A Ranger's Handbook

Monitoring Feral Animal Populations

Managing Feral Pigs for Biodiversity Conservation in Cape York

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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:

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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.

Activity transects: a laborious method of recording pig activity.

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.

Camera traps are an effective method to monitor presence of pigs, especially when used with bait stations.

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.

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.
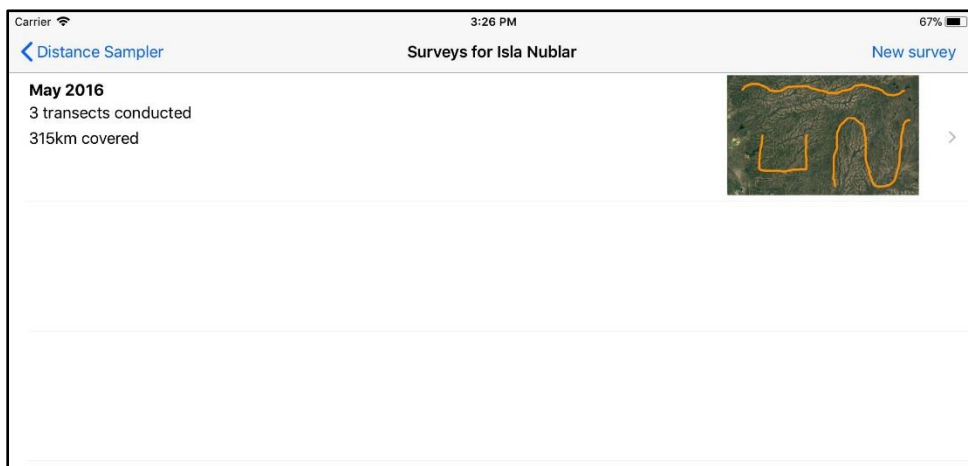
On this screen you can create new surveys or select an existing survey to add to or view.

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.

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.

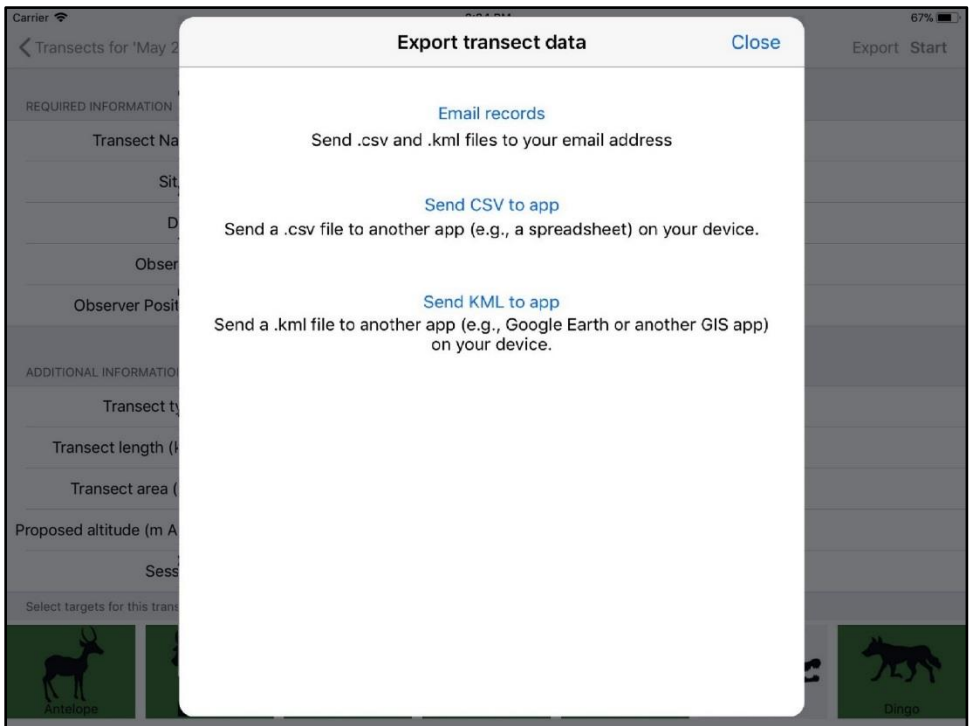*From this screen you can email records or send a CSV or KML file to an app on the iPad.*

> *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.*
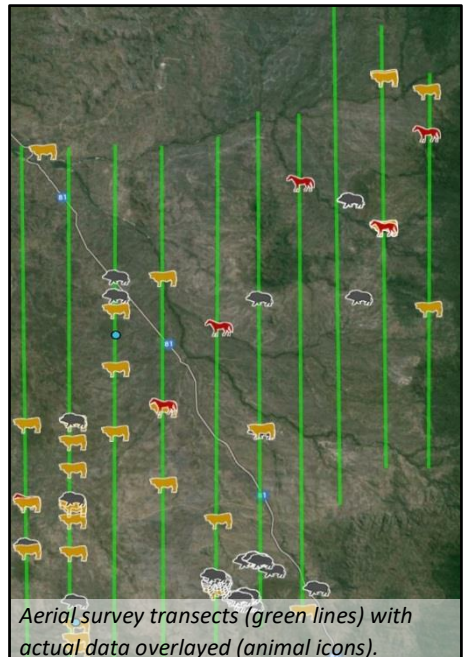
Viewing the Data

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.

	A	B	C	D	E	F	G	H	I	J
1	Timestamp	Latitude	Longitude	Altitude	HorizontalAccuracy	Animal	Count	Distance	Observer	ObserverSide
2	2015-05-17 07:04:02	-13.81092	141.9267	136.1921	5	Cattle	1	5	John Smith	Front-Left
3	2015-05-17 07:29:03	-13.87466	141.8902	125.1762	5	Pig	1	6	John Smith	Front-Left
4	2015-05-17 07:59:56	-13.67596	141.8515	76.79224	5	Cattle	1	2	John Smith	Front-Left
5	2015-05-17 08:51:49	-13.66342	141.8147	65.41846	5	Cattle	2	6	John Smith	Front-Left
6	2015-05-17 17:21:49	-13.5597	141.7052	39.83081	5	Cattle	1	1	John Smith	Front-Left
7	2015-05-17 17:25:19	-13.60404	141.703	48.11523	5	Cattle	3	6	John Smith	Front-Left
8	2015-05-17 17:42:09	-13.84071	141.7053	77.26306	10	Cattle	1	6	John Smith	Front-Left
9	2015-05-17 18:03:35	-13.94135	141.6668	53.51184	5	Pig	4	6	John Smith	Front-Left
10	2015-05-17 18:05:56	-13.91995	141.6667	45.96936	5	Pig	1	5	John Smith	Front-Left
11	2015-05-18 07:54:09	-13.86238	141.6301	63.50775	10	Cattle	3	6	John Smith	Front-Left
12	2015-05-18 07:54:44	-13.87108	141.6301	47.83167	5	Cattle	5	6	John Smith	Front-Left
13	2015-05-18 08:01:56	-14.00069	141.6291	52.52948	5	Cattle	1	6	John Smith	Front-Left
14	2015-05-18 08:28:02	-13.60254	141.5918	49.49542	5	Pig	10	5	John Smith	Front-Left
15	2015-05-18 08:33:07	-13.59487	141.5535	39.70782	5	Pig	1	2	John Smith	Front-Left

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

Aerial survey transects (green lines) with actual data overlayed (animal icons).

adaptive management and greatly informs aerial shooting programs.

Biocollect data management system - www.ala.org.au/biocollect/

Acknowledgements

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.

Important Disclaimer: