

## ENVIRONMENTAL MONITORING METHOD:

# Night Parrot Acoustic Monitoring – Song Meter 4 (SM4)



## About This Method



This document helps you to monitor Night Parrots by recording their calls using Autonomous Recording Units (ARUs); the Song Meter 4 Acoustic Recorder. This method has been adapted from: Instructions on setup and installation of Song Meter 4 (SM4) for night parrot detection, N. Lesenberg & S. Murphy (Adaptive NRM); [Song Meter SM4 User Guide, Wildlife Acoustics](#). You can find more information on the Monitoring Country website: [monitoringcountry.org.au](http://monitoringcountry.org.au) or scan the QR code.



This method has three parts: **1. Get Ready**, **2. Out on Country** and **3. Back in the Office**. Each part can be undertaken separately but you must complete all three parts to finish the method. At the end of the document, you will find guidance for all the gear you need - [Gather Your Gear – Complete List](#).

We recommend you read the whole document before you start.

## Part 1: Get Ready



### GATHER YOUR GEAR



#### Equipment required for this part:

- Tablets/phones with:
  - ability to take photos
  - data collection and navigation systems
- Laptop or computer with software for:
  - mapping
  - SM4 Configurator Software (Optional)
- GPS device (recommended)
- Song Meter 4 (SM4) (1 per site) – check that each has:
  - Microphone
  - Blank SD card with >32 GB capacity
  - Solar panel or 4 D-cell batteries
- Permanent marker

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### Night Parrot Acoustic Survey (SM4)

We acknowledge Aboriginal and Torres Strait Islanders as the Traditional Owners and Custodians of Country and recognise their continuing connection to and stewardship of land, water, and sea. We honour their culture

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## KEEP IN MIND



### Why?

Make sure there is a clear [monitoring question](#) and that the [method](#) you have selected will answer the monitoring question.

If this is the first time you are monitoring, you will need to [design the survey](#): what are you monitoring, where will you survey, and when and how often you will survey?



### When?

Prepare well before heading out on Country so that you have time to gather gear or train staff, if needed.



### Who?

At least 1 ranger/staff to plan and prepare.



### Training and skills

Staff involved in planning are trained and competent in:

- Mapping software (like QGIS, Google Earth) and/or [monitoring point generator](#)
- Navigation systems (like Avenza, GPS)
- Data collection systems (like Fulcrum, datasheets)
- Setting up Song Meters and using SM4 Configurator Software



### Check permissions

Consult with Traditional Owners, landholders and relevant government agencies and authorities, to determine appropriate access and approvals for environmental monitoring:

1. Where you can go – consult with the owners/managers of the land.
2. What you can do – check if you need [scientific licences or ethics permits](#)
3. What or who can you take photos of
4. What can be done with data and photos – who owns them, where will they be stored and how will data be interpreted and communicated.

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## Night Parrot Acoustic Survey (SM4)

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## ACTIONS

### Make a plan and prepare



*If you have done this monitoring before, it is best to do the surveys at the same time and same sites so that you can compare the data to previous surveys and see if there have been changes.*

1. Plan which dates you will put the Song Meters out and collect them
  - Battery life, SD card size, temperature and recording settings will change how long Song Meters can function.
  - If you are leaving Song Meters out for a long time, plan to service Song Meters to change SD cards, batteries or solar panels during the survey.
  - Song Meters can be deployed in rounds at different sets of sites if you don't have enough Song Meters for every site (e.g. you have 5 Song Meters but you want to monitor 10 sites for 2 weeks. Deploy Song Meters at 5 sites for 2 weeks, and then redeploy them at the other 5 sites for another 2 weeks. The survey will have two deployments over 4 weeks.)
  - A good time to monitor Night Parrots is after a good rain.
2. If this is the first year you are monitoring, gather Night Parrot [records in your area](#) and identify where potential Night Parrot habitat is.
  - Such as from Traditional Owners, Atlas of Living Australia (ALA) or government databases.
3. Use the [monitoring point generator](#) or GIS mapping software to select your sites
  - Roosting habitat is in long unburnt spinifex, and feeding habitat is nearby roost sites, and where there is water and grasses, herbs and salt bushes.
  - Song Meters should be at least 400 metres apart.
4. Give each site a unique name, and export and save the location data in your data management system
5. Prepare maps of sites and load sites onto navigation devices
6. Plan how you will record information on Country (electronic or paper data forms)
7. Plan your [data management system](#) - how you will store recordings
  - Audio recording files can take up large amounts of memory, so it is best to keep them in a cloud-based server and a local copy on a separate hard drive.
-  8. Check **GATHER YOUR GEAR** lists for [Get Ready](#), [Out on Country](#) and [Back in the Office](#) ([complete list on last page](#)) and get any equipment you don't have.
  - See [buying guide\(s\)](#) for advice on which recording devices may be suitable to buy.

