

2040 Bird Monitor Setup Instructions

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1. Introduction

The aim of predator free New Zealand is to help our native birds thrive and avoid extinction. The 2040 Bird Monitor provides an objective way of measuring the bird life population by recording the volume of bird song and uploading these recordings, with GPS and time to the Cacophony servers for analysis.

At the time of writing, Cacophony does not have a way of analyzing these audio files but is researching how to do this. The idea is to have a Cacophony index that can be tracked over time across the country. The hope is that this index will increase as we successfully remove predators from the birds' environments. Even though we don't currently have a way of analyzing these audio files it is worthwhile to start recording now, so we can collect the data and analyze them when we have developed the technology. This technology is advancing rapidly and the types of analysis in the future are likely to be very sophisticated. The key is to start recording as soon as possible.

The Bird Monitor consists of an Android App, Android phone enclosed in a weatherproof housing with an external microphone and charger. It may optionally include a solar panel and SIM card. Once configured the Bird Monitor makes regular audio recordings that are uploaded to the Cacophony cloud for analysis.

The Bird Monitor can operate on mains power, solar or with a battery. It can operate using WIFI, mobile data (using a SIM card), or with no connection.



Note: We used to call the 2040 Bird Monitor a Cacophonometer. However, we have dropped this because it was very difficult to say and spell, and no one knew what it was. We have elected to use a

the more descriptive name Bird Monitor. At some places throughout this manual and in the software, you may still see the Cacophonometer name.

The Bird Monitor was developed by The Cacophony Project. This not for profit organization is developing technology to help eradicate predators from New Zealand, starting with devices for monitoring birds and predators. 2040 LTD was formed to make New Zealand predator free 10 years before the government's 2050 goal. We believe this can be achieved through the intelligent use of technology and our primary focus is to build, sell and support the technology developed by The Cacophony Project. 2040 LTD intends to help fund The Cacophony Project by donating a proportion of all sales to them.

2. Privacy

Please be aware that once you have a phone with the Bird Monitor app installed, you should consider it to be LIVE as soon as you turn the phone on. **This means that if you keep the phone with you, it is likely to record your own private conversations and upload them to our server without you doing anything – the app does not have to be opened.** The phone is set up with recording disabled to minimize the chance of this happening.

If you do record by mistake, you can delete the recordings via the website, or you can send an email to support@2040.co.nz requesting that the recordings be deleted.

Note that recordings made by the Bird Monitor may be listened to by staff from The Cacophony Project (these includes approved, open source developers) and from 2040 Limited. The primary reason for this will be to develop algorithms to analyze the recordings automatically.

One of first goals is to develop a system to automatically delete any human voices. Only once this is done will any recordings be able to be viewed publicly.

3. Register on the Cacophony Server

You will need to create a Cacophony account. This can be done from within the App (see later) or directly on the website:

1. From your computer, go to <https://browse.cacophony.org.nz/>
2. Register and login with your chosen username.
3. Create a 'New Group' and remember this group for later as you will need to enter it into the App.

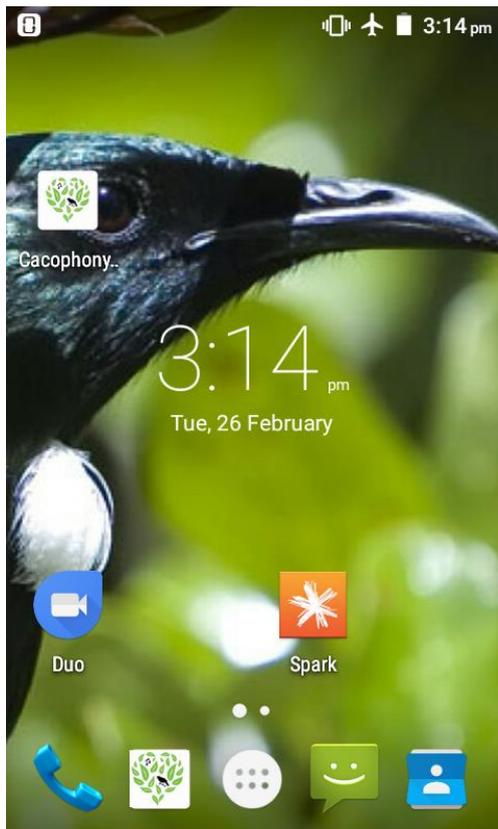
4. App Setup

To set up the App open the case, turn on the phone (the power button is on the right hand side below the volume buttons – press and hold to turn on) and enter the PIN. The default PIN is 2040. Feel free to change this.

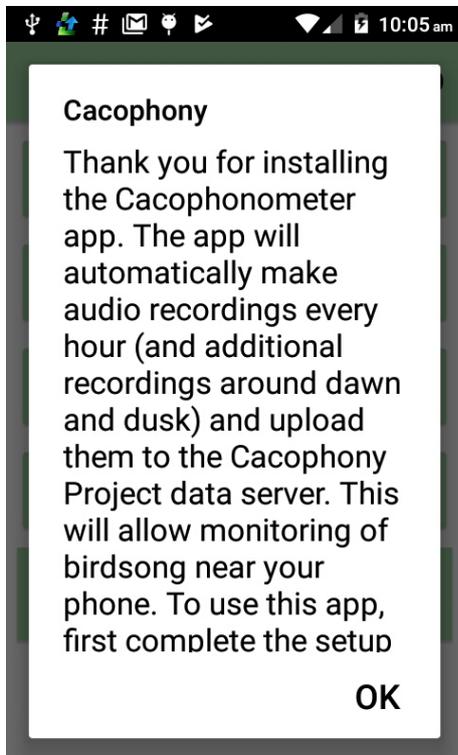
The high-level steps to set up the App are as follows:

- Connect to the Internet
- Log into the App
- Perform a test recording
- Disable recordings until you are ready to start.

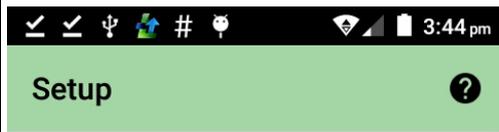
To set up the App you need to be connected to the internet. If the phone has a SIM and you are within coverage, then you are ready to go. Otherwise you will need to connect to a WIFI network. To do this, swipe down twice, turn off airplane mode if it is on turn on WIFI by clicking the WIFI icon on the top left select a network and log in.



Find the Cacophony icon (it should be on the navigation bar on the bottom) and tap to open.



If you have just installed the app, it will open with this message – once you have read it, press OK.



You can also display the welcome message by pressing the help ? icon in the top right corner. Every screen has a help icon that will give you more information.

'Swipe' the screen (left or right) to move through the setup wizard. You can exit the wizard at any stage by pressing your phone's back button.

Each screen has extra information available from the help icon (top right).

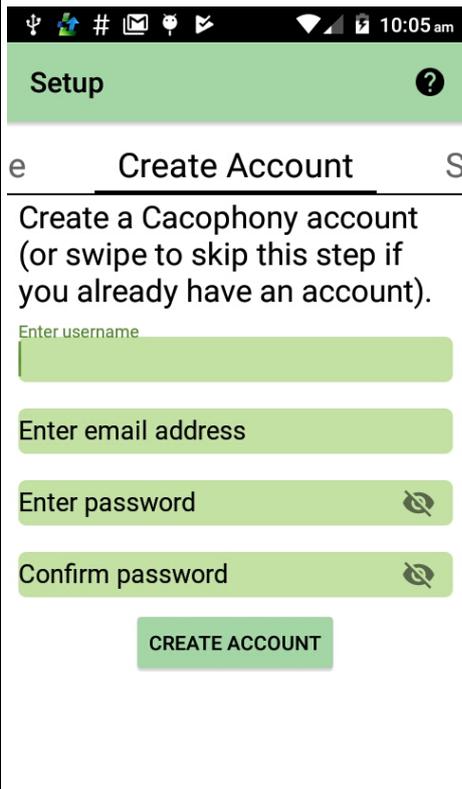


You can move through the setup wizard by swiping to the left or right.

You can exit the wizard by pressing the phone's 'back' button (bottom left on the reference phone).

