

From little things big things grow

Localised small-drone nesting beach surveys can support a regional dataset



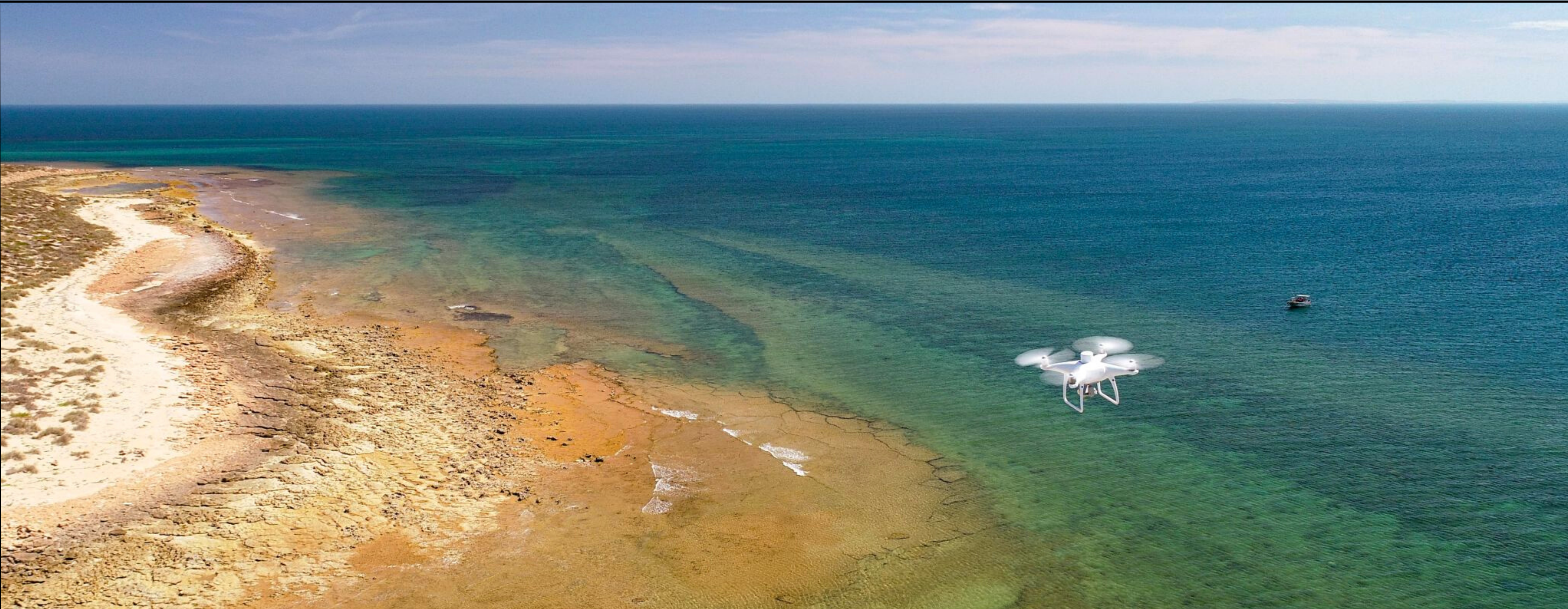
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INTRODUCTION

Globally, the conservation status of sea turtles ranges from critically endangered to data deficient. Many populations utilise nesting habitats which are remote and difficult or expensive to access for the purposes of scientific investigation and population monitoring. As a result, they are understudied which hinders conservation and management decisions. We provide a case-study from north Western Australia (WA) that shows how localised monitoring programs can use small drones to contribute to a larger dataset.

