Drone guidelines for Indigenous rangers

Book 2 – Ready to fly

Edition 1 | 2024

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Drone flight work flow

Before you go (see booklet 1)

1. Create a flight plan and get it approved by relevant Traditional Owners
2. Check your equipment list
3. Charge all your batteries (drone and controller)
4. Make sure your equipment is updated and your drone is safe to fly
5. Create an automated flight mission (if using) and make it available offline

On site

6. Check the location is safe to fly
7. Set up your launch area
8. Do a pre-flight check of your drone
9. Place your drone in the take-off area
10. Announce your launch
11. Watch your drone while it flies (keep the battery above 25%)
12. Announce your landing
13. Turn off the motors
14. Do a post-flight check of your drone
15. Check your photos
16. Pack up your drone

After you fly

17. Remove the SD card
18. Upload your photos to a safe location
19. Delete photos from the SD card (if needed)
20. Return the SD card to the drone

Contents

Equipment packing list

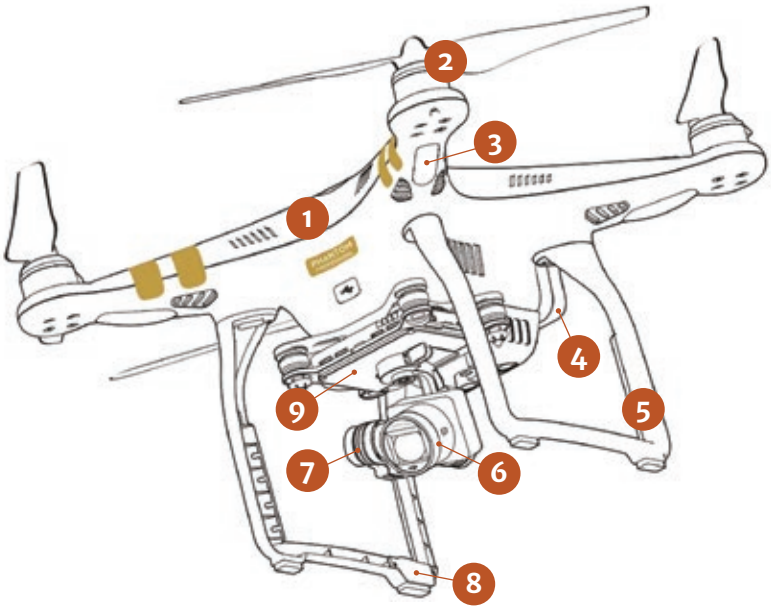
- Drone (with micro SD card)
- Drone batteries (charged)
- Controller (charged)
- Tablet or phone (if needed)
- Cable to connect drone to controller (if needed)
- Landing pads (optional)
- Pre-flight checklist and marker pen
- Spare propellers
- Hats and sunglasses
- Esky or LiPo safety bag to keep batteries cool (optional)
- Spare micro SD cards
- Copy of approved flight plan
- Screen wipes
- Controller sunshade (optional).

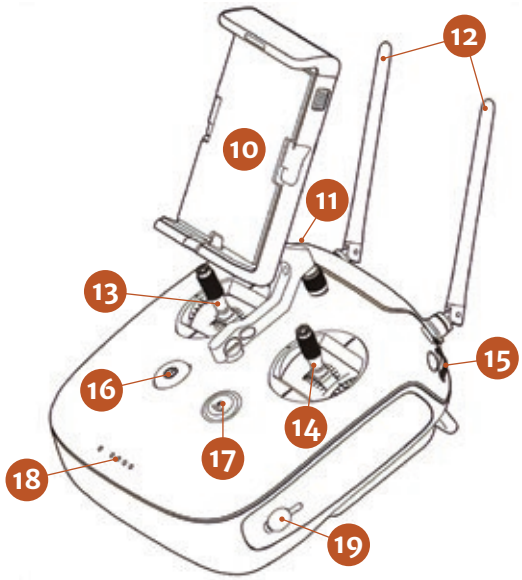
Setting up a take-off and landing area

It is important to set up a clear and safe place for a drone to take off and land. This should be a flat area clear of any obstructions on the ground and with a clear view of the sky (away from trees, buildings and powerlines). If the grass is very long or the ground is very dusty or sandy, you may want to use a landing mat to help smooth things out. You should set up your takeoff area at least 30 m away from any people, except the drone team, who should be behind the drone operator. It can help to mark out your takeoff area with cones to make it clear for the team. Once you are ready to fly, place your drone in the takeoff area facing away from everyone.

Pre-flight safety checks

Next, you want to check your drone. It is important to make sure drones are in good condition before you fly. Although you should have done a basic drone health check before you left, your pre-flight safety check will make sure all the parts of your drone are working correctly before you launch. It is a good idea to have a laminated copy of a pre-flight checklist in your drone kit at all times so you don't forget to check anything. You can photocopy the checklist opposite, print it out or make your own.





