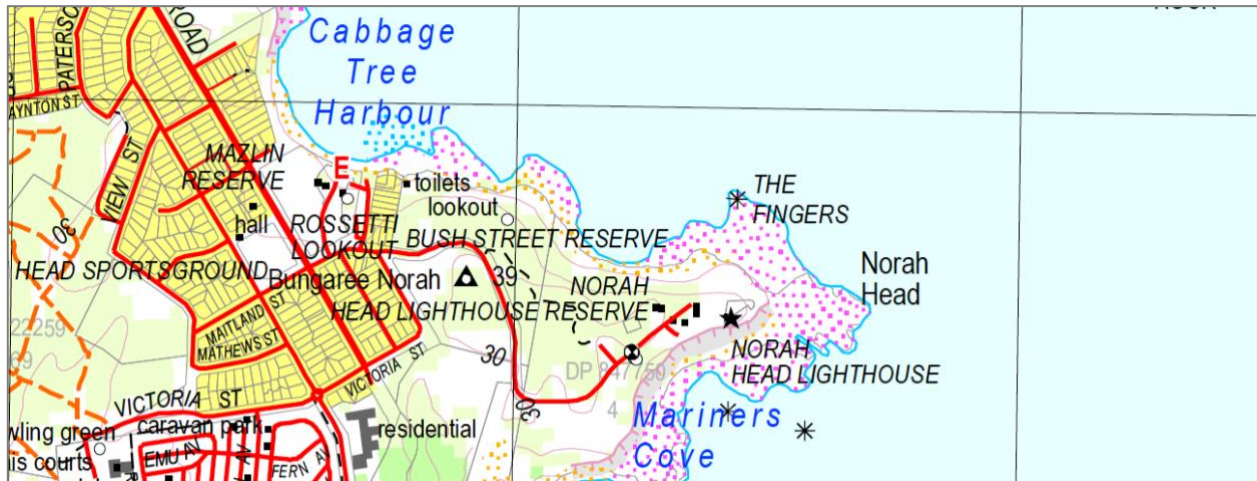


GREAT SOUTHERN REEF: VIRTUAL FIELDWORK



1. TICK THE BOXES - Indicate when you have completed the orientation activities.

- Examined the **topographic map and satellite image**
 - located the starting and finishing points
 - Identified beaches on the satellite image

- Watched **drone footage** and examined
 - the geology of the coast
 - areas with subtidal reefs

- Visited **SixMaps** website to
 - observe the section of coast
 - measure the length of the coastline. Result - km.

2. CREATE A SKETCH MAP of the coastline between Cabbage Tree Harbour (Northing 17) and Pebbly Beach (Eastings 67). Use the space on page 8

- Name features, add a **scale**, **N** direction, one **latitude** + one **longitude** line
- Show **rocky reefs** you observed in the drone footage and maps.
- Identify **the beach** between $151^{\circ} 34' 15''$ E and $151^{\circ} 34' 30''$
- Add a **title** and a legend

3. CREATE AN ANNOTATED FIELD SKETCH using Source 3 Use the space on page 9

- **Label** physical and human features along the coast
- **Label** the beach directly north of the lighthouse as your Weed Walk site.
- Add a **title** and N direction

4. ABIOTIC ENVIRONMENT. Refer to Source 3 and Source 4

a. Comment on the geology (lithosphere) of this section of coast from your observations of the maps, drone footage and photographs.

.....
.....
.....

b. Explain briefly how the lithosphere would influence marine biodiversity.

.....
.....
.....

Refer to Source 5

c. What was the average water temperature on September 13th?

d. Briefly describe how conditions in the atmosphere and hydrosphere changed on Sept. 13th.

.....
.....
.....
.....

e. What does this tell you about the dynamic nature of kelp forest ecosystems at Norah Head and their resilience to daily environmental change?

.....

f. What other natural stresses could impact this section of coast during a year?

.....
.....
.....

Where are the kelp forests?