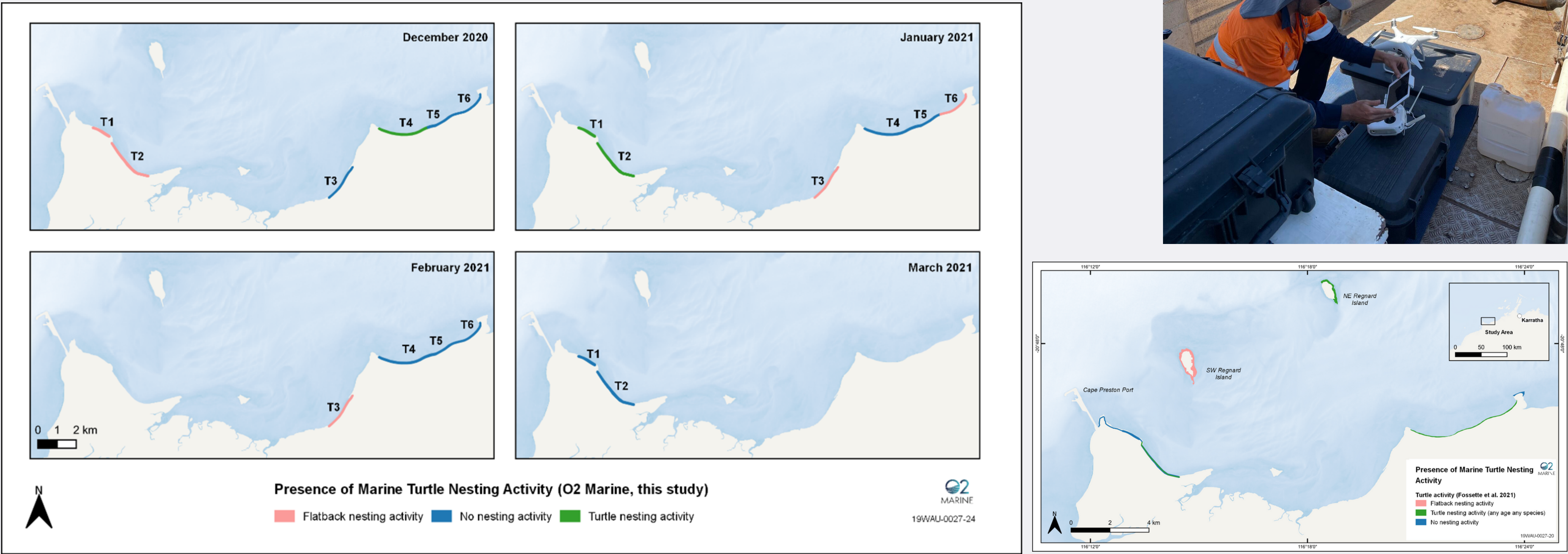
Six of the world’s seven species of sea turtles occur in Australian waters and are protected under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*. The north-west marine region of WA provides important nesting habitat for several species along a vast and remote coastline under various pressures from developments. The *WA Environmental Protection Act 1986* and *WA Biodiversity Conservation Act 2016* both aim to help achieve environmentally sustainable development while protecting environmental values, including biodiversity, across the State. The latter is implemented by the State Department of Biodiversity, Conservation and Attractions (DBCA) who are tasked with monitoring and managing threatened species and communities.

The purpose of our study was to inform an environmental impact assessment, by identifying the presence of nesting turtle species and determining the regional significance of the beaches at our site as nesting habitat.



METHODS

We used a DJI Phantom 4 remotely piloted aerial system (RPAS), or ‘drone’, which is relatively small, affordable, and easy to acquire. RPAS use in marine wildlife monitoring is rapidly growing, with benefits of reduced costs and health and safety risks due to less field time, and increased transparency and reproducibility due to permanent data storage for future verification and autonomous operations along pre-defined transects . We consulted with DBCA scientists during the early stage of survey design. Where possible, we mirrored photographic data capture, processing and analysis methods used by a regional-scale study conducted by an occupied aircraft with mounted cameras. RPAS flights were flown along pre-determined transects using the freely available DJI GS Pro app. The pilot moved by small vessel or four-wheel drive vehicle to maintain visual line of sight with the RPAS. A trained and experienced observer identified flatback (*Natator depressus*) and green (*Chelonia mydas*) turtle track presence, distribution, density, and nesting outcome.



OUTCOMES

While a larger RPAS would allow data to be gathered from large stretches of inaccessible coastlines and offshore islands beyond visual line of sight, associated licensing and permitting times can be prohibitive. We were able to directly compare our local data with results obtained for the region. By focusing surveys to a localised area, we were able to repeatedly survey beaches within a survey period and the turtle nesting season which increased capture probability. The data contributes to initiating steps towards scientifically-based spatially and temporally explicit management and recovery plans for Pilbara turtle stocks

HIGHLIGHT

The methods proved reliable with the potential for uptake by various groups including grass-roots NGOs, indigenous rangers, and environmental consultants to contribute to data for informed sea turtle population-level conservation and management.

Related literature

Fossette, S., Loewenthal, G., Peel, L., R., Vitenbergs, A., Hamel, M. A., Douglas, C., Tucker, A. D., Mayer, F. and Whiting, S. D. 2021. Using Aerial Photogrammetry to Assess Stock-wide Marine Turtle Nesting Distribution, Abundance and Cumulative Exposure to Industrial Activity. *Remote Sensing* 13 (6). <https://doi.org/10.3390/rs13061116>.

Johnston, D. W. 2019. Unoccupied Aircraft Systems in Marine Science and Conservation. *Annual Review of Marine Science*. 11:439-463 <https://doi.org/10.1146/annurev-marine-010318-095323>.

Pendoley, K. L., Whittock, P. A., Vitenbergs A and Bell, C. Twenty Years of Turtle Tracks: Marine Turtle Nesting Activity at Remote Locations in the Pilbara, Western Australia. *Journal of Zoology*. 64(3) 217-226 <https://doi.org/10.1071/ZO16021>



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