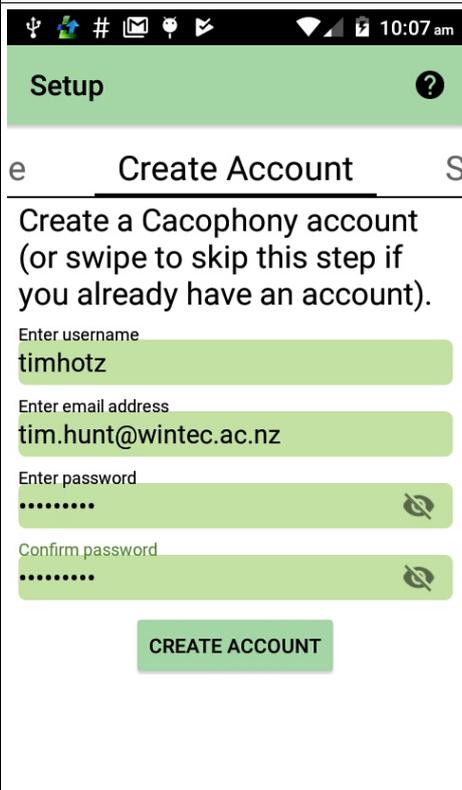
'Swipe' the screen (left or right) to move through the setup wizard. You can exit the wizard at any stage by pressing your phone's back button.

Each screen has extra information available from the help icon (top right).

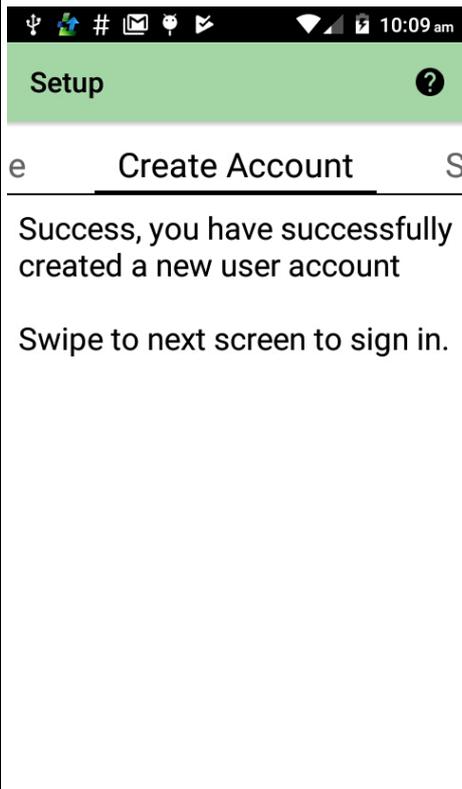


The app uploads audio recordings to the Cacophony server. If you have already created a Cacophony account, then swipe to the next screen to log in.

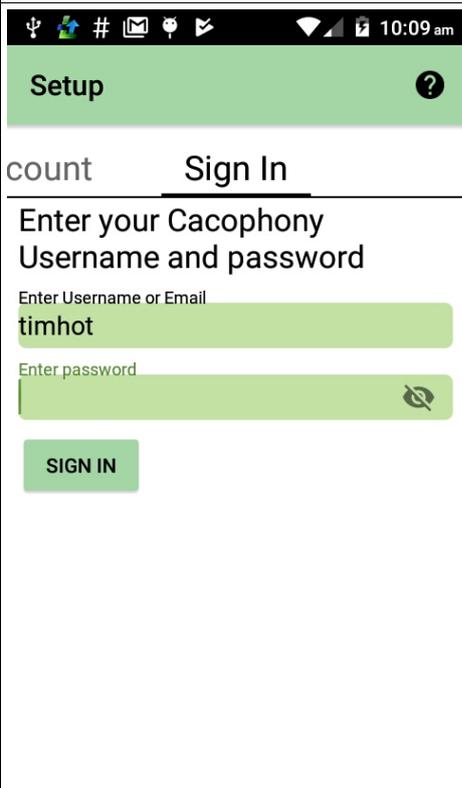
Otherwise you will need an account on the server which you can create using the screen shown on the left in the app.



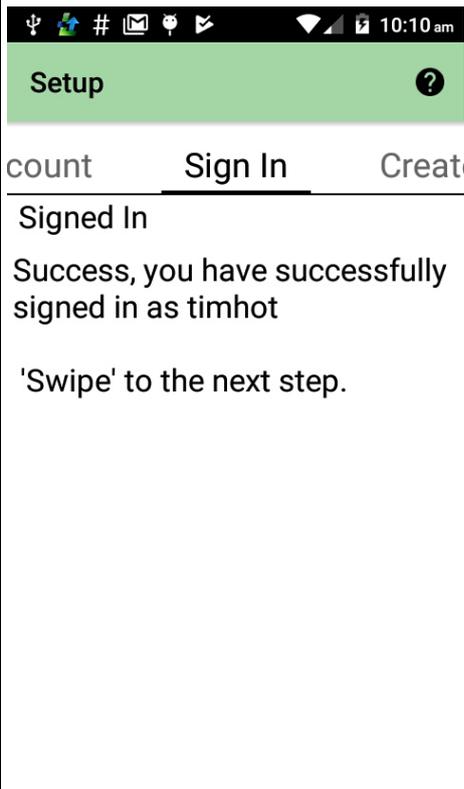
If you decide to create an account using the app, fill in the fields as shown and press 'CREATE ACCOUNT'.



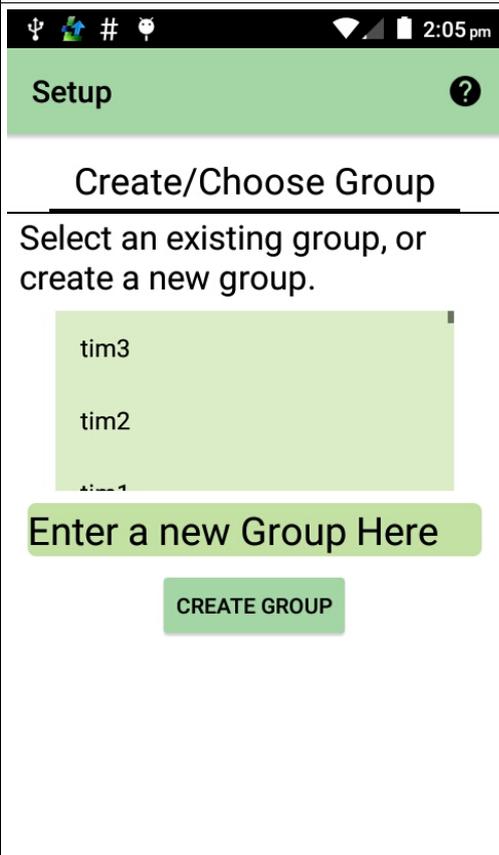
You should see this message.



You now need to sign in, using the same details that you just entered on the create account screen, or those that you used on the website.



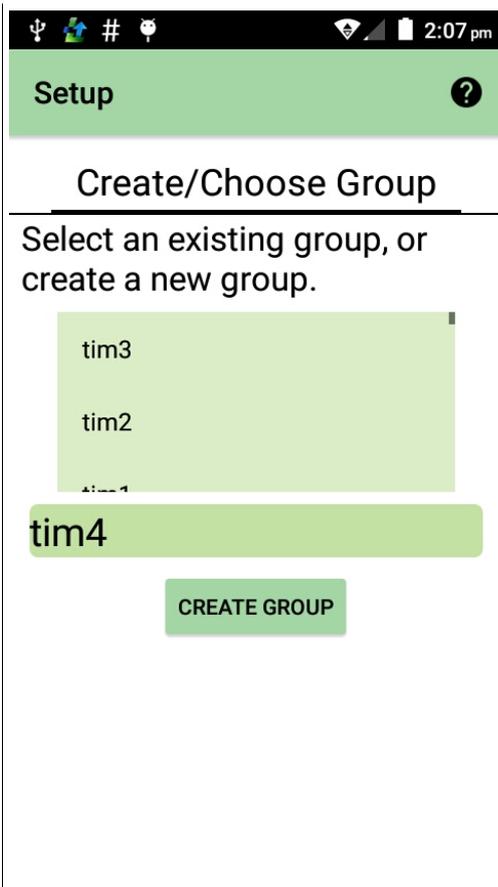
If you entered the correct details, you will see this message to say that you have successfully signed in.



