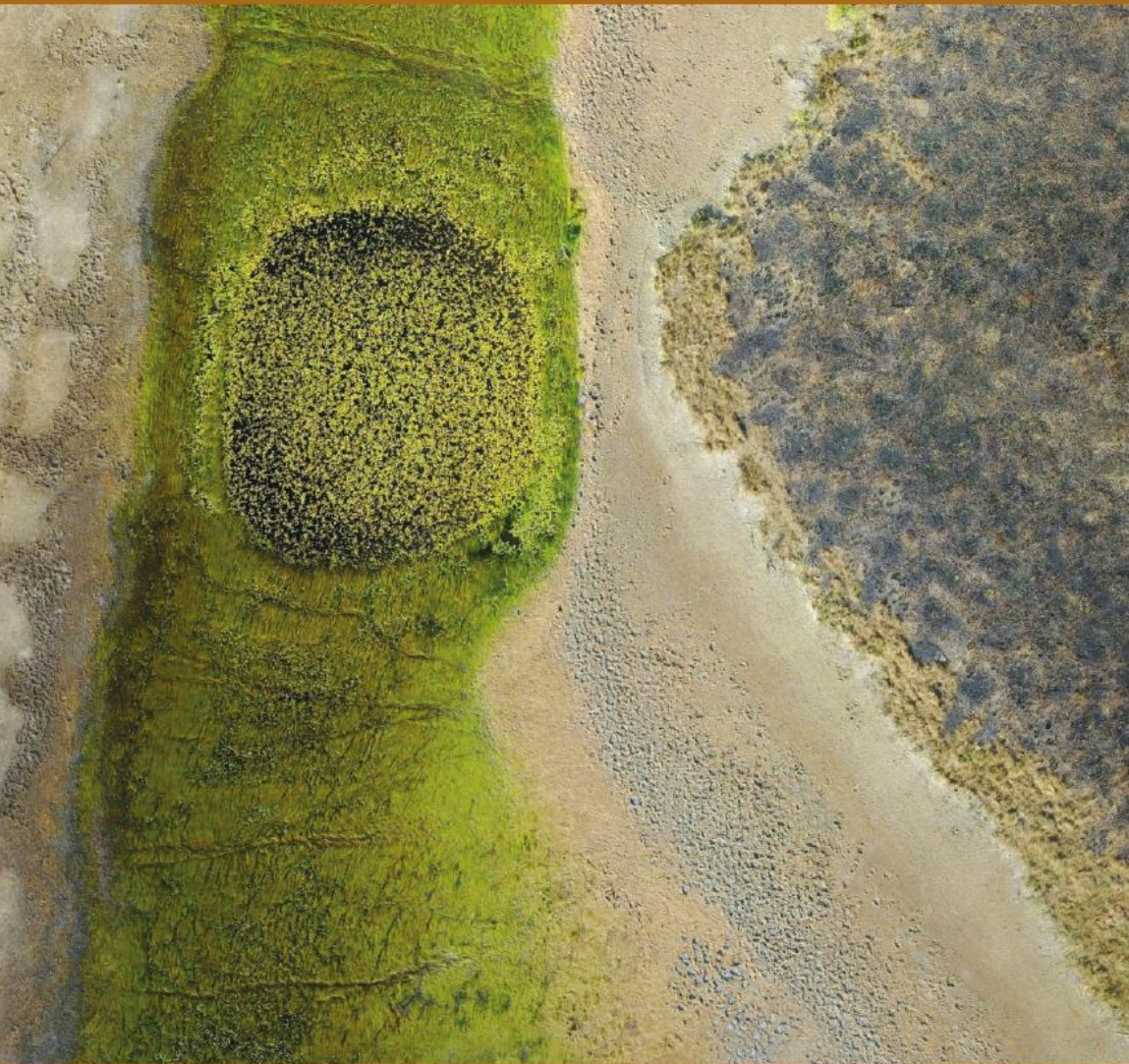


**A Ranger's Handbook**

# **Aerial Photography and Drones**

**Managing Feral Pigs for Biodiversity Conservation in Cape York**



**Balkanu**  
Cape York Development Corporation P/L



**This series of handbooks helps you choose suitable methods for the control of feral pigs and the monitoring of their impacts on biodiversity in your region. The techniques it describes have been used on Cape York Peninsula, Australia, but the ideas can be applied in similar environments in other regions.**

To choose what will work best in your area, it is important to understand the techniques that are available and their limitations. These handbooks provide a brief overview of the available options.

