

Southeast Coast Network

National Park Service
Inventory & Monitoring Program



Standard Operating Procedure (SOP) #1.4.1

Programming and Maintenance of Automated Recording Devices for Vocal Anuran and Bird Monitoring

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Summary

This Standard Operating Procedure describes programming the automated recording devices (ARD) used by the Southeast Coast Network (SECN) to monitor vocal Anurans and landbirds. The ARDs covered by this SOP are the Song Meter device, developed by Wildlife Acoustics, Inc. The user manual for the Song Meter (Wildlife Acoustics 2011) must be read prior to use of these devices as a monitoring tool. Currently, the SECN uses Song Meter (SM) models 1, 2, and 2+.

Revision Log

Previous Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #
1	3/15/2013	B Smrekar	Added equipment list and warning label, changes to shipping and maintenance and office prep procedures	Not included in the first version of the SOP	1.1

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Equipment

- Computer with software install rights or all software pre-installed
- Song Meter Configuration Utility software
- 16GB Class 4 SDHC flash card
- Flash card reader
- Maha Energy PowerEx IMEDION 9500mAh 1.2V NiMH D-cell rechargeable batteries for deployment of 77 days (4/ARD)
- Maha Energy PowerEx 11,000mAh 1.2V NiMH D-cell rechargeable batteries for deployments less than 6 weeks, or in situations when the batteries can be changed at the 6 week mark (4/ARD)
- Maha Energy MH-C808M Ultimate Professional Chargers for D-cell NiMH batteries
- CR 2032 3V watch battery (1 per SM1)
- Energizer Industrial AA batteries (2 per SM2 and SM2+)
- Mini-MBT ZTS Pulse Load Multi-Battery Tester
- Power squids
- 3 mm nylon cord
- Cordlocks
- 4-6 mm nylon cord
- 1/8" wire mesh sheets
- Loctite or other polyurethane construction adhesive
- Caulking gun
- Camouflage fabric
- Camouflage duct tape
- Diagonal pliers
- Needle-nose pliers
- Phillips-head screwdrivers

- Zip ties and small bungees
- Glass cleaner and paper towels
- Industrial super-permanent ink marker

ARD Office Preparation List

1. Clean all ARDs.
2. Check for Firmware updates and install as necessary. Time and date on each ARD will need to be reset if firmware updates are installed.
3. Plan recording schedule and program according to the Song Meter Configuration Application.
4. Load recording schedule onto an SD card. Make sure the SD card is in the **UNLOCKED** position. Place the card with the recording schedule on it into each ARD, turn the ARD on and load the recording program onto each ARD. Ensure that the recording schedule shows in the Schedule window of the ARD.
5. Change all clock batteries that have not been changed in the past year (SMI). Check all AA Industrial batteries and replace if less than 80% charge (SM2 and SM2+).
6. Ensure all ARDs have ropes attached to the back.
7. Ensure there is **one set** (2 ropes plus 2 clips) of attachment strings for every ARD.
8. Ensure there is **one pair** of microphones for each SMII.
9. Ensure all ARDs have NPS arrowhead stickers and warning stickers and that the SECN ARD number is legible. Rewrite as necessary using an industrial super permanent ink marker.
10. Ensure that each ARD has camouflage if necessary.
11. Collect or make a microphone cover from metal cage wire for each microphone on each ARD to be deployed at HOBE, KEMO, CHAT, OCMU, and any other park where squirrel damage may be a concern.
12. Tighten all connector ports on ARDs using pliers to ensure that they are waterproofed.
13. After charging **four** rechargeable D-cell batteries for each ARD, check the charge using the battery tester. DO NOT rely on the gauge in the battery charger to ensure that the batteries used during deployment are fully charged, as they do not always reflect the correct degree of charge in the batteries.
14. Place batteries into each ARD that is to be deployed and test record overnight before deployment to ensure the ARD is working properly.