Phantom 3

1. Flight controller and GPS (inside shell)
2. Motors and props
3. Status LEDs
4. Smart battery (rear)
5. Legs with antennas
6. Camera
7. Camera gimbal
8. Compass
9. Gimbal and camera electronics and microSD card

Phantom 3 controller

10. Smart phone or tablet holder
11. Flight mode 3-way selector
12. Antennas
13. Left stick – throttle and yaw
14. Right stick – pitch and roll
15. Thumbwheel
16. On/off button
17. Return to home button
18. Status LEDs
19. Charging port

Checklist

Before turning on the drone

1 Propeller (props)

- ☐ Move
- ☐ No damage

2 Camera

- ☐ Moves
- ☐ Clean
- ☐ No cracks or scratches

3 Body (shell)

- ☐ No damage

4 Battery

- ☐ Charged
- ☐ No damage

5 Controller

- ☐ Charged
- ☐ Screen plugged in
- ☐ Antenna out/open
- ☐ No damage
- ☐ Turn on controller

6 Get ready for take-off

- ☐ Drone is in the take-off area
- ☐ Drone is facing away from people
- ☐ Turn on drone

After turning on the drone

7 Check status on screen

- ☐ No errors (“take-off permitted”)
- ☐ Flight mode on Normal (N mode) or Position
- ☐ All signal strengths high
- ☐ Battery over 80%
- ☐ Home point (H) is showing on map

8 Check camera settings

- ☐ Is it on photo or video?
- ☐ Camera facing the right way
- ☐ SD card inserted
- ☐ Take a photo

9 You are ready to take-off!

- ☐ Tell people you are taking off
- ☐ Fly above head height
- ☐ Check controls are working

Collecting monitoring data

Planning your drone monitoring flight is dependent on what data you want to capture and the reason you want to fly the drone in the first place.

1. If you just want to take a few photos, you can design your survey by understanding where you can and cannot fly (such as near an air strip or helipad, or over any sacred sites where TOs do not want you to fly). Taking note of the cultural protocols, you launch your drone and take your photos.

2. If you want to design an automated mapping flight, there are a few more steps. This is where the drone follows a set path taking photos or video along the way and returns home when the task is completed. Automated flights are great when you want to make a map from your images, you want to cover a large area or you want to repeat the same flight another day to compare your results. There are lots of different programs you can use to do automated mapping or you can try flying these manually but they all require similar information and steps:

    a. **Where do you want to fly?** Decide the area you want to capture, for example over a waterhole. Make sure you make your survey area a bit bigger than your area of interest.

    If you're familiar with QGIS or Google Earth Pro, you could create a polygon of your area of interest and save it as a KML to use with your drone.

    b. **How high do you want to fly?** This actually decides the resolution or quality of your final map and how long the flight will take. The higher you fly, the lower the resolution but the shorter the flight will be. You might need to test different heights, but usually somewhere between 60 – 100 m is good. Remember, we are not allowed to fly higher than 120 m.

    c. **How much overlap do you need?** You may also want to pick how much overlap you want between each photo. Overlap is important as it helps with processing the data later to create a large orthomosaic. You need to ensure you overlap images at the front and at the side for better accuracy. This ensures there are no gaps in the data and to allow the computer to use several matching control points to increase accuracy when stitching images together. It is common to use 70–80% overlap if you want a very detailed map. The smaller the overlap, the harder it is to join images together accurately.

Safety tips for flying

There are three steps for keeping safe when flying a drone: Listen, look and feel.

Listen

For helicopters and planes:

- Bring the drone down quickly but safely if you hear or see a helicopter or plane nearby
- Wait until it is gone before flying again
- Ensure you are not flying in a controlled airspace.

Look

For dogs or other animals in your landing area:

- Clear them out before you land or use a different landing area.

For birds (especially birds of prey):

- If they try to get close to your drone, fly up to scare them away
- If they keep coming back, land your drone and try another time or location.

At your drone, not your screen while you are flying. If you need to check the screen, stop flying, keep it short and have a spotter watch your drone while you are looking down.

Useful tips for keeping sight of drone:

- Switch between your screen and the sky often
- Use the shade of a tree or a drone screen cover to reduce sun glare
- Put on sunglasses
- Keep your eye on your drone whenever it is turning
- Use spotters to help you watch your drone.

Feel

If you feel any rain drops, land your drone as soon as possible.

If the wind feels very strong or your drone is struggling in the wind, land it as soon as possible.

If you feel unsafe, land your drone as soon as possible and try later if needed. This could be because:

- You are culturally unsafe, for example, you are flying too close to a sacred site
- You are physically unsafe, like you are feeling too hot
- Or the drone might be unsafe, like a helicopter is coming close or the equipment is broken.

Dealing with heat

Often you are working in hot and dusty environments when out on Country. Heat can be a real problem when working with drones:

- The batteries can get too hot and swell
- The screen on the controller can get too hot and turn black.

Be aware of the welfare of you and your team to ensure team members are not suffering from heat exhaustion.

Try to stay in the shade as much as possible.

Ensure your batteries are stored in a cool dry place, and in the shade out in the field.

Keep the drone in the shade when it is not flying.

Stand in the shade to be able to read the controller screen. If possible, use a sun hood to block the sun getting on the screen.

Ensure you drink plenty of water and keep in the shade where possible. Wear a hat and cool clothes if possible.

Consider flying the drone in the cooler parts of the day.

Troubleshooting: Why won't my drone work?

My drone is saying you need to "calibrate compass" or that there is "magnetic interference"

It is time to do the DJI dance! Take yourself and your drone into an open area away from metal objects like cars or buildings. Click on the error message and follow the instructions on the screen to turn the drone, first holding it flat (horizontal) and, while holding it, spin around in the direction indicated on the screen. Follow the instructions to next hold the drone with the nose or camera facing up and spin around again in the direction indicated on the screen. Check the screen to see if it worked or if you need to repeat it.

My drone is saying it needs the IMU calibrated

This one is very similar to the compass calibration but instead of spinning around in circles you will follow the on-screen instructions to place the drone in different directions on a flat surface. Check the screen again to see if it worked correctly.

