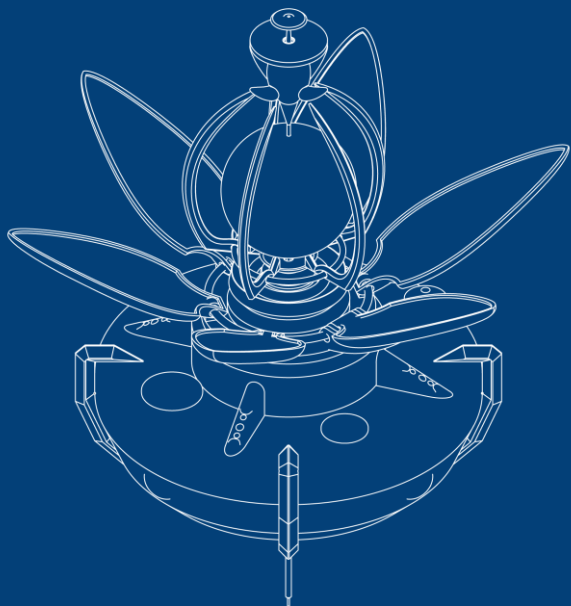
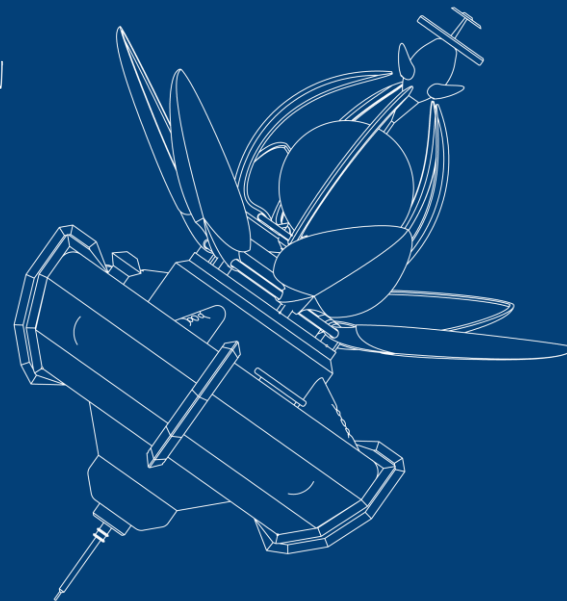




MARINE SYSTEMS

(BB-01)

DESIGNING FOR SUSTAINABLE SYSTEM & INNOVATION
ASSIGNMENT 3



JONATHAN TAN
SHANSHAN WEI
YANG LU

FOREWORD

FIRST, WE ACKNOWLEDGE THE EASTERN MAAR AND WADAWURRUNG PEOPLE AS THE TRADITIONAL CUSTODIANS OF THE GREAT OCEAN ROAD REGION. WE PAY OUR RESPECTS TO THEIR ANCESTORS AND ELDERS, PAST AND PRESENT.

THE GREAT OCEAN ROAD IS ONE OF THE MOST POPULAR TOURIST DESTINATIONS IN AUSTRALIA, ATTRACTING MORE VISITORS THAN ULURU AND THE GREAT BARRIER REEF COMBINED. HOWEVER, WE KNOW VERY LITTLE ABOUT ITS MARINE LIFE SYSTEMS.



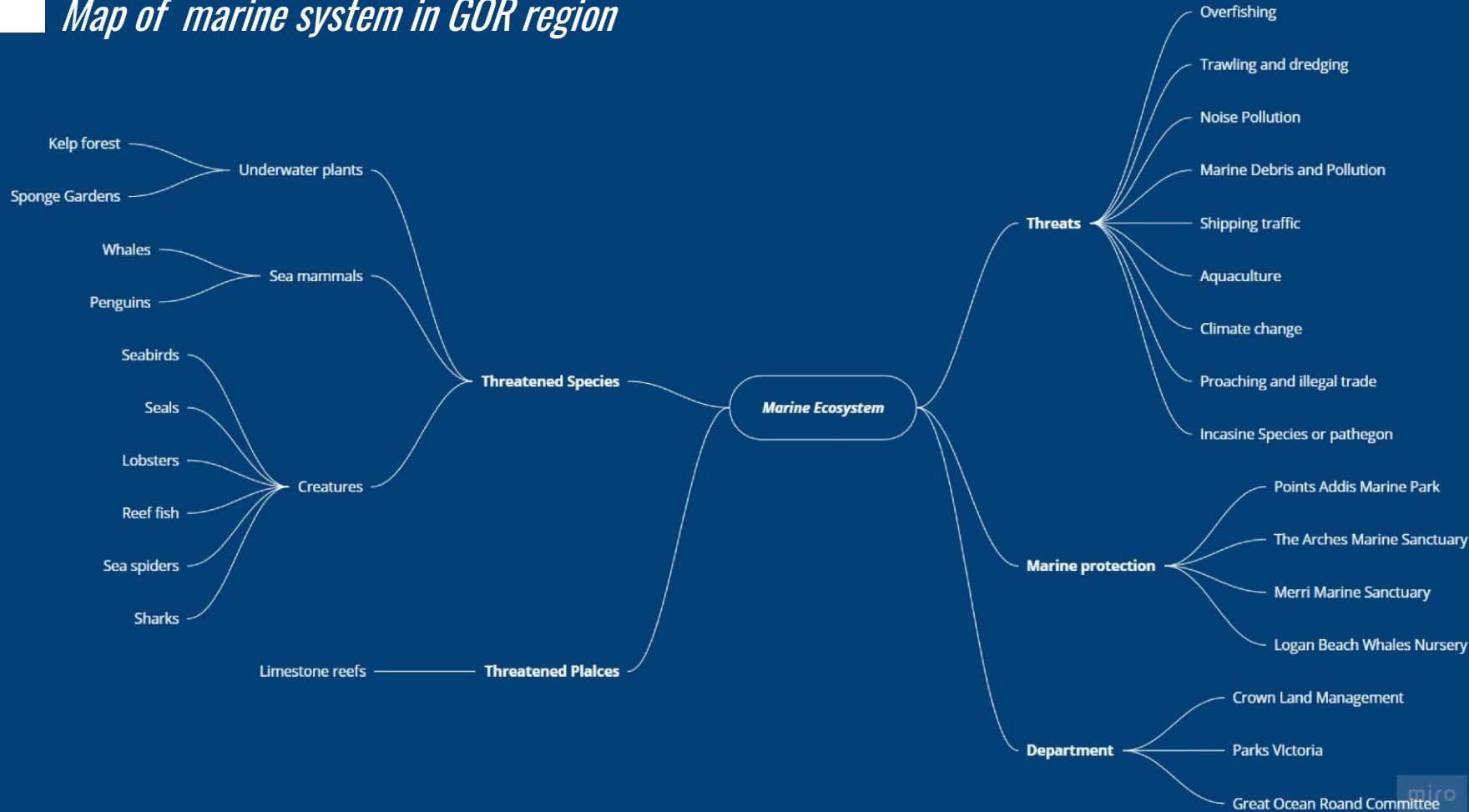


MARINE SYSTEM

MAPPING THE SYSTEM AND UNDERSTANDING IT IN A HOLISTIC WAY:

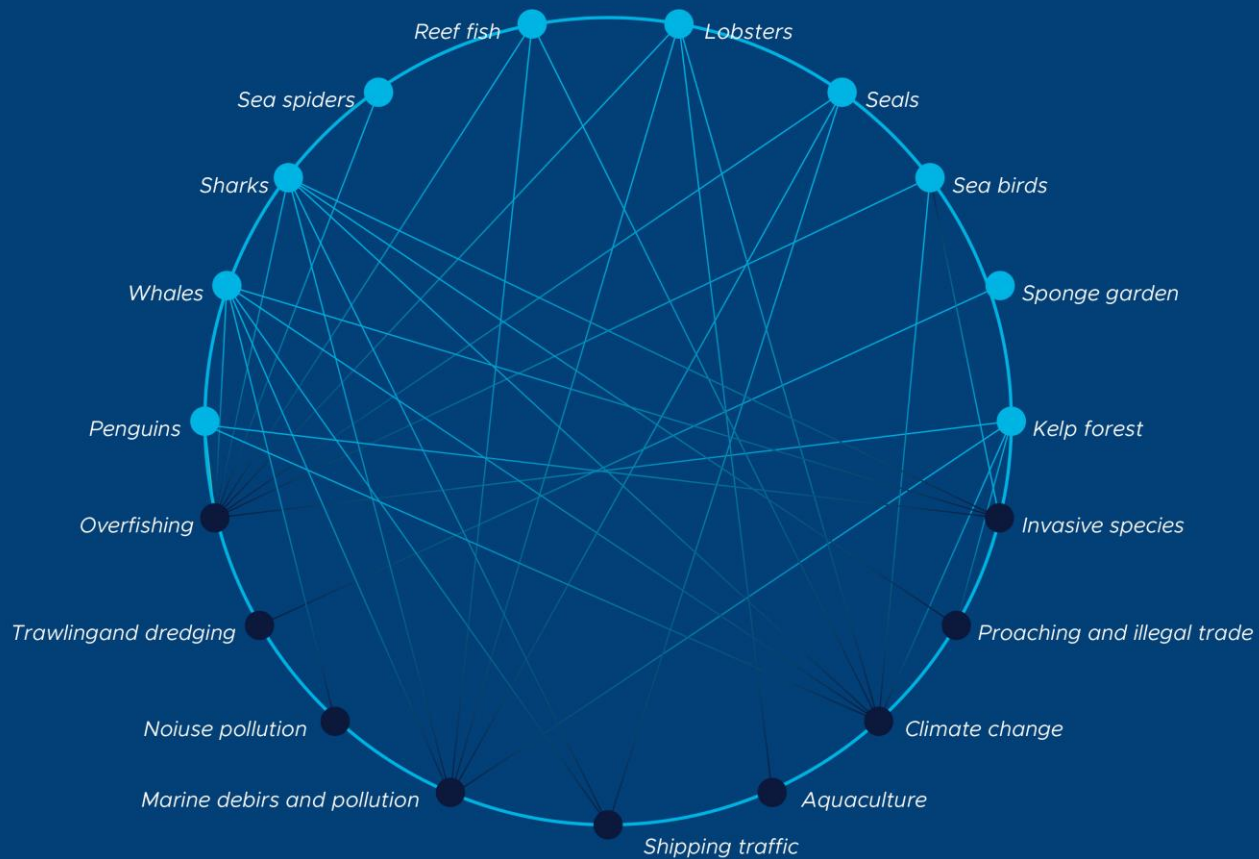
- CLUSTER MAP
- CIRCLE MAP
- ANALYSIS TABLE

