

FIELD PROTOCOL FOR THE NORTH AMERICAN BAT MONITORING PROGRAM IN THE PACIFIC NORTHWEST



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BEFORE HEADING INTO THE FIELD

Day before Detector Deployment

- 1) The checklist below is provided as an example of the detector and equipment you may use to deploy.

Item	Quantity
Detector (Pettersson D500X)	4
Microphone	4
Microphone capsule	4
Microphone cable, 25-foot	4
Storage Box	4
CompactFlash Memory Cards, 16GB or 32GB	20+
Batteries, Rechargeable, size C	16 (or 32 if have second set)
Battery Charger	2
Reusable Zip Ties	several
Lashing Straps	4

- 2) The checklist below is provided as an example of the equipment you may use to deploy the detectors:

Item	Quantity
T-post Pounder/driver	1
T-post, 5-foot (can be longer)	4
PVC Pipe, 2-inch diameter, 10-foot section	4
PVC T-joint, 2-inch diameter	4

- 3) Charge batteries. This can take up to 4 hours so allow time for this. When completely charged, each C battery should have a charge of >1.35 Volts.
- 4) Check that memory cards do not have data (shown on Startup or Ready screen). If memory cards have data, notify the Bat Hub Coordinator, so that he can check that this data has been downloaded and backed up.
- 5) **NEW SITES** – Review maps and GIS data and consult with the Bat Hub Coordinator if necessary, refer to the Site Selection section.
- 6) **EXISTING SITES** – See the Excel file provided to you by the Bat Hub Coordinator for site coordinates (note that these are in NAD83).
- 7) Review the ArcGIS Field Maps form (or datasheet).
- 8) Run through Detector Settings section with detectors to troubleshoot any problems with Bat Hub Coordinator if needed, especially if you will possibly be out of cell range when deploying the detectors.

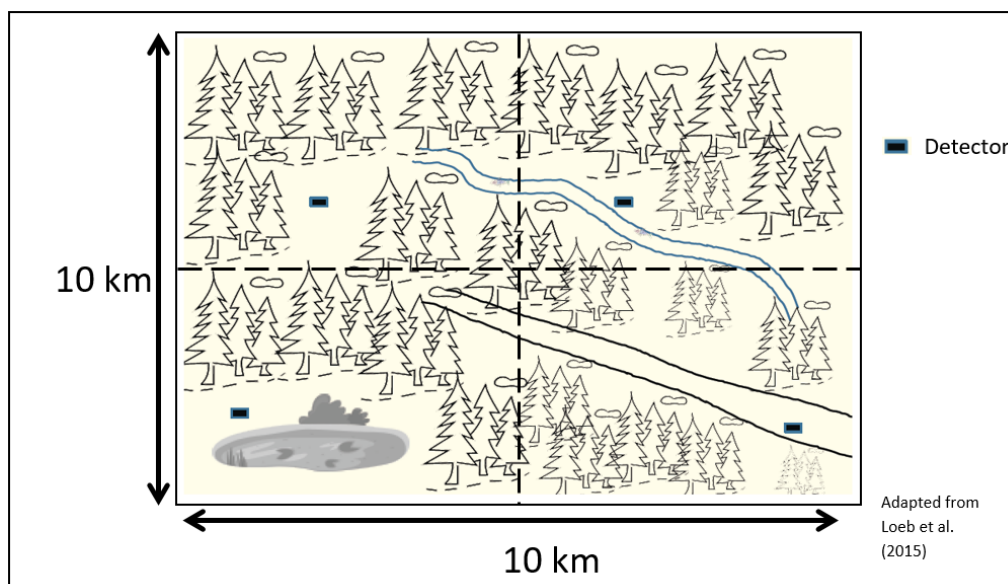
Day of Detector Deployment

- 1) Review Detector Setup/Deployment section to double-check that you have all necessary equipment.
- 2) Have this manual and downloaded Field Maps form (or at least 4 datasheets; 1 for each site).
- 3) Coordinates/directions to possible site locations.
- 4) Camera or other device (e.g., tablet if using Field Maps) to take photos of detector setup.
- 5) GPS to record coordinates (**REMEMBER to set GPS to NAD83 and Latitude/Longitude**), if not using Field Maps form.

SITE SELECTION

Within Sample Unit Guidance

- The survey period is from 1 June to 1 September.
- One (1) detector should be placed in each **5 x 5-km quadrant** of the Sample Unit (SU, 10 x 10-km).
- If this is not possible, then place the detector **at least 1.5 km (~1 mile)** from other detectors.
- **Ensure the sites are within the targeted SU.** To avoid selecting a site outside of the SU, consider using the Field Maps app or converting the SU boundaries to a Google Earth file and open in Google Earth on your phone or converting the SU boundaries to a GPX Tracks file that can be used with your GPS.
- Select 4 new sites or detector locations within the targeted SU. You can do this based on your knowledge of the area (such as where are water sources located) and selecting sites beforehand in GIS. Also, the Bat Hub Coordinator can assist you in selecting potential sites by reviewing GIS data and aerial imagery, but you will have to ground-truth these sites as to their suitability for monitoring (e.g., does the pond actually have water in it?).
- Sites and the subsequent detection targets should be selected to maximize the number of bat species that possibly occur in the area while placing the microphone as far as away as possible from sources of clutter to record the best quality echolocation calls.
 - **Detection Target** – the landscape feature of interest at which to record acoustic bat activity (e.g., pond, forest edge).
 - **Physical Clutter** – physical objects in the flight environment (e.g., tree branches, leaves, water surfaces, cliff faces).
 - **Acoustic Clutter** – sound produced by sources other than bats that may mask bat calls (e.g., insect noise, wind, cars, and power lines).
- Additionally, detectors may be placed to monitor bats in a variety of habitats to maximize the diversity of species likely to be detected. In the example below, each detector would be placed such that they sample different habitat features that may occur in each of the quadrants.