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- You will need to decide if you are using D-cell batteries or solar panels to power the Song Meters.
9. Be clear on how many people will be involved and what everyone needs to do the work.
  10. Charge electronic devices (tablets/phones, power banks, GPS) and batteries

### Train



1. Check the **Training and skills** requirements for **Get Ready**, **Out on Country** and **Back in the Office** steps and arrange any training or expertise that you need.
2. Run everyone involved in the survey through the plan.
  - Be clear on how many people will be involved, what everyone will be doing, and what they will need to do the survey.
3. Prepare guides for identifying Night Parrots and their habitat
4. Run a training session for all rangers involved in the survey to learn or refresh:
  - a. How to use the devices (tablets/phones, GPS)
  - b. How to use data collections apps and record data
  - c. How to identify Night Parrots and their habitat

### Set up the Song Meter 4

5. Read through the Song Meter SM4 User Guide on [wildlifeacoustics.com](http://wildlifeacoustics.com)
6. Give the Song Meter a unique name (like SM01) and write it on the outer cover of the Song Meter and on its SD card in permanent marker
  - If you plan to service the Song Meters during the surveys or deploy them at different sites, make sure the Song Meter has another SD card. Write the same unique name on the card and something to show that it is the second card (like SM01.2)
7. Check that the SD card is empty
8. Open the Song Meter, insert an SD card and, if you are using batteries, put D-cell batteries into battery bank
9. Turn Song Meter on
  - If you are using batteries, move the power switch to INT and if you are using an external power source, like solar panels, turn the switch to EXT.
10. From the main menu, select SETTINGS and then DATE AND TIME to set the correct date and time, then return to the SETTINGS menu
11. Select LOCATION and:
  - a. Enter the unique name (like SM01) as a prefix

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- b. Enter the coordinates (latitude and longitude) for the site where the Song Meter will be deployed
    - it doesn't need to be exact, within 10 kilometres is fine
  - c. Set the correct time zone
  - d. Return to the SETTINGS menu
12. Select SUNRISE/SUNSET TYPE and set to 'sunrise/sunset', then return to the SETTINGS menu
13. Select ADVANCED and then BATTERY CUTOFF
- a. If using D-cell batteries, set to 00.0
  - b. If using solar panels, set to 05.0
  - c. Return to the SETTINGS menu
14. Decide if you want to set up the Song Meter for recording manually or using the SM4 Configurator Software

If using manual set up:

15. From the main menu, select SETTINGS and then AUDIO to set the parameters:
- a. Sample Rate = 24000 Hz
  - b. Maximum recording length = 30 min
  - c. Channel = one channel only (left or right)
  - d. Period = sunset to sunrise
- Leave all other parameters as their default
16. Return to main menu, select SCHEDULE and then EDIT SCHEDULE and set times:
- a. START = 'set' with a +00:00 offset
  - b. DUTY = 'always'
  - c. END = 'rise' with +00:00 offset
17. Turn off the Song Meter and close the cover and latch.

If using the SM4 Configurator Software:

11. Open the SM4 Configurator Software on your computer
- LOCATION and BATTERY CUTOFF settings can be set within the software instead of directly on the Song Meter. If you do this, it will overwrite any settings currently on the Song Meter.
12. Under SCHEDULE, click the LOAD BUILT IN SCHEDULE dropdown box and select LOAD RECORD SUNSET-RISE
13. Save the schedule onto an SD card

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- Make sure it isn't saved inside a folder on the SD card
14. Inset the SD card into memory slot A of the Song Meter
  15. From the main menu, select SCHEDULE and then IMPORT SCHED+SETTS
  16. Select the schedule file on the SD card and then press ENTER
  17. Wait for a SCHEDULE IMPORTED message to appear
  18. Turn the power switch to OFF
  19. Close and latch the cover.

The Song Meter is now ready to be used, and when you turn it on in the field, all of the settings will be retained.