Refer to the drone and underwater videos and photographs used so far.

- Describe the lithosphere and biosphere.
- Add any evidence of human use of this coastal environment

	Cabbage Tree Bay	Norah Head
Lithosphere		
Biosphere		
Human activities		

5. BIOTIC ENVIRONMENT

a. Watch **Beach Wrack Fieldwork video**

- Name the 5 categories used to separate the beach wrack.

.....

- List four important functions of beach wrack in marine and coastal ecosystems

.....

b. Weed Walk (Source 6).

- Examine the samples of kelp and other materials found in the wrack
- Use the **Source 7: Kelp Forest Identification** pdf and **Source 8: A Beach Explorers guide** to identify:
 - different types of kelp / seaweed / algae
 - other organisms from the kelp forest, rocky reef, and intertidal zone.

List your findings in this table

Marine algae (Seaweed / kelp)	Other organisms

- Which species of kelp has the long stipe and flat blades?
.....
- Which species have gas bladders?
- Identify the two tallest growing species of kelp
.....
- Why do you think the older wrack line is much higher up the beach?
.....

- Can you see any evidence of bleaching, herbivory, or storm damage on the larger kelp blades? If yes, describe what you see.
.....
.....

- Name two larger consumer organisms that live on the subtidal kelp reef.
.....
.....

Quadrat STUDY: Refer to Source 9

- Determine the dominant type of kelp and its average % of the wrack.

..... % of wrack composition

6. ASSESSMENT: Healthy or unhealthy kelp forest ecosystem

- Does this section of coast appear to have a healthy, functioning kelp forest ecosystem? Justify your assessment with evidence.

.....
.....
.....
.....
.....
.....

- Form an opinion. Should beach wrack be cleared from beaches to improve the aesthetic quality and use of beaches. Justify your response.

.....
.....
.....
.....

7. HUMAN IMPACTS, MANAGEMENT and PROTECTION

Study the opening image and maps on the Google Site for Virtual Fieldwork.

- Would you consider this coast to be highly urbanised? Explain your response.

.....
.....

- Did you observe any rivers or creeks entering the ocean on this section of coast? Why is that significant?

.....

.....

.....

Use the documents in **Source 10**

- List the activities currently allowed in the marine waters around Norah Head.

.....

.....

.....

- What activities pose the greatest threat to kelp forest biodiversity here?

.....

.....

- Comment on the current management to protect biodiversity here

.....

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- How would a Sanctuary Zone change the usage of the marine resources here?

.....

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- What are the primary objectives of a proposed sanctuary zone?

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.....

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Look at the map of the **Proposed Hawksbury Shelf Marine Bioregion Marine Park**
What is unusual about this proposed park compared to other Australian MPA's?

.....

.....

What other areas were proposed as Sanctuary Zones within this Marine Park.

.....

.....

Follow up. Research the reason(s) the Proposed Hawksbury Shelf Marine Bioregion Marine Park Proposal has not proceeded since being announced in 2018.

CONCLUSION: Revisit the Key Inquiry Questions

- a. *What were the abiotic conditions on the day you visited?*
- b. *Are these conditions typical for temperate kelp forest ecosystems?*
- c. *Does the evidence suggest a high level of ecosystem biodiversity?*
- d. *Does the evidence support the statement - 'there is a healthy, complex kelp forest ecosystem on the rocky reef along this coast'? Justify your response.*
- e. *What values does the reef have for local communities and visitors?*
- f. *Does your evidence support the statement - 'there are no threats to this kelp forest ecosystem?' Explain.*
- g. *Is there evidence of effective management and protection of the marine environment along this section of coast?*

List other information that would help you to effectively determine the health of the kelp forest ecosystem at Norah Head e.g., tourist numbers

.....

