



CANDIDATE

The Whales of the Whitsundays project have collated information with the University of Queensland's (UQ) Cetacean Ecology Group to guide those wanting to contribute to the Humpback Whale Song Long-Term Monitoring Program.

The Cetacean Ecology Group at UQ has been studying the population of humpback whales that migrate along the eastern coast of Australia for more than 25 years. They focus on a variety of aspects of humpback whale ecology, including monitoring patterns in song. Hydrophones can be used to listen to underwater sound and then read using a spectrogram.

Our contribution will help them expand their study to other areas of the east coast and help to monitor changes in the song which occurs every year.

This document provides information on equipment, use and care of equipment and loading recordings up to the University of Queensland long term monitoring portal.

Equipment

There are two things required to be able to capture whale song, a marine mammal hydrophone and an audio recorder.

It is important to get the right frequency and recorder to capture humpback whales. Humpback song is 30Hz to 15kHz. With the right connections hydrophones can play whale songs directly through a vessel's audio system for guests to listen to live and also record. Buying a hydrophone with the preamp built in provides a better recording than a hydrophone with a preamp connected at the surface.

Sound recordings should be captured in WAV format (as audio). WAV files can be analysed with special software enabling researchers to view the audio files as a spectrogram, this way they can 'see' the sound. Look out for this when buying a recorder.

The approximate cost is \$1,000 for a hydrophone and a recorder. Recommendations are:

Hydrophone:

1. **Recommended** - HTI 90 min – This company is in America. You can request a quote by email and then call them early morning (7am) to pay. Make sure you request express shipping. When ordering ensure a long cable (15m) and plug for end (for zoom recorder a 1/4 inch mono jack will be required) – option from [High Tech inc.](#) Plug the ¼" mono jack into the recorder where an XLR connector could also be plugged into. The plug accepts both XLR and ¼" audio jacks. Also, make sure that Phantom Power is turned OFF. If phantom power is turned on with the hydrophone is plugged into the recorder it will permanently damage the hydrophone. I would set the recorder to Input 1 or 2 and set it to be unbalanced.
2. [AS-1 Hydrophone \(aquarianaudio.com\)](#) - if ordering this, will also require a pre-amp, as these are not built into the microphone the sound is not as good quality however they do seem to work OK.



CANDIDATE

Portable Digital Recorder:

1. H4n pro zoom. Ensure recording is not in a compressed file, needs to be in WAV format – option from [Zoom H4n Pro 4-Track Portable Recorder, All Black, Stereo Microphones, 2 XLR/ ¼" Combo Inputs, Battery Powered, for Stereo/Multitrack Recording of Music, Audio for Video, and Podcasting : Zoom: Amazon.com.au: Musical Instruments.](#)
2. Tascam DR-40X - use it with the EXT IN switch set to LINE. This will allow the recorder to accept a full scale signal from the hydrophone. It also has an XLR/TRS combo jack. And again, even with this recorder make sure the phantom power is set to OFF. It can record in WAV format.

Setting up your recorder

Most recorders will have a variety of settings in the menu. The notes below are for a Zoom H4 Pro recorder but are similar to many others. Most of the settings should stay off, but below are a few important settings for recording humpback whale song:

- In the Recording settings, set your sampling rate.
 - **Important:** Set sampling rate to 44.1kHz/16bit
- Make sure the date and time is correct.
- Include the date in the filename.
- Record to SD card.
- Set to stereo (channel 1 & 2 jacks are at the bottom of the recorder)
- Automatic level/gain should be off. You should always manually set your recording level.
- Mono mix should be off. You should only be recording to one channel.

Preparing for deployment

While the hydrophone can go in the water, remember that the recorder and the plug end of the hydrophone needs to stay dry. Next:

- Turn on the recorder. It may take a few minutes for the recorder to boot up, so best to do this first while you set up the rest of the gear.
- Prepare the hydrophone. Depending how you store the cord, make sure it is not tangled and ready for deployment. **Plug in the 9V battery.** Make sure you don't try to connect it the wrong way around or you may damage the pre-amplifier which is built into the hydrophone.
- Plug in the hydrophone to the bottom channel (for consistency, try to stick with channel 1). Plug the headphones into the headphone jack.
- Once the recorder has finished loading, you are ready to go!

Deploying hydrophone

- Lower the hydrophone into the water. Be careful not to hit the hydrophone on the boat when lowering into the water. The lower the hydrophone, the better. Make sure the hydrophone is deployed at least 5 metres.



CANDIDATE

- Press the record button on the recorder and have a listen. The record button will start to flash. Pressing the record button once will let you hear what the hydrophone is picking up without recording.
- **Important:** Check the recording level. Generally, a recording level of 50 works well with the pre-amp. But it is important to check the bars on the recorder.
Please note: If the bars are flickering around a lot and hitting the maximum, either the recording level is too high or there is something hitting the hydrophone. Have a listen and see what you can hear. If all you hear is background noise, the recording level is up too high. It is also important to keep an eye on the recording level when a singer is singing. If the recording level is too high, the audio will be clipped. This means the system is saturated and unable to accurately record the song and it becomes distorted.
- When you hear a singer, hit the record button again. When the record button is not flashing, it is recording. The timer in the display should be counting the time of the recording.

Finished recording:

- Hit the stop button to stop recording.
- At the end of a recording session, bring the hydrophone back in, being careful to not damage the end. Pat dry with a towel and unplug battery. Store appropriately.
- Turn off recorder and store back in the case.

Things to remember:

- The hydrophone will pick up vibrations in the water. Engines should be switched off. Generators as well.
- In windy conditions, if the boat is being blown across the surface, the hydrophone will pick up the vibration and it will sound like wind. The best way to stop this is to stop the boat from moving (which can be challenging if not in a small boat!).
- If this boat is moving across the surface, this will also mean the hydrophone to be dragged upwards/shallower. Remember, the hydrophone should be at least 5 meters deep. Adding weights to the hydrophone to sink it can help to some extent, but this can also lead to the cable being dragged through the water horizontally creating even more noise.
- To reduce cord strumming, the cord can be wrapped in string. This will break up the water flow and reduce vibration.
- Adding markers to the hydrophone cord will help you gage the depth of deployment.
- After use, rinse the hydrophone in fresh water, remembering to keep the plug and battery attachment dry. Wipe down the recorder with a damp cloth.

Recordings can be unloaded to the to the University of Queensland's Research Data Management System.

When uploading recordings please name them with the location of the recording (as specific as possible), your name and the date like this:



**Cetacean
Ecology
Group**



- Filename: HookPassage_OliviaBrodhurst_17062023

A new link for uploading too will be provided each year via email. The 2023 link is:

- <https://cloud.rdm.uq.edu.au/index.php/s/j7oKKpPD9dPNwzJ>
- Password: WhaleSong!

If you have any questions for UQ, please feel free to reach out directly to:

Genevieve Williams

PhD Candidate

Cetacean Ecology Group

Moreton Bay Research Station | University of Queensland | Australia

E: genevieve.williams@uq.edu.au

If you have any more general or localised questions please reach out to Crystal or Olivia.

Thank you for your contribution to the Cetacean Ecology Group's long-term monitoring program.

