

Case study 2: Using a remotely piloted aircraft (RPA) to research marine mammals

Background

Marine parks were designed to include many species of conservation importance. One of the most iconic is the southern right whale, which migrates to areas of South Australia, the most significant being the Great Australian Bight, for breeding and calving. The Bunda Cliffs, at the Head of the Bight, also include important haul-out and breeding sites for Australian sea lions. Our understanding of marine mammal ecology and behaviours is limited, largely due to difficulties in accessing them. Animals inhabit offshore islands and often remote on-shore locations. Approaching them can result in negative impacts on their behaviours, particularly when young animals are involved. The Head of Bight is world renowned as a habitat for southern right whales (SRW) and Australian sea lions (ASL), but it is difficult to access these animals due to rough waters and inaccessible cliffs. To overcome this, DEWNR has worked collaboratively with university researchers to find ways to use remotely piloted aircraft (RPA) (aka drones) to do this work.

In 2016, Dr Fredrik Christiansen from Murdoch University began a project to use RPAs to gain an understanding of the health of the southern right whale population, especially the relationship between mother and calf body condition. Climate-driven indirect effects on the whales' prey is becoming a growing concern. These whales feed mainly in the sub-Antarctic, and the amount of prey available will dictate how much energy a female will have available for reproduction. In addition, work was done to consider the impacts of using RPAs on the whales. The use of RPAs in a Restricted Access Zone for research required a DEWNR Marine Parks permit. The success of this work inspired DEWNR to begin a second project to use RPAs to count Australian sea lions located in breeding colonies and haul out sites in the Bunda Cliffs at the Head of Bight.

This case study highlights the two projects using RPAs, the links with the marine park management plan strategies, and some early socio-economic and ecological outcomes as a result of implementation of the management plans.

Methods

Southern right whale project

During winter, the Head of the Bight is an important breeding and nursing ground for southern right whales, where more



Southern right whale and calf at the Head of the Bight

whales are found here, particularly mothers and calves, than anywhere else in Australia. The whales are observed less than 500 m from the coast so RPAs can be used to photograph them. A small multi-rotor RPA mounted with digital cameras was operated from the cliffs of the Bight up to 2 km offshore, between 5 and 120 m above sea level.

Up to 300 whales of all ages were photographed, but the particular aim was to photograph females with calves, so that the relative body condition of the females could be related to the length and condition of her calf. When possible, repeated measurements were taken of the same whale at various times to investigate changes in body condition.

In addition, while flying the RPA, researchers used a reaction scale to assess whale responses, ranging from no reaction to strong reaction, and modified the use of the RPA accordingly. When a strong reaction was observed, work on that animal was immediately stopped and not resumed for the rest of the day.

Australian sea lion project

Following the success of the whale research, in 2017 as part of long term ASL monitoring, DEWNR in collaboration with SARDI used an RPA to count sea lions along the Bunda cliffs. This enabled the inclusion of previously unobtainable animals, including mothers and pups. RPAs were used on average at 50 m above sea level with little response from the animals observed.

Results

Southern right whale project

More than 90 mother/calf pairs were recorded at the Head of Bight, and a preliminary analysis shows a strong relationship between maternal body condition and calf growth rates.

The aim is to monitor the southern right whale population at the Bight over four years to quantify changes in their body condition, and how this relates to environmental variables in the sub-Antarctic. This will increase Australian and international understanding about the ongoing health of this population.

Australian sea lion project

The early results of the sea lion count show both a significant increase in numbers and previously unknown locations of animals in the Bunda Cliffs, which greatly improves our understanding of the health of this population.

Management plan strategies

Activities associated with the two RPA projects have addressed numerous strategies of the marine park management plans:

Strategies addressed

2	4	5	7	8	9	10	11	12	13
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Strategy 2: Understanding the requirements of marine mammals is important for helping to understand and mitigate threats.

Strategy 4: The marine parks program supported this work by providing permits under the Marine Parks Act 2007 which included conditions to ensure impacts on animals and the environment were mitigated.

Strategies 5, 7 and 8: Conducting collaborative research and communicating results will aid in increasing public appreciation and understanding.

Strategy 9: Aboriginal communities were involved with the southern right whale RPA projects.

Strategies 10, 11, 12 and 13: Outcomes from the two projects will inform the MER Program. The projects were collaborations that have informed better decisions on monitoring of southern right whales and Australian sea lions.

Ecological outcomes

Specific evaluation question addressed:

- ✓ What biodiversity is included within the marine parks network?
- ✓ Have sanctuary zones maintained or enhanced biodiversity and habitats?

These projects increase Australian and international understanding about the ongoing health and abundance of southern right

whale and Australian sea lion populations. Populations of SRW and ASL are predicted to maintain their current status inside the Restricted Access and Sanctuary Zones and the RPA projects will assist with monitoring these population trends.

Socio-economic outcomes

Specific evaluation question addressed:

- ✓ Have local businesses and communities changed due to marine park management plans?
- ✓ Has tourism changed due to marine parks?

Both projects are providing information about whale and sea lion responses to RPAs which will guide Australian and international researchers in future work. Research into the wellbeing and protection of breeding sites ensures a viable tourism industry into the future. Photographs obtained from both projects may be used for a wide range of community education materials.

References

Christiansen F, Rojano-Doñate L, Madsen PT and Bejder L (2016) Noise Levels of Multi-Rotor Unmanned Aerial Vehicles with Implications for Potential Underwater Impacts on Marine Mammals