Map of marine system in GOR region



*TO BE MADE CLEARER

Relationship map



Threats and research opportunities

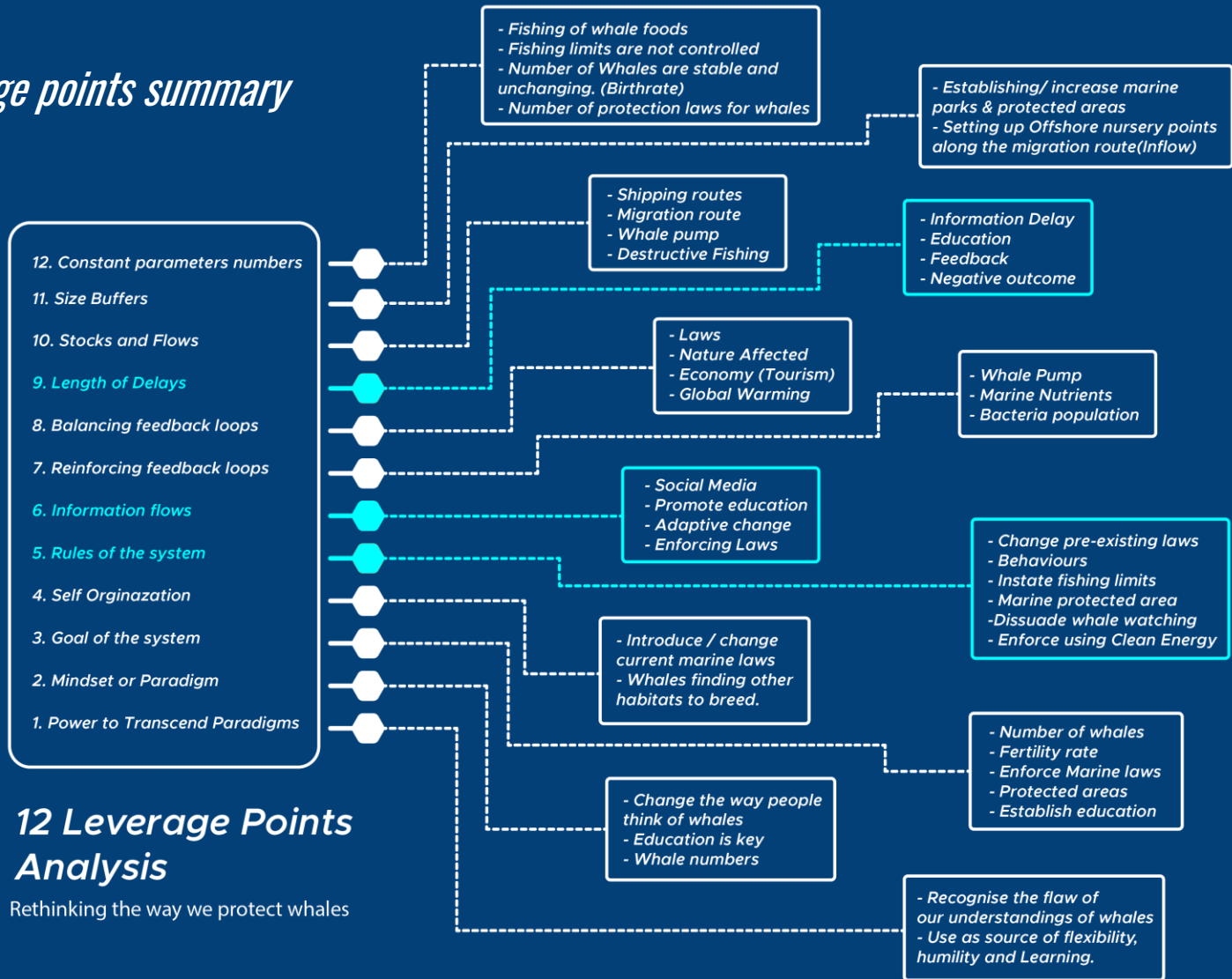
Threats Species	Overtfishing	Trawling and dredging	Noise pollution	Marine debris and pollution	Shipping traffic	Aquaculture	Climate change	Proaching and illegal trade	Invasine Species or pathegon	
Kelp forest	●			●			●	●		4
Sponge garden		●								1
Sea birds	●						●		●	3
Seals	●			●	●		●			4
Lobsters	●			●		●	●		●	5
Reef fish	●			●			●			3
Sea spider	●									1
Sharks	●			●	●		●	●	●	6
Whales	●		●	●	●		●		●	6
Penguin	●						●		●	3
	9	1	1	6	3	1	8	2	5	Total in Species Total in threats



PROBLEM DEFINITION

- Leverage point mapping
- Leverage points summary

Leverage points summary



FACTS ABOUT SOUTHERN RIGHT WHALES

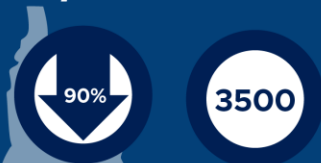
It was meant to be one of the biggest breeding seasons yet but south-east Australia's only established southern right whale nursery produced no evidence of calves this winter. The critically endangered mammal is a big drawcard in south-west Victoria, with thousands of whale watchers flocking to Warrnambool's Logan's Beach nursery each winter to catch a glimpse of a young whale.

This year, visitors failed to see a single whale calf.

Experts have yet to determine the reasons behind the scarcity of calves in Warrnambool this season, but there is speculation climate change might have played a part.



Population



The hunting of these animals made them an endangered species. Since the 19th, the original population was reduced by 90%.
Now listed as endangered under the Environment Protection and Biodiversity Conservation (EPBC) Act 1999, protection measures have seen numbers increase to an estimated 3,500 individuals.

Behaviors

Blowhole

Expels a water stream
5m high in 'v' shape.

Jump

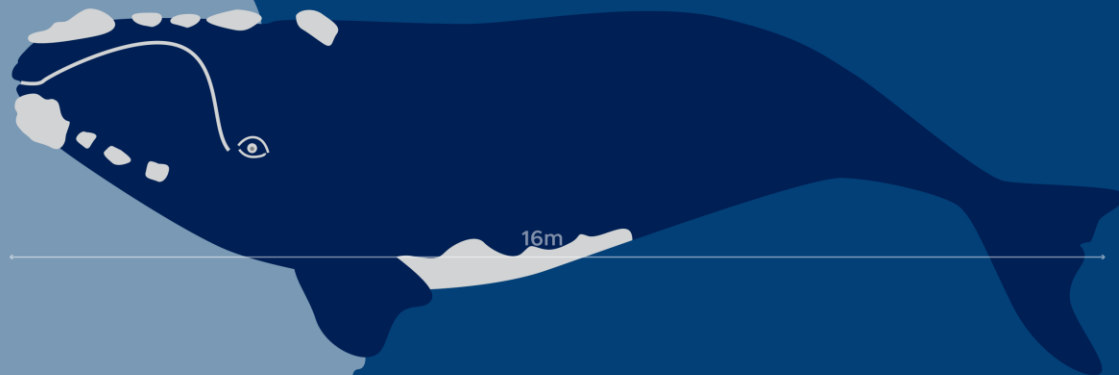
Could be for
dislodging parasites

Lash

Projection caudal fin
Probably from commu-
nication

Uprising headlong

This occurs when the
whales are curious



The life cycle

10m



They breed in winter in warm water. In warm summer, they feed in cold waters. They have a calf every three years. Southern right whales typically give birth every three years, with Warrnambool's nursery south-east Australia's only location that mothers return to each cycle. The whale calves are generally born around the start of June and leave to continue their Antarctic journey by the end of September. They prefer give birth in 10m depth shallow, warm and quite bay.

The southern right whales

Why does it matter

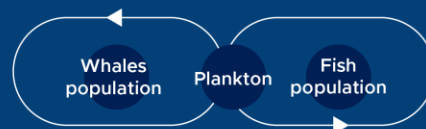


A 2011 study estimated that each visiting southern right whale was worth \$1.25 million to Warrnambool's tourism, meaning their return each year would make a huge economic splash for the town.



Whales are an important part of the marine food chain and play a huge role in maintaining the health of our oceans. Furthermore, their poo is a source of nutrients in the marine food chain, promoting Southern Ocean productivity.

Warrnambool



Threats for southern right whales



1 Entanglement



2 Global warming

1 Entanglement in commercial fishing equipment and marine debris can injure or kill whales. It can also reduce a whale's fitness by restricting its mobility, and impairing its breathing, swimming or feeding. Nets and lines cut through a whale's skin and blubber, exposing the animal to infection, amputation or death.