Formatting the Flash Card

The SD (i.e., flash) cards must be reformatted prior to use each field season. Formatting the SD card automatically erases everything contained on the card, so **ensure that all of the data is backed-up on the appropriate hard drive/office computers before formatting**. The most convenient procedure to reformat each SD card is immediately prior to copying the new recording schedule onto the card. To format the card:

1. Insert the SD card into the card reader. Make sure that the SD card is not locked on the side slot, as you will not be able to format the card. A locked card will result in the error message “Card is Write Only.”
2. Navigate to My Computer > Removable Disk and locate the folder containing the card reader.
3. Right click on the SD card folder and choose Format. Because the card needs to be completely re-formatted, be sure to click on the folder for the entire SD card, **not** on any subfolders (e.g., data folder) located on the card.
4. Check Quick Format and then Click Start. A warning will be issued asking if you want to erase all data on the card. Click OK. The entire SD card will then be formatted.
5. Once the card has been formatted, any new recording schedules should be loaded onto the card for the next recording session.

Updating ARD Firmware

Occasionally, the firmware for the ARDs needs updating. The firmware updates are in a .000 format and can be downloaded directly from the Wildlife Acoustics, Inc. website (<http://www.wildlifeacoustics.com/wa-php/downloads.php#sm2>). The release notes can also be found that identify the specific issues the firmware update(s) addresses. Do not use third-party firmware updates, or updates from sources other than Wildlife Acoustics, Inc.

SM1 Firmware (version 1.9.5)

The process to upgrade the SM1 firmware is:

1. Download the SONGMETR.000 file.
2. Copy this file to the top level directory of the flash memory card.
3. Power down the SM1.
4. Insert the flash memory card into Slot A of the SM1.
5. Power up the SM1. The following messages should appear:
 - a. *Booting from card... Please stand by... Upgrade complete!*
6. Repeat steps 3 through 5 for any other SM1s you wish to upgrade.
7. Ensure you delete the SONGMETR.000 file from the flash card when you are done so that the SD card is used for recordings, otherwise the SM1 will upgrade itself when it awakens instead of recording.

Song Meter SM2 and SM2+ Firmware (version 3.1.7)

The process to upgrade the SM2 firmware is:

1. Download the SYS3-2-4.SM2 firmware file.
2. Copy this file to the top level directory of the flash memory card.
3. Insert the flash memory card into Slot A of the SM2.
4. Press and release the "Reset" button (for SM2) or turn on power-NOT the WAKE/EXIT button (for SM2+) while pressing the "Up" button. Continue holding the "Up" button until you see the "Song Meter II Boot" message.

--- Continued on next page ---

5. A list of available SM2 files will be displayed. Use the "Up" and "Down" buttons to scroll to the desired firmware file and press "Select". The following messages should appear:
 - a. *Upgrading... Upgrading Complete!*
6. Press the "Reset" (for SM2) or turn power off and on (for SM2+) to reboot the SM2 with the new firmware.
7. Repeat steps 3 through 6 for any other SM2s you wish to upgrade.
8. Delete the SYS3-2-4.SM2 file from the flash card once upgrade is complete.

Batteries

The SM1 and SM2 both operate on battery power. Two types of batteries are necessary for proper functioning: D-cell batteries that power the device during recording events, a watch battery that powers the internal clock on the SM1, and two AA-cell batteries that power the clock in the SM2. These batteries should be checked prior to deployment and replaced as necessary. The SM1 clock battery should be replaced every year. Rechargeable batteries can be used for the SM2 clock battery, but their discharge rate should be determined and evaluated carefully to ensure power is available to fulfill all planned and programmed recording events. Maha Energy PowerEx IMEDION 9500mAh 1.2V NiMH D-cell rechargeable batteries are used for all current SECN deployment schedules. The batteries have a low discharge rate. These batteries should not be allowed to completely discharge, as this will destroy the battery and warrant replacement. Batteries are charged with Maha Energy MH-C808M Ultimate Professional Chargers immediately preceding deployment to ensure batteries are at full capacity. Batteries should also be tested with a standard battery charger to ensure proper functioning.

Although an option, solar-recharge devices for batteries are not a viable option in SECN parks due to canopy cover limiting the amount of sunlight for the majority of the devices. For SM1 and SM2 models, the internal power source (i.e. the set of D-cell batteries) is automatically selected unless the Song Meter is attached to an alternate external power source. The SM2+ model, however, includes a power source switch located inside the device just above the battery compartment. In order for these models to work properly, **it is imperative** that this switch is turned to Internal Power Source.

