >80% coral.
- A high abundance of butterflyfish can indicate a high abundance of coral.
- Some butterflyfish only eat certain species of coral.
- High butterflyfish diversity can indicate high coral diversity.

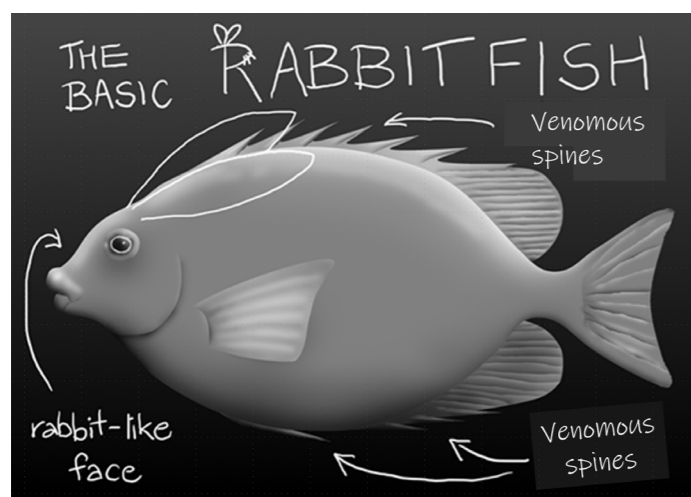
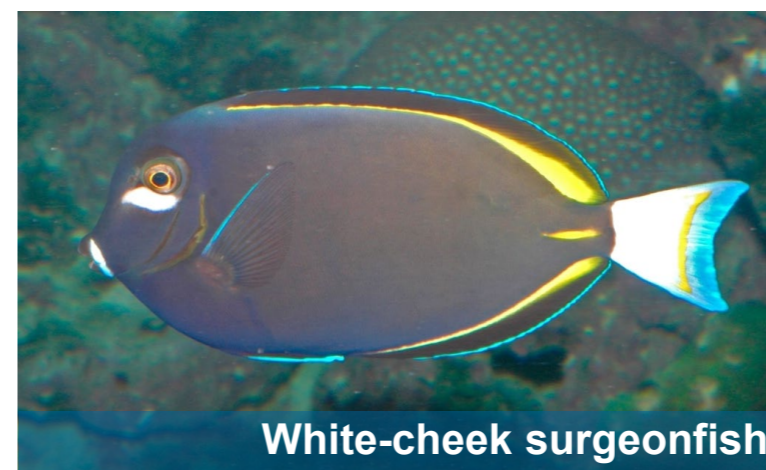
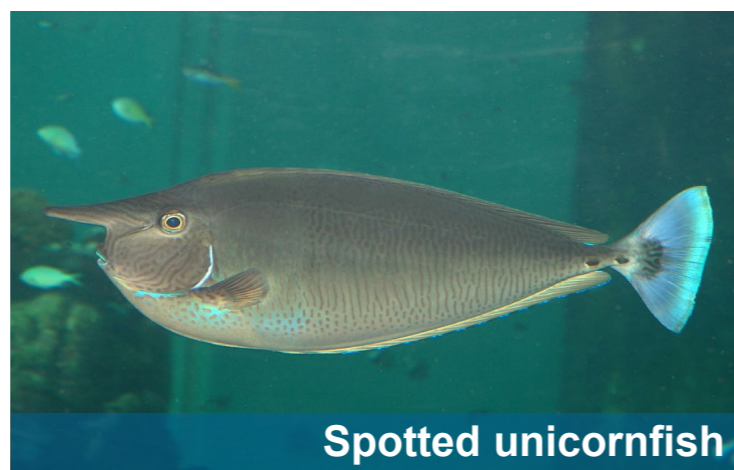
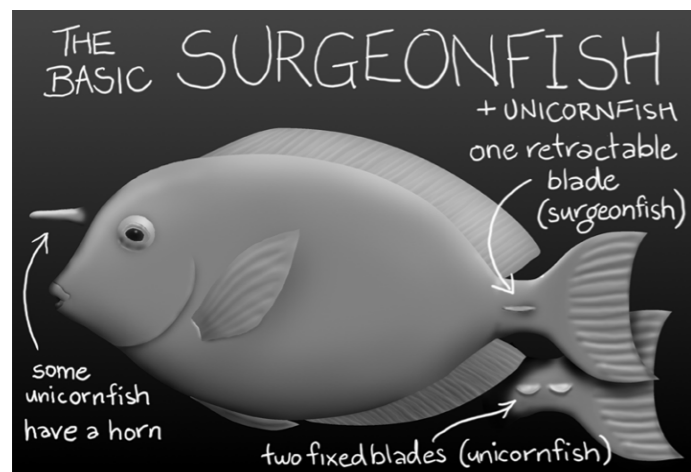
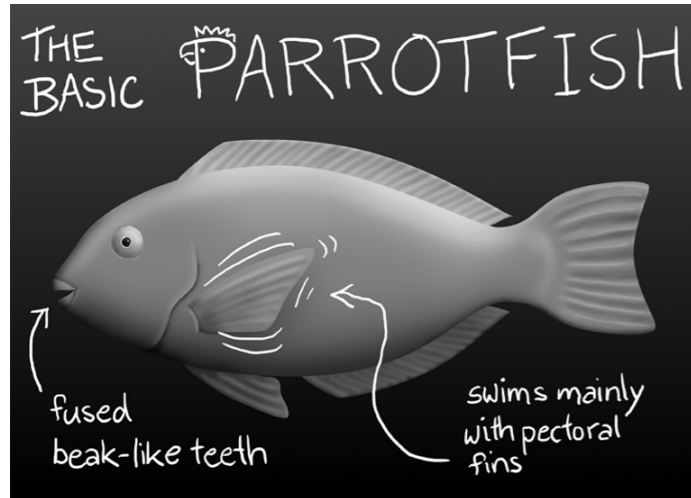
Where to look:

- Look for pairs or small groups, swimming close to or feeding on coral.

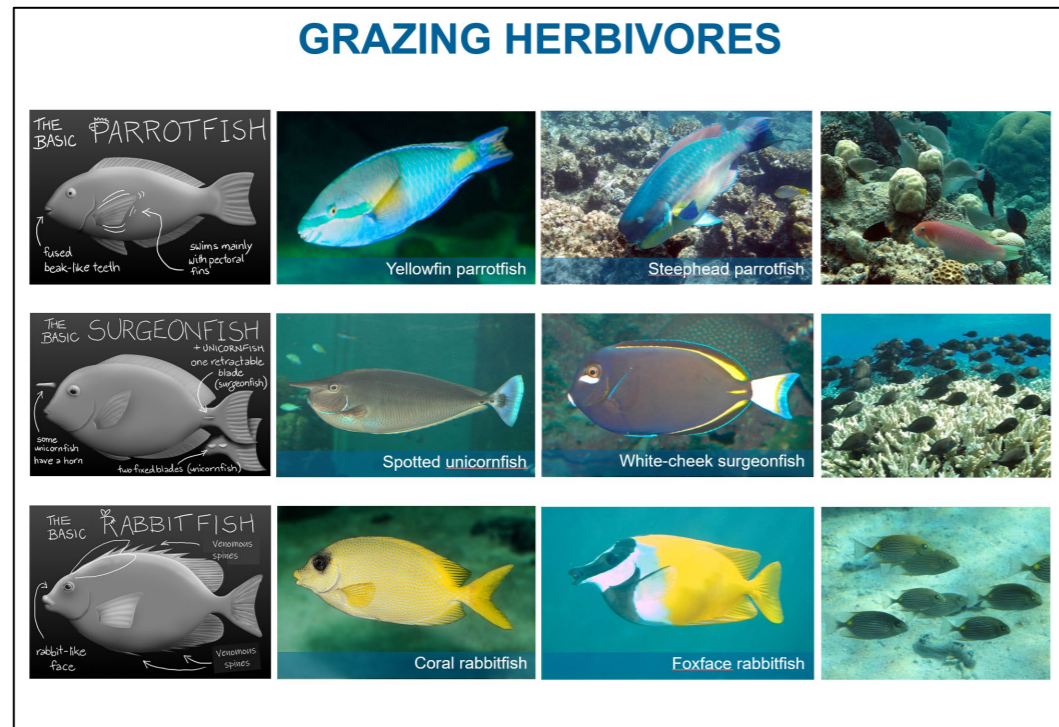
Additional information:

- They are easy to identify - flat disc-shaped bodies, a pointed nose and small mouth.
- Most are black, white and yellow with a variety of stripes and patterns.
- Often have a black stripe over the eye and/or a black spot near the tail.

GRAZING HERBIVORES



FACING PAGE:



Parrotfish swim by flapping their pectoral fins in a flying motion. Their teeth are fused into a parrot-like beak. The males are brightly coloured. They change gender from female-to-male, and they change colour during transition.

Surgeonfish have one or more pairs of scalpel-like blades at the base of their tail used for defence.

Rabbitfish are named for their downturned, rabbit-like mouth and use venomous fin spines for protection.

GRAZING HERBIVORES

Why do we count them?

- Grazing herbivores act like the Reef's lawnmowers by grazing on algae (and detritus), helping to keep it under control.
- They reduce algae-coral competition, such as algae overgrowth, to keep reefs healthy and resilient.
- By removing algae, they increase the availability of space and light for coral growth and recruitment.

Where to look:

- Look for schools of fish, often of similar size and appearance, moving slowly along the reef.
- Often seen face down, grazing, scraping and biting at algae growing on the coral rock.
- Species include Parrotfish (*Scarinae*), Rabbitfish (*Siganidae*) and Surgeonfish (*Acanthuridae*).

Additional information:

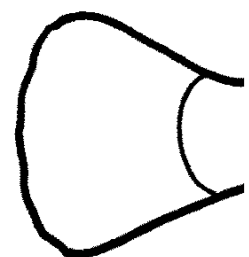
- Listen for the sounds of parrotfish beaks scraping on the rocks as they feed.

CODS AND GROUPEERS

Camouflage colours of black, brown, grey, tan and white.

Patterns of spots, blotches and irregular bars.

Size: up to 300 cm
Weight: up to 300 kg
Record all over 50cm



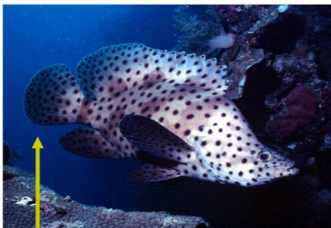



Most have a C-shaped tail.

Large upturned mouth with big lips, and multiple rows of small teeth.

Medium to large, torpedo-shaped body.

FACING PAGE:

CODS AND GROUPEERS

Camouflage colours of black, brown, grey, tan and white.	Patterns of spots, blotches and irregular bars.	Size: up to 300 cm Weight: up to 300 kg Record all over 50cm
		
 Most have a C-shaped tail.	Large upturned mouth with big lips, and multiple rows of small teeth.	Medium to large, torpedo-shaped body.

13

Fun Facts:

- The Queensland grouper is the largest bony fish on the Great Barrier Reef.
- Protected species include Potato cod, Barramundi cod and the Queensland grouper.
- ALL cod and grouper over 100cm are protected.
- Most are territorial and solitary, except when they gather for spawning aggregations.
- They start life as a female and change gender to male.

CODS AND GROUPEERS

Why do we count them?

- They are protected species.
- Slow growing and long lived.
- Important predators that help maintain balanced food webs.

Where to look:

- This group includes barramundi cod, potato cod and the Queensland grouper.
- They are often solitary and territorial.
- Look for them resting on the bottom or hiding under ledges or large plate corals.

Additional information:

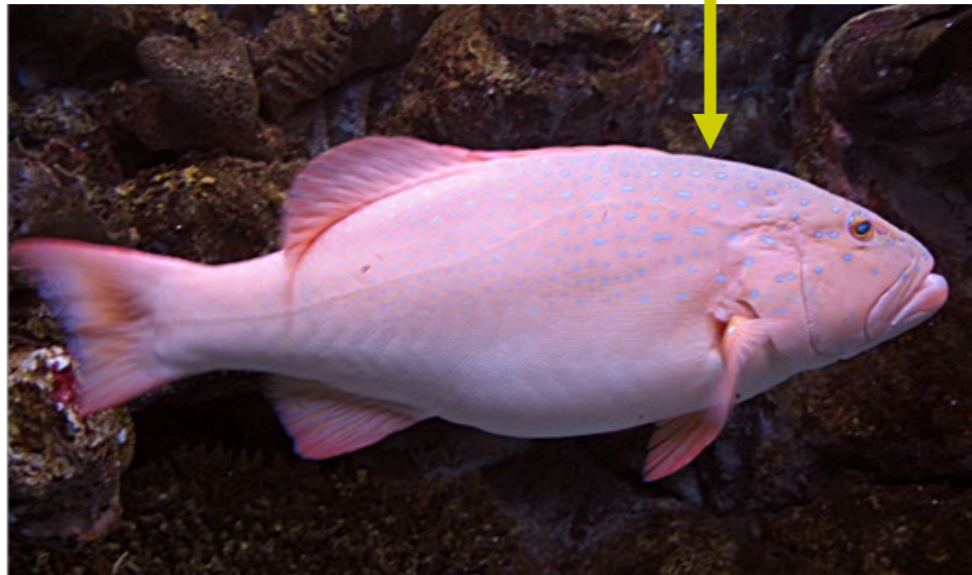
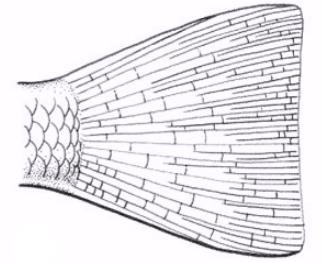
- Reminder only record cod and grouper >50 cm.
- Many are ambush predators, their colours help them to blend in with their surroundings as they wait for prey to come by.
- Some are residents on a particular reef for a long time, sometimes for over 20 years.

CORAL TROUT

Colours: blue, brown, red, pink, black and white.

Body covered in small blue spots.

Straight tail

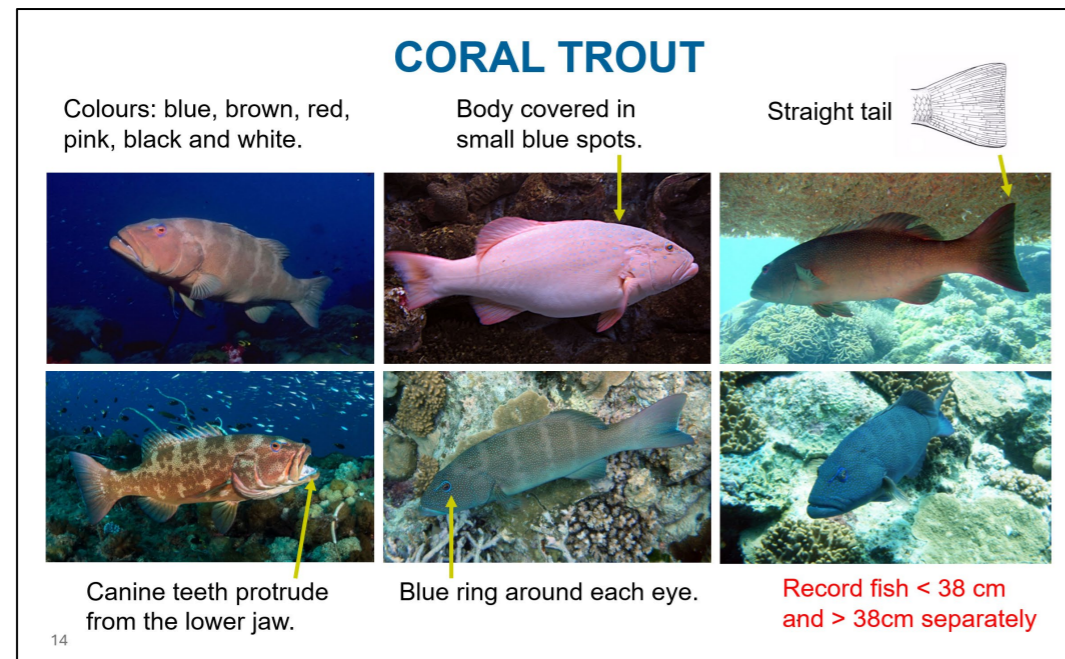


Canine teeth protrude from the lower jaw.