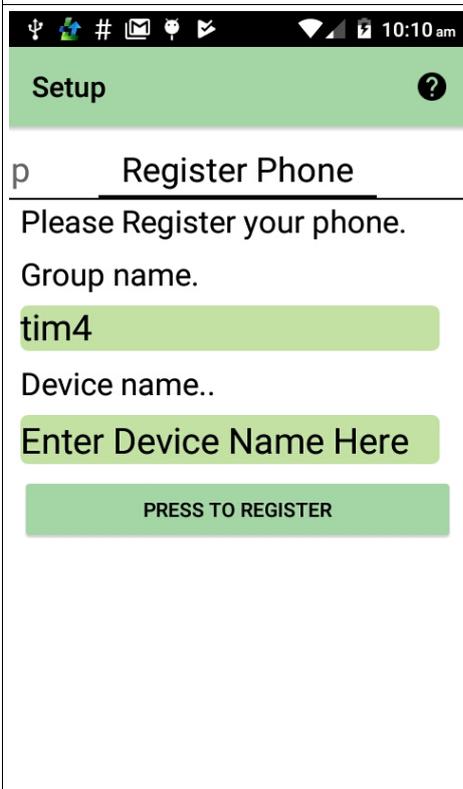
To help organize your recordings on the server, you need to create a group that your phone will 'belong' to. At a later stage you will be able to give other people access to the recordings in this group.

As you can see on this screen, I have already created some groups (tim1, tim3, ...) which you can select if you want this phone to use this group.

If you have lots of groups, you can scroll down to see the hidden ones.



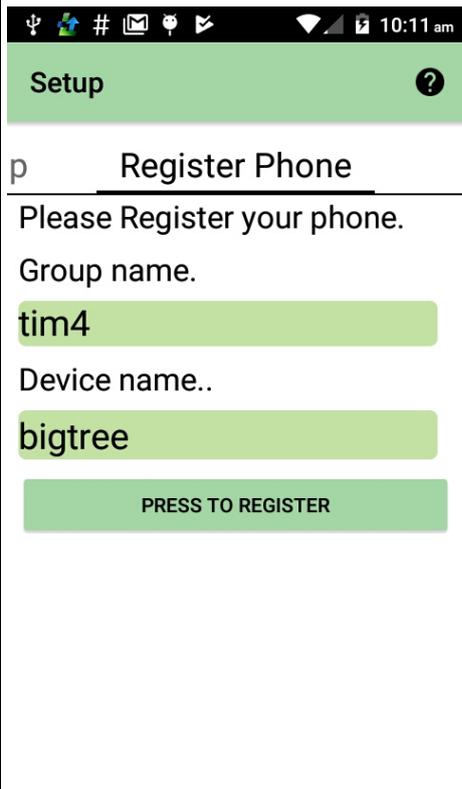
But if you haven't yet created a group then enter a new group name and press 'CREATE GROUP'.



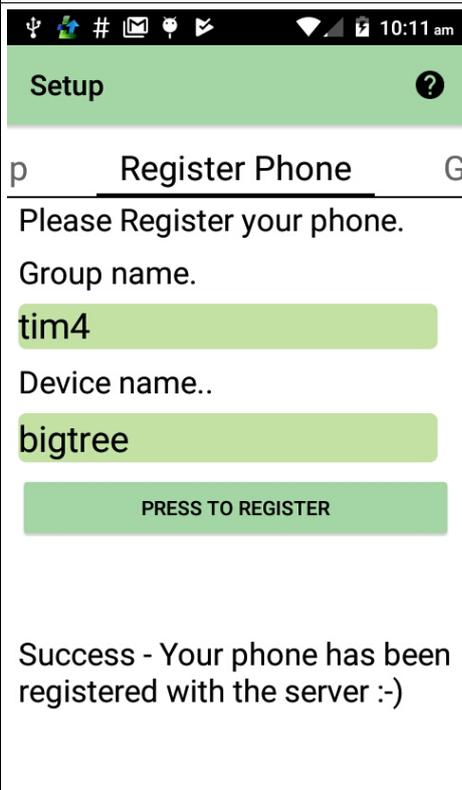
If all went well, the group is created on the server, and the next screen will automatically display the new group (or selected group).

You now need to register this phone to use this group (tim4) or any other group that you want to use and know already exists on the server.

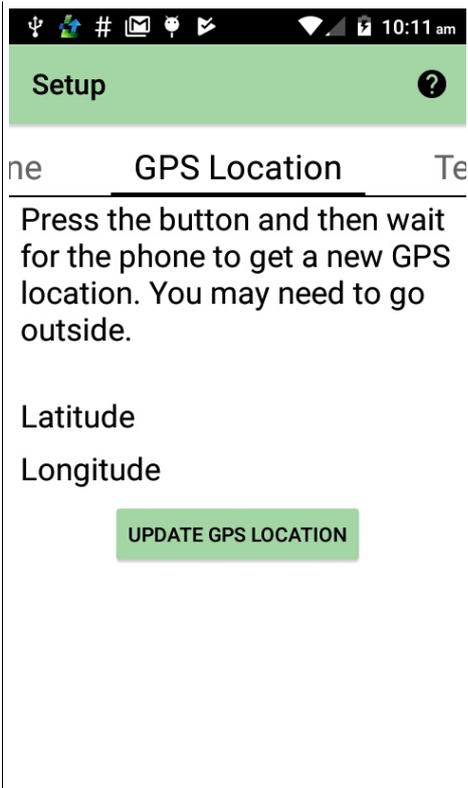
You need to also enter a unique device name, and then press the register button.



A very imaginative name :-)

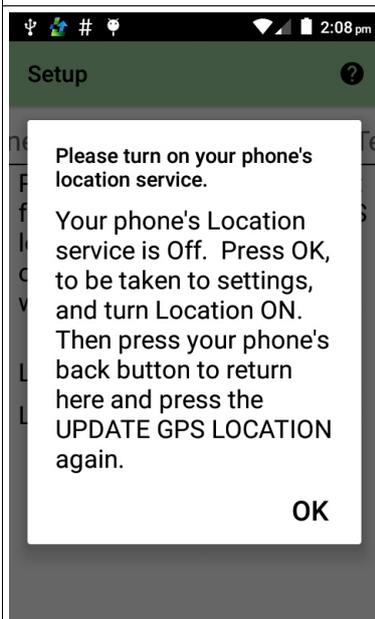


All went well, the phone is now registered.



Knowing the location of your phone will help us identify birds, and provide a map of bird locations. If you are going to be recording at a different location, then you can skip this step and return to it when you are at the recording location.

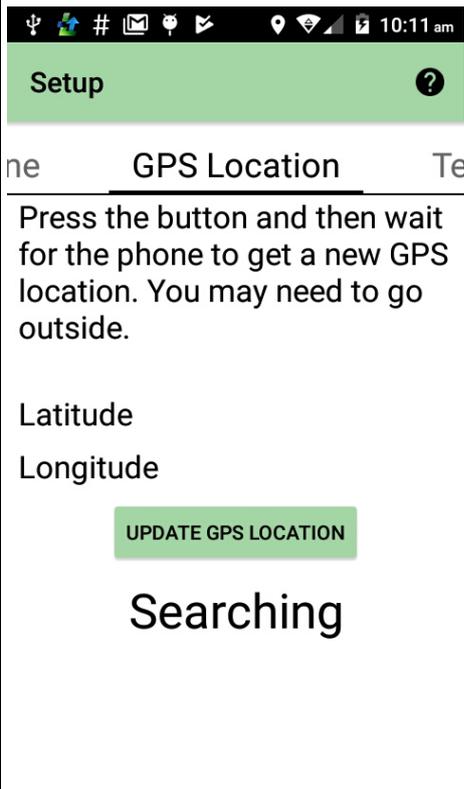
Press the button and go and find a location that can acquire a GPS reading.



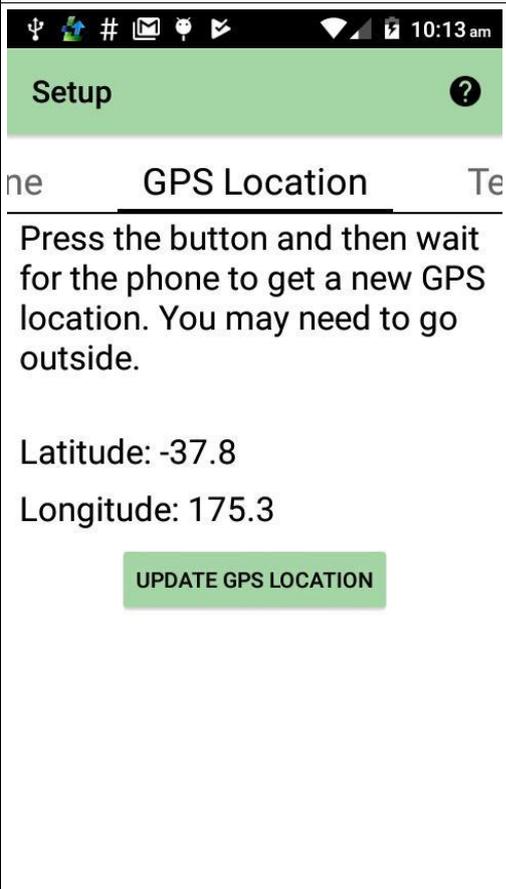
If you haven't enabled 'location' on your phone, you will see this message and when you press OK, will be taken to your phone's settings where you can enable Location.