2 Warming oceans, and changes to ocean processes may alter the distribution and supply of food (mostly krill and copepods) available to the southern right whale. Research suggests that warming waters may also hamper whale reproduction.

3 The southern right whale appears to be the primary whale species involved in vessel collisions, which can lead to death or serious injury. A study of cetaceans in the Southern Hemisphere found that southern right whales accounted for half of all whale deaths resulting from vessel collisions.

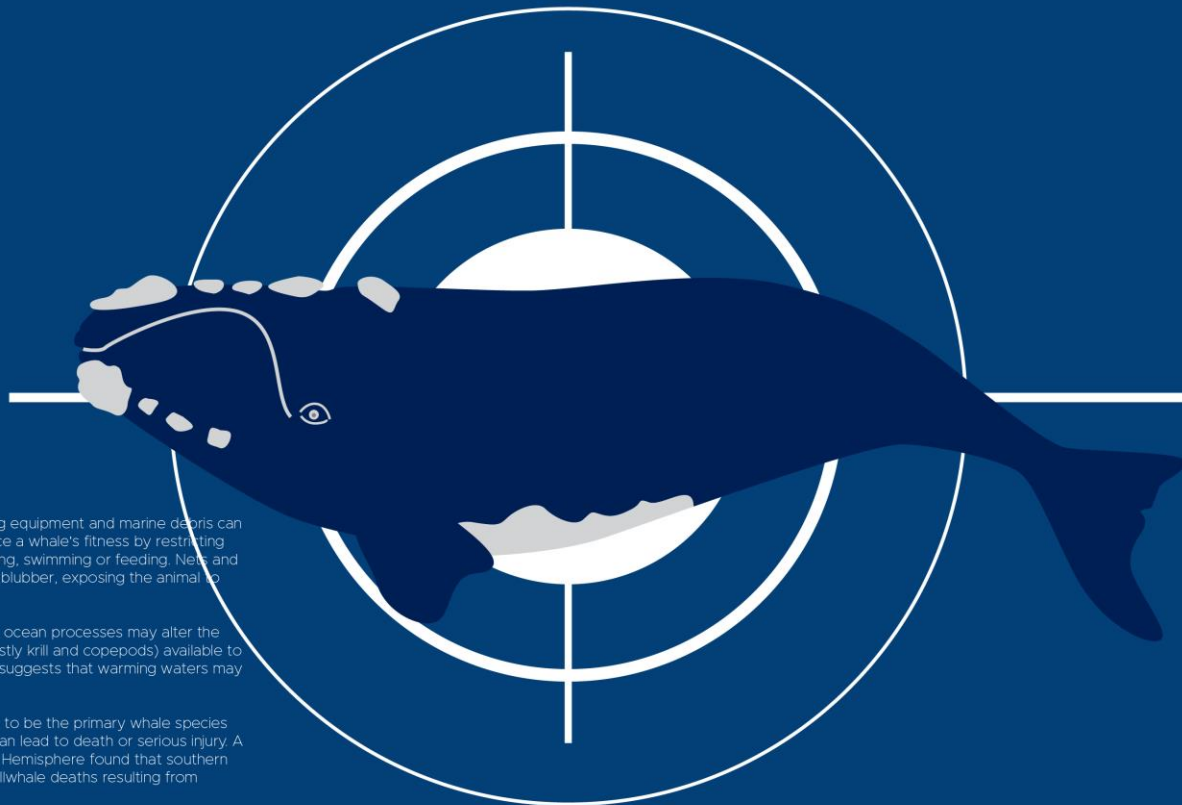
4 Loud noises or long exposure to underwater noise can not only disrupt whale communication and cause temporary or permanent hearing loss, they can also deter whales from important habitats. In Australian waters this harmful noise can include seismic surveys, industrial activities (such as drilling, pile driving, blasting and dredging), defence activities, vessel noise and aircraft operating at low altitude.



3 Vessel disturbance



4 Under water noise



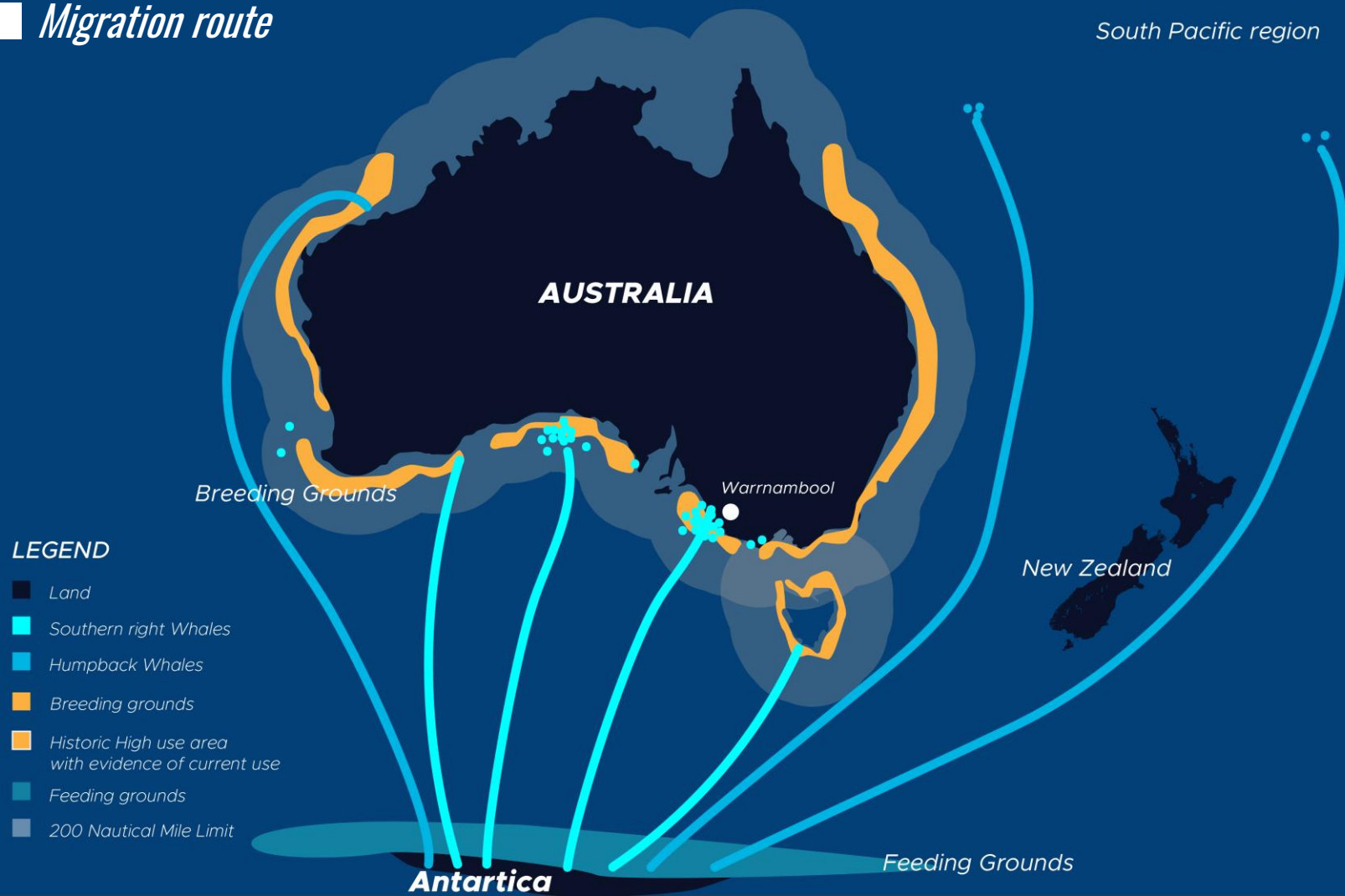


LOCATION RESEARCH

WHAT ARE THE PLACES FOR US TO INTERVENE

- MIGRATION AND DISTRIBUTION
- POTENTIAL THREATS
- STRENGTH OF PROTECTION OF SAID AREA
- SPECIFIC ZONES (PROTECTED / EXCLUSION)