Blue ring around each eye.

Record fish < 38 cm and > 38cm separately

FACING PAGE:



Fun Facts:

- Coral trout are usually solitary and territorial.
- They change gender from female to male around 42 cm.
- Adults are fish-eating predators (piscivores).
- They hunt by ambushing prey or slowly stalking before a fast attack.
- Coral trout have been observed hunting cooperatively with moray eels.
- Tail shape helps with identification:
 - ✓ Coral trout: straight or T-shaped tail
 - X Coral cod: C-shaped tail

CORAL TROUT

Why do we count them?

- They are targeted by recreational and commercial fishers.
- We record different sizes to calculate sustainable catch limits from accurate estimates of population size.
- Size < 38cm = under legal catch size.
- Size > 38cm = minimum legal catch size.
- Record fish less than 38 cm and more than 38 cm separately.

Where to look:

- Look for them hiding under ledges or amongst the coral crevices.

Additional information:

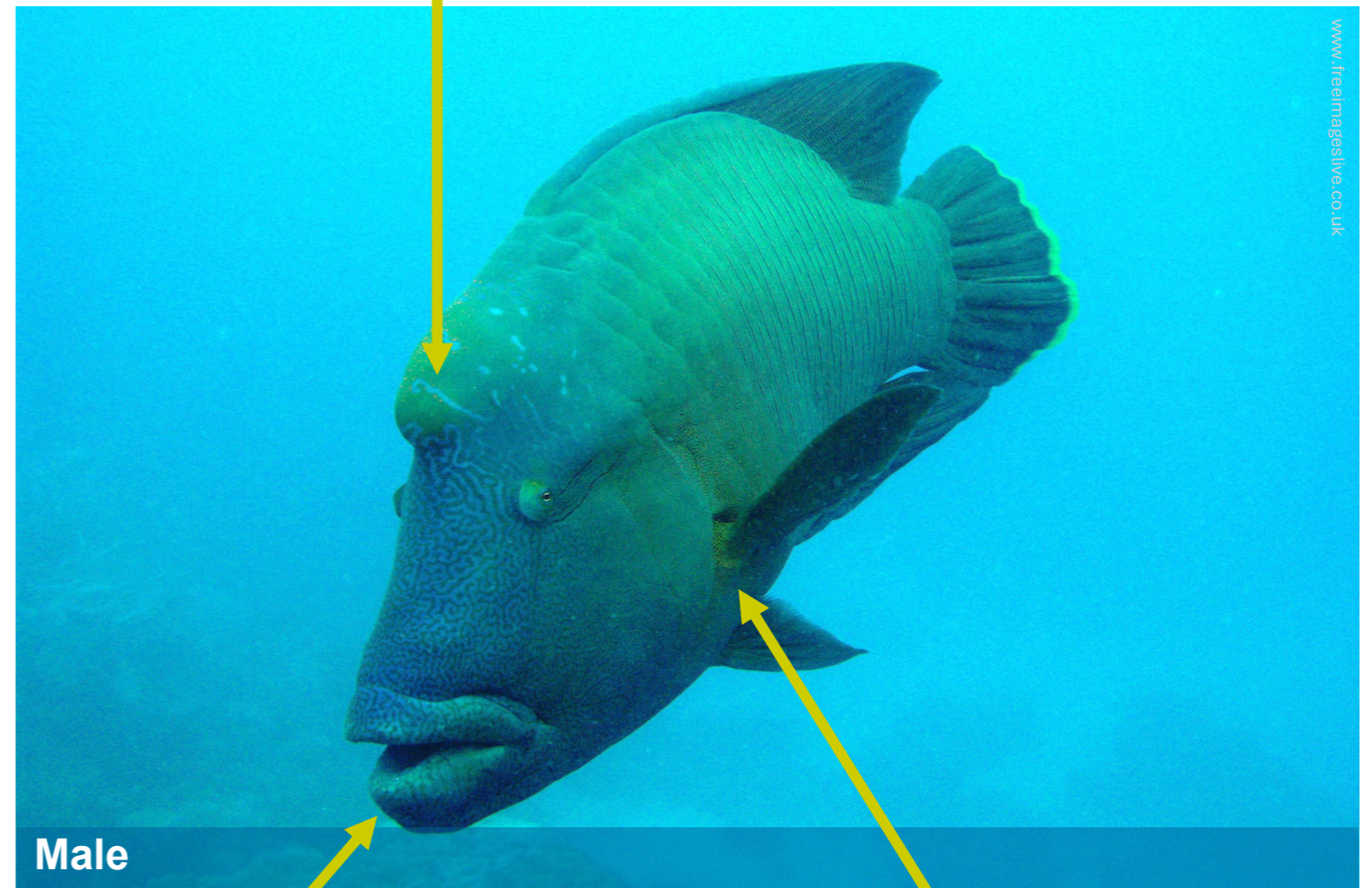
The name “Coral trout” includes different species:

- Common coral trout (*Plectropomus leopardus*).
- Blue-spot trout (*Plectropomus leavis*).
- Footballer trout (*Plectropomus leavis*) are an initial colour morph of the blue-spot trout.
- Bar-cheeked trout (*Plectropomus maculatus*).
- Passionfruit trout (*Plectropomus areolatus*).

MĀORI WRASSE

C-shaped tail

Males have a large hump on head.

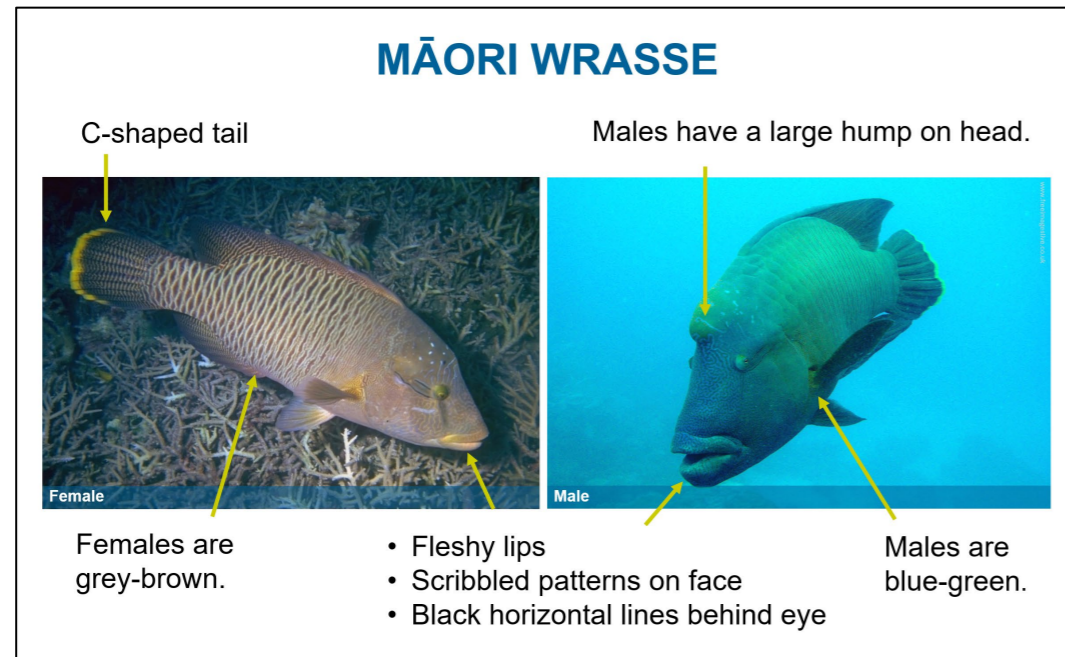


Females are grey-brown.

- Fleshy lips
- Scribbled patterns on face
- Black horizontal lines behind eye

Males are blue-green.

FACING PAGE:



Fun Facts:

- Named for the intricate markings on their face, reminiscent of the facial tattoos of the New Zealand Māori.
- Start life as female and change gender to male at 9 -15 years. During transition they change colour and develop a hump on their head.
- They are one of the largest fish on the reef growing to 2.3m and 190kg.
- Have a second set of jaws in their throat to help crush the hard shells of their prey.
- Diet includes snails, sea urchins, sea stars, brittle stars and crustaceans.

MĀORI WRASSE

Why do we count them?

- Māori wrasse are listed as Endangered.
- Once overfished, they are now protected on the Reef.
- They are iconic and popular with tourists.
- They help corals by feeding on Crown-of-thorns starfish.
- Recording males and females separately can be used as an indicator of recruitment.

Where to look:

- Look for them around the edges of reefs.
- Males are blue-green in colour with a large hump on the head.
- Females are grey-brown in colour, with no hump.

Additional information:

- They are also known as humphead wrasse and Napolean wrasse.
- They are territorial and can be found on the same reef for decades.
- Some are friendly and may approach you, but please do not touch.

SEA TURTLES

6 of the World's 7 species of sea turtles are found on the Great Barrier Reef.



Hawksbill



Green



Loggerhead



Leatherback

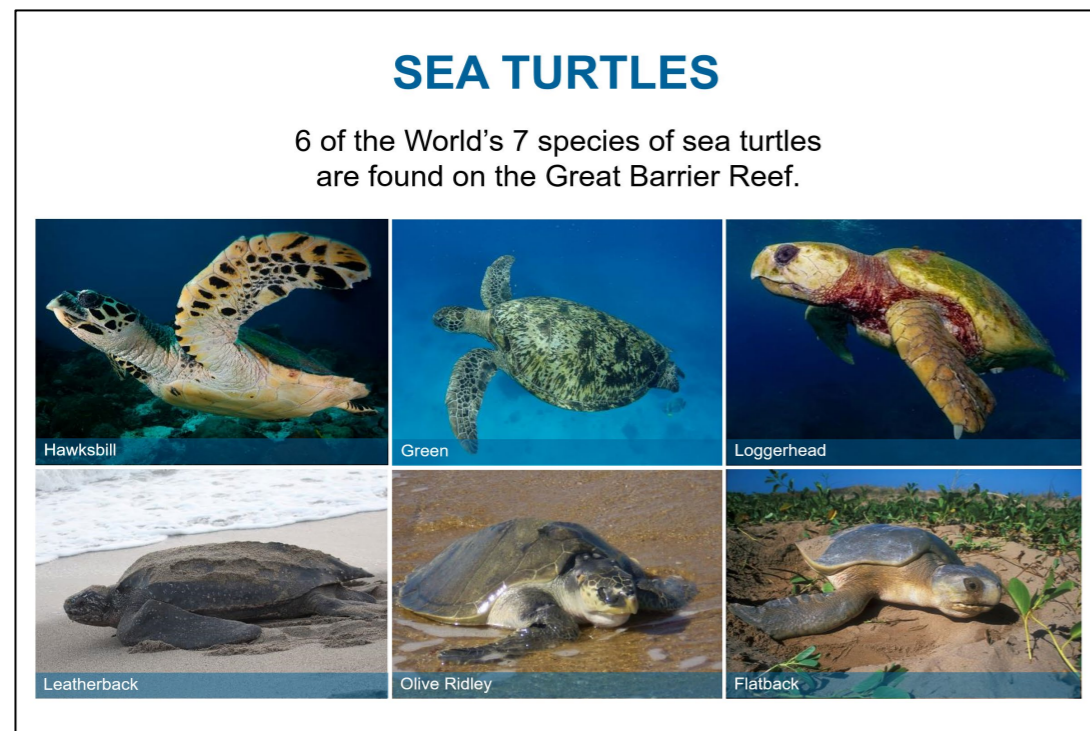


Olive Ridley



Flatback

FACING PAGE:



Fun Facts:

- Sea turtles are air-breathing reptiles, they have lungs like humans and must surface to breathe.
- They can sleep underwater for hours on one breath.
- Most species reach maturity between 20 - 50 years of age and may live up to 100 years.
- Females lay eggs in nests above the high-tide mark.
- Nest temperature is crucial for determining the sex ratio of turtle hatchlings, e.g. Green sea turtles in the southern Great Barrier Reef have a pivotal temperature of 28.1°C. Nests warmer than this produce mostly females, nests cooler than this produce mostly males.

SEA TURTLES

Why do we count them?

- All sea turtle species are protected in Australia.
- Their numbers have declined due to climate change, marine debris, hunting and habitat loss.
- They are threatened species and iconic.

Where to look:

- Look for them moving between the surface, where they breathe, and the reef substrate where they rest and feed.

