

A Ranger's Handbook

Wetland Condition Monitoring

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.

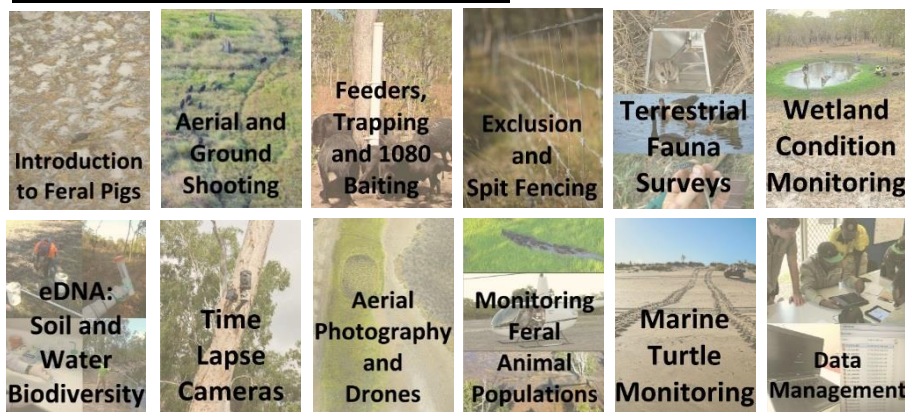
To choose what will work best in your area, it is important to understand the techniques that are available and their limitations. These handbooks provide a brief overview of the available options.

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:



Wetland Condition Monitoring



Background

Wetlands are home to many species of fish, crayfish, turtles, birds and frogs. Many land animals also use wetlands for feeding and drinking water. Wetlands are, therefore, important habitats and need careful protection and management.

Purpose

The condition of wetlands provides useful data to manage and protect them effectively. If wetlands are healthy, then many animals will be present, and water quality conditions will be good. If wetland conditions are unhealthy, then they are not providing important habitat for the many animals that depend on them.

Prerequisites

- Permission from TO's/landholder to access wetlands
- Research plan
- Team of workers to assist with sampling and to assist with safety requirements
- Specialised equipment for sampling
- Datasheets and camera
- Scientific knowledge or access to researcher for assistance.

Planning and Site Selection

Planning a program to monitor the condition of wetlands can be satisfying. For successful outcomes, ensure you have all the necessary equipment for your team, review your research plan, ensure all safety equipment and planning is in place, and finally, perform your pre-daily checks.

Wetland monitoring generates lots of information, much of which can be difficult to understand. However, with the right tools, and when following your research plan, it will generate important data for long term comparison and assessment. Safety is very important, there are several dangerous animals that live in wetlands (for example crocodiles), and along the water margins (for example snakes). Make sure your safety procedures are clearly outlined to each team member, each team member has adequate first aid training, and that communications (for example satellite phone) are charged and in working order.

Let's Go Wetland Monitoring - Applying the Method

At your wetland site, there are some important steps to consider:

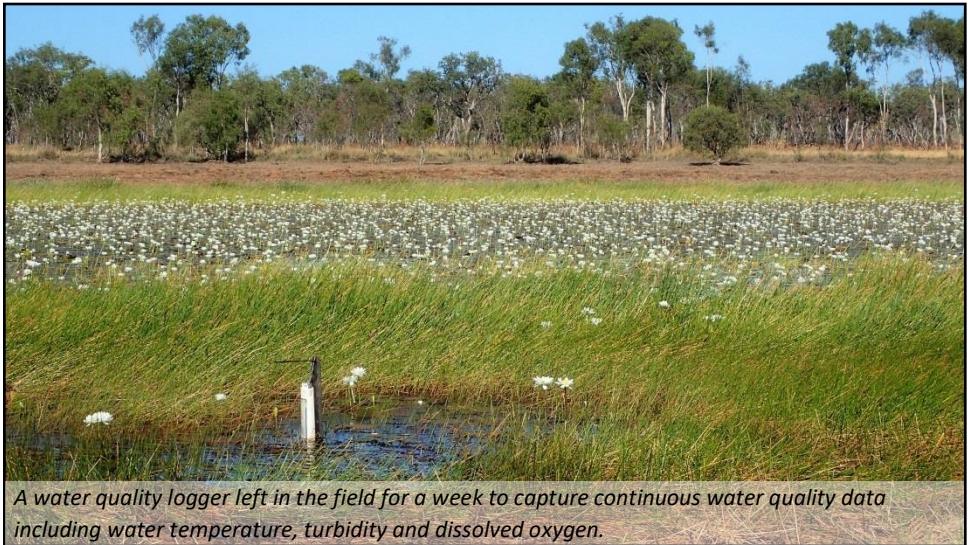
- Inspect the wetland for any dangerous hazards, including trip and fall hazard objects, water access points, and dangerous animals
- Check all safety and communication tools are in working order
- As a team, work through the plan for sampling, sequence of tasks, and check that all team members are clear on the tasks to be completed
- Check site codes and data sheets are correctly labelled
- Commence tasks, and continually check in with your team for any necessary changes to the work research plan.