Migration route



Oil rigs area

South Pacific region

AUSTRALIA

Breeding Grounds

Warrnambool

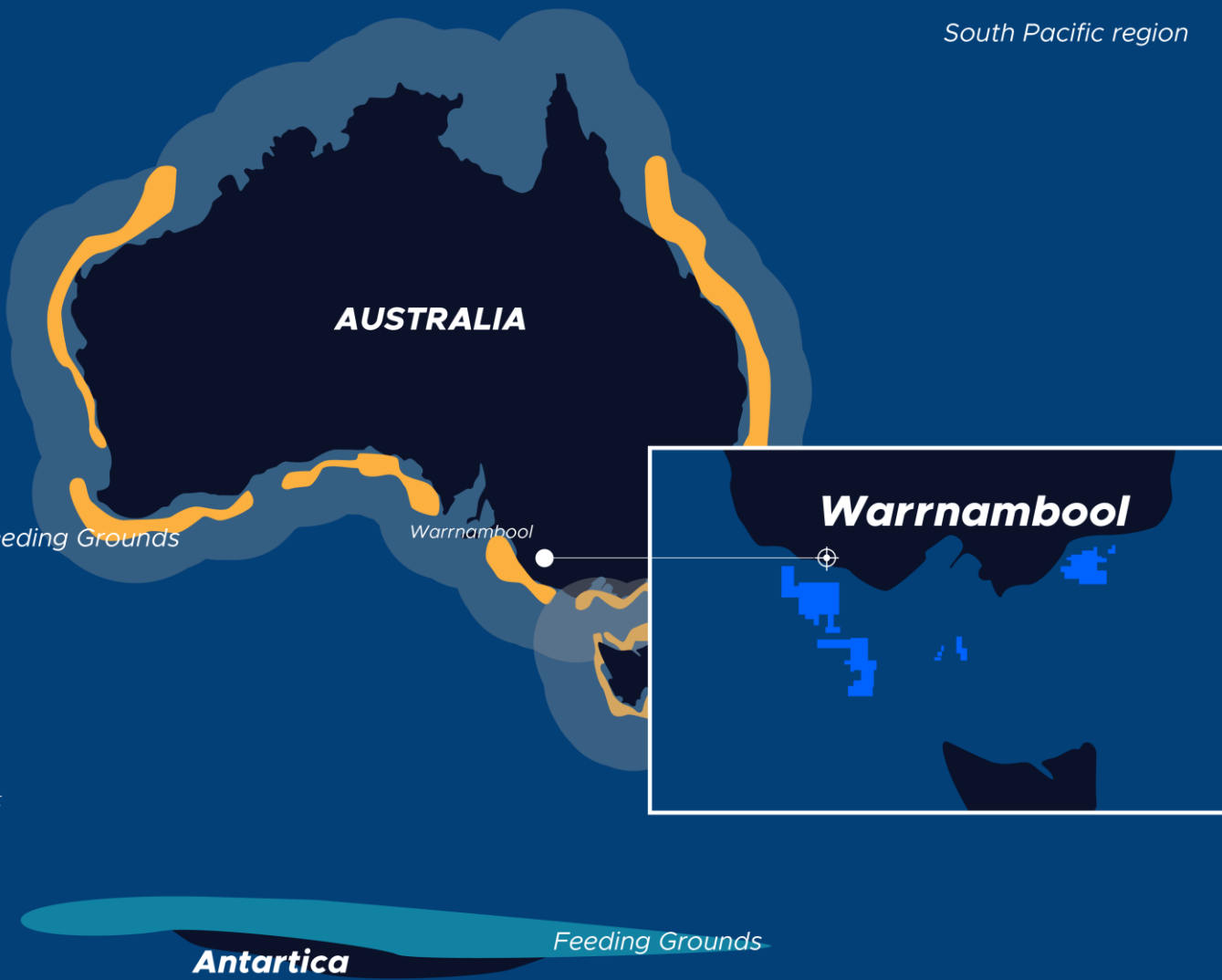
Warrnambool

LEGEND

- Land
- Oil rigs area
- Breeding grounds
- Feeding grounds
- 200 Nautical Mile Limit