Once you have enabled location, press the phone's 'back' button (bottom left on the reference phone) to be taken back to the GPS screen.

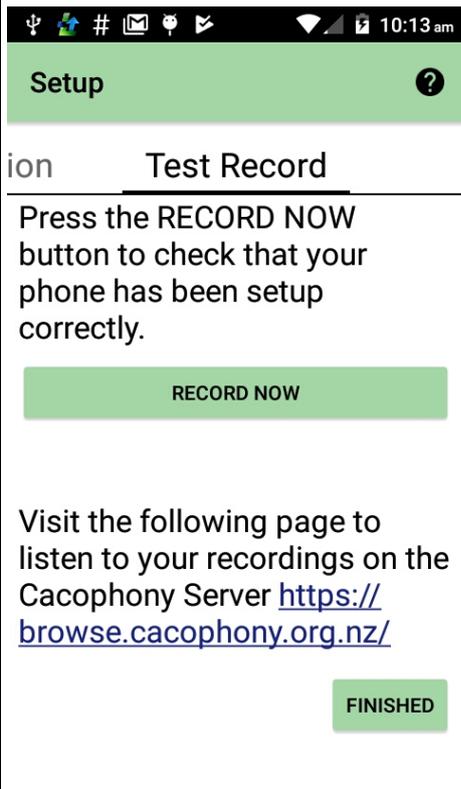
If you see a message along the lines of helping Google improve location services, do NOT accept it, as we will only be using GPS rather than other means of obtaining location.



This screen shows that the phone is still trying to find a location.



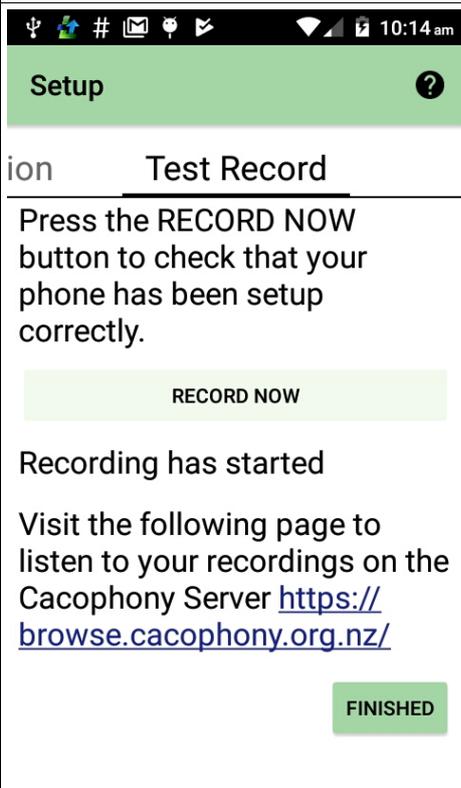
After a few minutes (keep walking about) you should get a GPS reading.



It's now time to check it all works.

Press the 'RECORD NOW' button if recording is enabled.

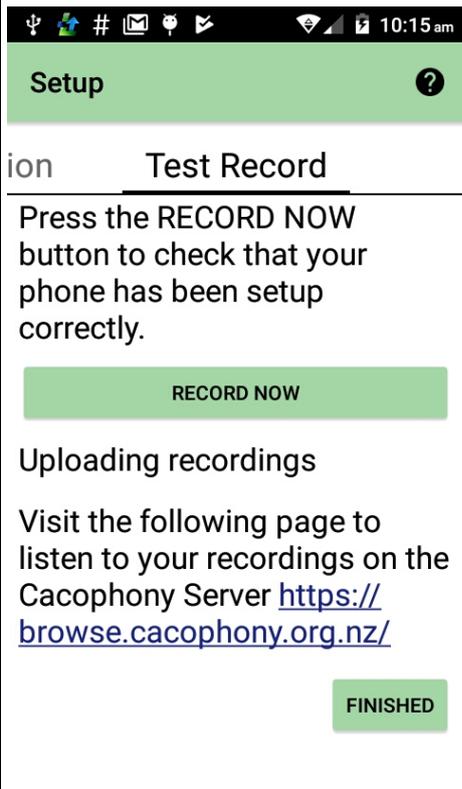
If recording is not enabled, you will need to navigate back to the main screen by pressing 'FINISHED' and then Click on Enable Recording, change the switch so Recording is on and press finished. You will then need to return to the 'Basic Setup' and swipe left until you are back on the Test Record screen.



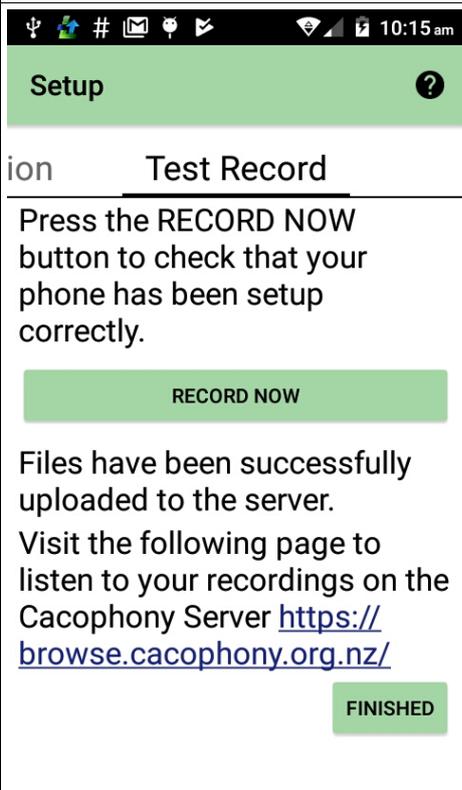
The phone will record for a minute – you may want to say a few words of wisdom.

A minute can see like a long time!

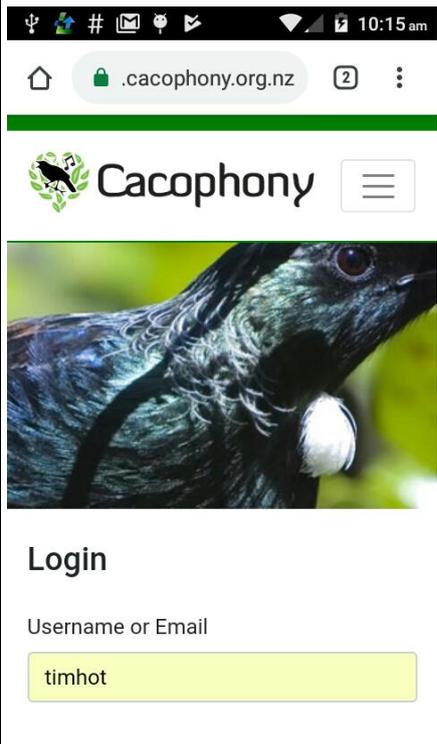
While recording it will say 'Recording has started'.



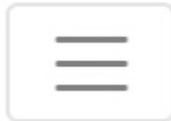
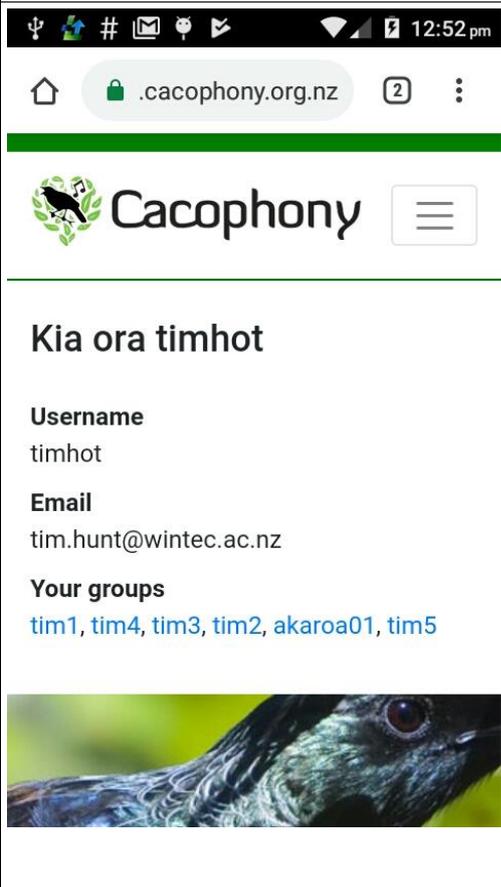
After a minute you will see (if paying attention) a message saying 'Uploading recordings'.



