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:
Monitoring Feral Animal Populations

Background

Feral animals in Australia have immense economic, agricultural and environmental impacts. They destroy wetlands, endanger threatened species, and have the potential to spread serious diseases. To assess the impacts feral animals are having in your area, an effective survey and monitoring program needs to be developed. There are several methods available for surveying populations, some of which are more suited to remote regions like Cape York. In this handbook aerial surveys will only be described in detail as the other methods are laborious and often yield poor results.

Purpose

The main reason to survey feral animal populations is to assess the success of any control program being conducted. By monitoring a population over time, you can see the initial population size, before control was conducted, and how it changes after control. Note that several other factors may affect populations, particularly time, season and burning and grazing regimes.
Prerequisites

Monitoring populations can be simple or complex. Simple monitoring could be observing pigs visiting a feeding site over time using trail cameras. Complex monitoring often requires help from research organisations. For this you will require:

- Relationships with or access to a research organisation
- Access to a helicopter equipped with survey booms
- iPads with ‘Distance Sampler’ installed to use as recording devices during surveys
- A safe helipad and access to AVGAS for refuelling
- Three staff to conduct the survey.

Planning and Site Selection

The ground monitoring methods (other handbooks) should be conducted in conjunction with sites already selected for control and monitoring activities. These could be sites selected for terrestrial fauna surveys, soil and water sampling and other methods outlined in the handbooks.

Selecting an area for aerial surveys requires consideration of:

- Selecting areas where you have or can gain permission to fly
- Stratified random sampling (5-10 transects spaced evenly in the landscape)
- Where the helicopter may be based (for time efficiency).

When selecting the area to survey, it is important to include all the different types of habitat in your area (see image under ‘Creating a Survey’).
Methods

Ground Activity Transects
A relative measure of animal activity can be calculated by conducting transects to look for the telltale signs of that animal (e.g. tracks/pig diggings).

Sand Plots
The presence of feral predators, such as cats, can be assessed by exploiting the fact that many predators will make use of existing roads and tracks. Sand plots are installed on roads and tracks and monitored regularly for cat/dog footprints. After checking, the plots are reset by smoothing over the sand with a broom.

Camera Trapping
Remote camera traps can give an idea of animal presence, but it is harder to get estimates of population size from camera trap data. However, the change in numbers visiting a site can give an indication of population changes. This method is used well in conjunction with 1080 baiting, when the number of pigs culled is difficult to confirm.

Aerial Surveys
Surveying for feral animals by helicopter or light plane is one of the more commonly used methods for estimating population sizes. An iPad application, ‘Distance Sampler’, has been developed specifically for this purpose. A significant limitation is cost, especially for long term surveys over several years.
Aerial Surveying Using Distance Sampler

Distance Sampler

Distance Sampler for iPad has been designed to allow simple and efficient data entry during aerial surveys for a range of target animal species. The general idea is to record the type and number of animals seen, and how far away from the aircraft they were. This information can be analysed later to estimate the density of that species across the study region. Instructions to use the app are included below. The app may also be used to record animal sightings on the ground.

Creating a Site

Before you get in the air and start recording animals, you will need to create a site. This is an area where you plan on aerial surveying, for example, Rinyirru National Park, Queensland. In the screenshot below the sites are: APN, MK, Isla Nublar and Kalan. To create a new site, touch ‘+ Add new site...’ and enter an appropriate site name. To select an existing site, touch the ‘i’ button near the ‘>’ arrow.

![Distance Sampler screenshot]

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Distance Sampler

This application allows one-touch recording of feral animal abundance, including location, date/time, and distance category. Data can be exported and emailed in a variety of formats.

Distance Sampler was designed and developed by CSIRO and Ula Media, in collaboration with Balkana and Jim Mitchell (Feral Fix). Field testing was conducted by Balkana, Kalan Enterprises rangers, Aak Paul Gunatam rangers and Ferals Australis who provided feedback for the design and functionality both during eering operations and during systematic aerial transect surveys. Funding for this application was provided by CSIRO, Balkana, and an Australian Government Biodiversity Fund grant.