### Next Section – Part 2: Out on Country

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## Night Parrot Acoustic Survey (SM4)

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## Part 2: Out on Country



### GATHER YOUR GEAR



#### One set of this equipment for each team:

- Tablets/phones
- Power bank (optional)
- GPS device and spare batteries (recommended)
- Hammer, mallet or picket driver
- Multi-tool or side cutter for snipping cable tie ends
- Spare D-cell batteries (for servicing only)
- Flagging tape (optional)

#### One set of this equipment for each site:

- Song Meter 4 – with microphone, solar panel or 4 D-cell batteries, blank SD card and preprogrammed recording settings.
- Star picket
- 300mm x 4.8mm sized cable tie/zip tie

### KEEP IN MIND



#### Where

If stock or other wildlife that might damage Song Meters, you may need to change the timing of the survey, move the site, or use guy lines to keep animals away



#### Who?



2 people per team



#### Training and skills

Make sure everyone knows the plan.

Field staff are trained and competent in:

- Navigation systems (like Avenza, GPS)
- Data collection systems (like Fulcrum, paper datasheets)
- Setting up/using Song Meters



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## ACTIONS



Check that your electronic devices (tablets/phones, power banks, GPS, batteries) are charged before you head out.



### Deploy Song Meter 4

1. Check that the site is in or near Night Parrot habitat.
2. Choose a spot to deploy the Song Meter that is:
  - a. At least 1.5 metres away from trees, tall shrubs, large boulders and water
  - b. Away from things that will be noisy, like branches in the wind and flagging tape
  - c. Away from hard, flat surface that will echo, like rock and water
  - d. Above where long grasses may grow while the Song Meter is deployed
3. Mark the Song Meter location on your navigation device
  - You can also attach a piece of flagging tape to something about 1.5 metres away from the Song Meter to make it easier to find again.
4. Hammer in the star picket
5. Attach the Song Meter with a cable tie/zip tie to the top of the star picket so that it is:
  - a. At least 1 metre above the ground
  - b. Secure/doesn't move around
  - c. Microphone pointed towards Night Parrot habitat
  - d. Microphone horizontal or pointed slightly down
    - This allows rain or dew to drain away.
    - DO NOT POINT THE MICROPHONE UPWARD.
6. Snip off the ends of the cable tie/zip tie
20. Open the Song Meter
21. Check that an SD card is inserted
22. If you are using batteries, check that D-cell batteries are in the battery bank, or if you are using solar panels, connect the Song Meter to the solar panel
23. Turn the Song Meter on
  - The ON/OFF switch is on the right-hand side of the Song Meter
  - If you are using batteries, move the power switch to INT and if you are using solar panels, turn the switch to EXT.
24. From the main menu screen, select SCHEDULE START and wait for a PREPARING TO RECORD message to appear.
  - If the main menu screen doesn't show, press the CHECK STATUS button.

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7. Wait for the date and time to appear, and check that these are correct (current date and time)
8. Wait for the GOING TO SLEEP message to appear, and check that the date and time that it is programmed to start recording are correct (time of sunset).
9. Close and latch the Song Meter

 10. Record **deployment data**

### **Service Song Meter 4 (optional)**

11. Open the Song Meter
12. Press the red SCHEDULE STOP button and wait for the main menu screen to appear
  - If the main menu screen doesn't show, or if a PREPARING TO RECORD message appears, press the SCHEDULE STOP button again.
13. Press the CHECK STATUS button
14. Wait for the SD card usage and battery voltage to appear to check that the Song Meter is still working and recording.
  - Battery voltage should be above 5.0V
15. Turn the power switch to OFF
  - The ON/OFF switch is on the right-hand side of the Song Meter
16. Take out the SD card and replace it with a new, blank SD card
17. If you are using batteries and they are low, remove the dead batteries and replace them with fresh ones.
  - The ON/OFF switch is on the bottom left of the Song Meter
25. Turn the Song Meter on again
  - If you are using batteries, move the power switch to INT and if you are using solar panels, turn the switch to EXT.
26. From the main menu screen, select SCHEDULE START and wait for a PREPARING TO RECORD message to appear.
  - If the main menu screen doesn't show, press the CHECK STATUS button.
18. Wait for the date and time to appear, and check that these are correct (current date and time)
19. Wait for the GOING TO SLEEP message to appear, and check that the date and time that it is programmed to start recording are correct (time of sunset).
20. Close and latch the Song Meter
21. Check that the Song Meter is still securely attached to the star picket and the star picket is securely in the ground.