And finally, a message to say that they have been uploaded.



I know you don't believe me – so log back in to the server and have a listen to your wise words.



Press the menu icon.

10:16 am
 .cacophony.org.nz

Cacophony

Analysis
 Recordings
 Admin ▾
 Logout

Group: tim1 <

Users ?

User Name	Admin
menno	false

Choose Recordings.

10:16 am

Animals

all animals ▾

Duration (sec)
 0 to

From Date

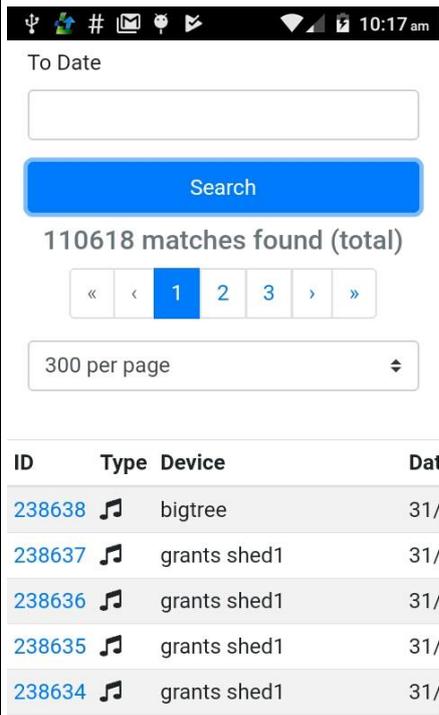
To Date

Search

300 per page ▾

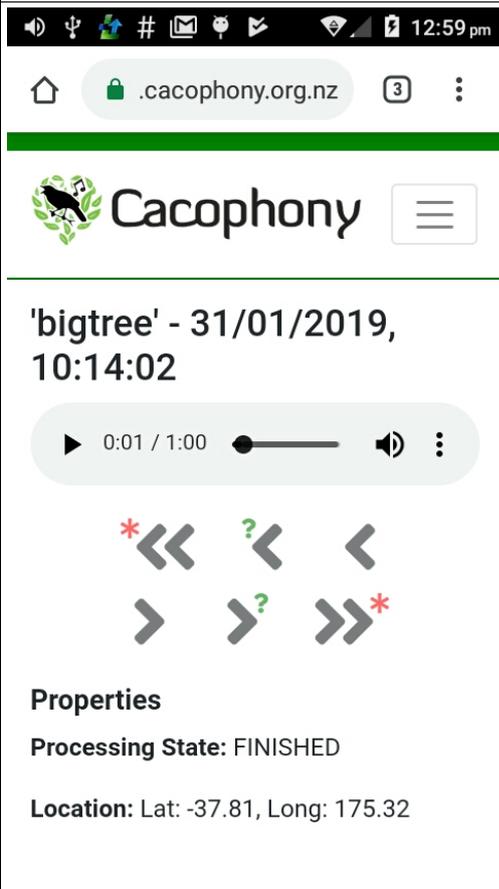
ID	Type	Device	Date	Time	Duration	Tag
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Press the Search button.



You should see your recording – probably just the one rather than multiply recordings as shown here.

Press the number in the first column (in this picture it is 238638 in blue).



Press the play button.

If all went well – Great job, you have done a basic setup on the phone.

See the Appendix 'Viewing Recordings' for more details on navigating the recordings on the website.

The App is now set up and tested and almost ready to go. Change the display sleep time to 15 seconds and remember to update the GPS reading when you get to the actual location where the phone is

When you enable recordings the App will automatically do the following:

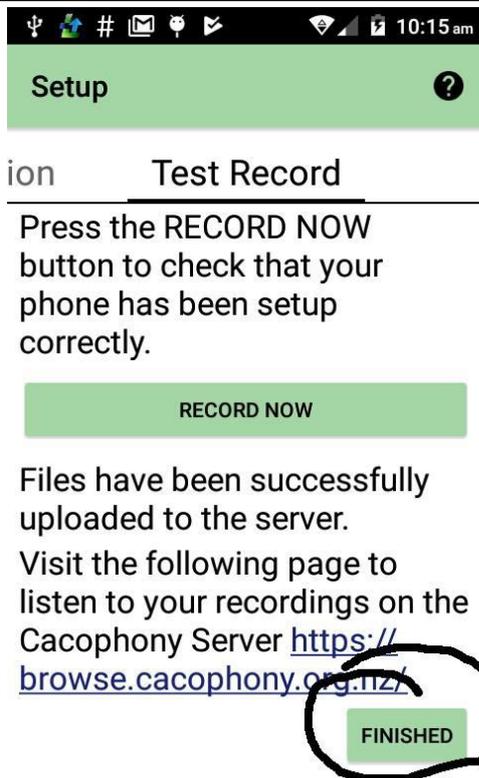
- Every hour make a 60 second recording,

to be left. Also consider setting up your own security pin on the phone to help prevent snooping. This can be done by navigation to Settings, Security, Screen Lock.

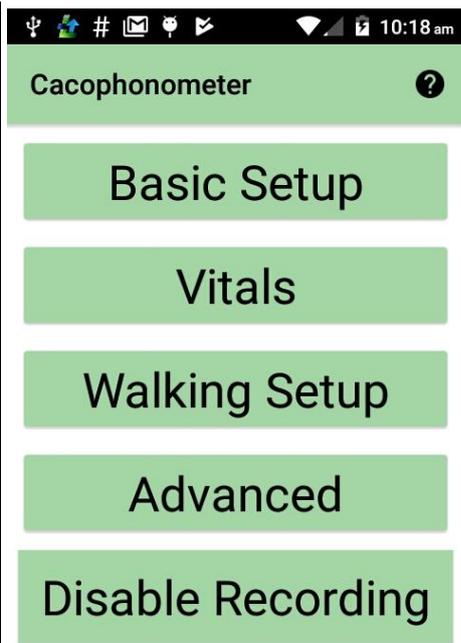
Important: If you are not going to use this straight away you should disable recordings from the main screen or turn the phone off. Otherwise you will have recordings made that you don't want.

- For one hour either side of dawn and dusk, make a 62 second recording every 10 minutes.
- Every 6 hours, upload the recordings to the server. Note: The 6 hours is from when a file was last uploaded. Pressing the 'Record Now' button, ignores the 6 hour wait and uploads all files currently on the phone but you will have to wait another 6 hours, before the next automatic upload.

If you turn the phone off and back on again, the phone will automatically resume recording without you launching/opening the app. This is what I normally do – just means anything else running is shut down.



Once you have finished checking your recording, return to the app and press the 'FINISHED' button.



This will take you to the main menu screen of the app.

Here you will see a number of further options for using the phone, including the 'Basic Setup' which you have just completed.

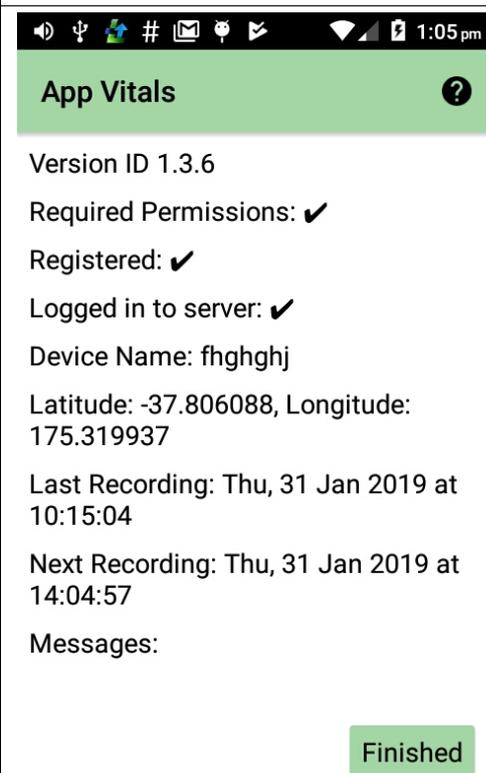
The other options are:

Vitals: Gives an overview.