For aerial sampling of animals on Cape York Peninsula we use the application as part of a standard distance sampling methodology that is conducted using two booms mounted on a helicopter flying at 200 ft at a speed of 50 knots.

Each transect can be annotated using the information button. This has details about observer, observer side and allows transect notes. In the case of three observers, data collected from the left-front and left-back can be used to conduct double count analysis. Data can be analysed using standard distance analysis (distancesampling.org).

Please contact Justin Perry at CSIRO (justin.perry@csiro.au) for any suggestions, questions or comments.
Creating a Survey

A survey is a period, most likely for the season you are surveying in, e.g. Winter, 2018 or May, 2018. To create a survey, touch ‘New survey’ and enter an appropriate survey name. To add to an existing survey, touch the survey you want to add to.

Starting a Transect

So that data can be managed and analysed correctly, it is vital that the transect is set up correctly in Distance Sampler before you start surveying. Details you need to record include:

- Transect name
- Name of the observer and the position they occupy in the helicopter
- Length of the transect (50 km is standard)
- Total area of the transects
- Proposed flying altitude and survey session number.

To add a new transect touch ‘New transect’ and enter an appropriate transect name, e.g. Rinyirru West.
Here you can create new transects or select an existing transect to view or export.

**Stegosaurus South**  
Site name: Isla Nublar  
Date: 2016-05-01  
Observer: Ian Malcolm

Survey summary
- Pig: 19
- Dog: 1
- Cattle: 12

**Velociraptor Valley**  
Site name: Isla Nublar  
Date: 2016-05-01  
Observer: Henry Wu

Survey summary
- Pig: 17
- Dog: 0
- Cattle: 2

**Pterosaur Peak**  
Site name: Isla Nublar  
Date: 2016-05-01  
Observer: John Hammond

Survey summary
- Pig: 0
- Dog: 2
- Cattle: 0

You must make sure you enter accurate details of the survey and survey staff here.
**Recording Data**

Once you are airborne and surveying, record each group of animals you see. Select the type of animal, type in how many were in the group (enter 1 for individual animals), then select the distance category (1-6) you saw them in on the boom attached to the helicopter (see front cover image). Hit ‘SAVE’ and make sure the page turns over to a fresh record. This will automatically record other information including the GPS location, time, altitude and speed.

If you make a mistake with the record, hit ‘Clear’ and start again. You can view current records on the map by touching ‘Show map’. Once the survey is completed touch ‘End’.

*In this record, 5 pigs were seen in distance class 3 of the boom.*
Exporting Data

Once the survey is completed, you need to email your data to whoever is managing the survey data. To do that, select a transect on the survey screen. A summary of sightings can be seen on the survey screen to help select the correct transect. Once you have the correct transect open, touch ‘Export’ and you will have the option of exporting the records via email or displaying them in a GIS (Geographic Information Systems) app if you have one installed (any application capable of importing a KML file) such as GIS Pro or Google Earth.

From this screen you can email records or send a CSV or KML file to an app on the iPad.

Note that Distance Sampler only works with iPads (not Android) and it must be the ‘cellular’ version of the iPad which contains the necessary GPS chip to record GPS location.
Viewing the Data

Once you've emailed the data or connected to a computer and downloaded it manually, you can view the records on a computer in an application such as Microsoft Excel. From here you can add up number of animals of different species seen and make other inferences.

You can also map these records by emailing yourself the KML file and opening it in Google Earth.

Data Management and Outputs

Collating and analysing the data from this type of survey requires a significant level of expertise and generally requires a research partner. In the Biodiversity Fund project, a data management system was set up on Biocollect to store the data permanently and to allow access for analysis. It is possible to monitor population size, density and distribution with consistent, well-planned aerial surveys. This information can be used to re-inform management decisions for adaptive management and greatly informs aerial shooting programs.

Biocollect data management system - www.ala.org.au/biocollect/
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Please reference as:

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