There are multiple techniques for both control and monitoring. Often the best approach for successful control is a combination of techniques (as opposed to just one). Knowing what impacts you want to monitor will drive your decision for a monitoring technique.

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## **Handbooks in this series:**



# Aerial Photography and Drones



## Background

In recent times unmanned aerial systems (UAS), often referred to as drones, have become very affordable and easy to operate. Photographs can be taken from a small personal drone such as a DJI Phantom Pro or from a helicopter to get low level aerial photographs of selected sites over time. This method provides a permanent record of change and if done correctly is easy to convert into geo-rectified stitched images that can be further analysed using GIS software.

## Purpose

Aerial photographs provide very detailed information on the structure and composition of wetlands over time whilst also providing a way to easily record the scale of feral pig impacts across an entire wetland. Drones provide a unique way of getting robust data on wetlands without having to do laborious physical sampling, which may not be connected to the impacts of pigs, because they can be used at any time.

## Prerequisites

- An appropriate drone that meets the legal requirements

- Appropriate training and licences
- Software for stitching photographs or partnerships with a research institution or group that has access to and skills with the software.

## Limitations

Flying the drone and getting the photographs is relatively straight forward, however, high resolution photographs have very large file sizes and data management can be an issue. It is important to account for appropriate data management and processing if seriously considering using drones for monitoring.

## Method

# Equipment Required

To do basic aerial photography over impacted wetlands to measure change over time the following equipment is required:

- Appropriate drone (we suggest a DJI Phantom 4 Pro or similar)
- iPad or Android tablet to control the drone and view the images
- Drone deploy application or similar for automating flights
- Spare batteries (4-5 batteries total is ideal)
- Car charging cable for charging batteries between sites
- High end computer with appropriate software (such as Agisoft Pro) or access to research partner with software
- GIS software for viewing output files.



*Rangers fly a DJI Phantom 4 Pro under the guidance of trained staff.*

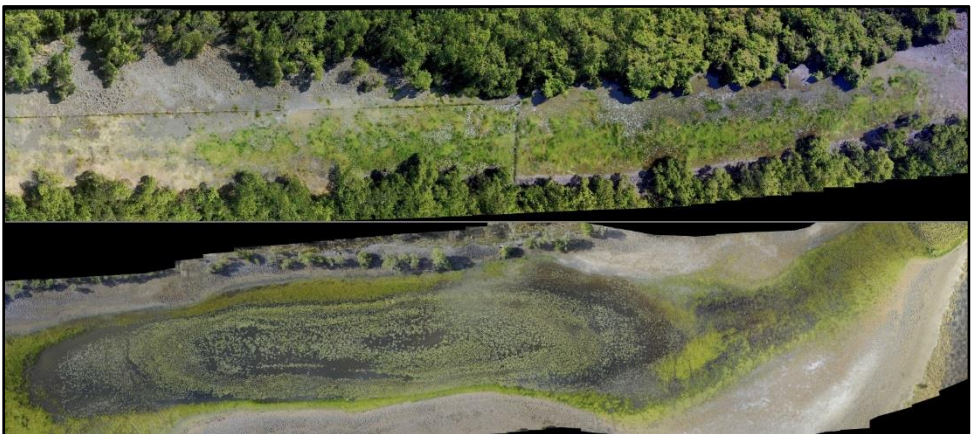
# Flying the Drone

Rangers should be familiar with the DJI Phantom 4 Pro (or similar). Civil Aviation Safety Authority (CASA) regulations allow property owners to operate small drones (under 2 kg) within their property boundaries and outside of controlled airspace without requiring a licence but appropriate training is essential to ensure the safe and effective use of a drone.