Walking Setup: Used for when out walking.

Advanced: More features for when you've got the basics working.

Disable Recording: Handy to prevent you recording yourself.



Vitals

If all is well, you should see the ticks as shown here.

You can also keep an eye on when the last and next recordings take place.



Turn walking mode on or off.

Also remember to turn off 'Walking' when you have finished your walk.

Walking is OFF



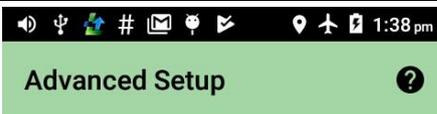
FINISHED

Walking

This option will quickly change some of the settings (in Advanced) that are best suited for when out walking with your phone. This option is designed for when the app is installed on a standalone phone, rather than in a waterproof case. Although you could carry the Cacophonometer if you wanted to.

- Automatically make a recording every 15 minutes (rather than the normal 60).
- Periodically update the GPS location – if it can – may depend on tree cover.
- Will NOT try to upload recordings to the server (in order to save battery power).
- Will make a warning sound before each recording; but on some (most?) phones plugging in an external microphone mutes this feature.
- Will keep recording when the battery is getting low – unlike the normal behaviour that stops recording to prevent the battery becoming completely drained.

Once you have finished your walk and are back in internet access range use the next screen 'Recordings' (under Advanced) to upload them.



Recordings Inte

Upload or delete all the recordings on the phone or swipe to next screen when ready.

Number of recordings on phone: 4

UPLOAD RECORDINGS NOW

DELETE ALL RECORDINGS

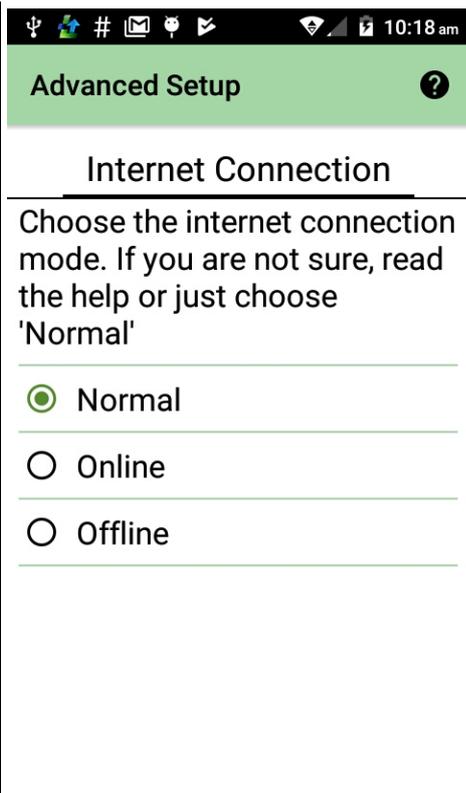
Advanced

Back at the main menu select 'Advanced'.

The first screen in the advance wizard allows you to manually manage the recordings on the phone.

Here you can see that there are currently 4 recordings on the phone.

You can upload them to your account on the server or delete them from the phone (forever).



Internet Connection

If you know your Bird Monitor will have an internet connection (either via WIFI or mobile data) then leave this in Normal. To save battery the Cacophonometer will place the phone in airplane/flight mode when it is not trying to upload recordings.

You shouldn't need to use Online mode. This keeps the phone connected to the internet at all times and uses more power.

If you know the Cacophonometer will have no internet connection, then setting it to Offline mode will save battery power by never attempting to connect. In this mode the recordings are stored on the phone and to upload the recordings you will need to bring the Cacophonometer into WIFI or mobile coverage and change the internet connection mode to Normal.

Recording in the bush with no internet access.

How to upload the recordings?

- Bring the phone back to an internet connection.
- Ensure the Internet Connection is set to Normal
- Either wait for up to 6 hours for the regular upload or upload the recordings manually from the Advanced screen.

or

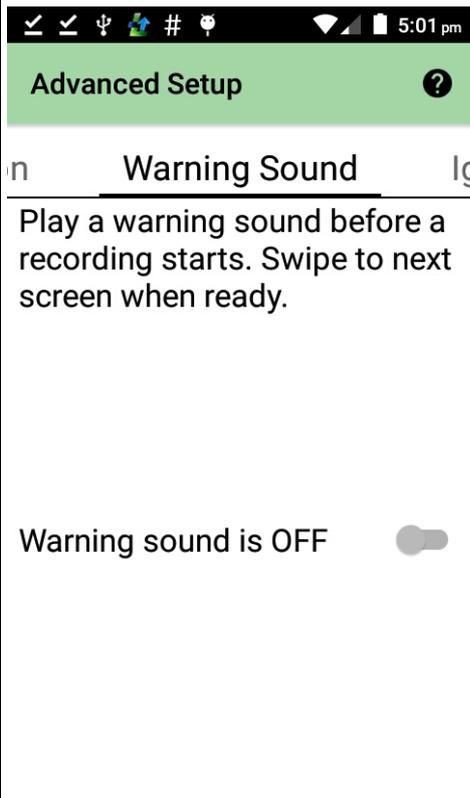
- Use a SD (memory) card and swap it out.

SD (memory) card

If you use a SD (memory) card in the phone (not supplied), the app will automatically use the card and you can just swap the card with an empty card each time you visit.

The app makes 45 recordings of 713KB each day (34 MB per day, 240MB per week) meaning a 32 GB memory card can store 133 weeks of recordings.

If you want to upload these recordings to the server, then put the card into another phone with the app and manually upload. Be aware that the recordings will have the name of this second phone.

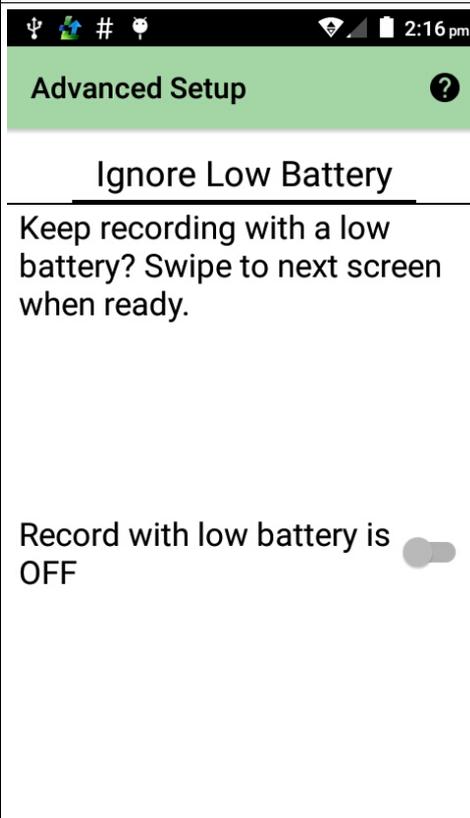


Warning Sound

Plays a sound just before and after each recording.

This option is automatically selected when using walking mode (but plugging in an external microphone may prevent the sound being played).

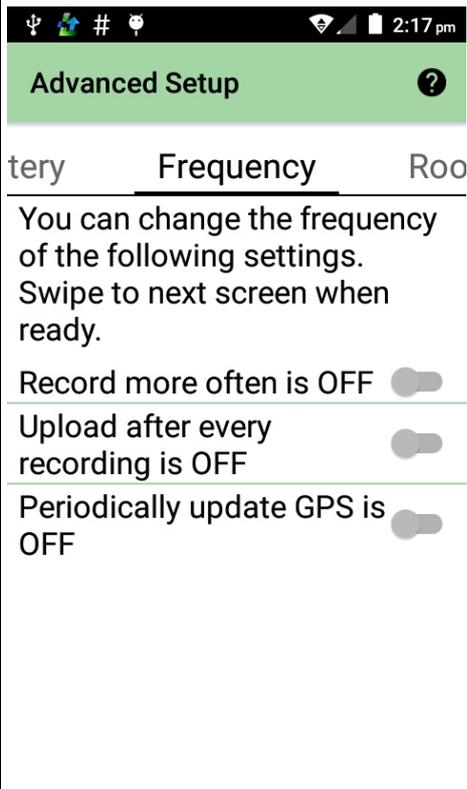
You may decide that even though it is nice to be warned that a recording is about to take place, the warning sound might scare away the birds :-)



Ignore Low Battery

The app will stop making recordings if the battery level gets low (below 50% charge). It will also reduce recordings to just dawn and dusk if the battery gets below 70%. This is very important if the phone is relying on a solar panel for charging and you have left the phone in a remote location. If the battery gets completely drained, the phone will not turn back on even when the battery is fully recharged.