My drone keeps stopping in the middle of an automated flight

Ensure there are no obstacles in the path of the drone. Usually, this happens if you are flying quite low and the drone's sensors (those 'eyes') are detecting the tops of trees or other objects. You may need to plan your flight a bit higher. If you know the flight height is safe you could also modify the detection distance for the downward sensors.

My camera is all white or black so I can't see anything in the photos

This usually happens when the camera setting is on manual and the settings are not right. If you know how to set your camera based on the light conditions you could adjust them in manual mode. Otherwise, click on the camera settings (usually found below the camera trigger) and if it is in Manual (M), select Auto (A).

I can't find my automated flight plan

If you are using a program like DroneDeploy for your automated flights, you can plan them on the computer and then log on to DroneDeploy on the controller to run the flight. But you may need to make your map "available offline" to be able to access it on the controller if you won't have internet at the site.

My drone is saying it has magnetic interference

Move your take-off position away from any obvious metal objects as they can interfere with the drone. For example, this can happen if you try to launch your drone off the roof or hood of your car. If you are taking off from concrete, sometimes the drone also picks up magnetic interference from the steel mesh used in laying the concrete. In this case, there is not much you can do about it.

My phone or tablet stops working mid survey

Most phones and tablets that we use to control the drones are not designed for hot Australian conditions. If you are working in the sun, your phone and tablet can easily overheat. When this happens the phone or tablet will shut down to avoid battery damage and this means you will have to regain control of the drone using the controller. In this case the best option is to hit the home button on your controller and let the drone return to the launch area automatically.

Post-flight checks and data storage

After your flight, it is important to check your drone and equipment for signs of damage to ensure it is ready for the next flight. It is also important to save the images or video you have taken on your flight.

- Check all equipment is still in good condition.
- Make sure the drone is turned off.
- Upload images onto the computer:
  - » Remove SD card from the drone (you will usually find this under a flap at the back or side of your drone).
  - » Plug the SD card into an adapter (if required) or insert the SD card into your computer.
  - » Find the SD card on the computer (it will usually show up as a new **removable disk**.
  - » Open **DCIM** folder – this is where all your drone photos will be.
  - » If you used DJI Pilot to do an automated survey your photos should be in a folder with the name you gave the flight.
  - » Otherwise, turn on thumbnails or use the date and time to find your photos.
  - » Select the first photo, hold down the "shift" key and select the last photo to select all.
  - » Right click one of the photos.
  - » Select **copy**.
  - » Create a new folder on your computer
    - » Labelling tips: usually you would use something like the location or project name and then the date so you can find photos easily later.
  - » Right-click the new folder and select **paste**.
  - » Check that your photos copied over correctly.
  - » You can now delete the photos from the SD card if you need to free up some space.
  - » Eject the SD card.
- **Return the SD card to the drone** (they are easy to lose).
- Charge and store the batteries safely (In a LiPo safety bag or fire safety cabinet if possible, or in a cool, dry place).
- Store your drone in a cool dry place.

Once your data is on your computer, there are different software you can use to process the data into an orthomosaic (joining all the photos into one large geo-tagged photo file). These include GeoNADIR and DroneDeploy.

Processing your data

Using GeoNADIR

1. Locate the photos you have downloaded from the drone onto the computer (see data storage section if needed).
2. Register or Log in to GeoNadir (**geonadir.com**).
3. Click on **New Project** at top right (or an existing project if it exists).
4. Click on **Add drone mapping data** and upload data by browsing to files or uploading folders of the jpgs or tiffs.
5. You can choose to merge folders into a single orthomosaic if they are taken on the same day at the same location.
6. You can add extra information, such as tags or descriptions if you like.
7. Click **upload**.
8. Once the data is uploaded, it is processed automatically to generate an orthomosaic under your project.
9. Repeat these steps for creating different orthomosaics for different locations and time periods.
10. See How do I upload drone data? (**help.geonadir.com/en/articles/8453446-how-do-i-upload-drone-data**) for more detail.

You can compare data taken over different dates (such as before and after scenarios):

1. Log in to GeoNadir and select your project where your data you want to compare is stored.
2. Make sure the layers are visible.
3. Select the layer you want to compare. You can select multiple layers by holding the shift key down and selecting them in the Table of Contents.
4. Select the compare tool .
5. Swipe left or right to compare images.

Using DroneDeploy

1. Locate the photos you have downloaded from the drone onto the computer ("Post-flight checks and data storage" on page 9 if needed).
2. Log in to DroneDeploy (you need a subscription).
3. Click **New Project** or, if you are adding to an existing project, open the project and select **upload** from the top bar and then **New Upload**.
4. Click the arrow next to the search bar to open the **Smart Uploader**.
5. Drag and drop all of your photos to upload. It will sort them automatically. If you want to merge files into one larger file, select the files and click the three horizontal dots near the capture date. Select **Merge with** and select the dataset you want to merge with. Rename the map if needed.
6. Click **Create Project** or **Start Upload**.
7. See Smart Uploader (**help.dronedeploy.com/hc/en-us/articles/7497013045143-Smart-Uploader**) for more details.