Rechargeable NiMH batteries can be used for short-term deployments or in parks where the batteries can be changed after six weeks. The NiMH batteries have a discharge rate of approximately 1%/day, so ensure batteries are fully charged immediately prior to installation. NiMH batteries are generally not compatible with long term deployments, as the batteries will be permanently damaged if they are allowed to discharge completely or to a low level. For deployments lasting 77 days, use alkaline batteries or IMEDION NiMH rechargeable batteries. In 2012 we began using the IMEDION NiMH rechargeable batteries for long deployments, which have a self-discharge rate of only 15%/year. This type of battery can be deployed for the 77-day deployments and will still be rechargeable, and therefore viable for future use upon retrieval.

All batteries should be checked for corrosion, damage, or other perturbations that may affect performance prior to use. If in doubt, replace the battery.

Mounting Harness

The Song Meter is designed to be affixed to a post or tree. It is imperative that the device is mounted in a manner that does not allow it to shake or bounce off the mounting object under windy conditions, as this could cause damage to the device or add unnecessary noise to the recordings. To avoid creating screw holes in trees in SECN parks, and acquiring and carrying the equipment necessary to attach the devices with this technique, we designed an alternative approach that uses a harness and mounting cords. Our approach uses the existing holes in the back cover of the Song Meter, intended for screws, to attach two 3-mm nylon utility cords with a stopknot on the inside cover. Each cord (i.e., harness) is run from the screw hole at the top of the device to the screw hole at the bottom of the device and is approximately 7-10 cm longer than the height of the ARD (i.e., approximately 18 cm) (Figure 1). The ARD is mounted to a tree, pole, or other object with two 4-6 mm nylon utility cords (i.e., mounting cord). Because the dimensions of potential mounting objects vary substantially, the mounting cord length is approximately 4-5 ft (1.2 – 1.5 m) (Figure 2). Two-hole cordlocks are attached to one end of the mounting cord and one end of the mounting cord is secured with a stopknot. The other end remains free and is wrapped around the mounting object in any arrangement necessary to ensure the ARD is securely affixed to the mounting object. The free end of the mounting cord is fed through the second hole in the cordlock and then tightened with the cordlock. This mounting technique has proven to be very successful, inexpensive, adaptable, and easy to apply in the field.



Figure 1. Utility-cord (3 mm) harness (red arrows) attached to the back of the automated recording device. Harness is affixed through the existing screw-hole mounts with an inside stopknot.

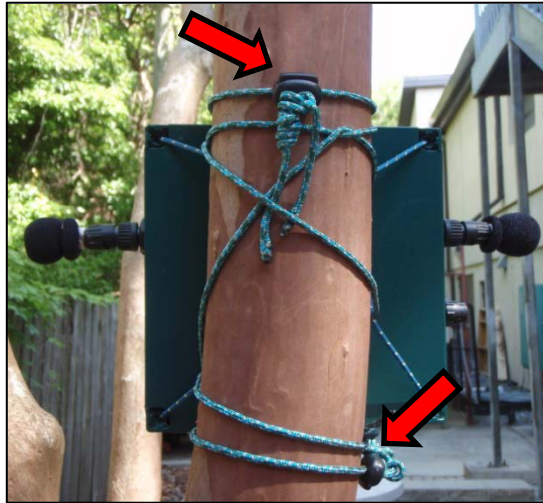


Figure 2. The mounting cords are fed through the harness on the automated recording device, wrapped around the mounting object, any extra cord is further wrapped around the device to ensure stability, and the utility cord is tightened with cordlocks (red arrows).

Camouflage

Because of the high visitation in all SECN parks and the visibility of the ARDs, extra efforts are employed to conceal the devices from public view. Standard camouflage sheeting is cut in sheets to cover as much of the device as possible. Extra care, however, is used around the microphones to ensure the camouflage sheeting does not cause an increase in ambient sound from wind. The sheeting is attached with Loctite, or any other polyurethane construction adhesive and a caulking gun. Camouflage duct tape is also used to aid in concealing the devices.