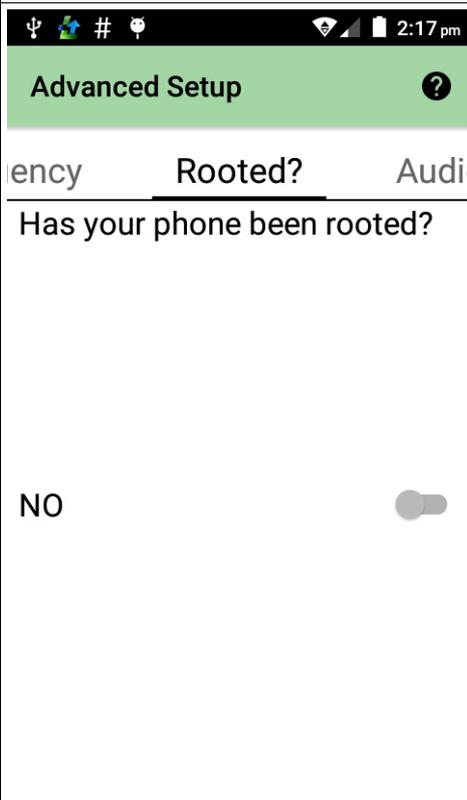
However, if you know that this isn't the case, for example you are out walking, or just want to leave it somewhere until it goes flat, then you use this option.



Frequency

You can change how often the following occur:

- Record more often: Records every 15 minutes instead of the usual 1 hour. Useful for getting a record of how sounds change when out walking. However, it is not recommended to use this option normally as when we start to report on bird counts, we may not initially factor in that you are recording more often!
- Upload after every recording: If you really can't wait six hours. But not advisable if on solar power or battery.
- Periodically update GPS: Automatically set by walking mode – not much point if the phone isn't moving and it will use more power.



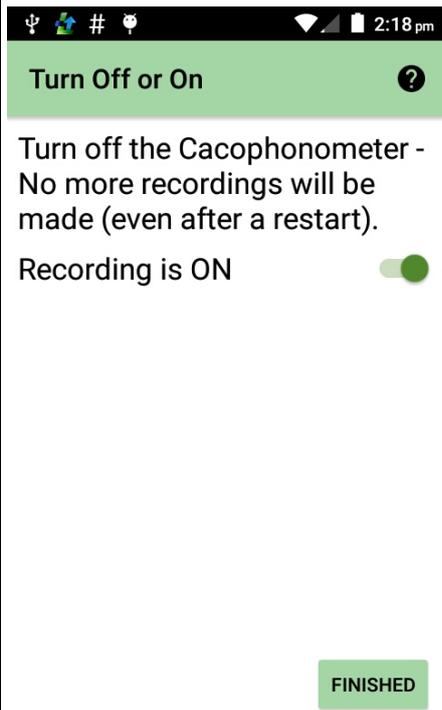
Rooted [https://en.wikipedia.org/wiki/Rooting_\(Android\)](https://en.wikipedia.org/wiki/Rooting_(Android))

The phone in your Bird Monitor has been rooted. This allows the app to turn airplane mode on and off to save battery.

Do NOT change this if you got your phone from The Cacophony Project – we root the phone and so the option is set to YES.

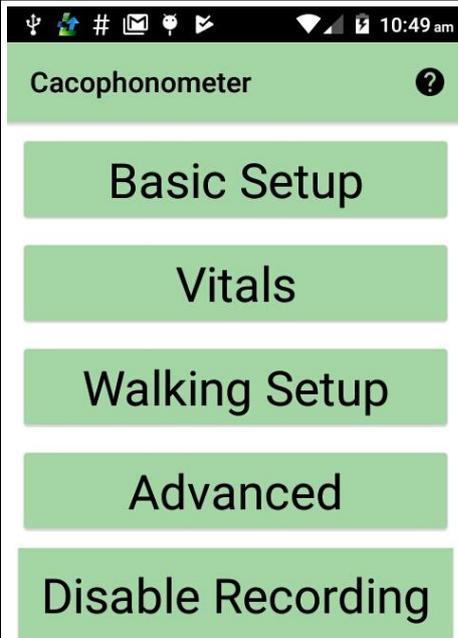
If the option is set to YES, the app will try to save power by enabling or disabling airplane/flight mode as needed. (Note: Setting this option to YES does NOT root the phone.)

If the option is set to NO, then the app will not try to enable or disable airplane/flight mode.



Disable Recording / Turn Off or On

The Disable Recording button on the main screen will take you to this screen which will allow you to prevent the app from making recordings.



That's all. You are ready to deploy your phone.

5. Deployment



The Bird Monitor comes in a weatherproof box and should be mounded ideally where it is shaded, so it does not get too hot and where it has some shelter from the rain. There is enough room in the box for the phone to be plugged into an extension cord of this is going to be run off mains power.

We are yet to find the perfect microphone. The microphone we have sent with your device has been designed for indoor use but has been tested outdoors for over a year. You may need to replace the microphone if the recordings stop, or the quality degrades. You should make sure that the microphone is just sticking out of one end of the case. Be careful when you close the case to make sure none of the leads or padding is sticking out of the edges, otherwise the clips will not close properly. This can be a little fiddley.



The Bird Monitor can be used in several modes explained in more detail below:

1. Mains power mode
2. Solar mode
3. Battery mode.

5.1. Mains power mode

In mains power mode the Bird Monitor is plugged into the mains power. If the connection to the Cacophonometer is outside then please make sure that the connection is made within the case. It is also very important that the extension cord should also be plugged into an [RCD](#) device to reduce the risk of electrocution. One variation some of our customers use is to keep the Bird Monitor indoors and run the microphone out a window. For example, this could be done from a shed or garage that has power.



5.2. Solar mode

If mains power is not available, it is possible to run the Bird Monitor using a solar panel if you have access to a sunny location. Trials have been done with 7 watt, 28 watt and 60 watt panels. The 7 and 28 watt panels proved to be marginal in their ability to keep the phone powered through short overcast winter days. The 60 watt panel purchased from 2040 (<https://www.2040.co.nz/products/cacophonometer-solar-power>) has proved to be very capable of keeping the phone charged to greater than 90% at all times through night and day, summer and winter.



Solar Panel setup

The picture on the left shows the panel tied to a tree (the Bird Monitor cannot be seen as it is behind the lower section).

Further power saving

If you are using a solar panel it is worth looking at further power saving options.

- Turn off Bluetooth: Check that Bluetooth is off in your phone’s settings.
- Screen display: Set the screen brightness level to the minimum.
- Screen timeout: Set the screen timeout to the minimum possible – 15 seconds on the reference phone.

5.3. Battery mode

Battery mode is the simplest to set up but is more work longer term. The device is configured to operate on very low power and will last approximately a week on the phone battery. So, each week the device will need to be charged. You can see the charge of the battery in the Cacophony Cloud Console.

Note: When operating in this mode you will need to go into the [Advanced Setup](#) and turn the option to Record with low battery to on. If you don’t do this then once the battery gets below 70% it will only record at dawn and dusk and it will stop altogether once it gets below 50%.

8:32:00 PM	62	 88%
8:22:00 PM	62	 88%
8:12:00 PM	62	 88%
8:02:00 PM	62	 88%
7:52:00 PM	62	 88%
7:42:01 PM	62	 89%
6:46:35 PM	60	 89%
5:46:35 PM	60	 89%

This time can be extended by using a battery pack. The battery that comes with the phone is 1600mAh, so in theory the device could last for 13 weeks with an 20,000 mAh battery pack. For example, [this can be bought for \\$45 from Kogan](#). Many “smart” battery packs turn off once the phone is charged and you need to unplug and plug them back in to start them charging. This is not useful for the Bird Monitor application. We are still researching the best battery pack to use in this situation. Please contact us at support@2040.co.nz to get our most up to date advice before buying a battery pack.