*Critical step: the flight plans must be done where there is Wi-Fi or phone reception, before heading into the field.*

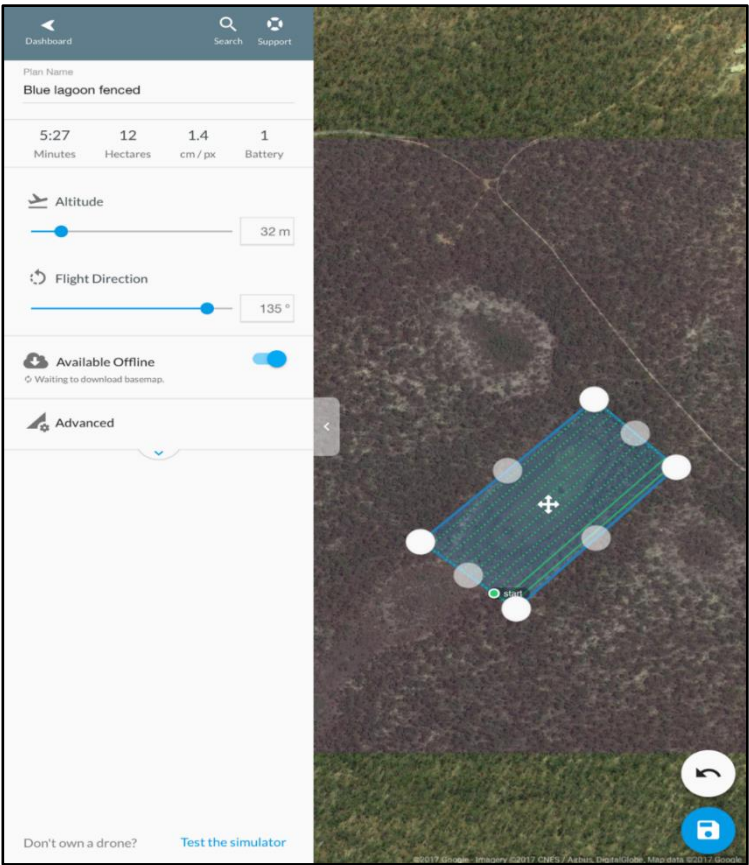
The DJI Phantom drone requires an app called 'DJI GO 4' to be installed on your tablet, which receives video from the drones, calibrates the drone compass and is the platform for all other settings. Another third-party application (i.e. not provided by DJI), called Drone Deploy (shown below) can be used to plan automatic flights of lagoons, with the correct amount of photograph overlap for stitching (approximately 60-70%). Within Drone Deploy, a box can be drawn around each wetland and the height (generally 30 m) and overlap is set. Drone Deploy then calculates the time it will take to complete the survey and informs you how many batteries it will take.

It is important to check the flight time and batteries needed, and set an appropriate return to home altitude for areas with tall trees. At the site, the drone must be calibrated before flight. Run the Drone Deploy program for the select wetland you are at and the drone will automatically fly the transects and take the



photographs. Ensure your Micro-SD card is large enough to fit several sites worth of photos, or have spares available. The pilot and spotter must constantly watch the drone, maintaining line of site and be prepared to take over control should anything go wrong. Watch out for birds that may be defensive and swoop at the drone and do your best not to disturb animals. The drone can be launched and landed manually to avoid collision with trees and shrubs. Images taken with a drone, of fenced and unfenced wetlands in Cape York, are shown under ‘Outputs’.