Moisture Control

Although the ARDs are waterproof under most circumstances, the SECN uses two techniques to minimize the potential internal moisture build-up in the ARDs; rechargeable non-toxic silica or Zorb-it moisture absorbent packs. Only one of these techniques is used on each device. Approximately 2 Tbsp of silica is placed into a standard fabric re-sealable and re-useable tea bag and situated behind the battery compartment. Because the rechargeable silica beads are small (i.e., approximately 2-3 mm in diameter), the fabric tea bag containing the silica remains malleable enough to conform to any available space in the device. The Zorb-it moisture absorbent packs are taped to inside cover of the device.

Microphone Protectors

The microphone windscreens tend to be a source of nesting material or simply chewing enjoyment for some species (e.g., squirrels) in the SECN's inland parks. Consequently, many windscreens are chewed off or removed, thus warranting replacement. Windscreens are expensive so small rectangular wire frames, only slightly larger than the microphone, are formed out of 1/8" wire mesh and attached to the microphone shaft or mount with zip ties or small bungee cords.

Programming Devices

Due to the strong influence of environmental variables in Anuran calling behavior, the programming times are not based upon the assumption of typical peak calling times of SECN species. It is strongly recommended that the schedule is determined, documented, and reviewed manually prior to programming the device; consequently, this section is divided to reflect this recommendation. Further, if in doubt, conduct a trial run of the device in a controlled setting (e.g., the office) prior to deployment. The characteristics of the recording event are directly related to the amount of power available to maintain the schedule. Because batteries discharge power even when not in use, it is strongly recommended that the Song Meter Configuration Utility 3.2.3 software, designed by Wildlife Acoustics, Inc. is used to evaluate if the desired programming schedule will support the amount of power available from the power source (i.e., batteries) and if storage capability of the SD card is adequate.

ARDs are used by the SECN to monitor vocal Anuran and bird communities. The programming code for the devices reflects this and is detailed in the following section.

Planning the Recording Schedule

To maximize the likelihood of species detection and the influence of weather variables on Anuran calling behavior, and to identify spring-migrating and breeding birds, each ARD is programmed to collect data during 20 sampling events every fourth day over the course of 77 days. The device records for 30 seconds every 10 minutes from 1800 to 0650 to target amphibians, and then for 12 straight minutes from 0730 to 0742 and 0800 to 0812 to target birds.

Each unit is programmed with the scheduling code identified in Table 1. The device is retrieved as the Visual Encounter Survey (VES) is conducted or at the end of the recording time frame. The data is downloaded and analyzed at the conclusion of the field season. Files from 1800 to 0650 are used for vocal Anuran detection and files from 0730 to 0812 are used for bird detection.

The SECN programming schedule has changed since our initial testing and deployment. In 2010, we used a 14-day deployment schedule that consisted of four sampling (recording) events. This code is presented solely for reference purposes (Table 2). The devices recorded one minute every 10 minutes in intervals from 1800 to 0800.

Table 1. Programming code for a 77-day deployment of the automated recording device (Song Meter), Amphibian and Bird Community Monitoring Protocols for Southeast Coast Network Parks.

Code		Description
01 AT TIME	18:00:00	Device powers up.
02 RECORD	00:00:30	Device records for 30 seconds.
03 PAUSE	00:09:30	Device pauses for 9 minutes and 30 seconds.
04 GOTO LINE	02 5X	Device records 30 seconds every 10 minutes each hour after 1800.
05 GOTO LINE	02 12X	Device records a total of 13 hours from 1800 to 0700.
06 AT TIME	07:30:00	Device powers up at 0730.
07 RECORD	00:12:00	Device records for 12 minutes.
08 PAUSE	00:18:00	Device pauses for 18 minutes.
09 GO TO	LINE 07 1X	Device records another 12 minutes from 0800 to 0812.
10 PAUSE	12:00:00	Device pauses a total of 72 hours from the 0813 end time.
11 GOTO LINE	10 5X	Device pauses during the daytime hours (12-hour pauses are the programming maximum).
12 GOTO LINE	01 19X	Repeat 19 times, for a total of 11 full weeks of recording and a total of 20 recording sessions.

Table 2. Programming code for a 14-day deployment of the automated recording device (Song Meter), Amphibian Community Monitoring Protocols for Southeast Coast Network Parks.