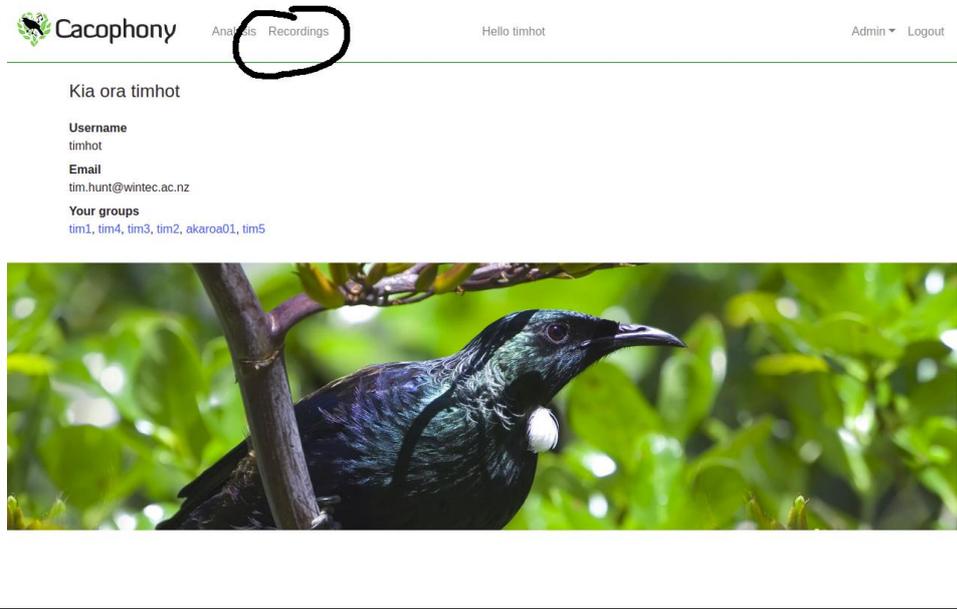
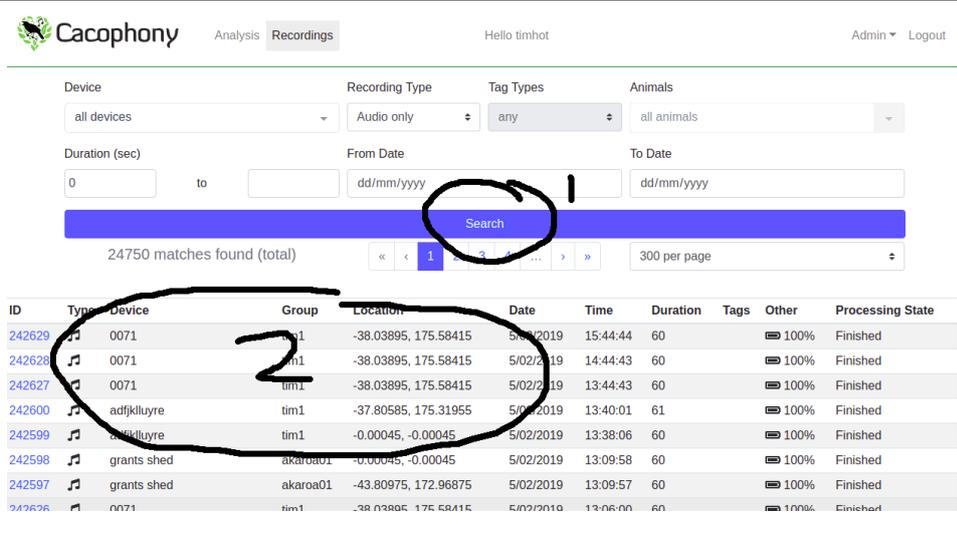
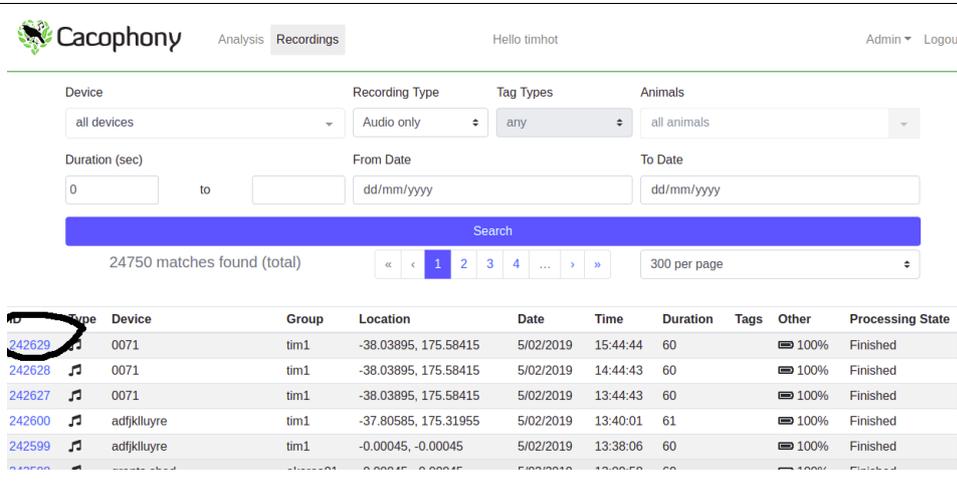
6. Final checks

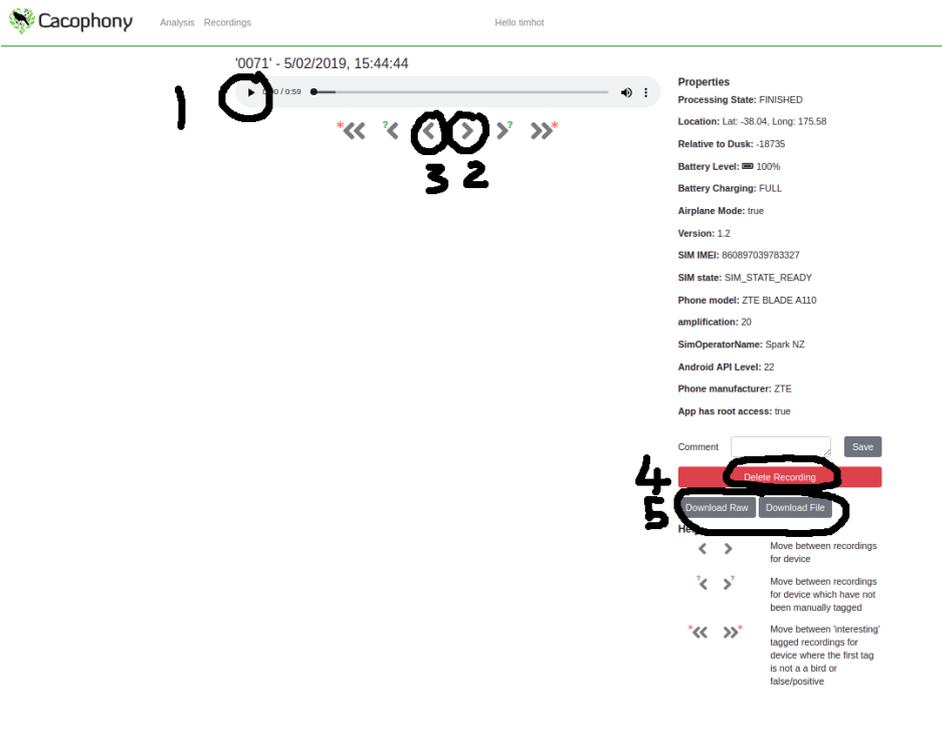
When you are at the location that the phone is to be deployed:

- Update the GPS location.
- Do another test record.
- Check volume is set to silent.

7. Viewing Recordings

Viewing your recordings is best done from the large screen of a computer rather than a phone.

	<p>Navigate to https://browse.cacophony.org.nz/</p> <p>Login and then choose Recordings</p>
	<p>Press the Search button (1) to show a list of recordings (2)</p>
	<p>Click on a number in the ID column.</p>



The following options are available:

- 1) play the recording.
- 2) move to the next recording.
- 3) move to the previous recording.
- 4) Delete the recording.
- 5) Download the file to your computer – Raw is the original version, File is an amplified version.



The other arrows are for navigating when the recordings have been 'tagged', but at the time of writing, tagging of audio files has not been implemented.

8. Acknowledgements

Many thanks to the team and contributors to [The Cacophony Project](#) for their work to create this product. Special thanks to Tim Hunt for donating his time and expertise.

Visit <https://cacophony.org.nz/> for the latest happenings.

22 Mar 2019