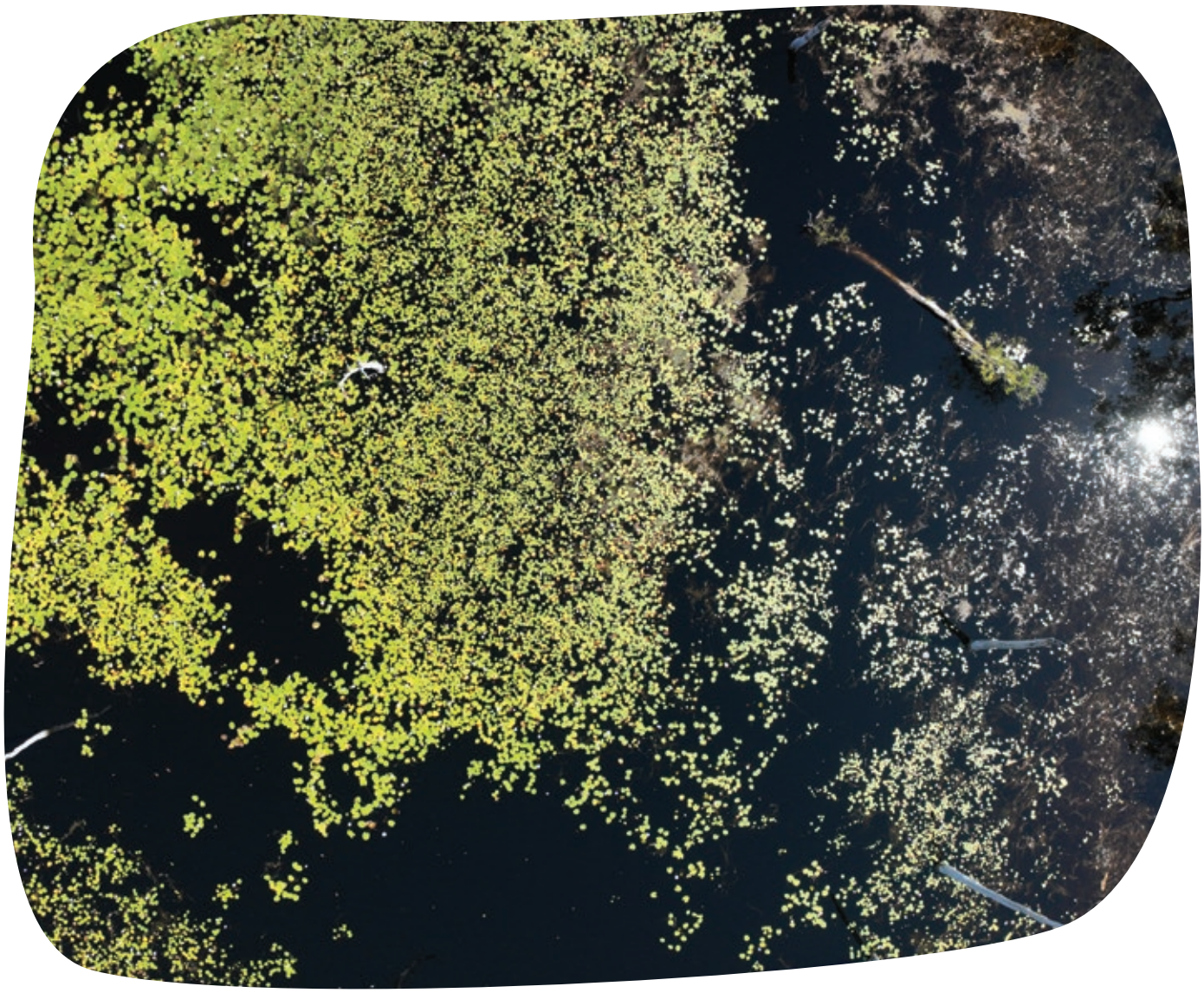
You can compare data taken over different dates (such as before and after scenarios)

1. Click the compare button on date selector bar.
2. Use your mouse to drag left and right to see more or less of the primary (left map) and comparison map (right map).
3. The primary map is the map you were last viewing. The comparison map is the map before this. To change maps, just change the order of viewing before comparing.
4. See Compare Map Layers Side by Side (**help.dronedeploy.com/hc/en-us/articles/15000048608O1-Compare-Map-Layers-Side-by-Side**) for more details.

Using drones for wetland impact assessment

Indigenous land and sea managers have collaborated with researchers over many years to develop and test methods that are useful for consistently monitoring changes in wetland values. This has led to some good insights on practical methods for surveying wetlands at different scales and using drone data for management and monitoring.

Some good examples include using drones to assess the effectiveness of weed management in Kakadu National Park (**nesplandscapes.edu.au/wp-content/uploads/2021/09/Using-Bininj-Mungguy-indicators-to-monitor-the-health-of-Country-in-Kakadu-National-Park-final-report.pdf**) and the assessment of feral animal impacts on waterholes on Cape York Peninsula (**nesplandscapes.edu.au/wp-content/uploads/2021/11/Defining-metrics-of-success-for-feral-animal-management-in-northern-Australia-final-report.pdf**).



