

Southeast Coast Network

National Park Service
Inventory and Monitoring Division



Standard Operating Procedure 1.4.22

Deployment and Retrieval of Automated Recording Devices for Vocal Anuran and Landbird Monitoring—Version 3.0

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Summary

This standard operating procedure (SOP) describes deployment and retrieval of automated recording devices (ARD) used by the Southeast Coast Network to monitor vocal anurans and landbirds. The ARD models covered by this SOP are the Song Meter 4 (“SM4”) and Song Meter Mini (“SM-Mini”), developed by Wildlife Acoustics, Inc.

Revision Log

Revision Date	Author	Changes Made	Reason for Change	New Version #
03/15/2013	B. Smrekar	Added field equipment check list.	Wasn't included in previous copy.	—
02/27/2014	B. Smrekar	Minor changes to ARD deployment data sheet.	Includes notes to be made at ARD retrieval.	—
07/6/2015	B. Smrekar	Updated materials list, added ARD retrieval procedures.	New materials needed; procedures for when ARDs are retrieved by someone other than the Wildlife Biologist and interns.	—
06/27/2016	B. Smrekar	Updated Overview section, deployment schedule, and equipment checklist, rewrote raw recording transfer section.	Corrected errors in Overview, Deployment window was incorrect for SECN parks, added items to equipment list, made other sections more complete.	2.0
05/25/2023	M. Parrish	Complete revision to cover new equipment now in use, streamline navigation and physical deployment procedures, and updates to recording transfer procedure.	Equipment and field procedures have evolved since the last update five years ago.	3.0

Contents

	Page
Equipment for Deployment.....	4
Field Sampling Overview	5
ARD Deployment Procedure	5
Mounting ARDs to Trees	6
Mounting ARDs on Wooden Posts in Open Areas	8
Activate and Document the Deployed ARD	9
ARD Retrieval Procedure	10
Transfer of Raw Recordings to Server and Backup Drives	10
Literature Cited	11
Appendix A. Forms.....	12

Equipment for Deployment

- Song Meter 4 (SM4) and/or Song Meter Mini (SM-Mini).
 - Units must be prepared for field deployment (see SECN SOP 1.4.1 *Programming and Maintenance of Automated Recording Devices for Vocal Anuran and Landbird Monitoring—Version 2.0* [Parrish 2023a]).
- GPS unit loaded with sampling location coordinates (see SECN SOP 1.1.2 *Uploading waypoints to GPS units—Version 2.0* [Parrish 2023b]).
 - GPSMAP 66i is current model in use.
 - Coordinates are available on the SECN GIS server:
 - `\\INPSECNS02\GIS\GIS\projects\Wildlife\SL_coords`
- Quality compass
- Pocket knife
- Lighter
- Map of sampling locations printed on write-in-the-rain paper
- Paracord
- 4-foot (1.2-meter) wooden stakes (silt fence stakes) to serve as mounts in sparsely vegetated areas
 - Stainless No. 8 machine screw, flat washers (2), and No. 8 nut for mounting ARDs on stakes (quantity per ARD)
 - 2-pound (0.9-kilogram) hammer for placing stakes in ground
- Copy of SECN form MP-05 printed on write-in-the-rain paper
Available on SECN server at: `S:\Monitoring\Landbird\Protocol-SOPs\Forms`
- Flagging tape

Field Sampling Overview

Landbird and vocal anuran monitoring are carried out by the same automated recording devices (ARDs). Sampling is scheduled on specific mornings (landbirds) and nights (anurans). Although wildlife monitoring was carried out in plots originally shared with the Southeast Coast Network's (SECN) terrestrial vegetation monitoring protocol, vegetation sampling has since been redirected to separate locations. Only landbirds and anurans are monitored on the original plots.

Automated recording devices are deployed in the field, generally between January 1 and March 1. Recording takes place at scheduled intervals, ending by June 15. The ARDs are retrieved from the field in the late summer and fall. Latitudinal and climate variation across the SECN region results in some variability in the peak calling period for vocal anurans (Dorcas and Gibbons 2008) and landbirds. A March 15 sampling start date is adequate in most SECN parks. Sampling at Canaveral National Seashore could potentially begin March 1, while sampling at parks in the Outer Banks could begin a little later, by April 1, with appropriate modifications to sampling end dates. Programming ARDs is covered in SOP 1.4.01 *Programming and Maintenance of Automated Recording Devices for Vocal Anuran and Landbird Monitoring—Version 2.0* (Parrish 2023a).