Code		Description
01 AT TIME	18:00:00	Device powers up.
02 RECORD	00:01:00	Device records for 1 minute.
03 PAUSE	00:09:00	Device pauses for 9 minutes.
04 GOTO LINE	02 5X	Device records 1 minute every 10 minutes each hour after 1800.
05 GOTO LINE	02 13X	Device records a total of 14 hours from 1800 to 0800.
06 PAUSE	12:00:00	Device pauses during the daytime hours (12-hour pauses are the programming maximum).
07 GOTO LINE	06 5X	Device pauses a total of 72 hours from the 0800 end time.
08 GOTO LINE	01 3X	Repeat 3 times.

Applying Programming Schedule to the Device

The most efficient procedure to apply the recording schedule onto all of the ARDs to be deployed in a given year is to program the code using the SongMeter Configuration Utility 3.2.3, save the code in a file called SONGMETR.SET, and then copy it to all SD cards. The current recording schedule file is stored at X:\Amphibians\ARD prep and deployment\2012 Recording Schedule. The name of the recording schedule must be SONGMETR.SET in order to load the program onto the older model (i.e., SM1) devices. Although SM IIs can load recording schedules with a different name, keep the recording program name as SONGMETR.SET because we continue to use both SM1s and SM2s in the field. To load the recording schedule onto an ARD:

1. After the SD card has been formatted (see “Formatting the Flash Card”), copy the recording schedule file onto each SD card.
2. Insert the SD card loaded with the recording schedule into the ARD and turn it on.
3. For SM2 and SM2+ models: Go to Utilities > Load config from A, choose the file SONGMETR.SET and press select. The ARD screen will read “Configuration Loaded” when the recording schedule has been properly loaded.
4. For SM I models: Go to Settings > Load A: SONGMETR.SET. Since only one recording schedule can be loaded into SM I models, SONGMETR.SET will be the only choice. SM I models do not state that the program has been loaded, so you must press the Schedule button and ensure that the schedule was indeed loaded onto the device.
5. The program **MUST** be **loaded** into the ARD in order to record properly (and not just copied onto the SD card that is then inserted into the ARD).

Alternatively, the recording schedule can be saved onto one SD card and then used to load the code to all other ARDs. Simply insert the SD card containing the recording schedule into each ARD, turn the unit on, and load the schedule in the manner described above. This method has not been used by the SECN recently, because all SD cards are reformatted and we have found that it is easiest to format the card and load the new recording schedule at the same time. The recording schedule can also be programmed into the ARD unit itself using the controls located under the Schedule option.

Audio-file Type Selection

The ARDs default to recording all audio data to lossless and uncompressed .wav format (i.e., 16-bit PCM). For efficiency in data processing, analysis, and storage, however, compression will need to be activated in every Song Meter. The Song Meter uses a proprietary compressed lossless audio format - .wac; or Wildlife Acoustics Audio Compression format. For the SM1 model, navigate to Settings > Compression, and turn compression to ON. This will program the ARD to record all audio data in the compressed .wac format. For the SM2 and SM2+ models, more compression options are available. The SECN uses WAC6, an audio file format that removes six of the 16 bits of audio recorded. This setting reduces files sizes and, in preliminary analyses, has not been determined to compromise the data quality (i.e., miss species that occur) within the 0.5-ha target area. Further, this compression setting is below the noise floor for the

microphones and results in no detectable loss of information (Wildlife Acoustics, Inc. 2011), while still improving the compression ratio and the subsequent processing time of the data files.

File Naming

To allow for flexibility in which individual device is deployed at what sampling location, the file-naming process occurs at the deployment time. This serves two purposes in that it also allows a last-minute check of the device's functionality prior to deployment. Each file created by the ARD is automatically time- and date-stamped (YYYYMMDD_hhmmss.wac). A prefix is added prior to deployment to differentiate among data collected by units. Each SECN ARD is assigned a three-digit code to potentially track variability in the performance of individual devices, or for other purposes. File naming is programmed through the "Settings" menu. The procedure is:

1. Press the "Wake" button. It may need to be held down for a moment.
2. Review the time and date displayed on the main screen. Ensure they are correct and change if necessary; however if the date and time are incorrect but were correct during the pre-field season preparation phase and you are suspect of the functionality of device or the device's clock battery, then deploy a backup device and re-evaluate the device's performance at days end.
3. Navigate to Settings > Location > Prefix.
4. Change the prefix to [Four letter park code] - [Three digit sampling location] - [Three digit ARD number]. Use the Up and Down buttons to choose the right letters, numbers, and symbols. When the ARD saves the files for this ARD, it will append the date and time of the file after this prefix.
 - a. Example: For Horseshoe Bend, Sampling Location 1, ARD 15, recorded at 8:10 pm on March 20, 2010
 - i. Prefix: HOBE-001-015_
 - ii. Final file name is: HOBE-001-015_20100320_201000.
5. It is imperative that file naming is done correctly. Proper prefixing allows us to combine all of the files into one folder, which dramatically improves the efficiency of the automated recognition process (i.e., facilitates the application of one recognizer to all ARDs as opposed to an ARD-by-ARD process). Further, it avoids the potential for duplicate-named but different files being overwritten in error. If the prefix is not added in the field, it can be manually added in the office after the device is retrieved and data are downloaded; however this is **NOT** the preferred option, is very time consuming, and increases the potential for error in file identification.
 - a. If prefixes are added *ad hoc* (i.e., in the office), the SECN uses a freeware software package called "A.F.5" (www.fauland.com) for file-renaming tasks.

Using A.F.5

A.F.5 is a file renaming program that is used to either name files or rename files that are incorrectly named.

If files need to be renamed:

1. Click "Add" and highlight the files that need to be renamed. Typically, all of the files from one particular ARD would be selected. Click Open.
2. Next to "Type", choose "String" with the drop-down arrow in the first box. For the first "Value" box, type "HOBE001_015_" or whatever prefix is necessary.
3. In the second box to the right of "Type" use the drop-down arrow to choose "Left". For the second "value" box, enter "1-".
4. The New Filenames will be displayed. The column width can be adjusted for easier viewing. Ensure all edited filenames are correct.
5. Click "Rename", and this will rename all edited filenames.
6. Because A.F.5 only allows 200-300 files to be renamed at a time, to continue renaming more than 300 files from the Edit menu, Select All, and then click Remove. Return to Step 1 and continue.

If files need name corrections (i.e., only part of the name is to be replaced):

1. Add file(s) to be renamed. Leave "Type" and "Value" boxes blank.
2. Click "Rename" in the task bar, and choose "Replace."
3. In the "Replace" dialogue box, enter the information that needs to be replaced. Use dashes and underscores to rename ONLY the appropriate part of the file name.
 - a. Example: An ARD deployed at HOBE was incorrectly programmed in the field. It was deployed at sampling location 045, but was accidentally programmed as sampling location 043. Therefore, all files from that ARD have the incorrect sampling location in their name. Figure 1 depicts the correct fields for the "Replace" dialogue box. Note the dashes before and after the field values. All instances that A.F.5 finds 043 together will be replaced with 045. Therefore, if the dashes are not present, not only will the sampling location be changed in the filename, but the time stamp for all files made at 0430 (4:30 AM) will be changed to 0450 (4:50 AM) as well. The dashes, which are present in the filename designating the sampling location, prevent this from happening.

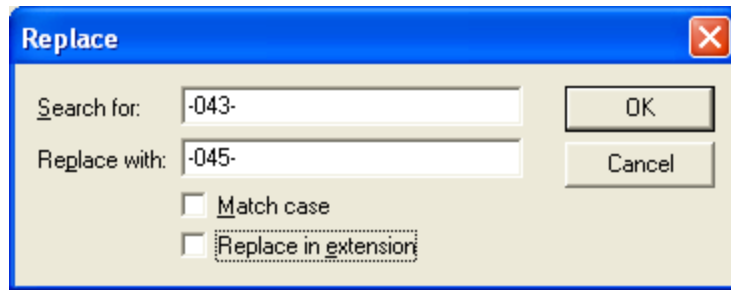


Figure 1. The Replace dialogue box and correct fields necessary to correct the incorrectly-named file presented in the example.