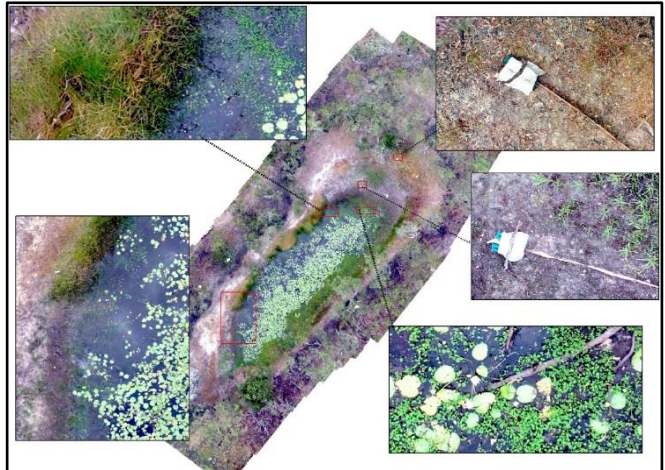
An example of the Drone Deploy interface is below, showing the programmed transects that the drone will fly. The application also shows how long the transects will take to fly and how many batteries will be required. If the batteries get too low the drone returns to the place of launch and lands and waits for a battery to be replaced. Once the battery is replaced the drone returns to the previous location and starts again.



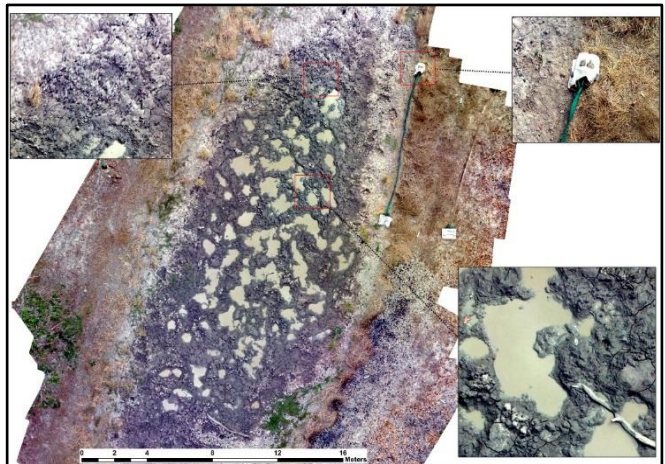
# Outputs

The outputs provide a very detailed view of the wetland that can be used to categorise pig damage, vegetation and water quality. If aerial photographs are collected across the seasons the results provide extremely useful information on seasonal change. In the context of feral pig impacts this is a critical part of the potential biodiversity and water quality impact story.

In a site near Coen, Cape York Peninsula, for example, Kalan enterprises excluded feral pigs using fencing and through the use of aerial photography it was possible to see in very fine detail the changes that have occurred.



In a nearby wetland, feral pigs were not excluded and aerial photographs were taken at the same time to demonstrate the difference between intact and damaged wetlands.



These aerial photos clearly show the extent and location of feral pig impacts. The inset close-ups show the level of detail in the aerial photographs.

## Acknowledgements

This handbook was only made possible by the groups we worked with in the life of the original Biodiversity Fund project and the funding received to conduct it. Funding was received under an Australian Government Grant (2011-2017) for the *'Improving biodiversity outcomes & carbon reduction through feral pig abatement'* project. Funding for much of the marine turtle work was received by a Nest to Ocean grant from a Federal and State funded program from National Parks, Sport and Racing (NPSR). We would like to thank the endless efforts of our partners Aak Puul Ngantam (APN) Cape York, Kalan Enterprises, Balkanu Cape York Development Corporation Pty Ltd, CSIRO, James Cook University and the Queensland Department of Environment and Heritage Protection. We especially thank the Traditional Owners from the lands of which we worked on, and for their advice, support and traditional knowledge shared during this project.

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Please reference as:

Ross, B., Perry, J.J., Waltham, N., Macdonald, S., Mitchell, J. (2017) Managing Feral Pigs for Biodiversity Conservation in Cape York: A Ranger's Handbook, Balkanu Cape York Corporation, Cairns.

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