This standard operating procedure (SOP) discusses procedures for deploying and retrieving ARDs in the field.

ARD Deployment Procedure

1. Navigate to within 5 meters (16.4 feet [ft]) of the sampling location using a GPS handheld unit programmed with the permanent sampling coordinates. See SOP 1.1.2 (Parrish 2023b) and navigation notes provided in SECN SOP 1.4.31 *Navigation to Southeast Coast Network Sampling Locations for Landbird and Vocal Anuran Monitoring—Version 3.0* (Parrish et al. 2023). Use a compass and flagging to aid navigation as necessary. Use flagging sparingly in areas frequented by the public and remove all flagging after ARD retrieval.
2. At the sampling location, mount the ARD to a fixed object, such as a tree (see instructions below). In open areas, mount the ARD to a wooden post driven into the ground. Both SM4 and SM-Mini ARDs have built-in mounting brackets at the top and bottom of each unit.

Mounting ARDs to Trees

The ARDs can be securely mounted to a tree using paracord in a way that does not harm the tree during the sampling interval (Figure 1). The preferred approach is as follows:

1. Cut a length of paracord sufficient to pass around the tree trunk. Melting the ends of the paracord with a lighter will limit fraying but is not required. If melting the ends of the paracord, use caution to avoid burns.
2. Tie a bowline knot onto one side of the top mounting bracket (Figure 2). Bring the loose end of the rope around the trunk and utilize a trucker's hitch (Figure 3) to tie in the other end of the mounting bracket. Using a trucker's hitch will tighten the ARD very securely to the trunk. Mount the ARD around 5 feet (1.5 meters [m]) off the ground, preferably facing away from any high foot traffic areas like trails. Example photos of the two knots are shown below, but to learn how to tie these simple, incredibly useful knots, refer to an outside source, such as an online knot-tying guide.

Caution: The trucker's hitch is an excellent knot for applying strong tension on a load, but it can be tightened excessively, which can warp open the case of the ARD, leading to water ingress. Cinch down the hitch securely, but do not tighten it beyond reason.



Figure 1. An SM-Mini ARD is mounted to a tree trunk using the top mounting bracket.



Figure 2. A bowline forms a fixed loop at the end of a line. The example knot is tied very loosely for illustrative purposes; in actual use, it is drawn snug.



Figure 3. A trucker's hitch is used to cinch down and secure a load. It depends on the far end of the rope being secured first. Create a small loop in the rope before it passes through the ARD bracket. Run the working end through the bracket and back through the small loop in the line. Draw down tight on the working end and secure the line with a few half-hitches while tension is maintained. It is possible to generate a great deal of tension on the rope using this knot. The example knot is tied very loosely for illustrative purposes; in actual use, it is drawn snug.

3. Generally, a single line around the top bracket is sufficient for mounting an SM-Mini. For the heavier SM4, run a second line of paracord around the tree, utilizing the SM4's lower mounting bracket.

Mounting ARDs on Wooden Posts in Open Areas

In open areas, such as marshes or dunes, there are no trees available on which to mount ARDs. Instead, hammer a wooden post into the ground with a 2-pound (0.9 kilograms [kg]) mallet. Posts need to be pre-drilled with holes to accept No. 8 stainless steel mounting hardware passing through the ARD's mounting brackets. Stainless hardware, though more expensive than zinc-plated hardware, is less likely to rust in salty environments. Mount the ARD to the post at one or two points using the integral brackets. Pass a No. 8 machine screw with a flat washer, through the ARD bracket and the post, and secure it with a second washer and a hex nut. It is sufficient to hand-tighten the nut, but alternatively, a screwdriver and small pair of pliers can be used to tighten it more. Again, the

small SM-Mini is secure enough with a single mounting point on the top of the unit (Figure 4), while a SM4 is more secure when two mounting points are used.



Figure 4. An SM-Mini is mounted on a 4-ft wooden post in the middle of a marsh where no trees are available as mounting locations. Stainless hardware ensures that the wet, salty environment will not overly rust the screw, making later removal easier.

Activate and Document the Deployed ARD

Activate the ARD according to the [user manual instructions](https://www.wildlifeacoustics.com) (<https://www.wildlifeacoustics.com>). Generally, the ARD will indicate it was successfully activated, then it will enter sleep mode.