## Night Parrot Acoustic Survey Song Meter 4

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We acknowledge Aboriginal and Torres Strait Islanders as the Traditional Owners and Custodians of Country and recognise their continuing connection to and stewardship of land, water, and sea. We honour their culture, customs, and community. We pay our respects to their Ancestors, Elders, and future leaders.

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22. Clear away any plant growth under the Song Meter that could cause noise.

 23. Record **service data**

### **Collect Song Meter 4**

24. Open the Song Meter

25. Press the red SCHEDULE STOP button and wait for the main menu screen to appear

- If the main menu screen doesn't show, or if a PREPARING TO RECORD message appears, press the SCHEDULE STOP button again.

26. Press the CHECK STATUS button

27. Wait for the SD card usage and battery voltage to appear to check that the Song Meter is still working and recording.

- Battery voltage should be above 5.0V

28. Turn the power switch to OFF

- The ON/OFF switch is on the right-hand side of the Song Meter

29. Close and latch the Song Meter

30. Cut the cable tie to remove the Song Meter from the star picket

31. If you don't plan to monitor at the site again, remove the start picket and flagging tape.

 32. Record **collection data**

**ENVIRONMENTAL MONITORING METHOD:**

**Night Parrot Acoustic Monitoring – Song Meter 4 (SM4)**



**RECORD DATA**



**Data to record when deploying Song Meters**

What to record	Required?	Notes
<i>Information to record about each ARU deployed</i>		
Project name	Yes	Make it clear which project this data belongs to and its purpose
Date	Yes	Record the date the Song Meter was put out on Country
Personnel	Yes	Record the name of the people who put out the Song Meter - this is helpful if any questions come up about the data
Site name/number	Yes	Record the site name/number where the Song Meter was put out
Location coordinates	Yes	Record an accurate location of where the Song Meter was put at the site (using a handheld GPS if possible) (latitude and longitude or eastings and northings)
Song Meter ID	Yes	Record the name written on the Song Meter
SD card ID	Yes	Record the name written on the SD card.
<i>Information to record about each site</i>		
Fire age	Optional	Record the fire history of the site.
Habitat description and/or photo	Optional	Describe or take a photo of the vegetation/spinifex (like size of spinifex, Night Parrot food plants), habitat type and landscape features at the site (like spinifex near a soak surrounded by samphire and chenopods). Make note of which camera/tablet/phone it was taken on, and the filename of the photo (usually end in .JPG)
Signs of disturbance	Optional	Types and causes of disturbance you can see at the site (like signs of introduced predators, vegetation clearing, wrong-way fire)
Stories and notes	Optional	Record information or stories from Elders, and anything else worth noting about the area or animals.
Video	Optional	Record videos of information or stories from Elders, and rangers performing or describing the work they are doing.

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**Data to record when servicing Song Meters**

What to record	Required?	Notes
<i>Information to check is correct when servicing an ARU</i>		
ARU ID	Yes	Check that the name written on the Song Meter is correct
SD card ID	Yes	Check that the name written on the SD card you take out of the Song Meter matches the Song Meter ID
Location	Optional	Check that the location is correct (using a handheld GPS if possible) (latitude and longitude or eastings and northings)
<i>Information to record about each ARU serviced</i>		
Project name	Yes	Make it clear which project this data belongs to and its purpose
Date	Yes	Record the date the Song Meter was serviced
Personnel	Yes	Record the name of the people who serviced the Song Meter - this is helpful if any questions come up about the data
Site name/number	Yes	Record the site name/number
SD card ID	Yes	Record the name written on the new SD card you put into the Song Meter
Song Meter issues	Optional	Record if anything has gone wrong with the Song Meter (like dead batteries, full SD card, Song Meter damaged by stock or rain, vegetation has grown lots)



**Data to record when collecting Song Meters**

What to record	Required?	Notes
<i>Information to check is correct when collecting an ARU</i>		
Song Meter ID	Yes	Check that the name written on the Song Meter is correct
SD card ID	Yes	Check that the name written on the SD card you take out of the Song Meter matches the Song Meter ID
Location	Optional	Check that the location is correct (using a handheld GPS if possible) (latitude and longitude or eastings and northings)
<i>Information to record about each ARU collected</i>		
Project name	Yes	Make it clear which project this data belongs to and its purpose
Date	Yes	Record the date the Song Meter was collected
Personnel	Yes	Record the name of the people who collected the Song Meter - this is helpful if any questions come up about the data
Site name/number	Yes	Record the site name/number
Song Meter issues	Optional	Record if anything has gone wrong with the Song Meter (like dead batteries, full SD card, Song Meter damaged by stock or rain, vegetation has grown lots)