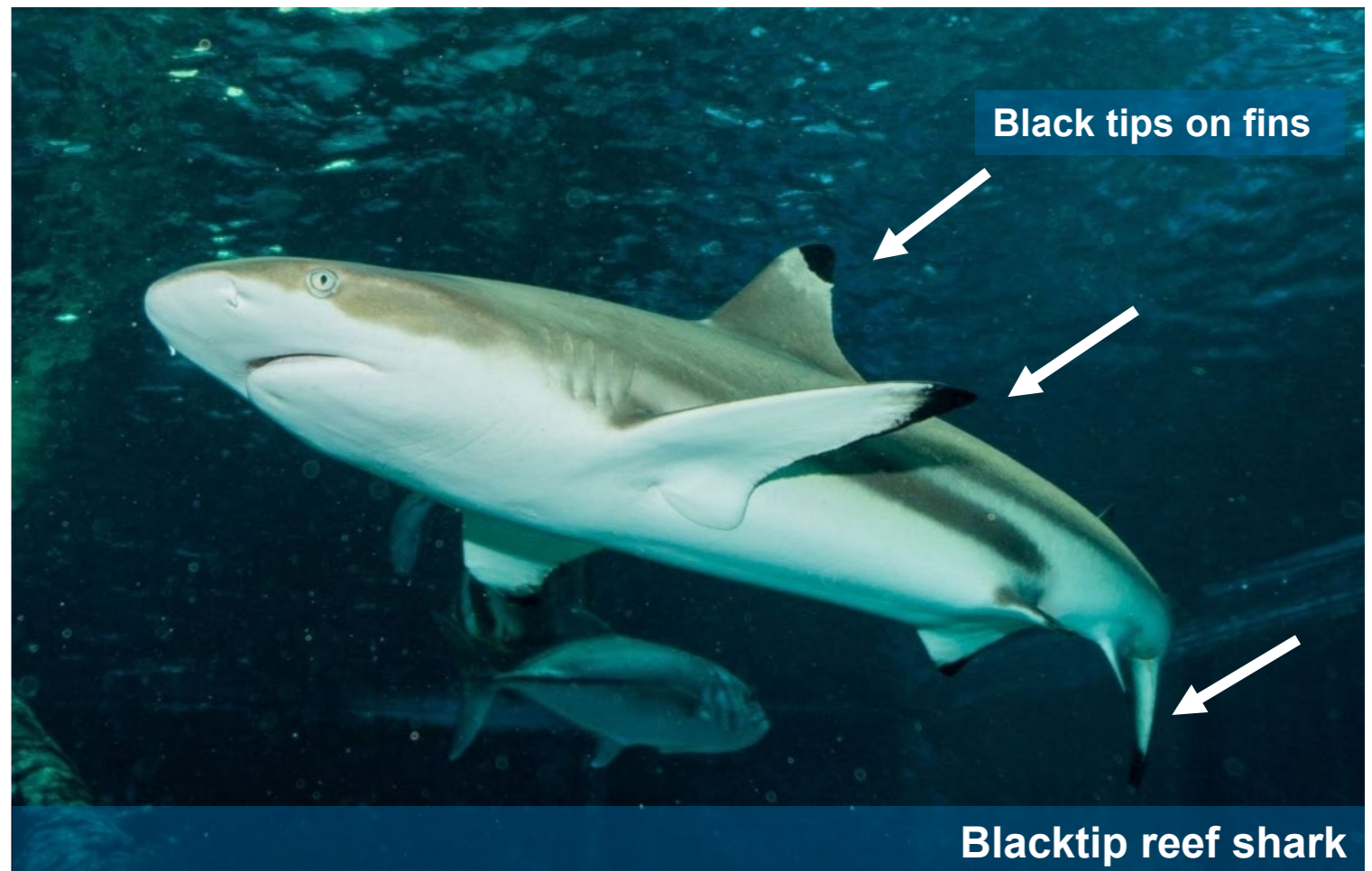
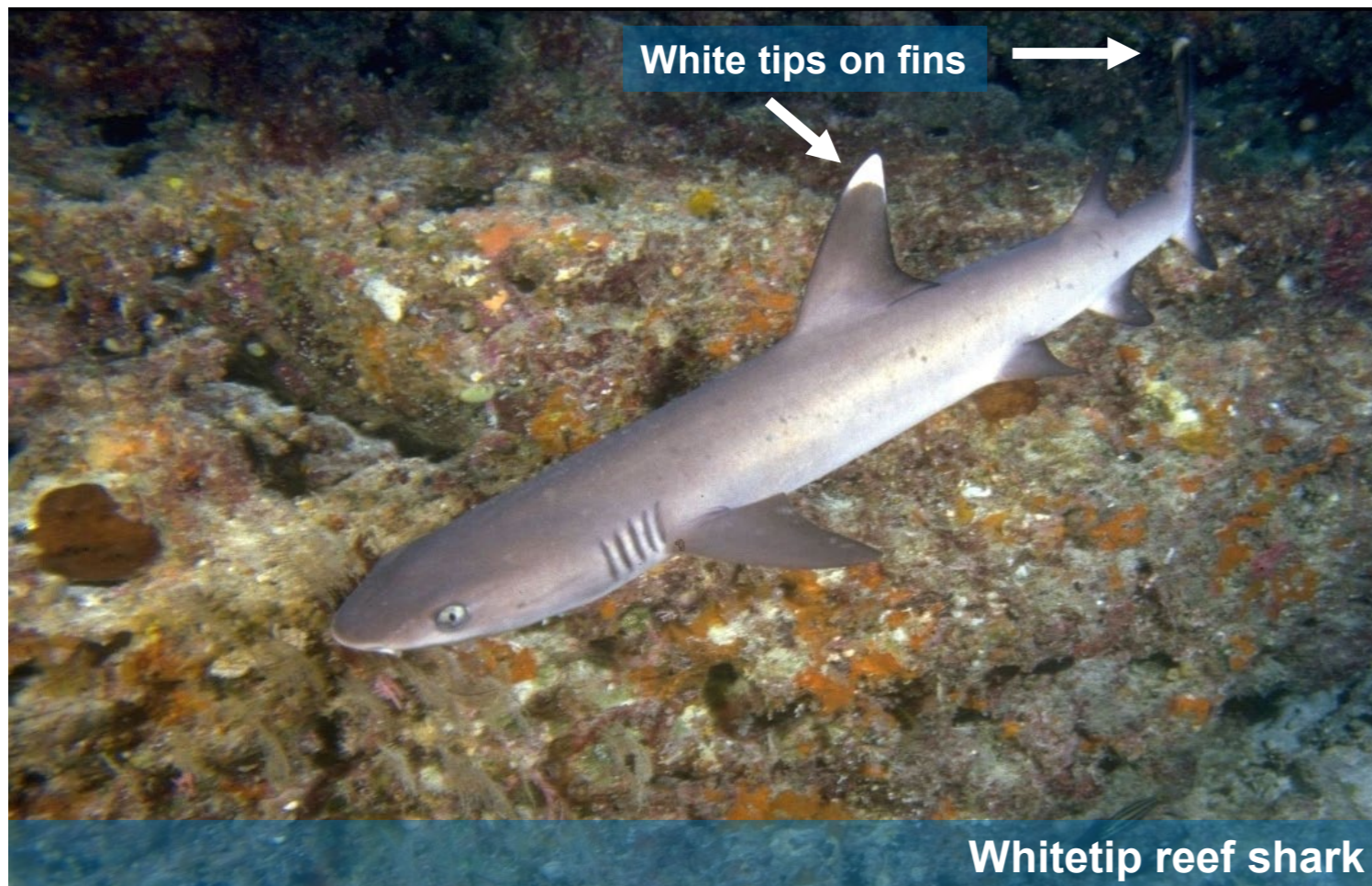
Additional information:

- The 6 species of sea turtles found on the Reef are: Hawksbill, Green, Loggerhead, Leatherback, Olive-Ridley and Flatback.
- The 7th species is the Kemp's Ridley turtle that is found in the Gulf of Mexico and the Northern Atlantic Ocean.
- Flatback turtles are Aussies. They only nest on the Australian beaches.
- Record all sea turtles that you see.
- Record Green and Hawksbill turtles separately.

SHARKS

Record blacktip reef sharks and whitetip reef sharks separately.

Record all sharks that you see.

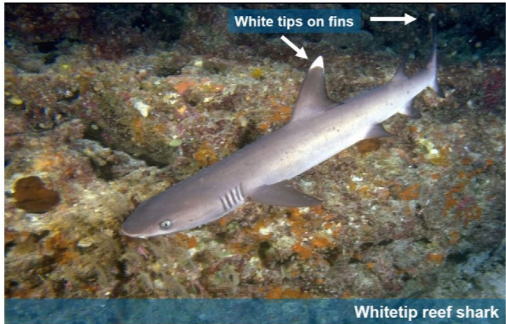


FACING PAGE:

SHARKS

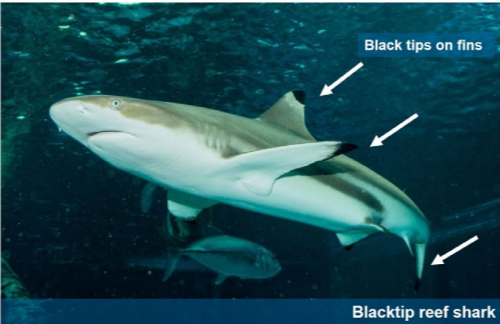
Record blacktip reef sharks and whitetip reef sharks separately.

Record all sharks that you see.



White tips on fins

Whitetip reef shark



Black tips on fins

Blacktip reef shark

17

Fun Facts:

- Sharks on the Reef range in size from the small 1m long epaulette sharks to 20 m whale sharks.
- Some pelagic species (e.g. blacktip reef sharks) must keep swimming to breathe. If they stop swimming, they will drown.
- Bottom-dwelling sharks (e.g. leopard sharks) use spiracles behind their eyes to pump water over their gills, allowing them to rest on the seafloor.
- Sharks have multiple rows of teeth, which are continually replaced when lost.

SHARKS

Why do we count them?

- Sharks are apex predators at the top of the food web.
- They are a keystone species that help regulate prey numbers and maintain ecological balance.
- Without sharks, food webs quickly become unbalanced.
- Many shark species are endangered.
- Sharks are iconic species and important to tourism.

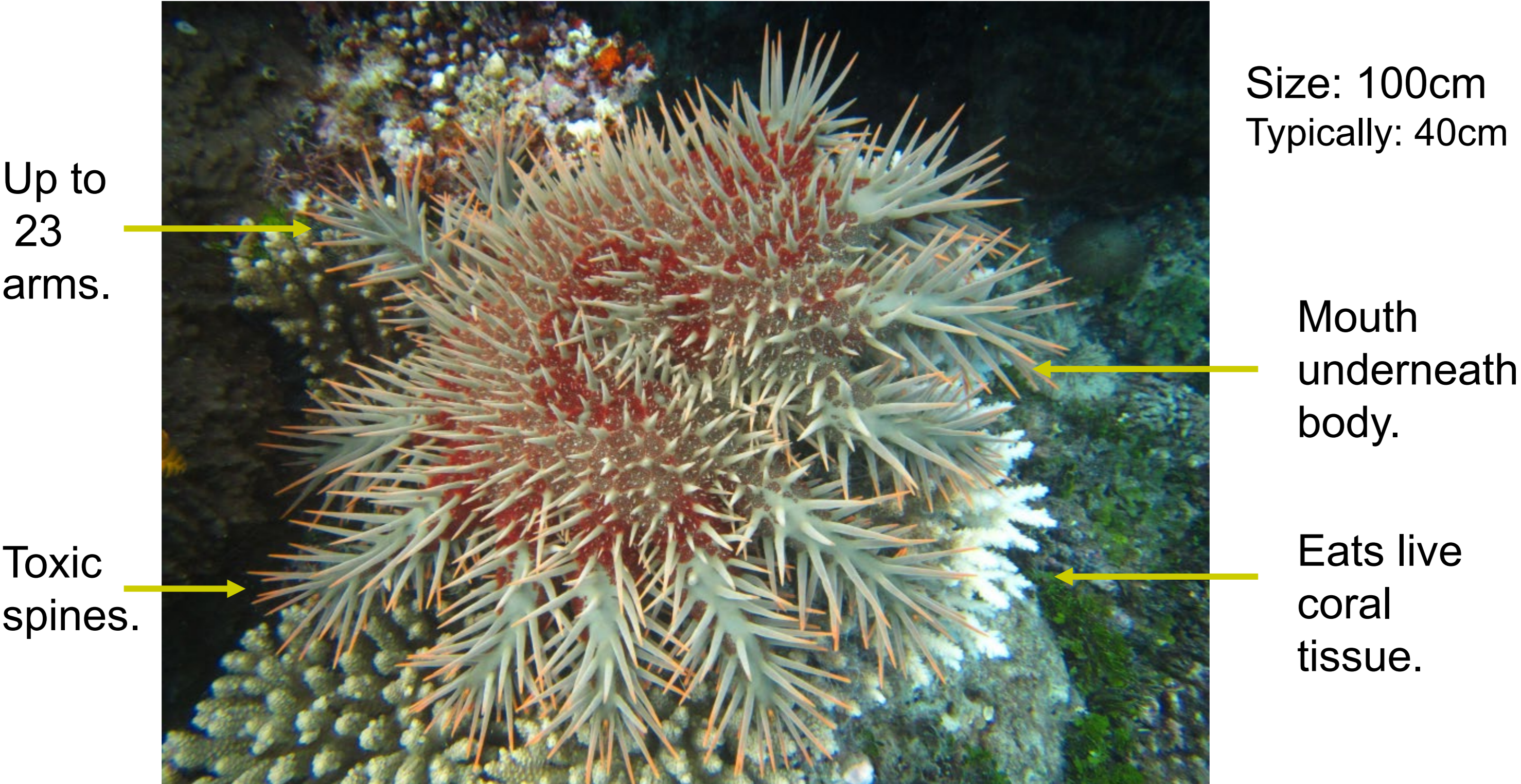
Where to look:

- Whitetip reef sharks may rest on the seafloor during the day.
- Blacktip reef sharks are usually seen swimming.

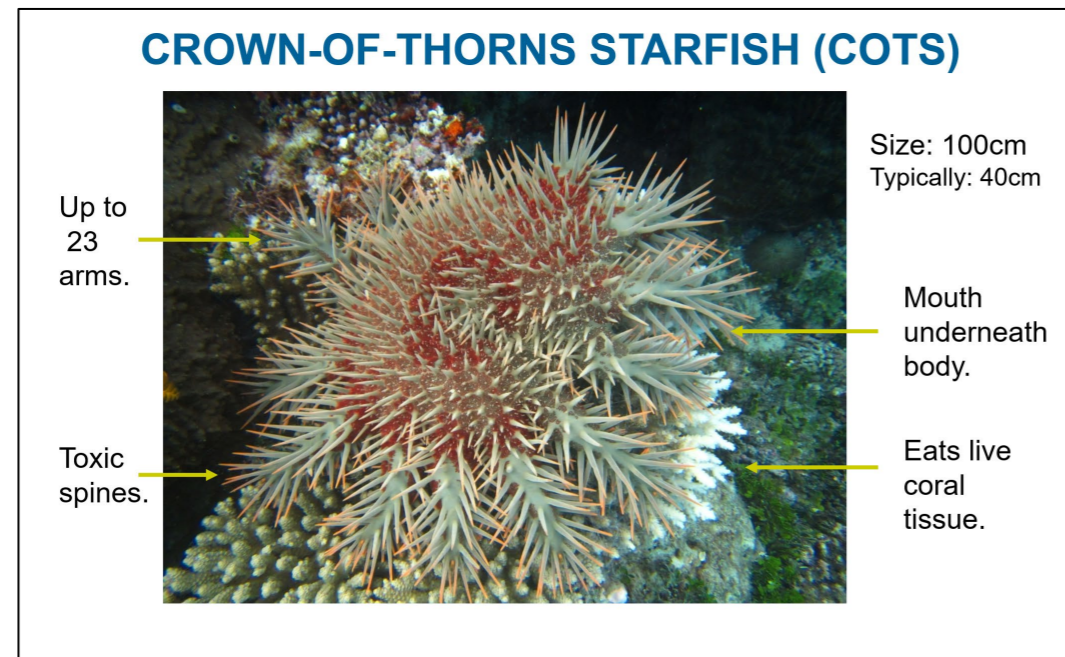
Additional information:

- Record all sharks that you see. But record blacktip reef sharks and whitetip reef sharks separately.

CROWN-OF-THORNS STARFISH (COTS)



FACING PAGE:



Fun Facts:

- COTS eat live coral, preferring branching and plate corals, but will eat most types when hungry.
- They push their stomach out through their mouth to digest coral tissue and can consume an area about their own size each day.
- COTS outbreaks have been a major cause of coral decline on the Reef over the past 40 years.
- A dedicated COTS control program operates on the Great Barrier Reef.

CROWN-OF-THORNS STARFISH (COTS)

Why do we count them?

- COTS are natural predators of coral.
- During outbreaks they can eat coral faster than it can grow.
- All COTS sightings are recorded to monitor outbreaks.

Where to look:

- COTS often hide underneath coral during the day.
- If you see large white patches on coral, look around as a COTS may be close by.
- During an outbreak they may be seen feeding on top of coral during the day.



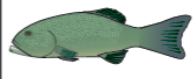
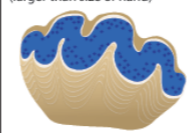


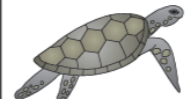
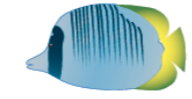




Additional information:

- Count adults and juveniles separately.
- Juveniles are smaller than your hand.
- Seeing several adults may indicate a COTS outbreak is occurring at that site.
- Seeing several juveniles may indicate that an outbreak is about to occur.

Part 2: CONDUCTING THE TIMED SWIM

Set a timer for 10 minutes and snorkel slowly in one direction.

- Tally animals as you see them.
- Estimate numbers in large schools.
- If unsure, ask or take a photo.
- Avoid scaring animals:
 - ✓ Move slowly and quietly
 - ✓ Avoid splashing
 - ✓ Use hand signals
- Only record what you see in the 10-minutes.
- Do not touch animals.

Timed swim (10 minutes) 			See below for survey methodology			
ANIMALS	TALLY	TOTAL	ANIMALS	SIZE	TALLY	TOTAL
Sea cucumber (all species) 	IIII IIII	8	Coral trout (all species) 	<38cm	II	2
				>38cm		
Giant clam (larger than size of hand) 	III	3	Maori wrasse 	SIZE	TALLY	TOTAL
				Male		
				Female	I	1
Anemonefish (all species) 	IIII	5	Turtle (all species) * See images below 	SIZE	TALLY	TOTAL
				Green Turtle*		
				Hawksbill Turtle*		0
				Other (please name)		
Butterflyfish (all species) 	III + 5	18	Shark (all species) 	SIZE	TALLY	TOTAL
	10			Whitetip reef shark	I	1
				Blacktip reef shark		
				Other (please name)		
Grazing herbivores See definition below 	30+5	47				
	+10 II					
Cods and groupers (over 50cm in length) 	I	1	Crown-of-thorns starfish 	SIZE	TALLY	TOTAL
				Juvenile		
				Adult		0

FACING PAGE:

CONDUCTING THE TIMED SWIM

Set a timer for 10 minutes and snorkel slowly in one direction.