Condition Assessment Tasks

There are several key tasks to be completed at each wetland that collectively allow you to assess condition. These tasks include:

- Deploy water quality loggers (minimum time for deployment is 24 hrs)
- Fish sampling
- Macroinvertebrate sampling
- Fencing checks and site observations.

Water Quality Loggers



Purpose

Water quality loggers provide information to understand the condition of the wetland. The data collected can be used to compare conditions over time, comparing with other wetlands (see Figure 1), and against national and state guidelines.

Prerequisites

To conduct the work without a contractor you will need:

- A water quality logger that is calibrated (following the manufacturer's manual), and a completed calibration log
- A computer to enable water quality logger operation
- Computer software to activate the logger and retrieve data
- Star picket, pole driver, cable ties,
- A 1 m stick marked in 10 cm increments and datasheets.

It is also helpful to:

- Consider where you deployed the logger last time (shaded section, open water) – these slight changes will alter your results
- Enter the water with a team member watching out for any hazards.

Planning and Site Selection

Deploying your water quality logger requires some planning. The location of your logger will generate different results, for example, a logger deployed in the shade of a tree will record different data to that in open water without shade. Ideally, position your logger in open water, this ensures your data is collected consistently and will not be influenced by local environmental conditions.

Method

The steps to deploying your logger are:

- For a new wetland study location, identify the most suitable location to deploy the logger. For an existing wetland, walk towards the water's edge ready to deploy your logger at a previously selected location.

Deployment

- Make sure a team member is in position to observe for any hazards
- Enter the water and slowly walk to a measured depth of 0.5 m (1 m stick)
- Using the pole driver, hammer in the star picket
- Attach your water quality logger to the star picket with a cable tie, and check that the sensors are a maximum of 20 cm below the water surface (deploying the sensors at this depth is standard protocol)
- Slowly exit the water, noting the date and time the logger was deployed on your datasheet.



TropWater staff calibrating and installing a water quality logger in a Cape York wetland.

Retrieving Your Logger

This should be completed a minimum of 24 hours after deploying it. This allows you to collect the maximum and minimum water quality conditions.

- Make sure a team member is in position to observe for any hazards
- Enter the water slowly, and remove the logger from the star picket, remove the star picket from the wetland
- Depart the wetland slowly with all your equipment
- Record on datasheet the date and time the logger was retrieved
- Data will need to be downloaded using a computer and the software supplied. Store your data as per research plan.