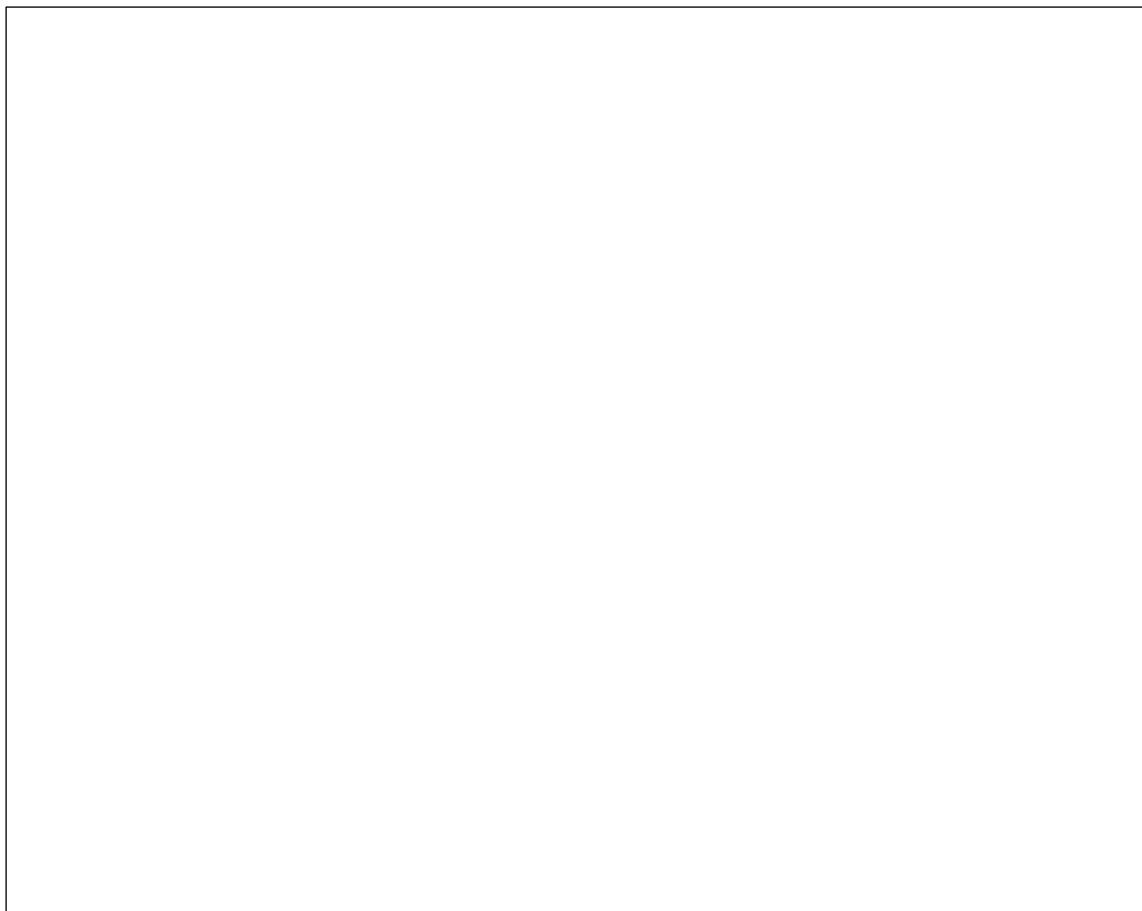
.....

.....

YOUR SKETCH MAP

The coastline between Cabbage Tree Harbour (Northing 17) and Pebbly Beach (To Eastings 67).

- Name coastal features, add a **scale**, **N** direction, one **latitude** and one **longitude** line
- Show **rocky reefs** you observed in the drone footage and maps.
- Identify **the beach** between 151° 34' 15" E and 151° 34' 30"
- Add a **title** and a legend



YOUR ANNOTATED FIELD SKETCH

The coastline between Cabbage Tree Harbour and Norah Head Lighthouse

- **Label** physical and human features along the coast
- **Label** the beach directly north of the lighthouse as your Weed Walk site.
- Add a **title** and N direction