4. Click OK and then the Rename button. The file name(s) will be corrected. Again, if there are more files to rename, click Select All and Remove to add more files.

Other Settings

The devices should be programmed to collect two-channel (i.e., stereo) audio data at a sampling rate of 16,000 samples/second. This setting covers the entire possible frequency range of vocal Anurans and will likely detect some nocturnal birds; although this is still in the refinement and development phase. Ensure that a sampling rate of 16,000 is chosen for all ARD units.

Maintenance

Maintenance is performed on each device once retrieved from the field. Two types of maintenance may be required following retrieval: maintenance that can be performed by field staff (and should be performed after every retrieval) and maintenance that can only be performed by the technical personnel at Wildlife Acoustics, Inc. (i.e., all those listed below that relate to professional maintenance).

Field Staff Maintenance

- Clean all ARDs, paying special attention to the seals around the inside edge of the box and the lip on the inside edge of the lid.
- Evaluate casing to look for obvious defects.
- Evaluate all seals to ensure they remain watertight. If device took on water during deployment, it should be sent to Wildlife Acoustics, Inc. for maintenance.
- Check clock battery(ies). Battery should be replaced yearly (SM1) and as necessary, although at an interval of no longer than biannually (SM2 and SM2+).
- Reapply camouflage material as necessary.
- Check D-cell batteries for their structural integrity and ability to hold a charge.
- Evaluate recordings to determine if device is functioning properly. If device performance is in question, program device and test in a controlled setting (e.g., in the office).
- Replace microphone covers as necessary. These are occasionally damaged by wildlife.
- Replace or modify microphone-cover protectors (i.e., wire screen).
- Ensure that each device has an NPS arrowhead sticker and warning label. The warning label is provided here:

FEDERAL GOVERNMENT RESEARCH EQUIPMENT

DO NOT DISTURB



This device (AUDIO RECORDING ONLY—THIS IS NOT A WILDLIFE CAMERA) is property of the US National Park Service, SECN Inventory and Monitoring Program. Theft, vandalism, or tampering of this device is prohibited (36 CFR 2.31). Unauthorized persons caught damaging or in possession of this device may be subject to imprisonment of up to 2 years, and/or fines of up to \$10,000.00. This device **MAY CONTAIN GPS**

Professional Maintenance

Wildlife Acoustics, Inc. should be consulted as necessary and to discuss device problems, identify and possible troubleshooting procedures, ensure devices needing service are shipped to the proper address or technician and they are aware of service needs. The email address is: support2012@wildlifeacoustics.com. The types of issues for which professional maintenance is required include the following (note that this list does not cover all situations):

- Improper functioning (e.g., inability to maintain recording schedule, atypical power drain).
- Leaking seals.
- Microphone replacement.
- All other maintenance needs that cannot be confidently achieved by field staff. If in doubt, ship the device to the professional technician.

Before maintenance occurs, obtain a cost estimate of service prior to shipping and ensure the Terrestrial Ecologist is aware of the service costs to incorporate into the budget.

Shipping

Contact Wildlife Acoustics, Inc. in order to obtain a service order number. This number should be included on the address label when shipping the package. Record the serial number of each device that is to be shipped to Wildlife Acoustics, Inc. for service and document the specific problems with the device. Include a copy of this documentation, including SECN contact information and the specific SECN point of contact with the shipment. Wrap each device in need of service individually to protect it during the shipping process. Group as many devices as possible into as few boxes as possible to keep shipping costs down. Ship the devices to the address provided by the technician, and follow any other instructions they provide. Ship to Wildlife Acoustics, Inc., or the authorized servicer identified by them, by any standard means (e.g., FedEx, UPS, USPS). Ensure the shipping option includes a tracking number and delivery confirmation.

Evaluate Serviced Devices

After devices have been serviced and returned, evaluate their performance prior to deployment. Consult with the Wildlife Acoustics, Inc. technical staff as necessary. Keep all packing materials to re-use the following year.

Literature Cited

Wildlife Acoustics, Inc. 2011. Song Meter user manual. Wildlife Acoustics, Inc. Concord, MA. Available online at <http://www.wildlifeacoustics.com/wp-content/uploads/2011/08/Song-Meter-Users-Manual.pdf>