Antartica

Feeding Grounds



Shipping route

LEGEND

- Land
- Shore
- Ship Route
- Oil and Gas Rigs

AUSTRALIA

Port Fairy Warrnambool

New Zealand

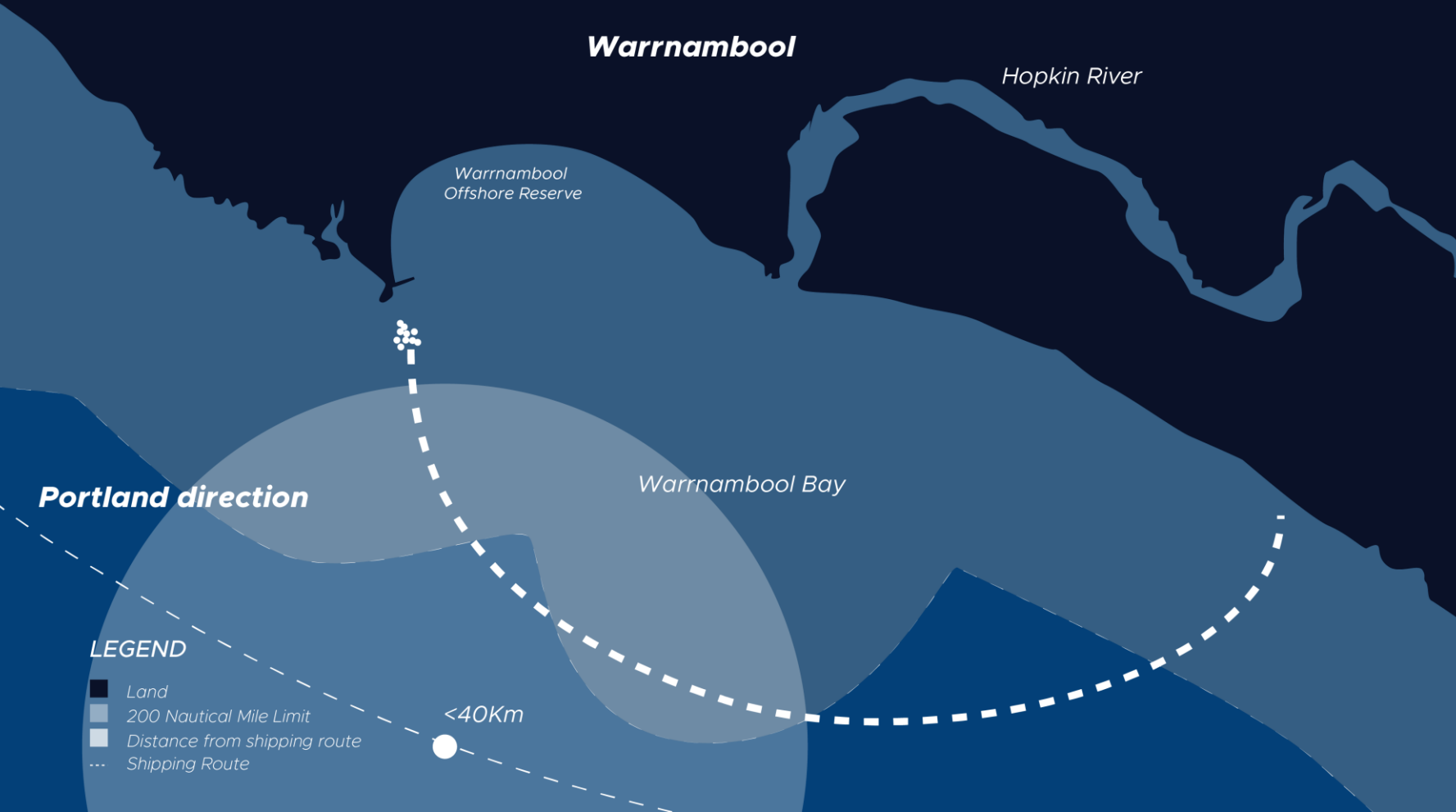




POTENTIAL THREATS RESEARCH

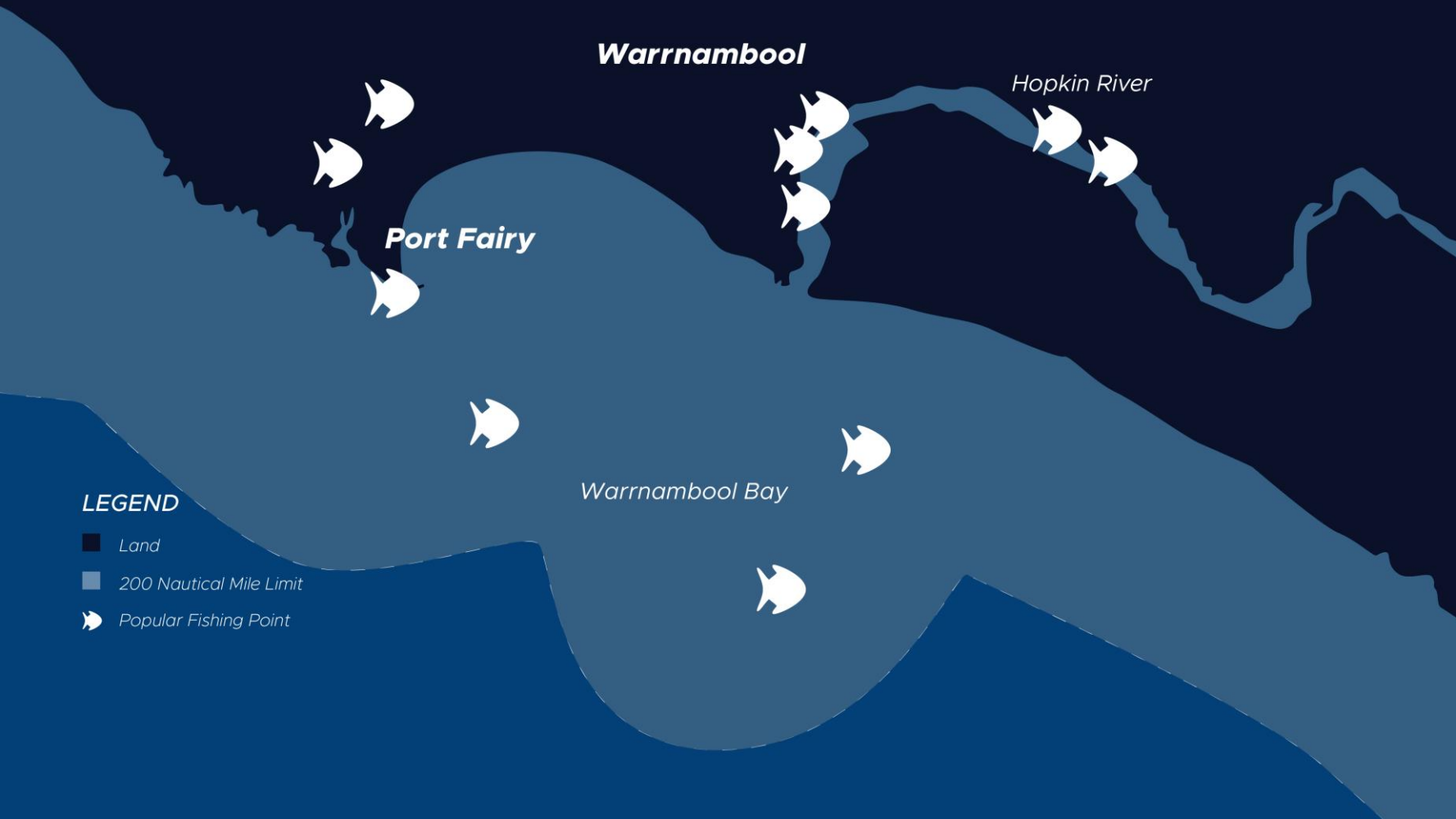
1 km

Shipping route in small scale



1 km

Popular fishing zone in small scale



Warrnambool

10Km

Merri Marine Sanctuary

Oil rigs area in small scale

LEGEND

-  Land
-  200 Nautical Mile Limit
-  Exclusion Zone
-  Gas Field

Halladale

Black Watch

Martha

**Twelve Apostles
Marien National Park**

Henry

Netherby

Henry

Minerva



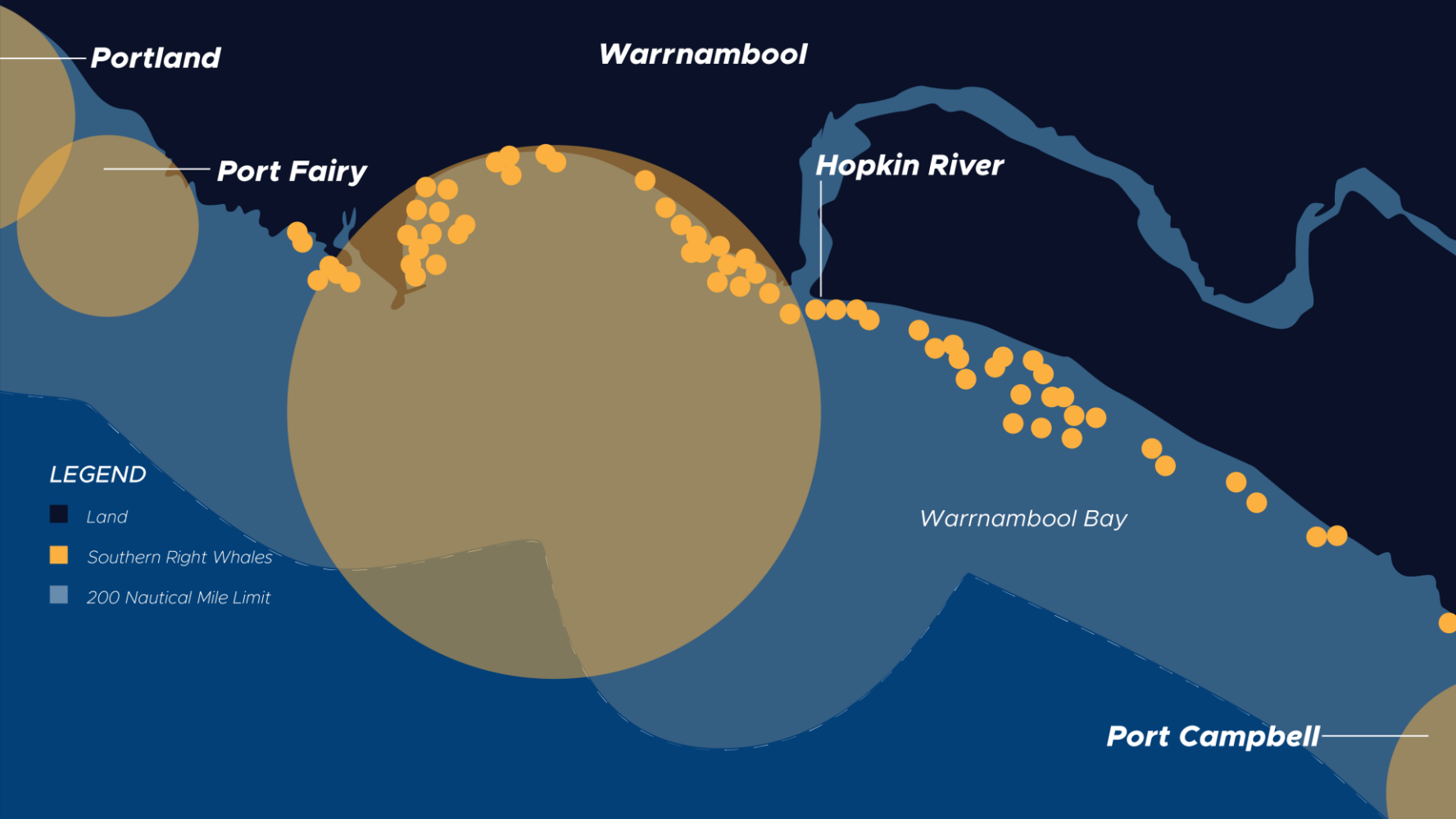




PROTECTED AREA RESEARCH

1 km

Distribution map in small scale



1 km

Protected area

Thunder Point
Coastal Reserve

Warrnambool

Hopkin River

Warrnambool
Offshore Reserve

Merri Marine
Sanctuary

Logan Beach
Whale Nursery

Logan Beach Whale
Watching Platform

LEGEND

- Land
- Southern Right Whales Active Area
- 200 Nautical Mile Limit
- Marine park, Marine Sanctuary, Reserve

Warrnambool Bay

Mepunga
Coastal reserve

Peterborough
Coastal reserve

1 km

Exclusion zone

Warrnambool

Hopkin River

Warrnambool Bay

Exclusion Zone

LEGEND

-  Land
-  200 Nautical Mile Limit
-  Exclusion Zone



OVERLAPPING MAP

1 km

Overlapping map

Thunder Point
Coastal Reserve

Warrnambool

Port Fairy

Warrnambool
Offshore Reserve

Merri Marine
Sanctuary

Logan Mouth
Whale Nursery

Logan Beach Whale
Watching Platform

Hopkin River

Portland direction

LEGEND

- Land
- Southern Right Whales Active Area
- 200 Nautical Mile Limit
- Marine park, Marine Sanctuary, Reserve
- Exclusion Zone
- Shipping Route
- Fishing Zone