- Tally animals as you see them.
- Estimate numbers in large schools.
- If unsure, ask or take a photo.
- Avoid scaring animals:
 - ✓ Move slowly and quietly
 - ✓ Avoid splashing
 - ✓ Use hand signals
- Only record what you see during the 10-minutes.
- Do not touch animals.

ANIMALS	TALLY	TOTAL	ANIMALS	TALLY	TOTAL
Sea urchin	III III	8	Green Reef Shark	II	2
Spot-tail Noddy	III	3	Blue		
Acropora	III	5	Male		
Butterflyfish	III + 5	18	Female	I	1
Grouping herbivores	30 + 5	47	Green Turtle*		0
Catfish and groupers	+ 10 II		Blacktail Turtle*		
			Other (please name)		
			Shark (if seen)		
			Whitetail reef shark	I	1
			Blacktip reef shark		
			Other (please name)		
			Green of Green of Green		
			Female		
			Adult		0

Additional information:

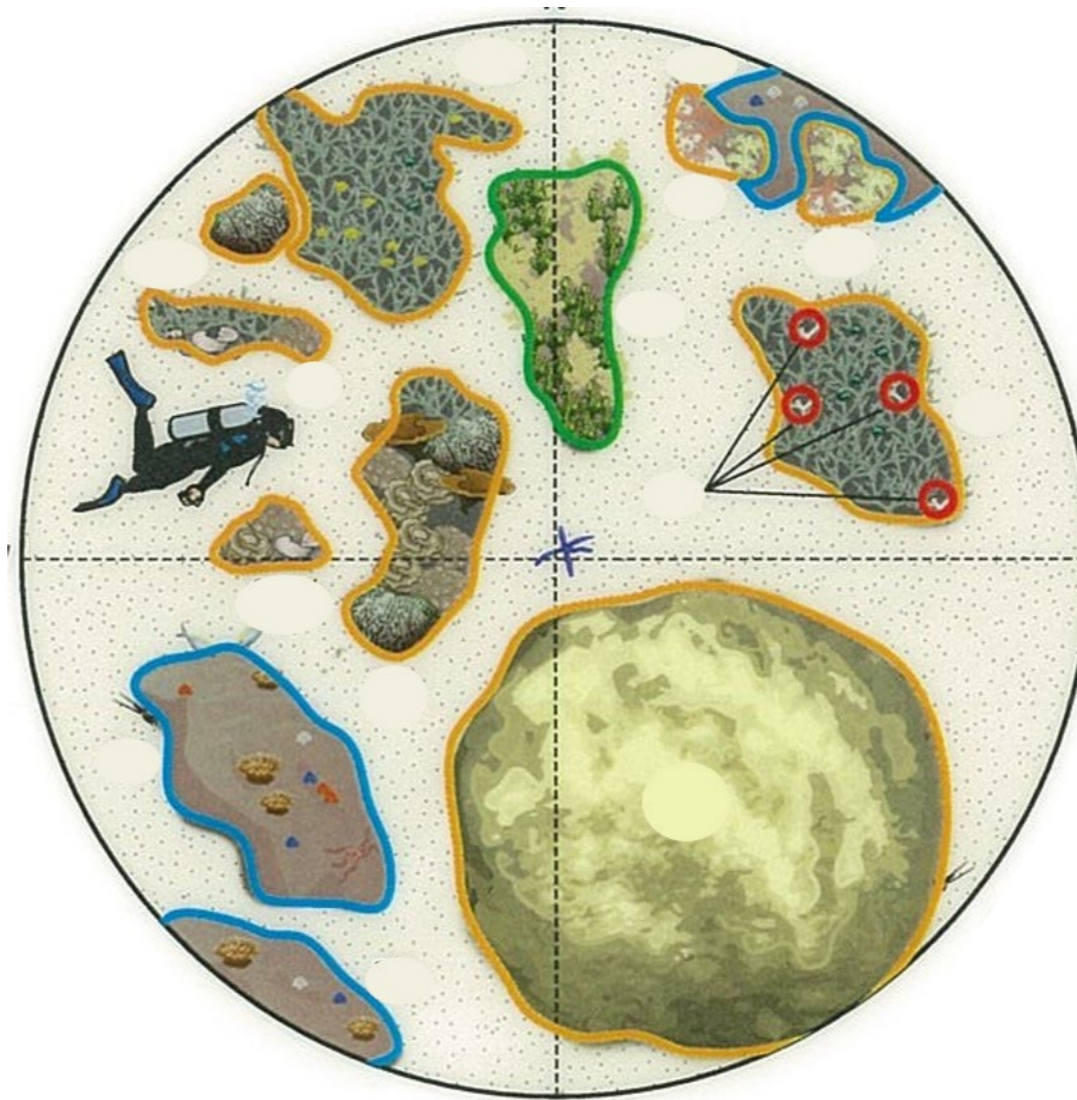
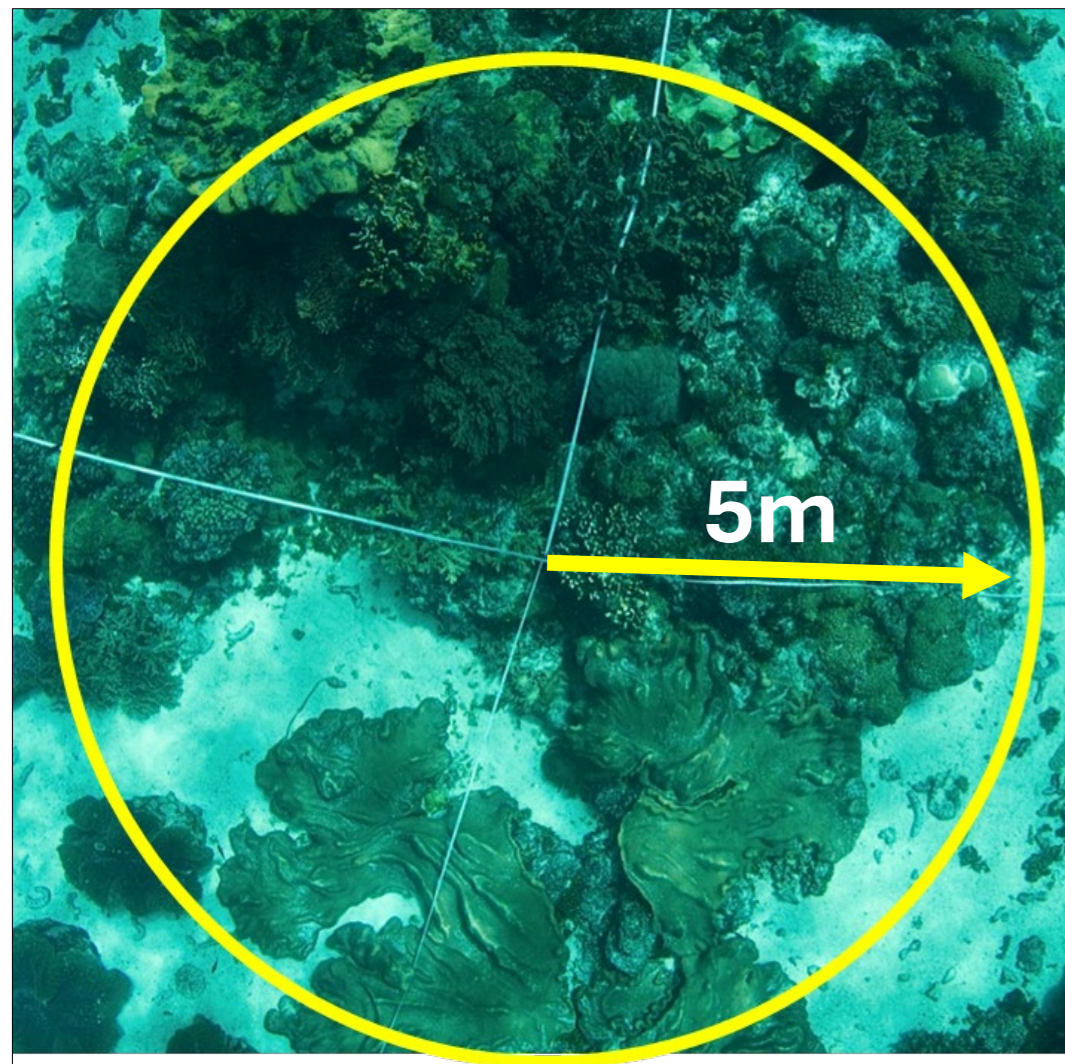
- Complete safety, buddy, and equipment checks before entering the water.
- Some groups may only do the timed swim component.
- Next is the **360° Survey** recommended for ages 15+.

CONDUCTING THE TIMED SWIM (10-MINUTES)

- Ask someone to start timing the 10 minutes.
- Swim slowly in one direction – no backtracking.
- Stay in one habitat: reef flat, lagoon, crest, slope.
- Look up occasionally so you know where you are.
- Use a tally system to record what you see.
 - e.g. 4 vertical lines + 1 diagonal line = 5.
- Estimate numbers for large schools of fish.
- Record numbers as accurately as possible.
- If unsure - ask, take a photo or don't record.
- Move quietly and slowly to avoid scaring animals.
- Talk quietly, use hand signals, and don't splash.
- Only record what you see in the 10-minutes.
- When you get back to the boat total the numbers for each target species.
- Do not touch the animals.

Part 3: 360° BENTHIC SURVEY

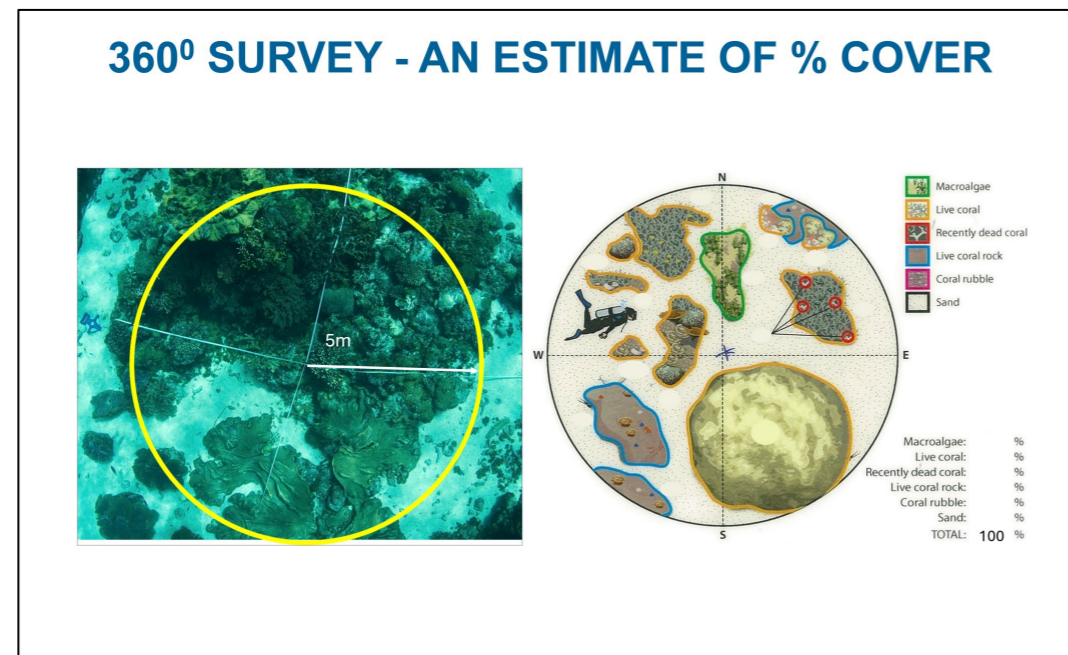
One 5m radius circle



Estimate % cover of each category.

-  **Macroalgae**
-  **Live coral**
-  **Recently dead coral**
-  **Live coral rock**
-  **Coral rubble**
-  **Sand**

FACING PAGE:



The 6 benthic categories are:

- Macroalgae
- Live coral
- Recently dead coral
- Live coral rock
- Coral rubble
- Sand

360° SURVEY - AN ESTIMATE OF % COVER









- The 360° survey is an estimate of the how much (%) of each benthic category covers the seafloor.
- Swim around your chosen habitat and choose a representative area.
- Your survey area should be representative of the site, not just a 'best bit'.
- Find an easily recognisable center point.
- Create an imaginary 5m radius circle for the survey.
- Use your body length to help you estimate 5m.
- Do a quick presence and absence check in the survey area.
- Mark down any missing categories as zero.
- Record the largest and most obvious category first, then work down to the smallest.
- Use whole numbers only (e.g., 10% not 10.5%).
- Do a final swim-around to adjust estimates.
- Benthic categories must total 100% across the six (6) categories.

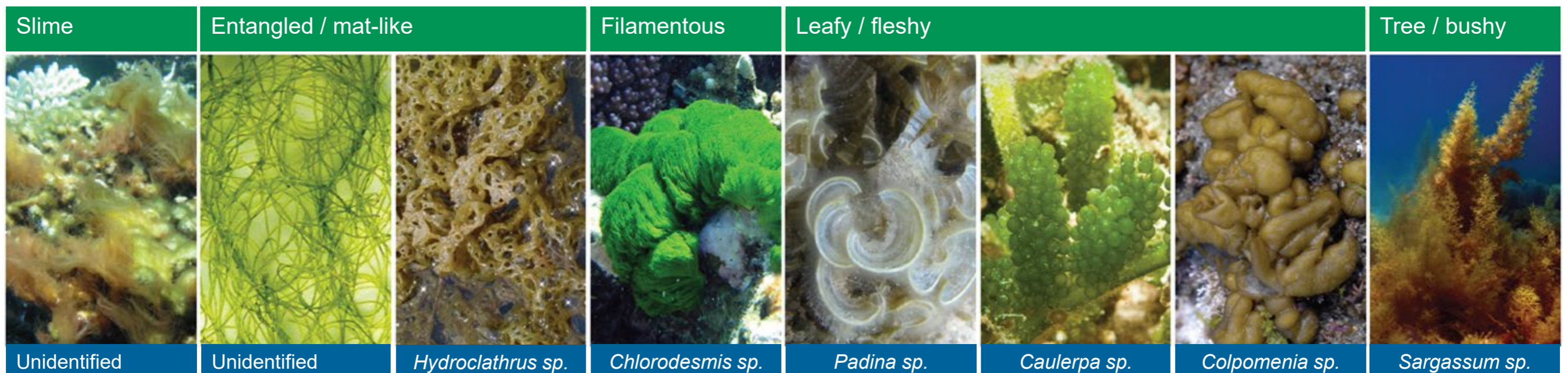
Next - let's take a closer look at the 6 categories!

MACROALGAE

- Macroalgae can be green, brown or red.
- Record all macroalgae observed.
- Species ID not required.