After the ARD is activated, use a phone camera to take a few locator photos that may be useful to the person tasked with retrieving the unit. Locator photos can be stored on the SECN server (S:\Monitoring\Wildlife\Deployments\LocatorPhotos) for later use by field crews, but they are not considered project data.

Use SECN form MP-05 (Figure A1; available on the SECN server at: S:\Monitoring\Landbird\Protocol-SOPs\Forms) to record information about which unit was assigned to which sample location, who deployed it, and how it may be relocated. It is also helpful to note on MP-05 whether waders or special equipment or vehicles may be needed to access the location.

ARD Retrieval Procedure

1. Using a handheld GPS unit, navigate to the sampling location.
2. Using the information from the ARD Deployment Data Sheet and/or locator photos taken during deployment, locate the ARD.
3. Remove the mounting hardware, brush the unit clean, check for remaining power (note if the batteries failed before collection) and turn it off. If a wooden stake was placed, remove it at this time and take it back to the vehicle. Remove flagging used to identify the deployment site.

Caution: Be aware that various biting arthropods and other wildlife (e.g., treefrogs) have been known to ensconce themselves in and on ARDs, so use caution when initially handling them. It may be preferable to store the unit in a plastic bag while packing out the ARD, to prevent backpack infestations. Dry out units as soon as possible if they are wet. If ants or other insects have infested a unit, double seal the unit in plastic bags back in the lab and freeze the unit for two weeks.

4. Fill out the remainder of the ARD deployment/retrieval data sheet (Form MP-05).

Transfer of Raw Recordings to Server and Backup Drives

Upon returning to the SECN lab, remove each SD card from its ARD, one at a time. Download the contents of the card to the appropriate storage folders on the SECN server (below). The landbird and anuran recordings are all stored together in one folder on the SD card, but they should be separated into landbird and anuran directories on the server, to facilitate analyses. Select only the landbird files in Windows Explorer by using the search term, “*080000*”; likewise, the anuran data can be isolated by searching for “NOT *080000*.”

Where “YYYY” represents the four digit year of recording; “PPPP” represents the standard four-letter park abbreviation; and “sss” represents the three-digit sampling site ID code:

Store vocal anuran recordings within the working directory:

S:\Monitoring\Anuran\Data\RawAudioFiles

using the following subfolder naming convention: ..\YYYY_Recordings\PPPPYYYY\PPPPsss

Store landbird recordings within the working directory:

S:\Monitoring\Landbird\Data\RawAudioFiles

using the following subfolder naming convention: ..\YYYY_Recordings\PPPP\PPPPsss\Example:

Anuran recordings from Cape Hatteras National Seashore (CAHA) made in 2020 at sampling location 001 would be stored in:

[S:\Monitoring\Anuran\Data\RawAudioFiles\2020_Recordings\CAHA2020\CAHA001](S:\Monitoring\Anuran\Data\RawAudioFiles\2020_Recordings\CAHA2020\CAHA001)

Make a copy of the primary data when performing analyses. Do not directly modify the primary recording data.

Literature Cited

Dorcas, M., and W. Gibbons. 2008. *Frogs and Toads of the Southeast*. University of Georgia Press, Athens Georgia.

Parrish, M. C. 2023a. Programming and maintenance of automated recording devices for vocal anuran and landbird monitoring—Version 2.0. Southeast Coast Network Standard Operating Procedure NPS/SECN/SOP—1.4.01. National Park Service, Athens, Georgia. Available at: <https://irma.nps.gov/DataStore/Reference/Profile/2299550> (last accessed June 2023).

Parrish, M. C. 2023b. Uploading waypoints to GPS units—Version 2.0. Southeast Coast Network Standard Operating Procedure NPS/SECN/SOP—1.1.02. National Park Service, Athens, Georgia. Available at: <https://irma.nps.gov/DataStore/Reference/Profile/2299548> (last accessed June 2023).

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Appendix A. Forms

Survey Year: _____		Park Code: _____		ARD Field Deployment and Retrieval Notes				
Page _____ of _____								
Sample Location	ARD Number	SD Card Number	Deploy Date	Deployer Initials	Deployment Notes (Location Description)	Retrieval Date	Retriever Initials	Retrieval Notes (Indicate if batteries or cards not intact)

Updated: March 2023
RESEARCH NOTES

Landbird / Anuran Monitoring Project
IF FOUND: Contact michael_parrish@nps.gov

Datasheet MP-05
NPS / SECN

Figure A-1. Example of ARD field deployment and retrieval notes form.