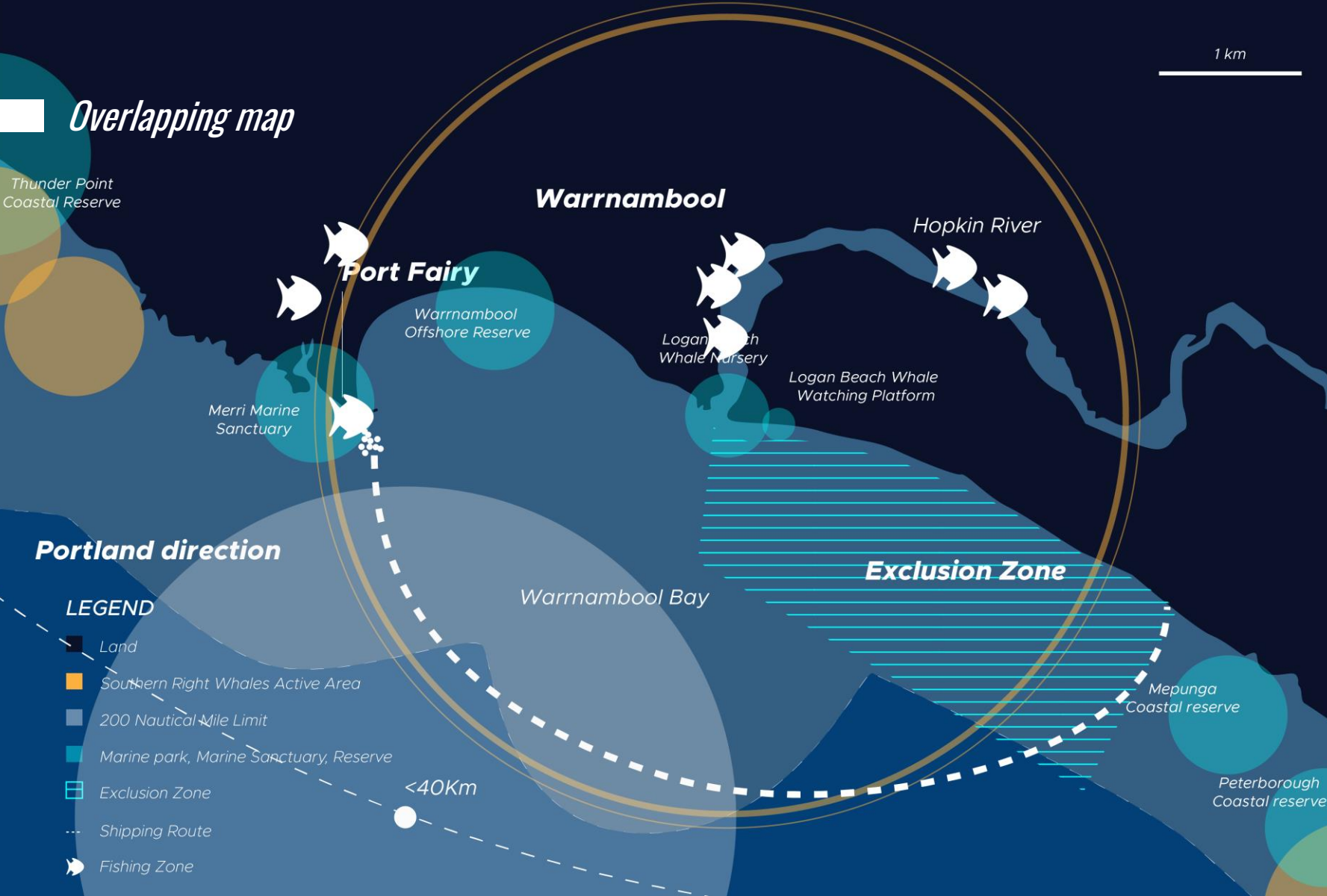
Warrnambool Bay

Exclusion Zone

Mepunga
Coastal reserve

Peterborough
Coastal reserve

<40Km

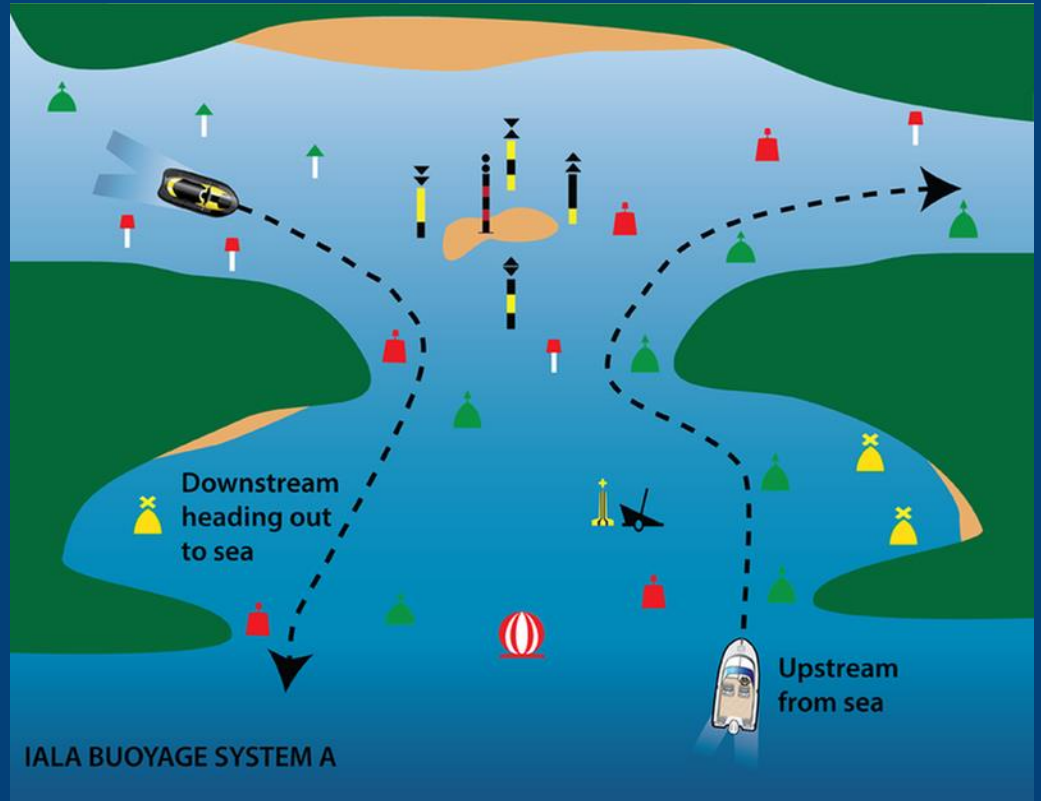




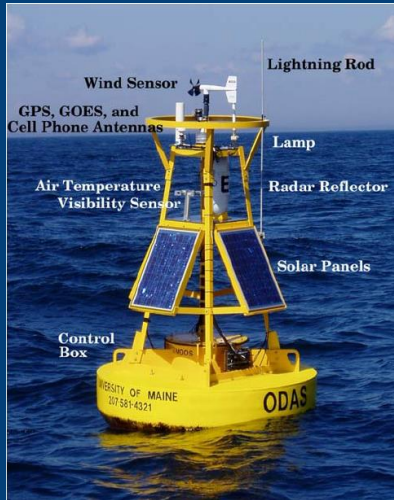
BUOY RESEARCH

TYPES OF BUOY

- LATERAL CHANNEL MARKS
- CARDINAL MARKS
- ISOLATED DANGER MARKS
- SPECIAL MARKS
- SAFE WATER MARKS
- NEW DANGER MARKS

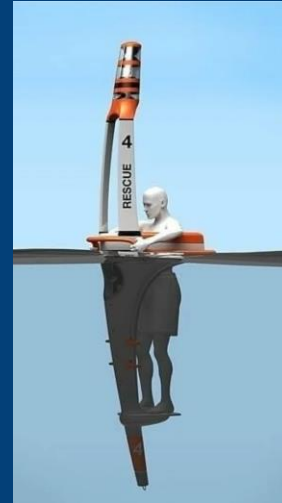


BUOY DETAILS PURPOSE GENERAL (PRECEDENTS STUDY)



The Purpose

- A device which started in part as a prototype for sustained regional ocean observing systems in energetic environments.



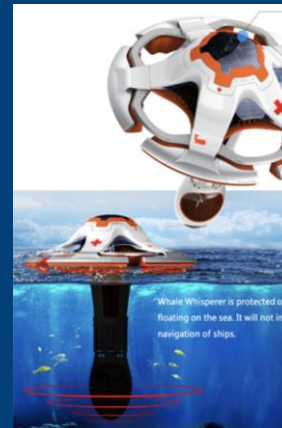
The Purpose

- A device which can help monitor people swimming at big beaches



The Purpose

- A device which deployed in marina entries and ports for temporary and permanent navigation guidance



The Purpose

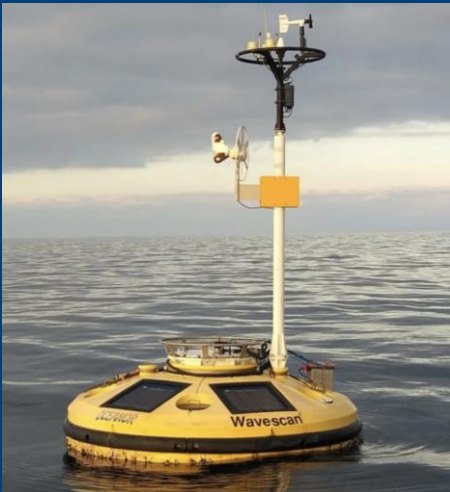
- A device which can avoid whales get stranded at beaches
- They help in emitting the right feedback to the sonic signals sent out by the whales, thus preventing any accidents.

BUOY DETAILS PURPOSE GENERAL (PRECEDENTS STUDY)



The Purpose

- The OMC-7012 data buoy is ideal for environmental monitoring projects, specifically designed for the measurement of hydrological parameters in lakes, rivers, estuaries and coastal zones.



The Purpose

- Moored buoys are anchored at fixed locations and regularly collect observations from many different atmospheric and oceanographic sensors, providing evidence on the ocean state and ocean variability, allow a better understanding on the several processes that take place in the marine environment

DESIGN PROPOSAL



DESIGN PROPOSAL

THE PROPOSAL

- A NETWORK & A SYSTEM OF BUOYS WHICH ACTS AS BARRIERS
- SAFETY MEASURE FOR MARINE LIFE ALONG THE GREAT OCEAN ROAD

INTENTION

- ENCOURAGE WHALES TO BE ABLE TO HAVE A SAFE PLACE TO REST AND BREED (IF POSSIBLE) AS WELL AS A LOCATION WHERE THEY WOULD FEEL SAFE TO BE IN.
- ENGAGE WITH SHIPPING VESSELS IN THE LOCATION ABOUT THE SPECIES IN THE AREA.
- ENGAGE WITH THE PUBLIC FOR BETTER UNDERSTANDING OF THE SPECIES

E.G. SCIENTIST FOR INFORMATION.

OTHER

- HYDROPHONES TO PICK UP ON MARINE SOUNDS LIKE THE WHALE SONG AND DOLPHIN COMMUNICATION TO LOCATE THEIR WHEREABOUTS.