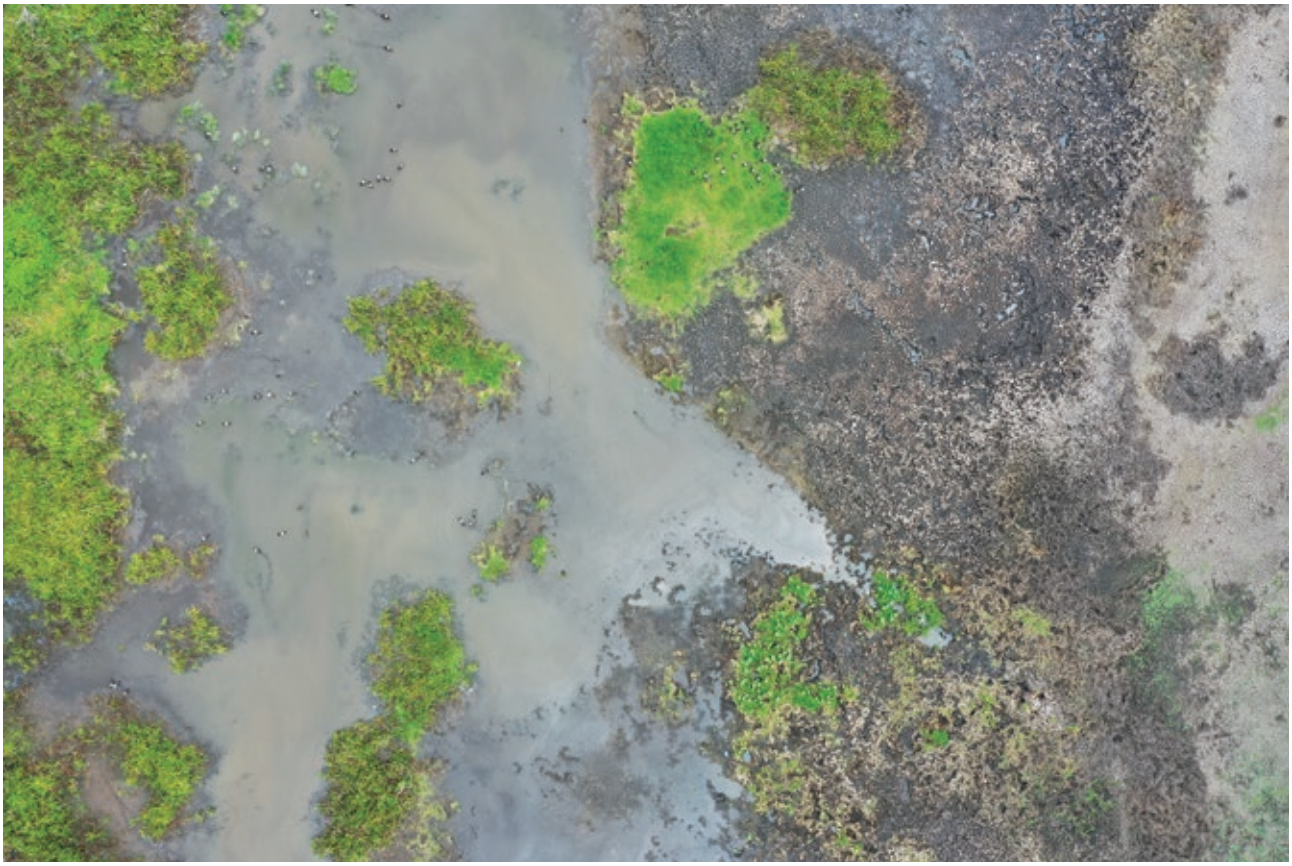
Case study 1 – Impacts of weed management in Kakadu National Park

As part of a broader collaborative project that aimed to develop and trial Bininj/Mungguy healthy Country indicators, the project team developed and tested the use of drones to monitor the impact of broadscale weed control (Paragrass) on the Nardab floodplain in Kakadu National Park. See **vimeo.com/430230796**.

Keeping Country healthy in Kakadu National Park

The team established a drone survey and analysis method that aimed to show the extent of weed distribution (and other wetland values visible in the drone images) before management and then use ongoing surveys in different seasons to monitor the effectiveness of weed control, guide follow-up control and monitor the response in important flora and fauna.

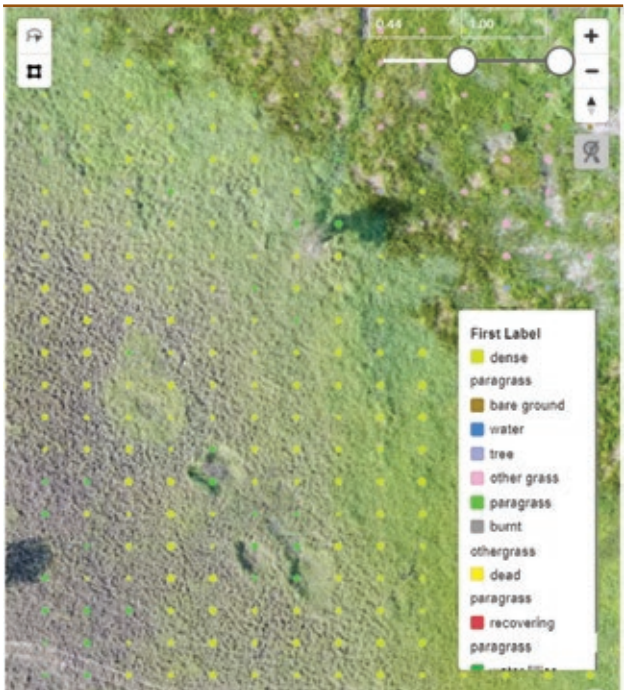
The important challenges to overcome were to establish consistent survey methods, consistent analysis, and to be able to quickly complete the analysis and provide it to the rangers in a timely manner so follow-up management could be done. The images below demonstrate how the categories the team used in the analysis were set up to guide follow-up spraying of paragrass. The categories clearly showed where spraying had led to dead stands of paragrass,