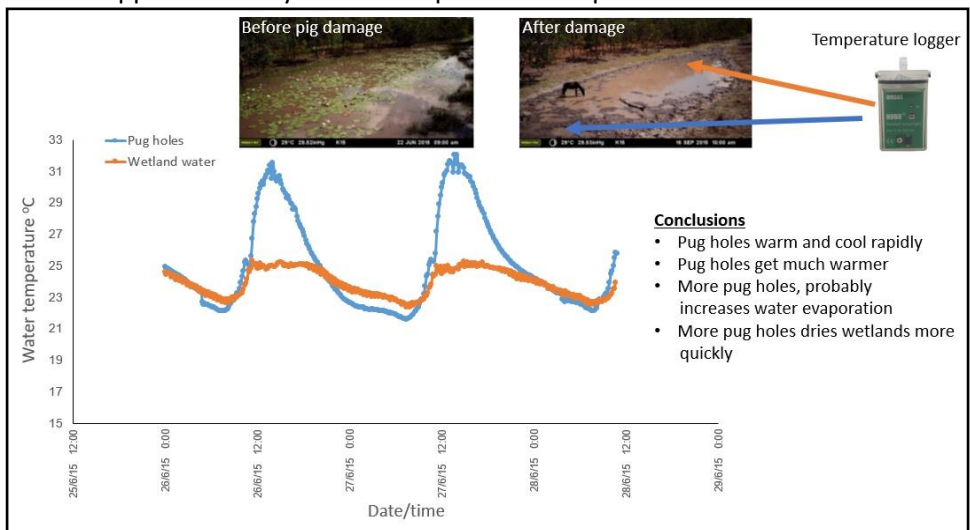


Figure 1: An example of data (recorded during the Biodiversity Fund Project) produced by the water quality loggers. This data compares the temperature of water in the main wetland, with water that is separated due to pig digging (e.g. pig wallows). Water in pig wallows/tracks (pugs) is more susceptible to temperature change which can speed up evaporation of a wetland.

Fish Sampling



A fyke net deployed in the late dry season after heavy pig damage. Fyke nets are great at catching fish and some aquatic invertebrates like yabbies.

Purpose

Wetlands are home to many different aquatic animals, such as fish, crayfish and freshwater turtles. Assessing which aquatic animals are found in wetlands provides data that can be used to examine wetland condition and track changes from year to year.

Prerequisites

To conduct the work without a contractor you will need all three of these:

- Sampling nets/traps and baited remote underwater video (BRUV) frame and camera
- Scientific guide to identify captured animals
- Ruler to measure fish length, and data sheets to record information.

It is also helpful to:

- Consider where you deploy the fish sample devices (shaded section, open water) – these slight changes will alter your results
- Enter the water with a team member watching out for any hazards.

Planning and Site Selection

Deploying your fish traps requires some planning, the location of your nets will generate different results. If installed in the shade of a tree, for example, they will record different data to that in open water without shade. Ideally, position your nets in open water, this ensures your data is collected consistently and will not be influenced by local environmental conditions.

Method

Setting fish traps requires some important steps:

- Determine the most appropriate location to set your trap – think about where fish might be located or swim past different features in the wetland
- Before entering the water, ensure all the necessary equipment is available and in working order, secondly make sure you have a team member as a spotter on the bank to watch for hazards
- Enter the water slowly and deploy the fish trap according to configuration, make sure the trap is secure
- Ensure that the top of the fish trap remains out of the water so that any air breathing animals such as turtles and water rats can breathe
- Record the date and time that the trap was deployed on your field sheet (ideally deploy fish trap in the afternoon)
- The next morning, make sure team members assess the trap and access point for any hazards, make sure there is a spotter in place
- Slowly enter the water, and retrieve the fish trap, making sure you don't lose your catch
- Depart the water and empty the fish catch into water filled buckets on the bank, for identification
- Identification of fish catch should be completed in conjunction with a suitability qualified scientist, identify each fish catch species, including any water snakes, insects or turtles



- Measure all fish catch, as total length, using a ruler, to the nearest mm
- Return animals to the water once measurements are completed.

Baited Remote Underwater Video (BRUV)

- Make sure your camera is fully charged before commencing monitoring, make sure camera is in waterproof case and frame and bait are ready
- Bait used can range from meat, fish or sardines (with sardines commonly used)
- Attach the sealed camera to the BRUV frame, ensure the seal is tight, add the bait to the pocket
- Check the camera settings are the same among your cameras (adjust the settings as necessary)
- Starting filming, and deploy camera in a plant free, clear water, section of the wetland
- Leave the camera recording for 2 hours, after which, you can retrieve the it
- Transfer the video to a computer, label the film name with site code and date
- Processing of the video data will require a suitably qualified scientist to identify and complete the analysis.



Aquatic Macroinvertebrate Sampling



Following kick sampling, rangers and TropWater staff use pick kits to pick out macroinvertebrates and put them into a preservative solution (70% ethanol) for identification and reference.

Purpose

Small aquatic insects are food items for larger wetland animals, and determining which species are present also helps to understand the condition of the wetland.

Prerequisites

To conduct the work, you will need:

- Three buckets, sorting trays, pick kits, labelled jars with preservative (70% ethanol) and a catch net (250 μm) with a triangle frame.

It is also helpful to:

- Consider which habitat to target – wetland plants, river bank edge or leaf packs (leaves packed at the bottom of water) on the wetland margins
- You may sample all of these different habitats, or only those available in your wetland.

Planning and Site Selection

The location of your sampling is important and results vary between habitats, so it's best to keep sampling to one habitat type for consistent results.