1 km

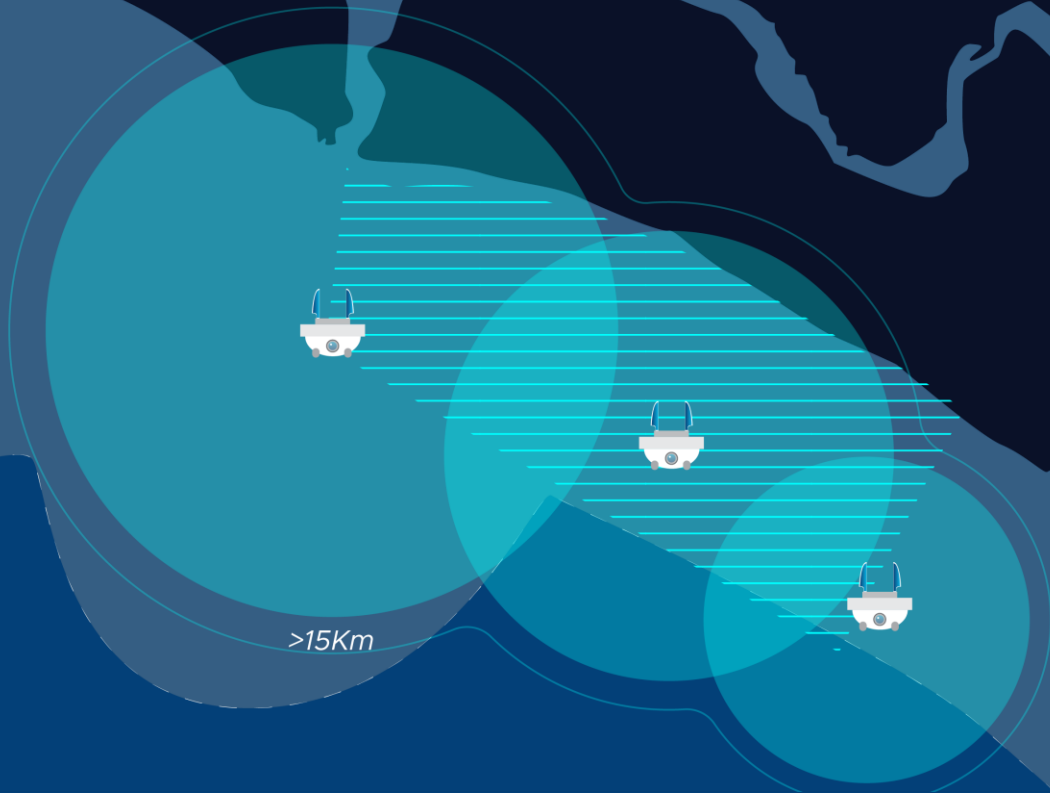
Warrnambool

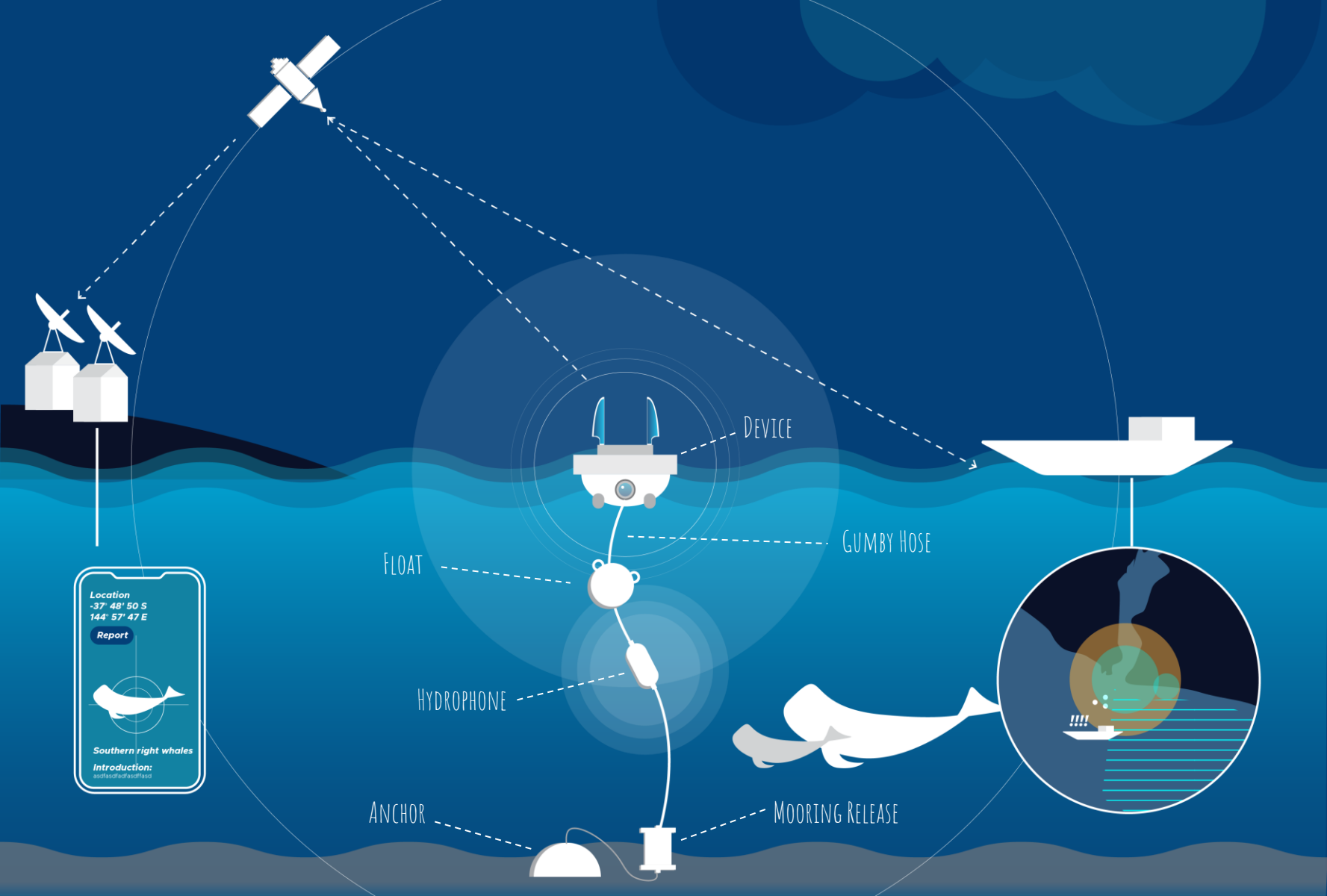
Hopkin River

Warrnambool Bay

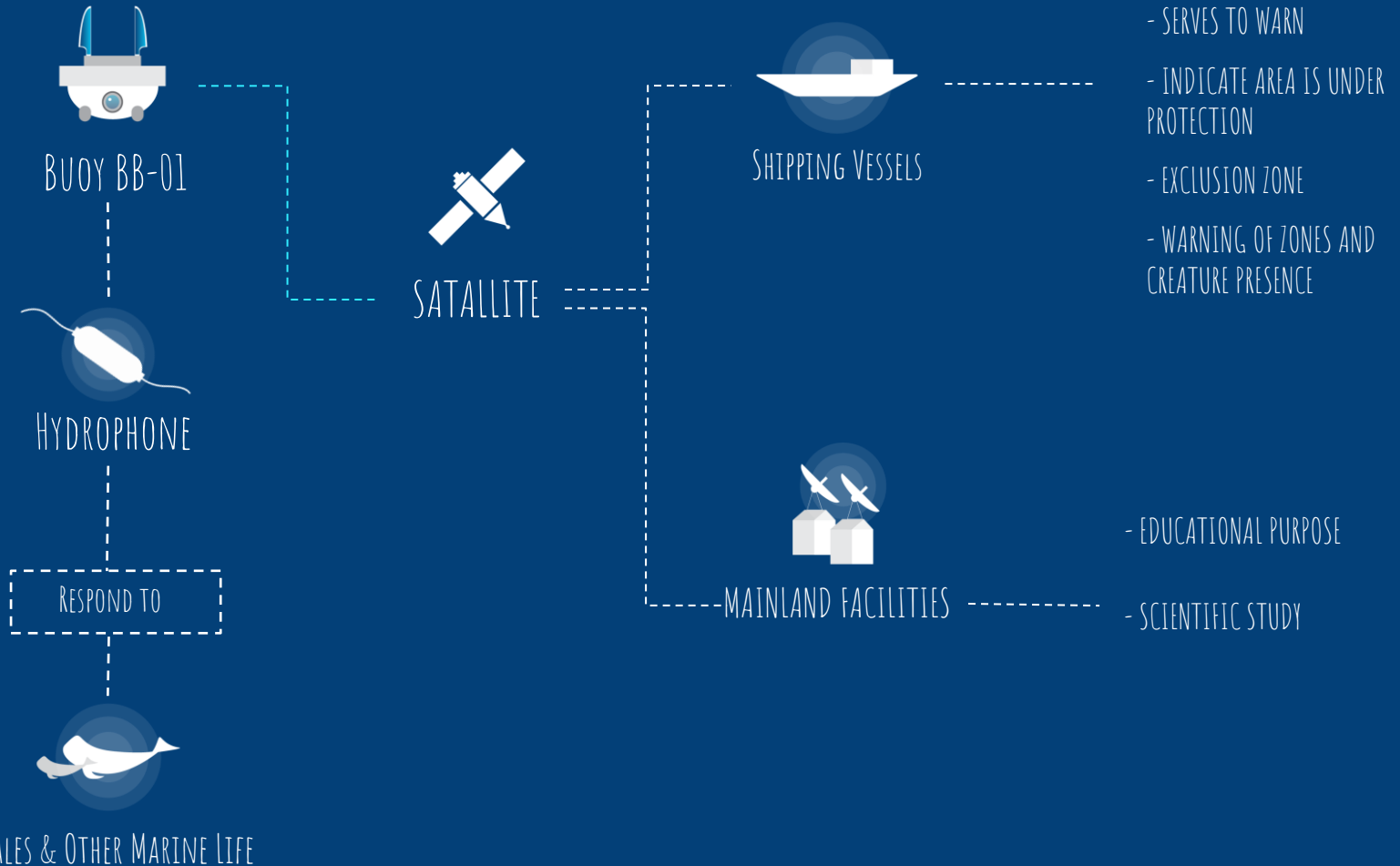
LEGEND

- Land
- 200 Nautical Mile Limit
- Exclusion Zone

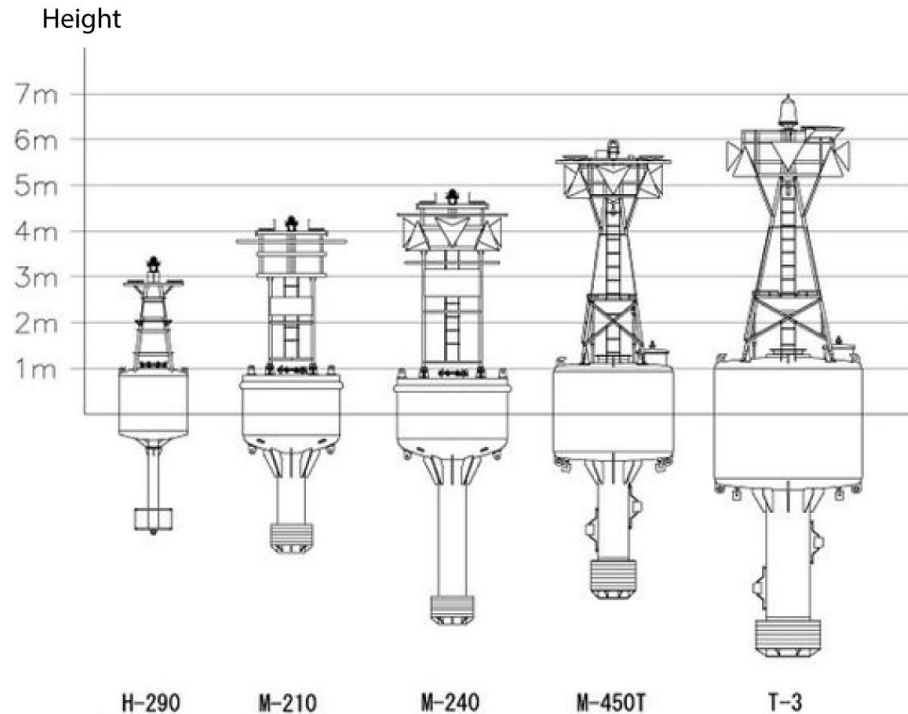
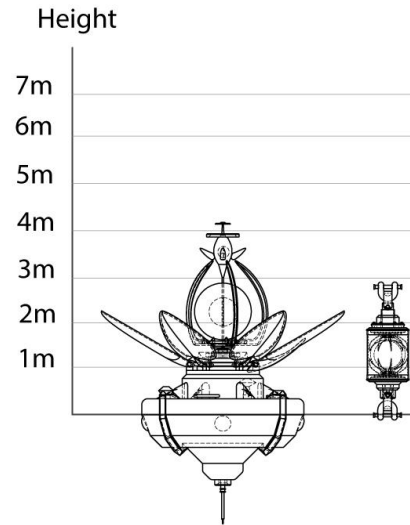




HOW IT WORKS



HEIGHT COMPARISON (BB-01)