360° survey (One 5 metre radius circle)











BENTHOS		Insert % for each benthos type to total 100%	
Macroalgae			
Live coral		← MACROALGAE →	
Recently dead coral (white)			
Live coral rock		← LIVE CORAL →	
Coral rubble			
Sand			
Total	100 %		
PHOTOS TAKEN (Please provide details e.g. image no./name, what it is, and a description)		RECENTLY DEAD CORAL	CORAL ROCK (includes dead coral)
		CORAL RUBBLE	SAND

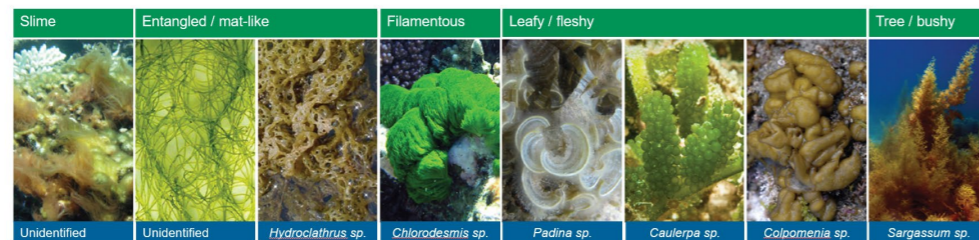


FACING PAGE:

MACROALGAE

- Macroalgae can be green, brown or red.
- Record all macroalgae observed.
- Species ID not required.

360° survey (One 5 metre radius circle)	
BENTHOS	
Insert % for each benthos type to total 100%	
Macroalgae	
Live coral	
Recently dead coral (bleached)	
Live coral rock	
Coral rubble	
Sand	
Total	100%
PHOTOS TAKEN	
Please provide details (e.g. image no/name, what % of area)	
RECENTLY DEAD CORAL	CORAL ROCK
	
CORAL RUBBLE	SAND
	



21

Fun Facts:

- Macroalgae (or seaweed) are photosynthetic organisms in the Kingdom Protista. They are not plants.
- Instead of leaves, stems and roots, they have blades, stipes, and holdfasts.
- Their body, called a thallus, absorbs nutrients directly from the water.
- Some have floats to help keep the macroalgae upright in the water column.

MACROALGAE

How to identify Macroalgae:

- Usually large and fleshy with a range of different growth forms: slime, mat-like, filamentous, leafy, bushy etc.
- They attach to hard substrates.
- They sway freely in the water.
- Usually coloured green, brown or red.
- Not encrusting or rigid like coralline algae.
- Found naturally on coral reefs.

Why monitoring Macroalgae is important:

- Their presence and abundance may be indicative of water quality and overall reef health.
- High levels can indicate an imbalance e.g. a low abundance of herbivores (fish, urchins), or high nutrient levels.
- They can compete with corals for space and light.
- They can trap sediments and prevent coral larval settlement.
- Record all macroalgae observed.
- There is no need to identify species.

LIVE CORAL

- Corals form essential habitats on coral reefs.
- Group all types of living coral that you see as Live Coral.



360° survey (One 5 metre radius circle) (

BENTHOS	
Insert % for each benthos type to total 100%	
Macroalgae	
Live coral	
Recently dead coral (white)	
Live coral rock	
Coral rubble	
Sand	
Total	100 %

PHOTOS TAKEN
(Please provide details e.g. image no./name, what it is, and a description)


← MACROALGAE →	
← LIVE CORAL →	
CORAL RUBBLE	SAND

RECENTLY DEAD CORAL CORAL ROCK (includes dead coral)

FACING PAGE:

LIVE CORAL

- Corals form essential habitats on coral reefs.
- Group all types of living coral that you see as Live Coral.



360° survey (One 5 metre radius circle)

BENTHOS	
Insert % for each benthos type to total 100%	
Macroalgae	
Live coral	
Recently dead coral (white)	
Live coral rock	
Coral rubble	
Sand	
Total	100%

PHOTOS TAKEN
(Please provide details e.g. image no./name, what it is, and a description)

RECENTLY DEAD CORAL (includes dead coral)
CORAL ROCK (includes dead coral)
CORAL RUBBLE
SAND

Why monitor Live Coral?

Corals are the building blocks of a coral reef. They:

- Create the physical reef framework.
- Provide shelter and food.
- Support biodiversity.
- Protect coastlines from waves and storms.

LIVE CORAL

How to identify Live Corals:

- Visible texture: bumps, ridges, valleys, cups.
- Visible tissue: polyps or tentacles may be extended.
- Coloured: brown, tan, orange, green, red, pink, purple or blue.
- Hard corals: most are rigid and unmoving in the current.
- Soft corals: most sway or bend in the current.
- Surface appears clean and free of algae.


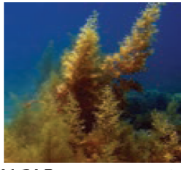






Why monitoring live coral is important:

- Corals form the structure and habitats of coral reefs.
- Estimating live coral cover is important for assessing reef health.
- Group all types of living coral that you see as live coral.
- You don't need to record which type of coral it is for this survey.

RECENTLY DEAD CORAL




360° survey (One 5 metre radius circle)

BENTHOS		Insert % for each benthos type to total 100%	
Macroalgae			
		← MACROALGAE →	
Live coral			
		← LIVE CORAL →	
Recently dead coral (white)			
Live coral rock		← CORAL ROCK (includes dead coral) →	
Coral rubble			
Sand			
		← CORAL RUBBLE → ← SAND →	
Total	100 %		
PHOTOS TAKEN (Please provide details e.g. image no./name, what it is, and a description)			

- Recently dead coral turns green or brown as algae begins to grow over it.
- If the coral skeleton is still visible beneath a light algal layer, record it as recently dead coral.

FACING PAGE:

RECENTLY DEAD CORAL



23

360° survey (One 5 metre radius circle)	
BENTHOS	
Record % for each benthos type to total 100%	
Macroalgae	
Live coral	
Recently dead coral (white)	
Live coral rock	
Coral rubble	
Sand	
Total	100%
PHOTOS TAKEN (Please provide details e.g. image no./name, what it is, and a description)	
MACROALGAE	
LIVE CORAL	
RECENTLY DEAD CORAL	
CORAL RUBBLE	
SAND	

- Recently dead coral turns green or brown as algae begins to grow over it.
- If the coral skeleton is still visible beneath a light algal layer, record it as recently dead coral.

RECENTLY DEAD CORAL

How to identify recently dead coral:

- White to pale skeleton with a thin film of algae starting to grow.
- Original coral shape still clear — branches, plates, ridges unchanged.
- Solid, hard skeleton with no living tissue.
- Begins turning green or brown as algae lightly coats it.
- Structure remains intact, not eroded or crumbling (unlike old dead coral).


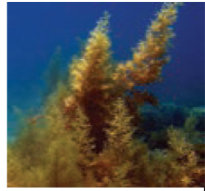




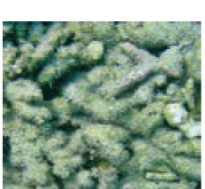

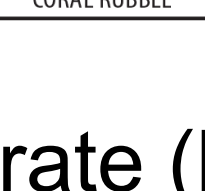

Why monitoring recently dead coral is important:

- Signals recent reef stress (bleaching, disease, crown-of-thorns).
- Helps track coral mortality trends before algae fully overgrows.
- Indicates changes in reef health and potential recovery needs.
- Guides management and rapid response actions.

LIVE CORAL ROCK




360° survey (One 5 metre radius circle)





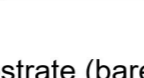
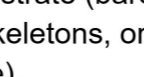


BENTHOS		Insert % for each benthos type to total 100%	
Macroalgae			
		← MACROALGAE →	
Live coral			
Recently dead coral (white)		← LIVE CORAL →	
Live coral rock			
Coral rubble			
Sand		← CORAL RUBBLE →	
Total	100 %		
PHOTOS TAKEN (Please provide details e.g. image no./name, what it is, and a description)		RECENTLY DEAD CORAL	CORAL ROCK (includes dead coral)
		CORAL RUBBLE	SAND

- Solid, stable substrate (bare rock, old coral skeletons, or cemented rubble).
- Substrate available for coral settlement and recruitment.

FACING PAGE:

LIVE CORAL ROCK



360° survey (One 5 metre radius circle)	
BENTHOS	
Insert % for each benthos type to total 100%	
Macroalgae	
Live coral	
Recently dead coral (shells)	
Live coral rock	
Coral rubble	
Sand	
Total	100%
PHOTOS TAKEN	
(Please provide details e.g. image no./name, what it is, and a description)	
	
RECENTLY DEAD CORAL	CORAL ROCK (include dead coral)
CORAL RUBBLE	SAND

- Solid, stable substrate (bare rock, old coral skeletons, or cemented rubble).
- Substrate available for coral settlement and recruitment.

Tip

- If algae is shorter than your thumbnail, record it as **live coral rock**.
- If algae is longer than your thumbnail, record it as **macroalgae**.

LIVE CORAL ROCK

How to identify Live Coral Rock:

- Solid, hard substrate made of old coral skeletons.
- Mostly bare rock with limited algae cover.
- May have small patches of live coral, sponges, or encrusting life.
- May have a covering of short, fuzzy algae.
- Natural texture: holes, grooves, and rough surfaces.

Why monitoring Live Coral Rock is important:

- Provides stable habitat for corals, algae, and invertebrates.
- Acts as a foundation for new coral growth and reef recovery.
- Supports biodiversity through cracks, holes, and surfaces used by reef species.
- Indicates healthy reef structure and resilience after disturbance.
- Helps track shifts in benthic cover (e.g., coral vs. algae dominance).






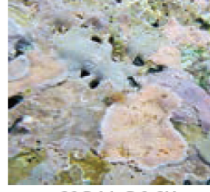
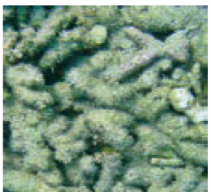

CORAL RUBBLE



360° survey (One 5 metre radius circle)

BENTHOS	
<i>Insert % for each benthos type to total 100%</i>	
Macroalgae	
Live coral	
Recently dead coral (white)	
Live coral rock	
Coral rubble	
Sand	
Total	100 %


PHOTOS TAKEN
(Please provide details e.g. image no./name, what it is, and a description)



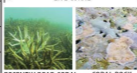


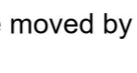
	
← MACROALGAE →	
	
← LIVE CORAL →	
	
RECENTLY DEAD CORAL	CORAL ROCK <i>(includes dead coral)</i>
	
CORAL RUBBLE	SAND

- Dead coral, or gravel-sized material, that is loose and can be moved by wave action.
- Coral rubble is natural. Just like the branches of trees on the forest floor.


FACING PAGE:

CORAL RUBBLE




BENTHOS	
Insert % for each benthos type to total 100%	
Macroalgae	
Live coral	
Recently dead coral (herbiv)	
Live coral rock	
Coral rubble	
Sand	
Total	100 %

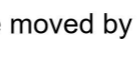
PHOTOS TAKEN
(Please provide details e.g. image no/name, what it is, and a description)



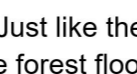
RECENTLY DEAD CORAL



CORAL ROCK
(includes dead coral)



CORAL RUBBLE



SAND

- Dead coral, or gravel-sized material, that is loose and can be moved by wave action.
- Coral rubble is natural. Just like the branches of trees on the forest floor.

Tip:

When **Coral Rubble** is cemented together with encrusting coralline algae it is categorized as **Live Coral Rock**.

CORAL RUBBLE

How to identify Coral Rubble:

- Loose, broken pieces of dead coral lying on the seafloor.
- Fragments are moveable, not attached or cemented together.
- Shapes resemble old coral skeleton but are worn or irregular.
- Often piled or scattered, not forming a solid reef structure.
- May have light algae, but the structure looks broken rather than intact.








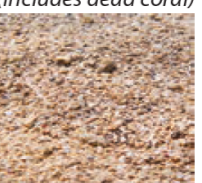


Why monitoring Coral Rubble is important:

- May indicate recent physical damage (storms, anchors, cyclones, COTS).
- Coral rubble does not provide a good settlement substrate for coral larvae to support reef recovery.
- It has potential to become consolidated Live Coral Rock over time.

SAND



360° survey (One 5 metre radius circle)

BENTHOS		<i>Insert % for each benthos type to total 100%</i>	
Macroalgae			
Live coral		← MACROALGAE →	
Recently dead coral (white)			
Live coral rock		← LIVE CORAL →	
Coral rubble			
Sand			
Total	100 %		

PHOTOS TAKEN
(Please provide details e.g. image no./name, what it is, and a description)


RECENTLY DEAD CORAL CORAL ROCK
(includes dead coral)






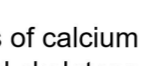
CORAL RUBBLE SAND

Loose, fine particles of calcium carbonate from coral skeletons, mollusc shells, crustaceans and calcareous algae.

FACING PAGE:

SAND



BENTHOS	
Measure % for each benthos type to total 100%	
Macroalgae	
Live coral	
Recently dead coral (shells)	
Live coral rock	
Coral rubble	
Sand	
Total	100 %

PHOTOS TAKEN
(Please provide details
e.g. image no./name, what
it is, and a description)

RECENTLY DEAD CORAL
CORAL ROCK
CORAL RUBBLE
SAND

Loose, fine particles of calcium carbonate from coral skeletons, mollusc shells, crustaceans and calcareous algae.

26

Challenge Question:

Can you see the camouflaged fish in the image?

Fun facts:

Sand can be formed by:

- the mechanical breakdown of coral and shells by high energy wave action.
- bioerosion of coral skeletons from parrotfish and burrowing organisms.
- Sandy seafloors may look deserted, but they are essential habitats for many crawling and burrowing organisms including sea cucumbers, worms, crabs, snails and fish.

SAND

How to identify Sand:

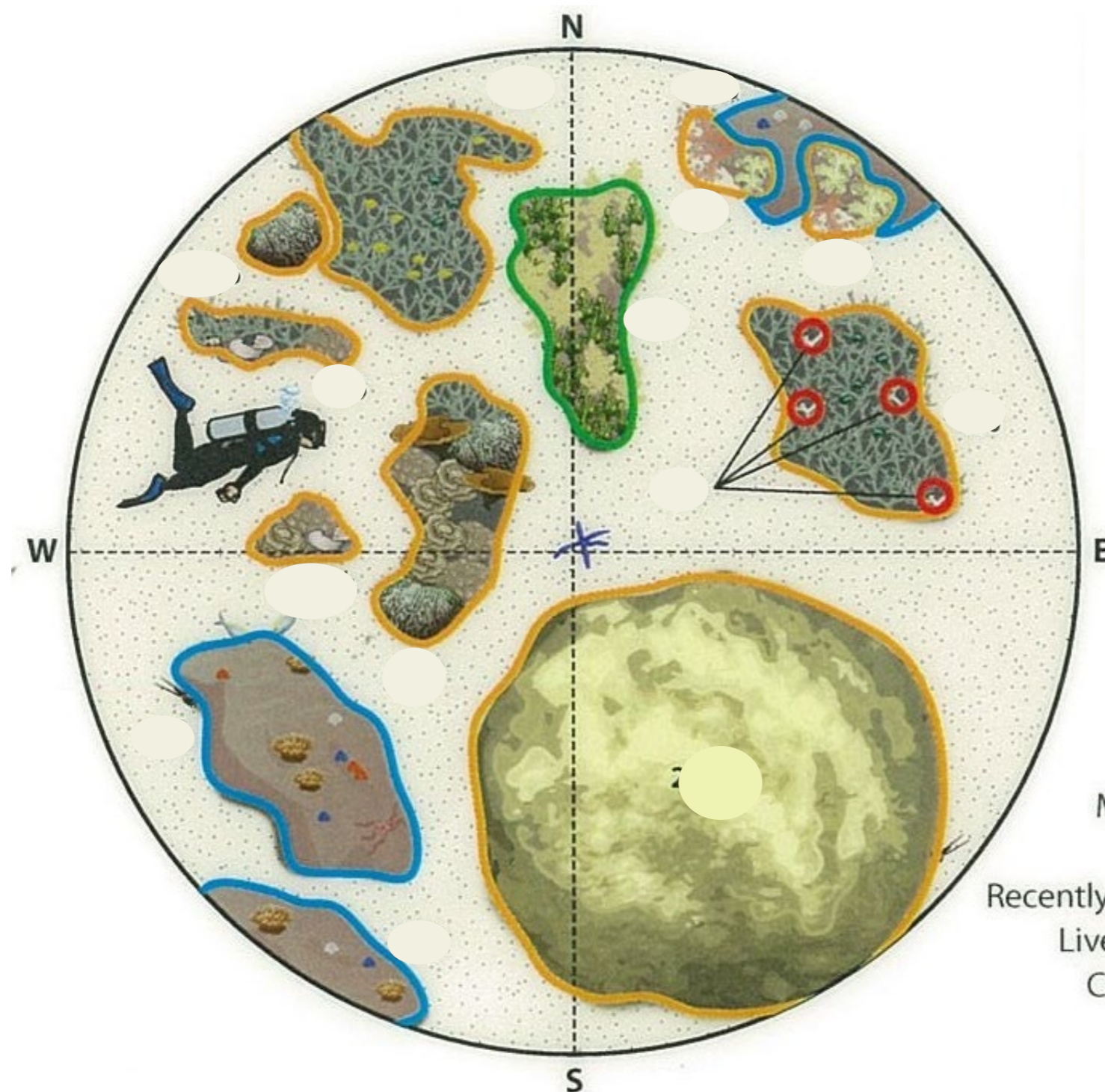
- Loose, fine particles that are easily displaced by currents.
- Usually light in colour: white, tan, beige.
- Particles composed of limestone or calcium carbonate from coral skeletons, mollusc shells, crustaceans and calcareous algae.
- Found on the seafloor in lagoons, channels, and between reef structures.