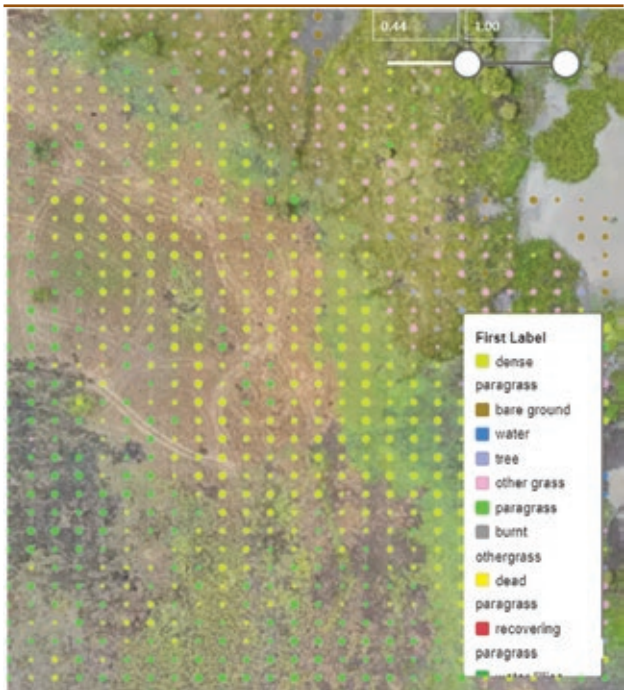
An image from the drone survey showing ducks, magpie geese, water and paragrass

where it hadn't worked at all and where the paragrass was recovering. In this case the rangers could tackle the paragrass that was recovering as the best chance of creating larger paragrass-free areas on the floodplain that would enable other wetland vegetation to emerge and provide open foraging areas for magpie geese and other water birds.

In this example, the selection of the categories for the image classification were built around the most important thing that the rangers needed for completing weed management. There will be lots of different reasons why you want to do a survey but you should have very clear goals on what you are going to use the data for, so an appropriate analysis can be applied.



December 2018. Green and light green dots represent living paragrass of different densities dominating the survey area before control.



October 2019. The same site after spraying, highlighting the recovering and dead paragrass. This information enabled rangers to follow up areas that were impacted by the spraying but not killed.

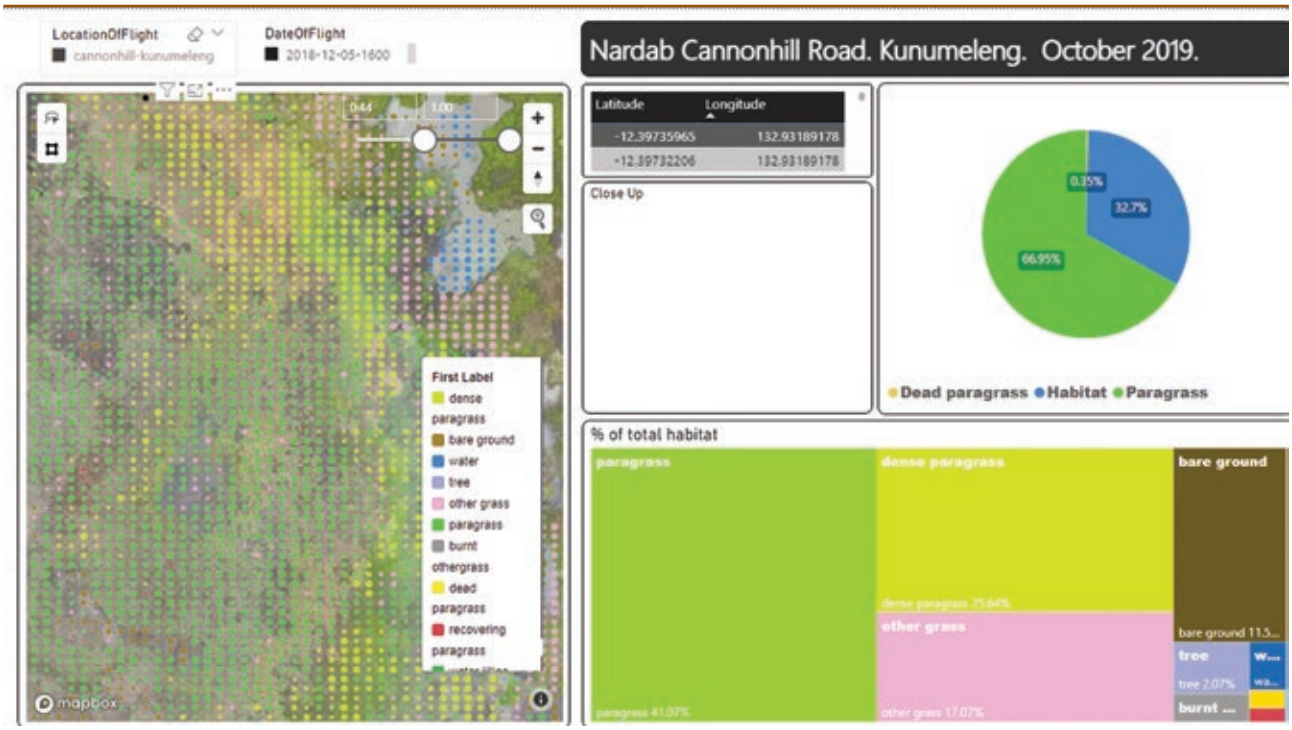
Lessons learned

There were some operational lessons learned from the project that are important for rangers planning to use drones to guide management and monitor impacts in a similar way.

1. Drone survey height should be as high as possible whilst still allowing the analysis of the imagery. If you don't need super high-resolution imagery then go as high as you can to reduce the time you need for the survey and the number of images that you need to process.
2. Doing the surveys in the late dry season was very challenging due to overheating of the drones and mobile devices used to do the mapping. A good solution was to do the surveys from inside a car with the air conditioner running. This kept the equipment and the drone operator comfortable.
3. The flood plain sites were very large. This required a lot of time in the field to collect the surveys. When using smaller drones, it is better to select smaller survey areas. When moving to much larger areas it might be better to explore long range drones or high-resolution satellite imagery.