**Next section – Part 3: Back in the Office**

## ENVIRONMENTAL MONITORING METHOD:

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## Part 3: Back in the Office



### GATHER YOUR GEAR



#### Equipment required for this part:

- Tablets/phones (or paper datasheets) that you used to record data
- Data management system (like databases, cloud storage, external hard drives)
- Laptop or computer with software for:
  - Spreadsheets (like Microsoft Excel)
  - Mapping (like QGIS, Google Earth)
  - Bioacoustic analysis software (like Kaleidoscope)

### KEEP IN MIND



#### When?

Always try to complete this work as soon as you can after returning from your time on Country so that recordings on the SD cards aren't overwritten or lost.



#### Who?



1 person to manage the data



1 Expert to validate recordings (optional)



#### Training and skills

Staff managing data are trained and competent in:

- Mapping software (like QGIS, Google Earth)
- Spreadsheet software (like Microsoft Excel)
- Data collection systems (like Fulcrum, datasheets)
- Data management systems (like databases, cloud storage, external hard drives)
- Using Bioacoustic sound analysis software (like Kaleidoscope)



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## ACTIONS



### Data entry, analysis and reporting

1. Record a summary of what you did and why, any observations (like weather conditions, fire history, site condition), anything that went wrong or didn't work and things that worked well.
2. Upload the **Song Meter deployment, service and collection data** to your data management system.
  - Recommended: get someone else to proof the data to check for mistakes.
3. Upload any photos or videos taken during the survey to your data management system.
4. Remove SD cards from Song Meters
5. Download recordings from SD cards and upload to your data management system.
6. Use the bioacoustics analysis software to check recordings for Night Parrot calls.
  - Pallid Cuckoos calls can sound and have similar looking call signatures to Night Parrots.
7. Contact experts to help confirm Night Parrot calls and check for any that may have been missed
  - Night Parrot calls can vary a lot and can be easy to misidentify.
8. In GIS mapping software, create a map showing the survey sites and where Night Parrots were detected.
9. Discuss with the ranger team or community the results of the monitoring, any reasons for the presence or absence of Night Parrots, and if there have been any changes to previous years.
  - Consider whether trends might be related to your management (like cat control or fire management) to check how well management is working, or if you need to make adjustments.
10. Share the data according to any data sharing or funding agreements you have made

**Next section – Full Equipment List**

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**Night Parrot Acoustic Monitoring – Song Meter 4 (SM4)**



# Gather Your Gear – Complete List



The complete **GATHER YOUR GEAR** list for **Get Ready**, **Out on Country** and **Back in the Office**.

Gear List	Required?	Get Ready	On Country	In Office
Electronic device(s): <ul style="list-style-type: none"> <li>Charged</li> <li>Ability to take photos</li> <li>App for data collection (like Fulcrum)</li> <li>App for navigation (like Avenza)</li> </ul>	✓	✓	✓	✓
Power bank <ul style="list-style-type: none"> <li>Charged</li> </ul>	<b>Recommended</b>		✓	
Laptop or computer with software for: <ul style="list-style-type: none"> <li>Mapping (like QGIS, ArcGIS, Google Earth)</li> <li>Spreadsheets (like Microsoft Excel)</li> <li>SM4 Configurator Software (optional)</li> <li>Bioacoustic analysis software (like Kaleidoscope)</li> </ul>	✓	✓	✓	✓
GPS (like Garmin handheld device) & spare batteries	<b>Recommended</b>	✓	✓	
Song Meter 4 (1 per site) with: <ul style="list-style-type: none"> <li>Microphone</li> <li>SD card &gt;32GB</li> <li>Solar panel OR 4 D-cell batteries</li> </ul>	✓	✓	✓	✓
Permanent marker	✓	✓		
Star picket (one per site)	✓		✓	
300 mm x 4.8 mm cable ties/zipt ies	✓		✓	
Hammer, mallet or picket driver	✓		✓	
Multi-tool or side cutter	✓		✓	
Flagging tape	<b>Optional</b>		✓	
Data management system (like cloud storage)	✓			✓