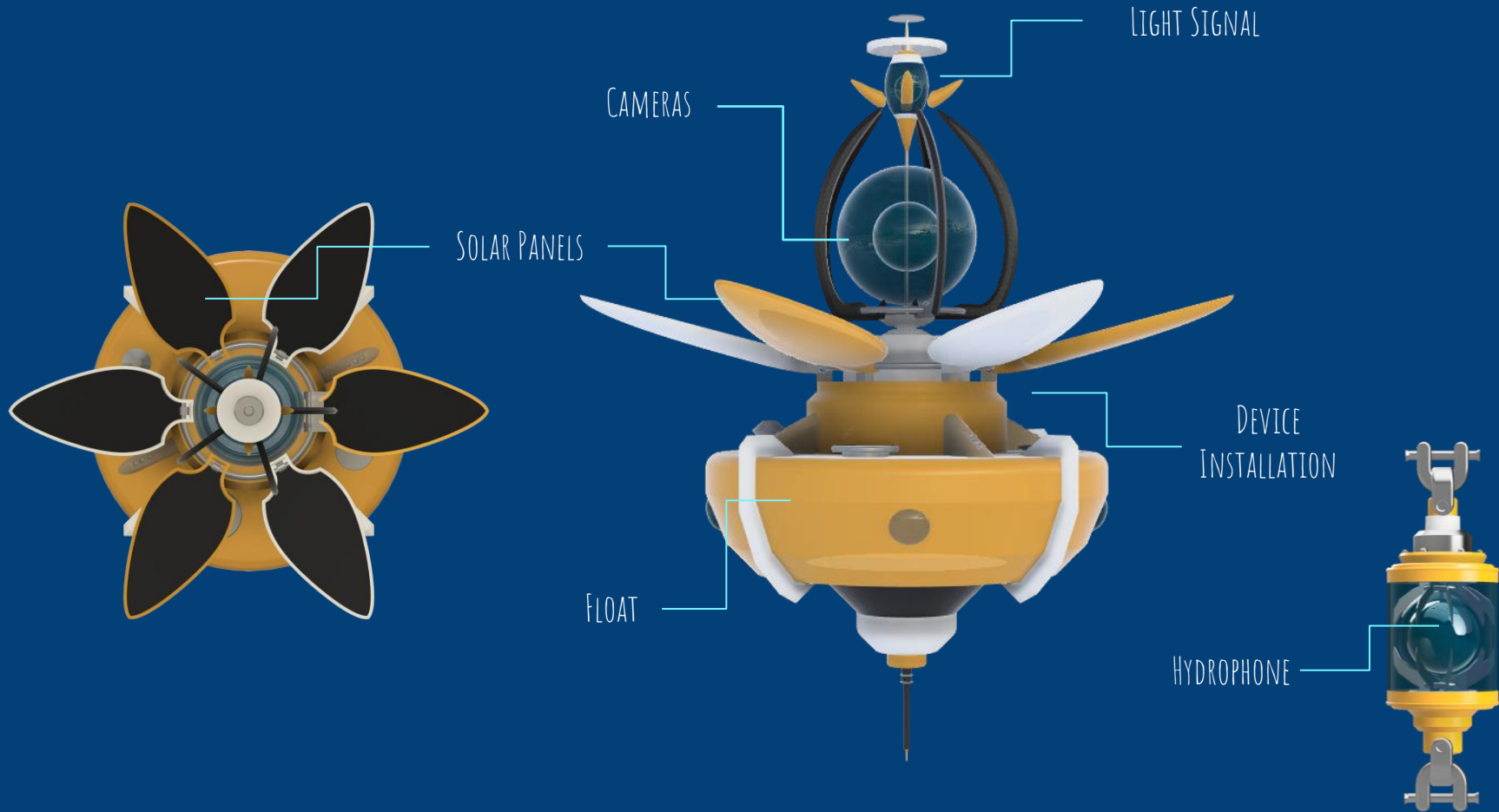
DESIGN (BB-01)

CONCEPT HERE

- MODEL DIAGRAMS (COMPONENTS)
- RENDERED 3D MODEL

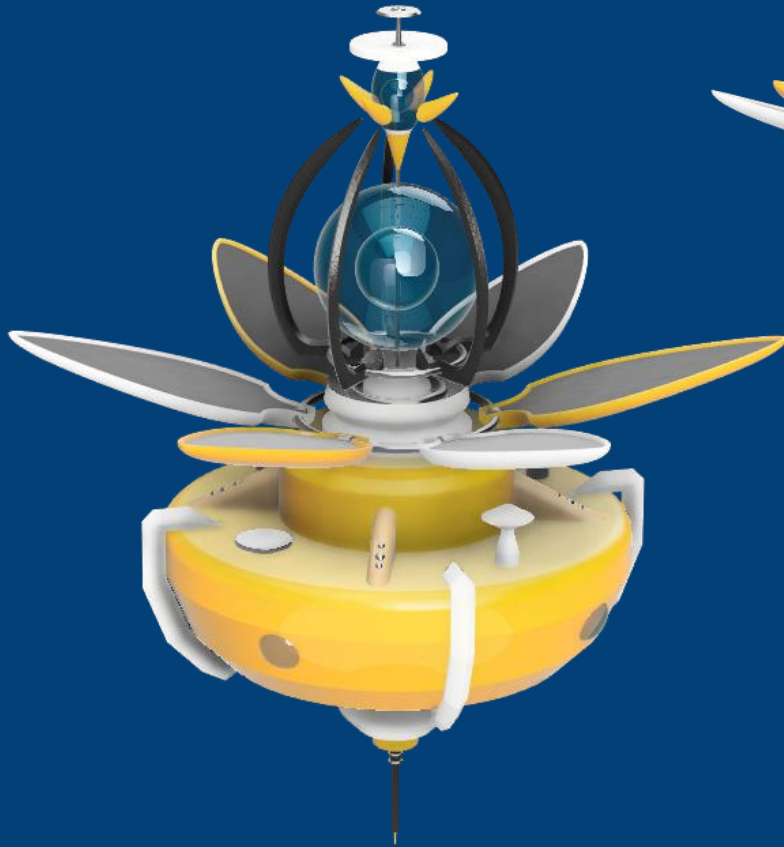


COMPONENTS IN THE BB-01

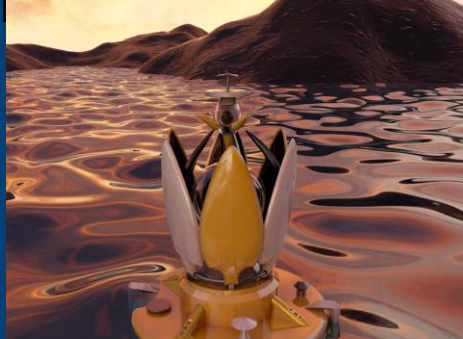


Final Model

- Hero shots



3D RENDERS



THANK YOU
FOR LISTENING



Reference List

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