Why monitoring Sand is important:

- Indicates sediment movement and changes in reef conditions.
- Helps detect erosion or deposition that may smother corals.
- Shows shifts in habitat availability for bottom-dwelling species.
- Useful for tracking disturbance impacts such as storms or dredging.
- Sand doesn't support coral settlement.

360° SURVEY

One 5m radius circle



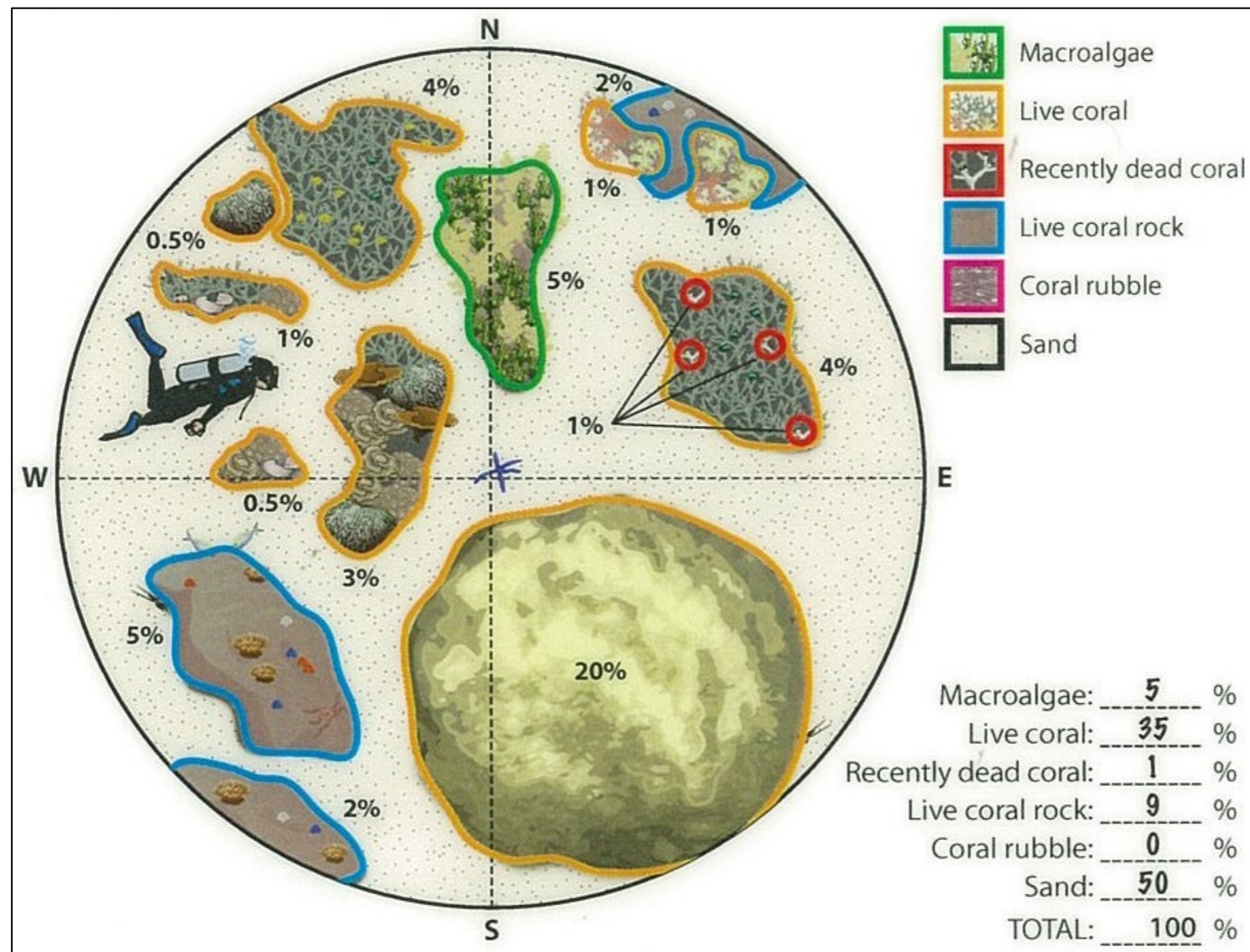
Estimate the % cover of each category.

-  **Macroalgae**
-  **Live coral**
-  **Recently dead coral**
-  **Live coral rock**
-  **Coral rubble**
-  **Sand**

Macroalgae:	_____	%
Live coral:	_____	%
Recently dead coral:	_____	%
Live coral rock:	_____	%
Coral rubble:	_____	%
Sand:	_____	%
TOTAL:	_____ 100	%

Remember:
total = 100%

ANSWERS FOR FACING PAGE:



360° SURVEY One 5m radius circle

- Survey area is one 5m radius circle.
- It should be representative of the habitat type at that reef.
- Don't pick the best or worst spot.
- Reef habitats are:
 - Reef slope
 - Reef crest
 - Reef flat
 - Reef lagoon
- Try and estimate the % cover of each of the 6 benthic categories.
- Discuss the answers and highlight that a difference (+/-) of 5% is ok.
- Remember: the total must add up to 100%



Discuss the answers

CORAL IMPACTS - BLEACHING



CORAL IMPACTS (Complete 1, 2 and 3 below. Circle Y or N)

1 Is any coral white? Y / N
 Is living coral tissue present? Y / N If yes: **BLEACHING**

Is coral being eaten? Y / N If yes: **PREDATION**

If yes, by what? How many seen?

Crown-of-thorns starfish

Juveniles (size of hand or smaller) _____

Adults (larger than size of hand) _____

Drupella snails (all sizes) _____

Is coral banded in appearance? Y / N If yes: **DISEASE**

Is coral competing with something else? Y / N If yes: **COMPETITION**

2 Is any coral broken or damaged? Y / N

If yes: **What is the likely main cause?** (Circle one)

Storm Animal Vessel Anchor Divers Snorkellers

Unknown Other: _____

3 Is any rubbish present? Y / N

If yes:

Number of pieces in survey area:

Fishing line _____ Plastic _____

Netting _____ Rope _____

Other (please specify)

IMPACT DETAILS
 (How much bleaching, predation, disease, damage? Other impacts?)

OTHER THINGS OF INTEREST?
 (Mating, spawning, behaviour, etc.)



FACING PAGE:

CORAL IMPACTS - BLEACHING

CORAL IMPACTS Complete 1, 2 and 3 below. Circle Y or N!

1 **Is any coral white?** Y/N

Is living coral tissue present? Y/N If yes: **BLEACHING**

Is coral being eaten? Y/N If yes: **PREDATION**

If yes, by what? How many seen?

Crown-of-thorns starfish _____
Jellyfish (size of hand or smaller) _____
Adults (larger than size of hand) _____
Drupella snails (if seen) _____

2 **Is any coral broken or damaged?** Y/N

If yes: **What is the likely main cause?** (Click on)

Storm _____ Animal _____ Vessel _____ Anchor _____ Divers _____ Snorkellers _____
Unknown _____ Other _____

3 **Is any rubbish present?** Y/N

If yes: **Number of pieces in survey area:**

Fishing line _____ Plastic _____
Netting _____ Rope _____
Other (please specify) _____

IMPACT DETAILS
(How much bleaching, predation, disease, damage? Other impacts?)

OTHER THINGS OF INTEREST?
(Mating, spawning, behaviour, etc.)

Coral Impacts include:

- Bleaching
- Predation
- Disease
- Competition
- Damage
- Marine debris

CORAL IMPACTS – BLEACHING

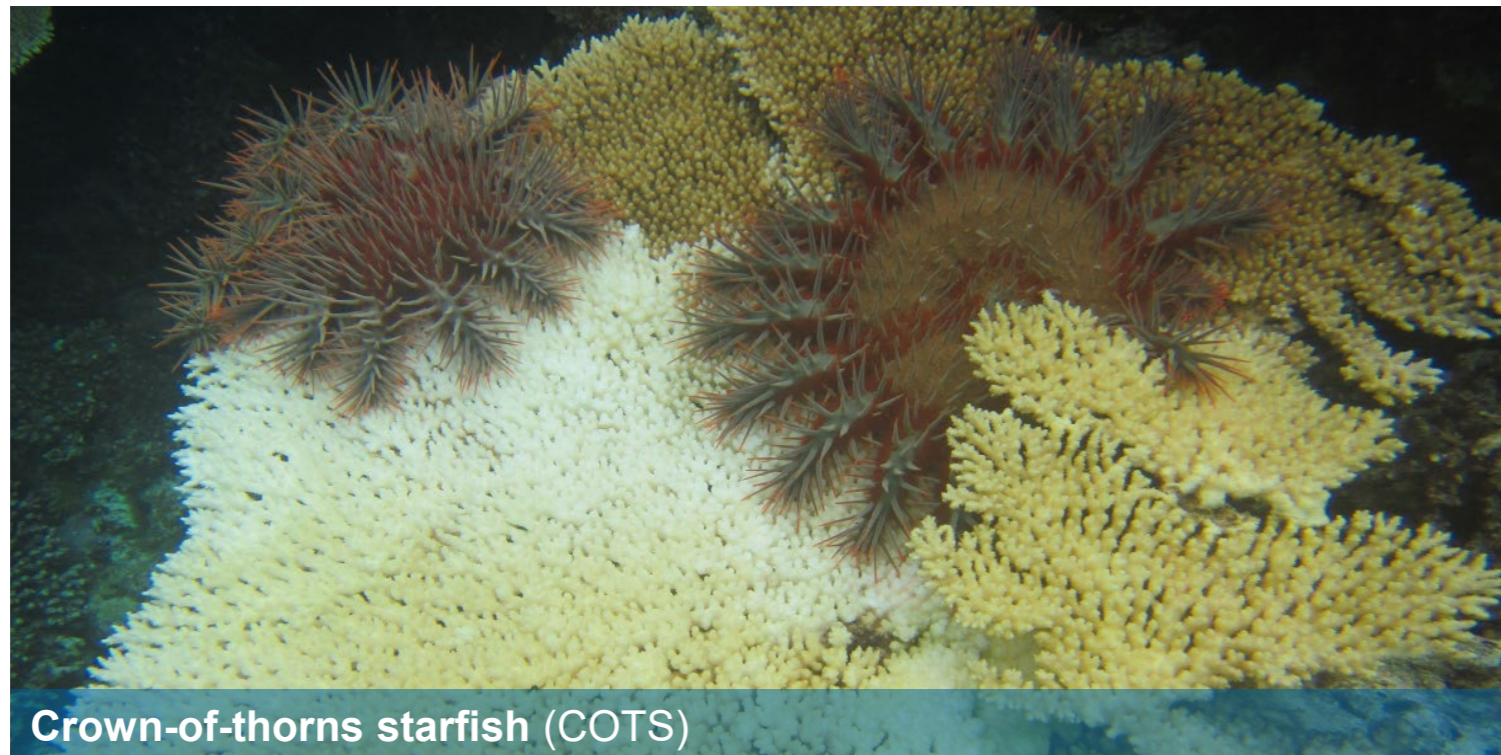
Coral Impacts:

- This section is recommended for Year 12 students, adults, and professionals.
- You can complete this section during the benthic survey (can be done as a group if needed).
- To dive deeper, a separate Coral Impact Training Manual is available via Eye on the Reef or Reef Guardian School programs.

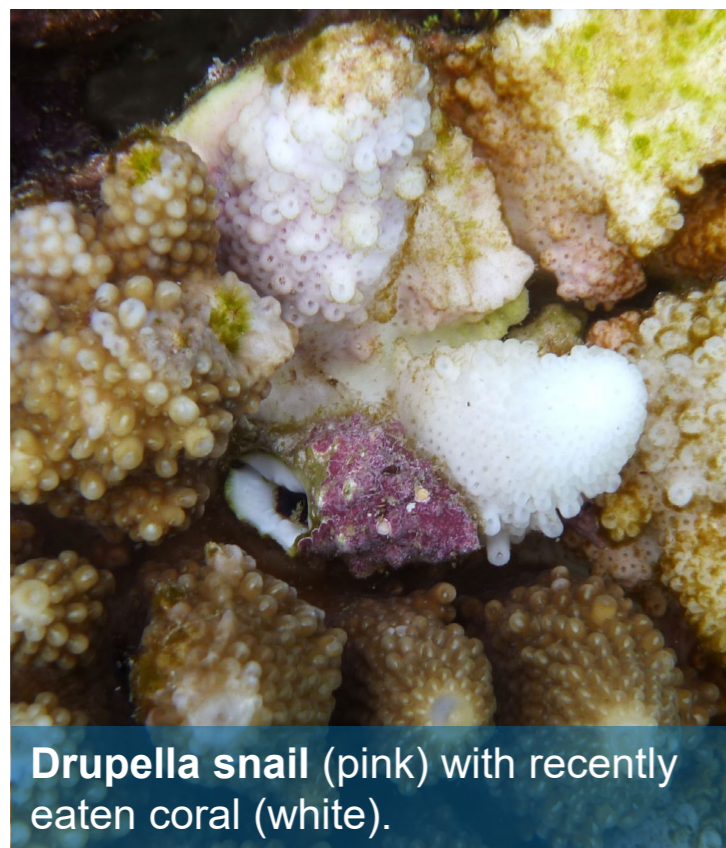
Bleaching:

- Coral appears white or very pale, but living tissue remains
- Often affects whole colonies or large sections, not small patches.
- Polyps are still present - coral is alive but stressed.
- May show fluorescent blue, pink or yellow before turning white.
- Not predation: no clean feeding scars or missing tissue.
- Not disease: no discoloured edges, mucus, or patchy tissue loss.

CORAL IMPACTS - PREDATION



Crown-of-thorns starfish (COTS)



Drupella snail (pink) with recently eaten coral (white).



Drupella snail (dark brown)

There are two main coral predators to monitor.

CORAL IMPACTS (Complete 1, 2 and 3 below. Circle Y or N)

1 Is any coral white? Y / N

Is living coral tissue present? Y / N If yes: **BLEACHING**

Is coral being eaten? Y / N If yes: **PREDATION**

If yes, by what? How many seen?

If yes, by what?	How many seen?
Crown-of-thorns starfish	
Juveniles (size of hand or smaller)	-----
Adults (larger than size of hand)	-----
Drupella snails (all sizes)	-----

Is coral banded in appearance? Y / N If yes: **DISEASE**

Is coral competing with something else? Y / N If yes: **COMPETITION**

2 Is any coral broken or damaged? Y / N

If yes: ▼

What is the likely main cause? (Circle one)


Storm Animal Vessel Anchor Divers Snorkellers

Unknown Other: -----

FACING PAGE:

CORAL IMPACTS - PREDATION

There are two main coral predators to monitor.