4 We developed software to analyse the data for this project but there isn't an easily accessible way for rangers to use the software. Presently there are few options for the analysis of drone data after you have converted to a stitched image.

5 Using the data for management required analysis to be available to rangers as they were making decisions and soon after the survey had been completed. We developed a dashboard linked to the AI outputs to do this for the project that enabled a simple way of measuring the proportional change in key values over time.



Dashboard showing the proportion of the different habitat and weed categories chosen for the analysis

Example of the DroneDeploy survey time slider. Here a survey undertaken using the same survey plan is showing the same location in June 2023 and November 2022.

Case study 2 – Impact of feral animal management with Aak Puul Ngantam, Cape York Peninsula

Traditional Owners and Rangers working with APN Cape York selected important waterholes where feral animals were impacting important values. Researchers worked with the APN team to establish some management actions and decided to use drones to track the impact of those actions on some indicators of change. Fairly simple categories were selected that included: how much of the wetland was impacted by ferals (labelled pugged sedge above); how much of the different major habitat types (grass and sedge) remained intact and; how much was open water. See our video at **vimeo.com/652306629**.

It was decided to do surveys in the early dry season and in the late dry season to demonstrate the seasonal impacts of pigs and cattle. Tests were done to see what height was suitable to get enough detail to understand change. Three different heights – 40, 50 and 80 metres – were flown. The waterholes that were selected for survey varied in size from less than one hectare to greater than 30 hectares. After testing the time it took to fly the different heights we selected 70 m as this provided enough detail to do the general habitat assessment we were looking for. When 40 m was used, for a moderately sized waterhole (14 hectares) with 70% front overlap, 60% side overlap and a flight speed of 5 m per second, a survey took 26.37 minutes, used two batteries and captured 524 photos. At 70 m, 75% front overlap, 75% side overlap and 6 m/s flight times, the survey was done in 14 minutes, used one battery and took 294 photos. This dramatically reduced survey and processing times, which is important for practical operation in the field. It's important to use drone control software as the software chooses the best path and speed based on the height and type of survey you are doing.

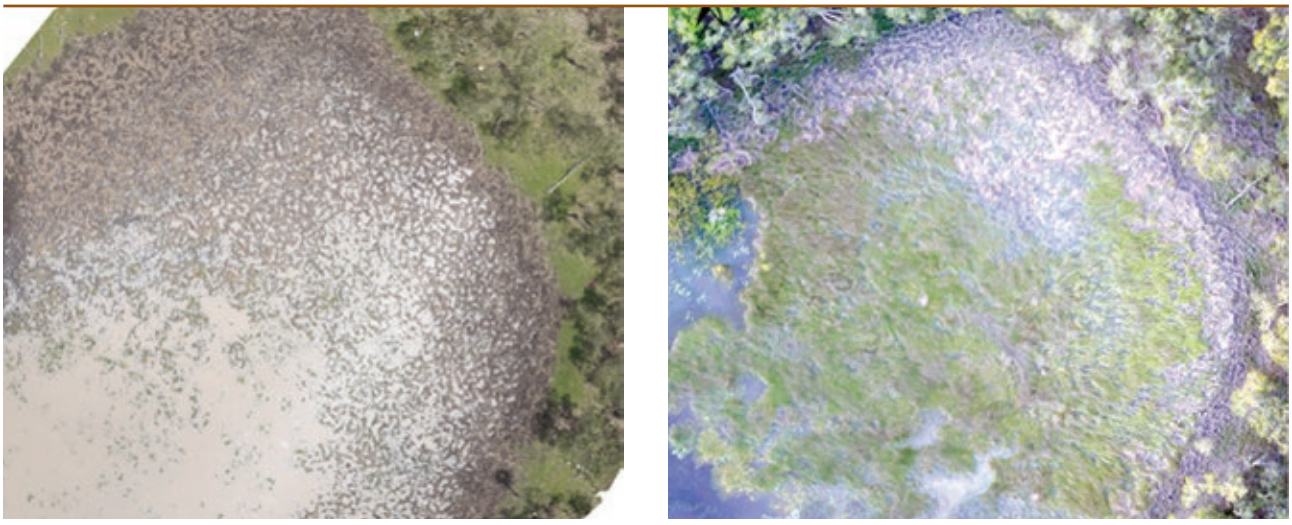
In this project we used DroneDeploy to convert the survey into a geo-rectified image that could be used for analysis.

We used DroneDeploy to convert the survey into a geo-rectified image that could be used for analysis

Using the data

A software solution was developed to test an AI method for analysing the data across time for one of the waterholes using the open source **HealthyCountryAI** software (github.com/microsoft/HealthyCountryAI.git). Using this method, we identified habitat categories that would be impacted by pigs and cattle and trained the AI model to look for those categories in the stitched drone image.

This was very useful for looking at how the categories changed over time as management was applied (a cattle proof fence was installed, trapping was done and aerial culling was done). The drone data indicated that the cattle fence had helped to decrease the impact on the water hole but the pig trapping had not been effective in stopping the pig damage.