Method

The steps to collecting your sample are:

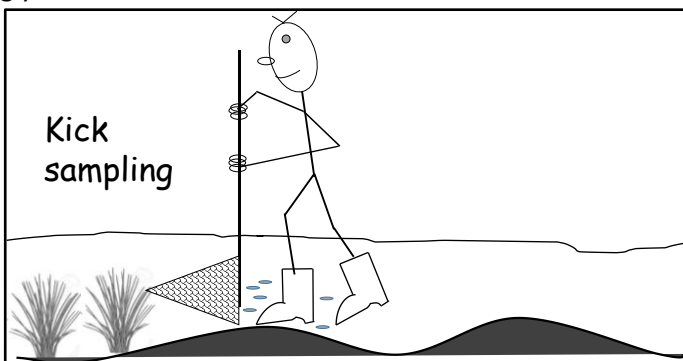
- For a new wetland study location, identify the most suitable location to collect your sample. For an existing wetland, walk towards the water's edge ready to collect your sample from a previously selected location.

Kick sampling is effective for collecting macroinvertebrates:

- Make sure a team member is in position to observe for any hazards
- Enter the water and slowly walk through the water to your target habitat
- Using your feet or wet boots, stir the habitat by shuffling your feet to disturb the target habitat
- Using the triangle frame net, swoop the net through the water, through the disturbed target habitat to collect sample
- Continue to disturb the target habitat over an area of 2 m by 2 m
- Once finished swooping the net through the disturbed habitat, wash clean wetland water through the net to remove any soil particles
- Empty the net contents into a bucket with clean wetland water
- Repeat these steps two more times, so you have a total of three samples using your buckets.



A dip net is used to catch aquatic invertebrates in the vegetation at the edge of the wetland.



Live-Picking Aquatic Macroinvertebrates

- Label three storage jars using water proof paper and fill the jars with preservative solution
- Using a sorting tray, empty a small amount of the sample onto the tray, and using a pick kit, start picking out macroinvertebrates and placing them in the jar



- Once most of the living aquatic organisms have been removed, discard the tray sample, and pour more of the collected sample from the bucket onto the sorting tray
- Continue sorting through the entire bucket sample, until 15 minutes of picking is completed
- Close the sample jar lid, check the label is correct and store the sample jar in a cool, dry place
- Identification of macroinvertebrates requires formal training and a microscope. Analysis of the data will also require a suitably qualified scientist to complete this task.



Fence Inspections and Site Observations



Purpose

At wetland monitoring sites with fences it is critical to monitor potential damage to the fences. Your fence protects the condition of the wetland by keeping out feral animals. It is important to regularly inspect fences for damage, but also for animals that might be caught in the fence.

Prerequisites

To conduct the work without a contractor you will need:

- GPS to record position of any damage or caught animal
- Field note book to record data.

Planning and Site Selection

Each of your fenced wetlands require regular inspection. Plan to complete these inspections every six months (ideally when access is first possible following the wet season and at the end of dry season). This task will provide lots of useful information, plus it will ensure that your fencing is maintained to a high standard.

Method

The steps to inspecting the fence:

- Arriving at your wetland, make sure the team are clear about the tasks to be completed, and that all safety and communication tools are in working order
- Enter the fenced wetland and start walking along the fence boundary. As you are walking look for any sign of damage, logs or sticks that have fallen across the fence
- Continue walking around the entire enclosed wetland
- If you find any injured or dead wildlife, note the location of the animal using your GPS, take a photo as a reference, and record any details on your field data sheet. Injured wildlife must be appropriately and humanely managed
- In addition, take note of any other animals you observe, this data will be important for future comparison
- Once you complete a full loop of the wetland, make sure all your recorded notes, GPS points and information are stored for future reference.



Useful Resources

- The Department of Environment and Heritage Protection water monitoring and sampling manual:
<https://www.ehp.qld.gov.au/water/pdf/monitoring-man-2009-v2.pdf>
- The staff at TropWater and JCU Townsville are also very experienced and worth contacting.

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.

Authors: Brian Ross, Justin Perry, Nathan Waltham, Stewart Macdonald, Jim Mitchell

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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Balkanu
Cape York Development Corporation P/L



242 Sheridan Street,
CAIRNS, QLD, 4870
T: (07) 4019 6200
E: info@balkanu.com.au