Crown-of-thorns starfish (COTS)

Drupella snail (pink) with recently eaten coral (white).

Drupella snail (dark brown)

CORAL IMPACTS (Complete 1, 2 and 3 below. Circle Y or NI)

1 **Is any coral white?** Y / NI

Is living coral tissue present? Y / NI If yes: **BLEACHING**

Is coral being eaten? Y / NI If yes: **PREDATION**

If yes, by what? How many seen?

Crown-of-thorns starfish

Juveniles (size of hand or smaller)

Adults (larger than size of hand)

Drupella snails (all sizes)

Is coral banded in appearance? Y / NI If yes: **DISEASE**

Is coral competing with something else? Y / NI If yes: **COMPETITION**

2 **Is any coral broken or damaged?** Y / NI

If yes: What is the likely main cause? (Circle one)

Storm Animal Vessel Anchor Divers Snorkellers

Unknown Other:

Drupella snails

- Small, knobby, spiral-shaped snails 1-5cm in length.
- Often covered in pink encrusting coralline algae.
- They feed on coral tissue using a rasp-like tongue.

Drupella predation indicators:

- Look for fresh white patches of exposed skeleton with clean edges (recent tissue loss).
- Often multiple clustered scars, not large uniform areas like bleaching.
- Typically feed on coral tissue from the base upwards.
- They often hide in crevices or between coral branches.

CORAL IMPACTS – PREDATION:

The two coral predators we monitor are:

1. Crown-of-thorns starfish (COTS)
2. Drupella snails.

Crown-of-thorns starfish (COTS)

- Large starfish, up to 60 cm, with venomous spines.
- They feed by pushing their stomach out of their mouth to digest living coral tissue.
- Record juveniles and adults separately.

COTS predation indicators:

- Look for white feeding scars where coral tissue has been removed.
- Scars often have scalloped edges.
- Scars are spread across large coral areas, not small clusters.
- COTS are often found near fresh scars, especially on branching or plate corals.
- Seeing several adult COTS may indicate an outbreak.
- Juveniles may signal a potential outbreak.

CORAL IMPACTS - DISEASE

- If a coral shows tissue loss it may indicate the presence of disease.
- You don't need to identify the specific disease, just distinguish it from bleaching or predation.

CORAL IMPACTS (Complete 1, 2 and 3 below. Circle Y or N)

① Is any coral white? Y / N

Is living coral tissue present? Y / N If yes: **BLEACHING**

Is coral being eaten? Y / N If yes: **PREDATION**

If yes, by what? How many seen?

Crown-of-thorns starfish

Juveniles (size of hand or smaller) _____

Adults (larger than size of hand) _____

Drupella snails (all sizes) _____

Is coral banded in appearance? Y / N If yes: **DISEASE**

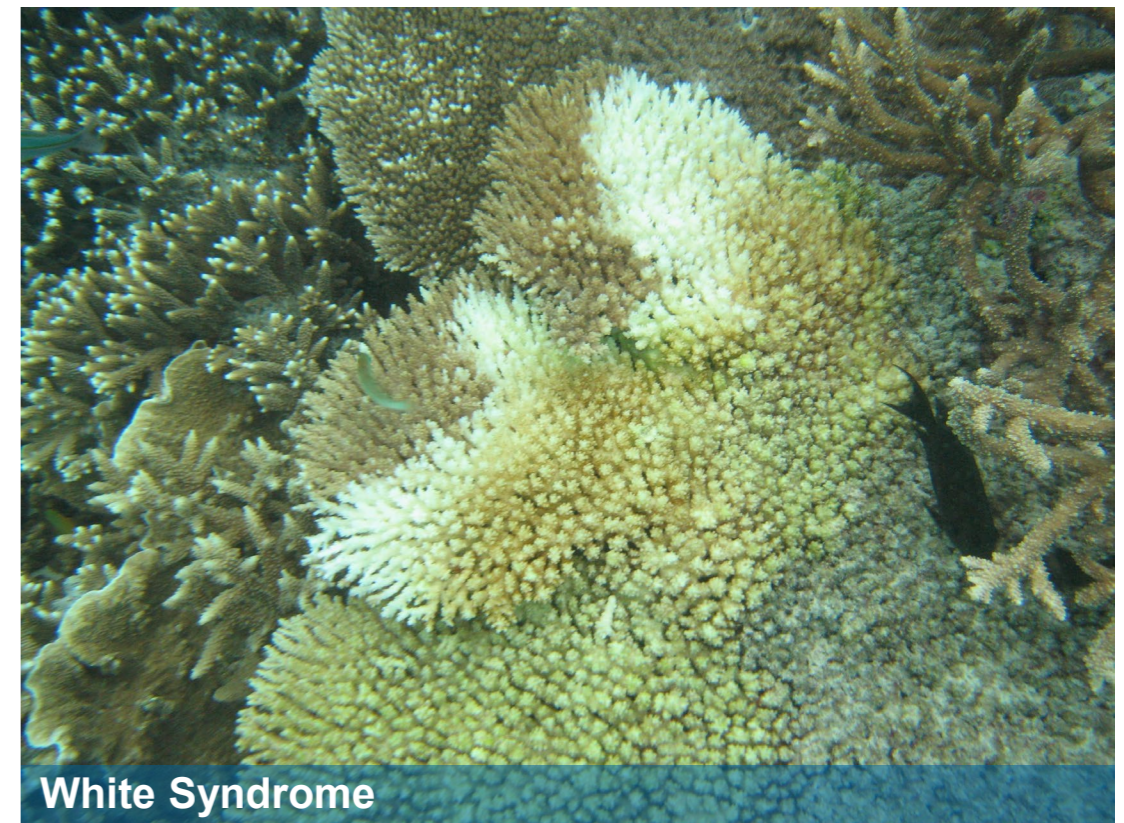
Is coral competing with something else? Y / N If yes: **COMPETITION**

② Is any coral broken or damaged? Y / N

If yes: What is the likely main cause? (Circle one)

Storm Animal Vessel Anchor Divers Snorkellers

Unknown Other: _____



FACING PAGE:

CORAL IMPACTS - DISEASE

- If a coral shows tissue loss it may indicate the presence of disease.
- You don't need to identify the specific disease, just distinguish it from bleaching or predation.

CORAL IMPACTS Computer 1.2 and 3 below. Circle Y or N.

1. Is any coral white? Y / N

Is living coral tissue present? Y / N If yes: BLEACHING

Is coral being eaten? Y / N If yes: PREDATION

If yes, by what? How many seen?

Crown-of-thorns starfish _____

Juveniles (size of hand or smaller) _____

Adults (larger than size of hand) _____

Drupella snails (all sizes) _____

Is coral banded in appearance? Y / N If yes: DISEASE

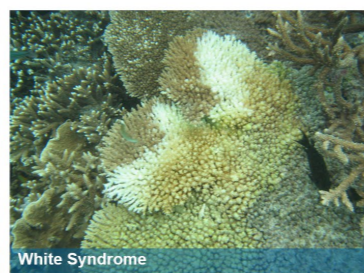
Is coral competing with something else? Y / N If yes: COMPETITION

2. Is any coral broken or damaged? Y / N

If yes: What is the likely main cause? (Circle one)

Storm Animal Vessel Anchor Divers Snorkellers

Unknown Other _____



CORAL IMPACTS – DISEASE

- If the white coral shows tissue loss and no coral predators are visible, this may indicate the presence of a disease.
- You don't need to identify the specific disease, just distinguish it from bleaching or predation.
- Coral diseases can cause significant coral mortality, decrease biodiversity, and reduce reef resilience and recovery.

Black Band Disease

Key visual sign: a dark black or reddish-black toxic band that separates healthy coral tissue from exposed white skeleton.

Location: Often begins on the upper surface of coral colonies.

Cause: microbial infection dominated by cyanobacteria.

Brown Band Disease

Key visual sign: a distinct brown band (often slimy) that moves slowly across healthy tissue, leaving white skeleton behind.

Location: Usually starts at the base or edge of a coral colony.

Cause: ciliates feeding on living coral tissue.

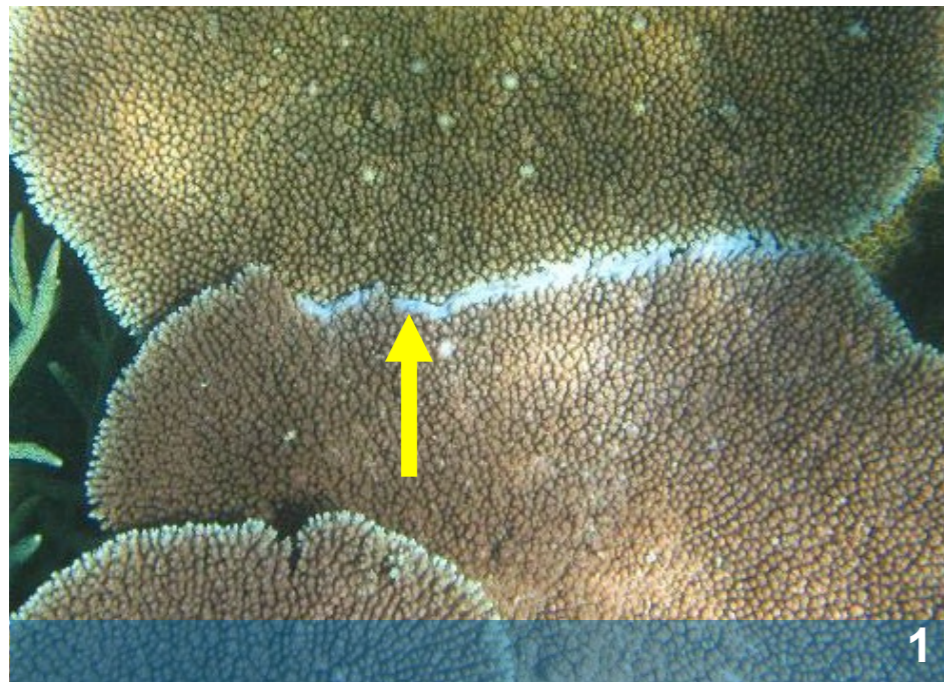
White Syndrome

Key visual sign: a sharp boundary between healthy tissue and bright white, freshly exposed skeleton.

Location: Can start at the base, edge, or centre of a colony depending on the species.

Cause: A group of coral diseases causing rapid tissue loss, often linked to bacteria and heat stress.

CORAL IMPACTS - COMPETITION



Can be identified by:

1. A coloured band between two coral colonies.
2. An even gap separating two coral colonies. One or both may show a coloured edge.

CORAL IMPACTS (Complete 1, 2 and 3 below. Circle Y or N)

① Is any coral white? Y / N

Is living coral tissue present? Y / N If yes: **BLEACHING**

Is coral being eaten? Y / N If yes: **PREDATION**

If yes, by what? How many seen?

Crown-of-thorns starfish

Juveniles (size of hand or smaller) _____

Adults (larger than size of hand) _____

Drupella snails (all sizes) _____

Is coral banded in appearance? Y / N If yes: **DISEASE**

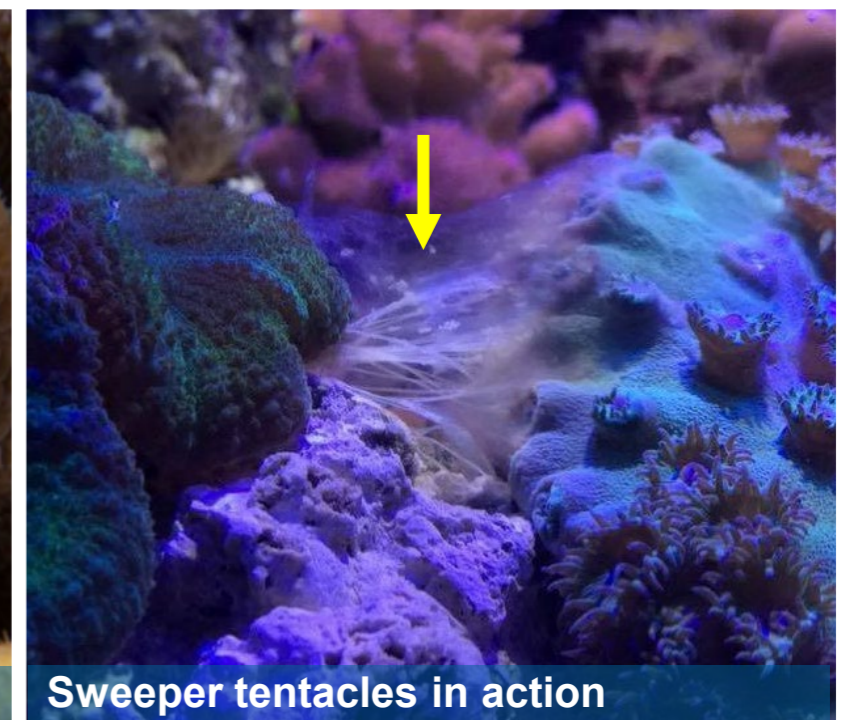
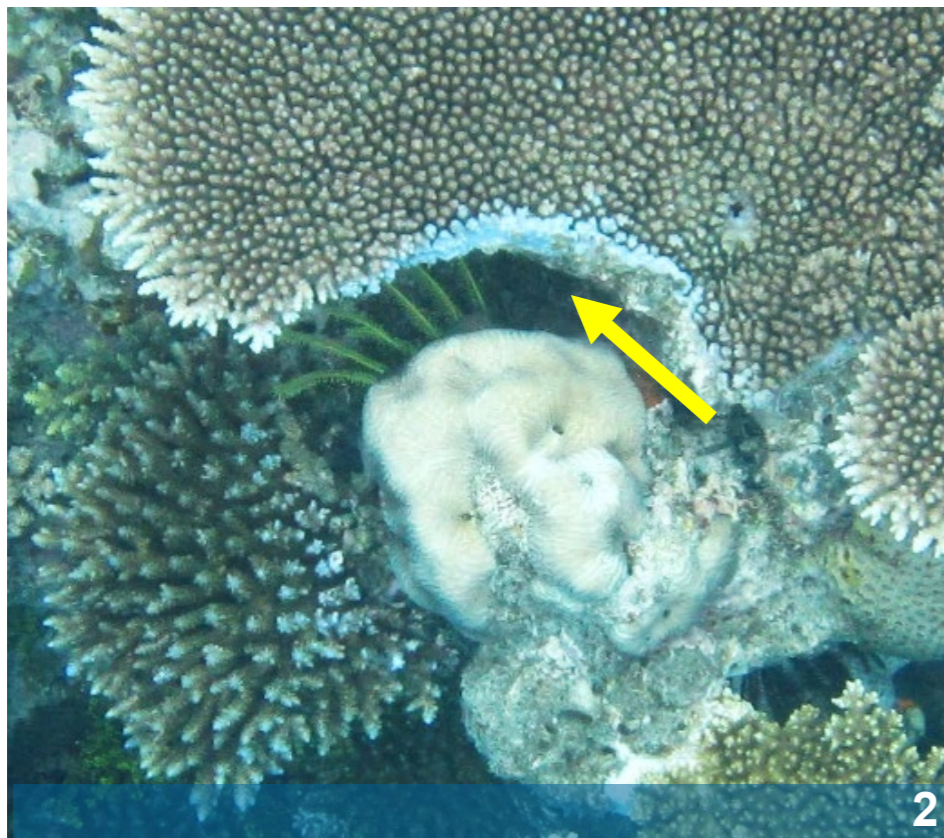
Is coral competing with something else? Y / N If yes: **COMPETITION**

② Is any coral broken or damaged? Y / N

If yes: What is the likely main cause? (Circle one)

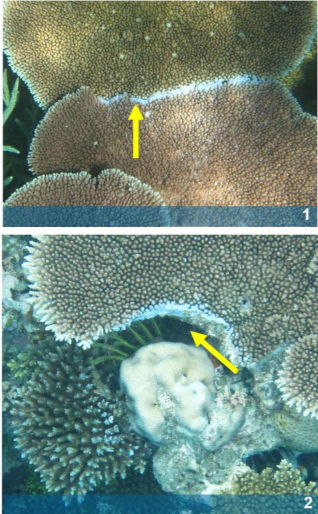
Storm Animal Vessel Anchor Divers Snorkellers

Unknown Other: _____



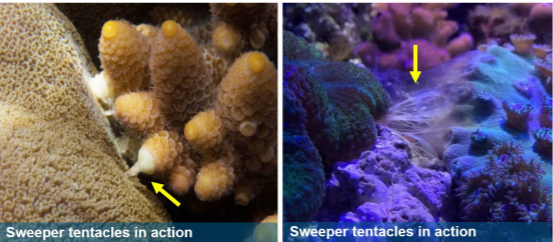
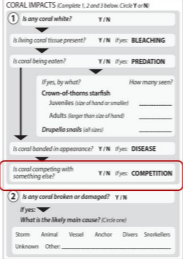
FACING PAGE:

CORAL IMPACTS - COMPETITION



Can be identified by:

1. A coloured band between two coral colonies.
2. An even gap separating two coral colonies. One or both may show a coloured edge.