Drone image from 2015 (left) without any fencing and 2017 (right) after a cattle fence had been installed, taken at the same time of year

Using the Healthy Country AI software to detect feral animal damage using image classification methods

Case Study 3: Mamardawerre community drone training, cultural protocols and application

With the Mamardawerre community we aimed to co-deliver the Site Survey with Drones (Introductory) training on Djalama Country, with Warddeken Land Management staff Erica Smith and Cara Penton, and technical trainers Rebecca Rogers and Aliesha Hvala from Charles Darwin University. The key component of the training week began with a workshop discussing the cultural protocols with Elders to determine Indigenous and non-Indigenous considerations for using drones.

Alongside adhering to CASA regulations and rules, it is crucial for Indigenous communities to assess their cultural protocols and rules regarding drone use. Adapting the data production steps for collaborative conservation research outlined by Robinson *et al.* (2023), Warddeken Land Management assessed and co-designed project frameworks. This comprehensive approach includes planning, data collection, data management, data analysis and processing, and data translation, ensuring that both regulatory compliance and cultural sensitivities are respected in drone-related projects. Seven male rangers, two female rangers and six high school students completed the training under the technical authority of Charles Darwin University. Janice and Margaret Narlomen provided cultural authority and approval as the Traditional Owners of the Country on which the training was conducted.

Key insights from the workshop

Planning and consultations

Drone use and surveying must have a clear purpose and require a planning map for consultations with Traditional Owners and Custodians. It is essential to map potential drone operating areas while avoiding sacred sites, necessitating consultations with both male and female custodians to exclude all sacred and ceremonial areas. These exclusion zones should not be mapped to prevent revealing their locations, making it crucial for consultations to occur on a project-by-project basis based on the flight plan. Drone surveys cannot proceed if family is on Country for ceremonies or if Country is closed.

Additionally, it is important to clarify the use of photos taken on phones for personal or work purposes, including whether these photos can be shared on social media. As phone photos are often geolocated, landowners must give explicit permission to share photos or both photos and their locations.

Data collection

Surveys should involve the appropriate Traditional Owners and Custodians or receive their approval for specific individuals to conduct the survey. Additionally, involving both younger and older people in these activities provides opportunities for intergenerational knowledge transfer when visiting places on Country. This collaboration ensures that traditional knowledge and practices are preserved and passed down, enriching the cultural understanding of the younger generation. Moreover, it strengthens community bonds and reinforces the collective stewardship of the land.

Data Management

Effective data management is essential for maintaining the integrity and security of the collected data. It is important to determine who has access to the data and ensure that access is restricted to authorised individuals only. Adequate computer storage must be available to handle the volume of data generated by the drone surveys. Currently, project data is accessible to the community, allowing members to view and engage with the information. This accessibility supports community involvement and ensures that the data serves its intended purpose in benefiting the Landowners and their conservation efforts. In this case we agreed on the use of GeoNadir (GeoNadir | Environmental Drone Mapping Software), a cloud-based solution, to store the images and undertake basic analysis.

Analysis and processing

Traditional Owners or Custodians should analyse the photos. If no Traditional Owners or Custodians are present, other close family members or community members can analyse the data with permission. It is important to provide Traditional Owners with updates on data processing, particularly if there are delays. This ensures transparency and maintains trust within the community, emphasising the respect for cultural protocols and the collaborative nature of the work.

If the images are to be shared with or analysed by other scientists, approval must be sought for the purpose of the research and approval to use the data for that specific project.

Story and Translation

It is crucial to ensure that data is used for the purposes initially communicated to the Landowners. If there is a need to use the data for a different purpose, permission must be sought from the Traditional Owners. Additionally, it is important to consider how the results of the drone survey will be communicated to the Traditional Owners. This could involve creating a report, sharing photos, or developing other forms of presentation. Approval from the Traditional Owners should be obtained before sharing the survey story with outsiders. Keeping them informed and involved in each step of the process upholds transparency, respects their authority, and fosters trust.

Conclusions

Co-designing culturally appropriate place-based training is crucial to develop just data practices and Indigenous community protocols around new technology. Finding a purpose for the application of drone skills, in this case to map a community billabong, was critical in fostering purpose, shared vision, and confidence in the application of skills on Country. It also provided the opportunity for side-by-side training and support from staff members and other Indigenous rangers. Once some rangers were confident in their skills, they were able to assist with training other rangers in their first language. Data management and visualisation were also critical components for building confidence in the process and purpose of data, as well as creating a collaborative achievement and being able to share the data with the community.

Reference

CJ Robinson, D Urzedo, JM Macdonald, E Ligtermoet, CE Penton, H Lourie & A Hoskins (2023) *Place-based data justice practices for collaborative conservation research: A critical review.* Biological Conservation 288. DOI: 10.1016/j.biocon.2023.110346

Resources

Data capture

Creating a mapping mission with DJI Pilot
youtu.be/-RNtgBNsQ3M?si=U2AJIJv0ODk2__6T__

Creating a mapping mission with Pix4D capture
youtu.be/mi3iInawQjM?si=yX7QW3AYaT1LTp-8

Creating a mapping mission with DroneDeploy
youtu.be/OKMxhWZSIAM?si=6CdRGz376f188rU9

Set up for a flight with DroneDeploy
help.dronedeploy.com/hc/en-us/articles/1500004964262-Set-Up-for-Flying-Start-Here

Making great maps
www.dronedeploy.com/resources/ebooks/making-great-maps

Data upload

Uploading data to GeoNADIR
youtu.be/HT9d6nszrpM?si=vmHxMIUnizB-LT_V

Data analysis and storytelling

Digitising your data with GeoNADIR
youtu.be/dyCXlLmIdYU?si=drNuTnhFB54iLToM

Processing drone maps using QGIS
youtube.com/watch?v=bI0PuYaTptU

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