31

CORAL IMPACTS – COMPETITION

- Corals compete with other corals, algae, sponges and invertebrates for space, light, and nutrients.
- Competition is most noticeable in fast-growing species.
- Often seen as a coloured band between two coral colonies.

Key visual sign: Clear interaction zones where two organisms meet - may show tissue recession, sweeper tentacles, or overgrowth.

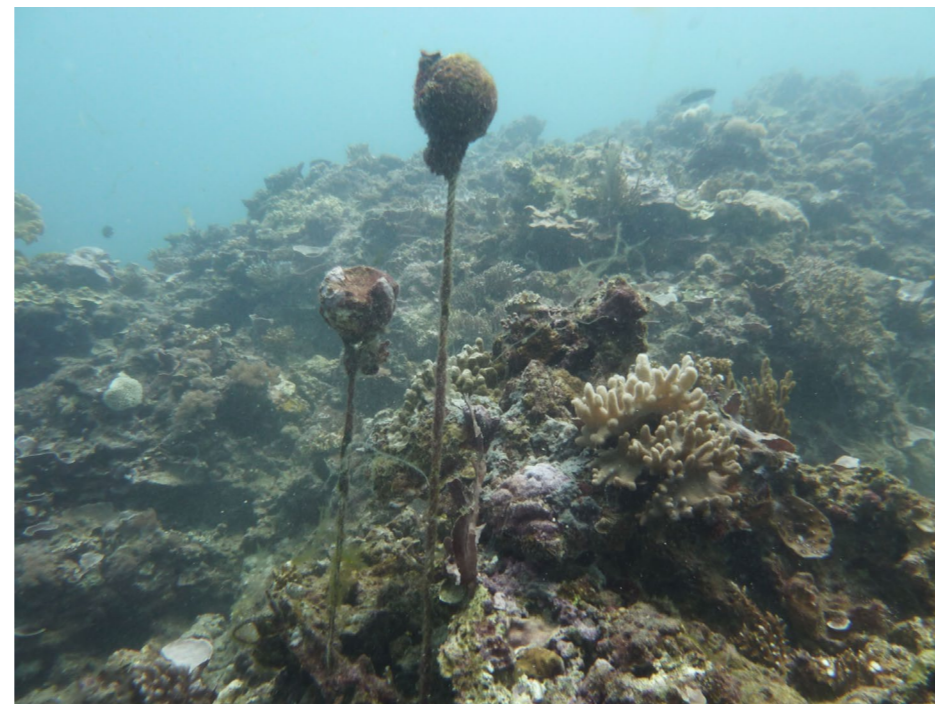
Common interactions:

- Coral vs. coral: Margins touching, dead patches where one outcompetes another.
- Coral vs. algae: Algae overgrowing or shading coral.
- Coral vs. invertebrates: Sponges or tunicates encroaching on coral tissue.

Impacts on reefs:

- Reduced growth and colony health.
- Increased risk of tissue loss and disease entry points.
- Limits space for coral recruitment and slows reef recovery.

CORAL IMPACTS - RUBBISH (MARINE DEBRIS)



Plastics, fishing line, nets, and other debris can become entangled on coral colonies.

CORAL IMPACTS (Complete 1, 2 and 3 below. Circle Y or N)

1 Is any coral white? Y / N

Is living coral tissue present? Y / N If yes: **BLEACHING**

Is coral being eaten? Y / N If yes: **PREDATION**

If yes, by what? How many seen?

Crown-of-thorns starfish

Juveniles (size of hand or smaller) _____

Adults (larger than size of hand) _____

Drupella snails (all sizes) _____

Is coral banded in appearance? Y / N If yes: **DISEASE**

Is coral competing with something else? Y / N If yes: **COMPETITION**

2 Is any coral broken or damaged? Y / N

If yes: What is the likely main cause? (Circle one)

Storm Animal Vessel Anchor Divers Snorkellers

Unknown Other: _____

3 Is any rubbish present? Y / N

If yes: Number of pieces in survey area:

Fishing line _____ Plastic _____

Netting _____ Rope _____

Other (please specify)

IMPACT DETAILS
(How much bleaching, predation, disease, damage? Other impacts?)

OTHER THINGS OF INTEREST?
(Mating, spawning, behaviour, etc.)

FACING PAGE:

CORAL IMPACTS- RUBBISH (MARINE DEBRIS)



Plastics, fishing line, nets, and other debris can become entangled on coral colonies.

CORAL IMPACTS Complete 1, 2 and 3 below. Click Y/N

1) Is any coral white? Y/N

Is bleaching observed? Y/N If yes: BLEACHING

Is coral being eaten? Y/N If yes: PREDATION

If yes, by what? Cause of bleaching: Juveniles (size of head or crown) Adults (larger than size of head) Disruptive events (all coral)

How many seen? _____

Is coral banded in appearance? Y/N If yes: DISEASE

Is coral competing with something else? Y/N If yes: COMPETITION

2) Is any coral broken or damaged? Y/N

If yes: What is the likely main cause? Circle one

Storm Animal Vessel Anchor Other Breakdown Unknown Other

3) Is any rubbish present? Y/N

If yes: Number of pieces in survey area: Fishing line _____ Plastic _____ Netting _____ Rope _____ Other (please specify) _____

IMPACT DETAILS (check mark if bleaching, predation, disease, damage/Other impact)

OTHER THINGS OF INTEREST? (Writing, swimming, techniques, etc.)

Important:

If you find marine debris do not try to remove it! Advise the operator so they can remove it safely without any further damage to coral.

CORAL IMPACTS – RUBBISH (MARINE DEBRIS)

What it is: Plastics, fishing line, nets, and other debris that become entangled on coral colonies.

Key visual sign: Foreign objects resting on or caught within coral branches or surfaces.

Common signs of impact:

- Tissue abrasion where debris rubs against coral.
- Breakage of delicate branches.
- Shading that limits light for photosynthesis.

Impacts on the Reef:

- Slower growth and reduced health.
- Higher risk of infection at damaged sites.
- It can cause colony mortality if not removed.

IMPACT DETAILS & OTHER THINGS OF INTEREST

CORAL IMPACTS (Complete 1, 2 and 3 below. Circle Y or N)

1 Is any coral white? Y / N

Is living coral tissue present? Y / N If yes: **BLEACHING**

Is coral being eaten? Y / N If yes: **PREDATION**

If yes, by what? How many seen?

Crown-of-thorns starfish

Juveniles (size of hand or smaller) _____

Adults (larger than size of hand) _____

Drupella snails (all sizes) _____

Is coral banded in appearance? Y / N If yes: **DISEASE**

Is coral competing with something else? Y / N If yes: **COMPETITION**

2 Is any coral broken or damaged? Y / N

If yes: What is the likely main cause? (Circle one)

Storm Animal Vessel Anchor Divers Snorkellers

Unknown Other: _____

3 Is any rubbish present? Y / N

If yes:

Number of pieces in survey area:

Fishing line _____ Plastic _____

Netting _____ Rope _____

Other (please specify)

IMPACT DETAILS
(How much bleaching, predation, disease, damage? Other impacts?)

OTHER THINGS OF INTEREST?
(Mating, spawning, behaviour, etc.)

IMPACT DETAILS

E.g. 1- Half the area was affected by bleaching.

E.g. 2- The whole area was affected by COTS.

OTHER THINGS OF INTEREST?

Sightings of protected species, mating or spawning behaviours.

FACING PAGE:

IMPACT DETAILS & OTHER THINGS OF INTEREST

CORAL IMPACTS (Complete 1, 2 and 3 below. Circle Y or N)

1 Is any coral white? Y / N

Is living coral tissue present? Y / N If yes: BLEACHING

Is coral being eaten? Y / N If yes: PREDATION

If yes, by what? How many seen?

Crown-of-thorns starfish

Juveniles (size of hand or smaller) _____

Adults (larger than size of hand) _____

Drupella snails (all sizes) _____

Is coral banded in appearance? Y / N If yes: DISEASE

Is coral competing with something else? Y / N If yes: COMPETITION

2 Is any coral broken or damaged? Y / N

If yes: What is the likely main cause? (Circle one)

Storm Animal Vessel Anchor Divers Snorkellers

Unknown Other: _____

3 Is any rubbish present? Y / N

If yes: Number of pieces in survey area:

Fishing line _____ Plastic _____

Netting _____ Rope _____

Other (please specify) _____

IMPACT DETAILS (How much bleaching, predation, disease, damage? Other impacts?)

OTHER THINGS OF INTEREST? (Mating, spawning, behaviour, etc.)

IMPACT DETAILS

E.g. 1-Half the area was affected by bleaching.
E.g. 2- The whole area was affected by COTS.

OTHER THINGS OF INTEREST?

Sightings of protected species, mating or spawning behaviours.

IMPACT DETAILS & OTHER THINGS OF INTEREST:

Impact details:

Record details - how much bleaching, predation, disease or damage.

For example -

- half the area was affected by bleaching.
- the whole area was affected by COTS.

Other things of interest:

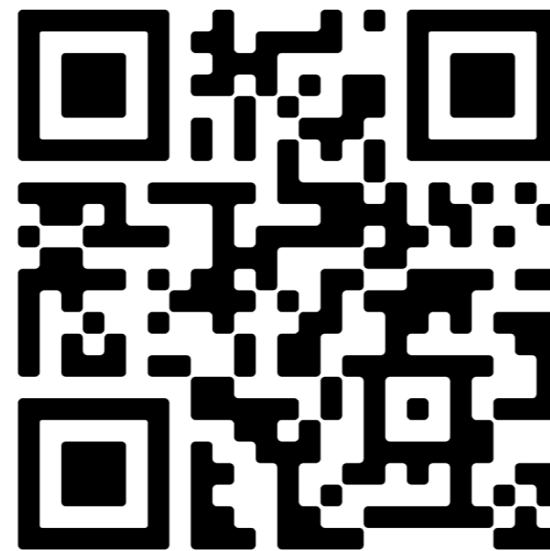
Relevant site information -

- site conditions
- storms
- sightings of protected species
- mating or spawning behaviour

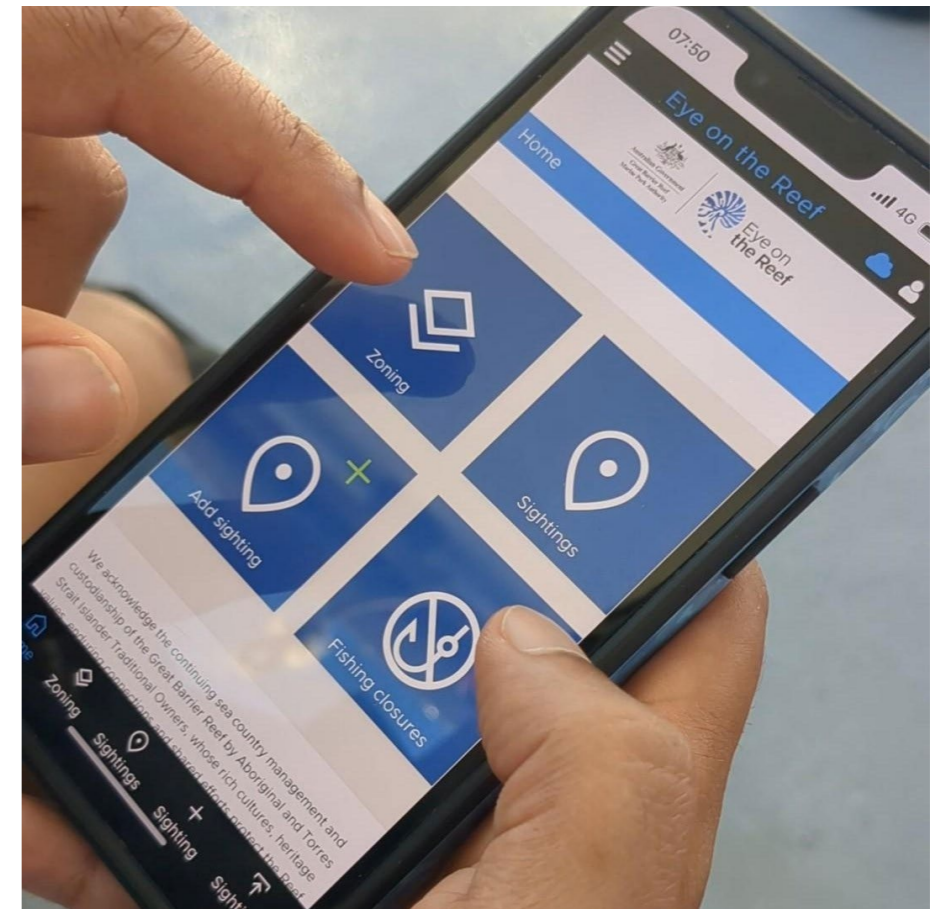
ENTER YOUR SURVEY DATA INTO EYE ON THE REEF!



Download the **Eye on the Reef App** to know your zones, submit your sightings and upload your data.




Enter your survey data via the QR code.




FACING PAGE:

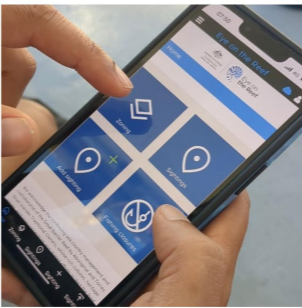

ENTER YOUR SURVEY DATA INTO EYE ON THE REEF!



Download the **Eye on the Reef App** to know your zones, submit your sightings and upload your data.



Enter your survey data via the QR Code.



ENTER DATA INTO EYE ON THE REEF

Scan the QR code to enter your survey data!

Eye on the Reef is available on desktop (preferred way of submitting your data) or via the App.

- **Download** the *Eye on the Reef* App from Google Play or the App Store.
- **Register** for an account.
- **Add data** - from 'Home' page select 'Surveys' then select 'Add survey' top right corner. Choose 'Add rapid monitoring survey'.

Additional information:

- Entering your survey data is the most important component.
- The data you collect can be used to inform how the Great Barrier Reef is managed.
- The data goes into the Eye on the Reef system, the official Reef management system for the Great Barrier Reef Marine Park Authority, the Australian Government's lead agency for managing the Great Barrier Reef.

Based on reviews, data entry of survey results scores high for value, well-being, and sense of contribution. The difference between Primary and Citizen Science data is how it is shared. Citizen Science data is entered into a collective dashboard, whilst Primary data is not.



Questions?

Male Māori wrasse