Priority of Site Selection

For guidance in selecting sites, below is a listing of sites or detection targets in order of highest to lowest priority. Note that the availability of these will depend on site-specific conditions. Consider the following when selecting among the detection targets listed below:

- Reliable perennial water sources compared to temporal water sources.
- Small areas (1-20 m) of slow, open water where vegetation does not inhibit bats drinking or feeding or interfere with detector recording calls.
- Points along commuting routes or in foraging areas where bat activity is somewhat restricted to a narrow area such as stand edges, waterways, dry creek beds and where detectors can be placed to avoid echoes off of water, walls, or rock features.
- **If there appears to be no suitable bat habitat, then set up the detector somewhere within the SU because 4 sites are still needed and absence data is also beneficial.**

Detection targets:

- 1) Pools, open guzzlers, water tanks, troughs, oxbows, sewage ponds, pump chances, water impoundments, seeps with standing water, or ponds
- 2) Small streams, canals, or springs
- 3) Wetlands
- 4) Small bays or inlets of larger ponds or lakes
- 5) Side channels or flat rivers
- 6) Edge habitats – old/young forest, forest/open land (shrub-steppe, agriculture, grassland), riparian, and rock cliffs
- 7) Forest openings – small gaps, along trails and forest roads
- 8) Roosting sites – mature trees, snags, rock crevices, anthropogenic structures (e.g., bridges, homes, barns, and log cabins), caves, and mines
- 9) Wetlands with dense surrounding vegetation
- 10) Large bodies of water (lakes and reservoirs)
- 11) Fast flowing streams or rivers
- 12) Dry water features – large canyon bottom, large canyon top, small arroyo/dry gulch bottom, small arroyo/dry gulch top
- 13) Rock features – ridge top, cliff bottom, cliff top
- 14) Wide-open places, such as the middle of a cultivated field

Detector Placement and Microphone Orientation

- Consider placing the detectors where they are less visible from the general public (away from roads, trails, etc.) to avoid possible vandalism.
- Detector should be placed at least **3 to 5 m (~10-16 ft)** in any direction away from sources of clutter (any obstructions) or detection targets. For example, flat rock features, large flat waterbodies, walls, and pavement can produce echoes that confound or mask clean, clear bat calls. For roost sites, detectors should be placed **5 to 10 m** away from small roosts (trees) and **15 to 30 m** away from large roosts (caves).
- Poles used to deploy microphones set out in openings can cause bats to make audible inspections of the “new structure” in their environment, thus producing atypical calls that make it difficult to differentiate species. Consider camouflaging the pole or placing the detectors so they are less noticeable.

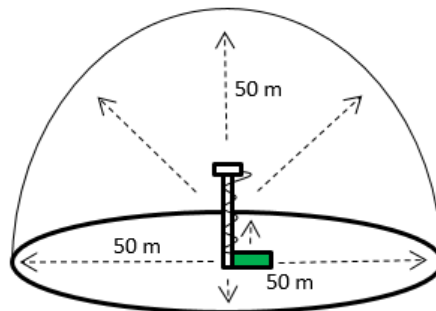
- Microphone should be oriented horizontally and towards more open space.
- The height of the microphone will be 10 ft (or 3 m) and for those areas that vegetation will be = ~3 m in height, try to find an opening in the vegetation to orient the microphone towards the detection target. Also, ensure that the microphone is **3-5 m** from overhanging branches or other sources of clutter or obstructions.
- Insects, fluttering leaves, fast moving water, machinery, and amphibian calls can mask bat calls. Consider these when placing the detector.

Clutter Considerations

Alternatively, consider Clutter Categories (see the Datasheet Instructions section and the datasheet) to determine where to place the detector, that is, detectors should be placed in less cluttered areas (i.e., less immediate, dense vegetation or other obstructions). The description of these categories are based on observing clutter within a **50-m hemispheric radius** of the detector (as in the figure below).

Clutter Categories

- 0 - no structural interference (open habitat)
- 1 - 1 to 25% clutter
- 2 - 26 to 50% clutter
- 3 - 51 to 75% clutter
- 4 - 76 to 100% interference (dense vegetation or narrow canyon topography)



Assessing Clutter

- Standing near the detector setup, visually observe the volume of physical clutter in the entirety of this 50-m hemispheric space as best as possible.
- If topography (e.g., a hillside) hinders your view, there is no need to view what's on the other side of hill, just include the hill in your assessment of clutter.
- Be sure to consider all physical objects (vegetation, rock, human-made structures) in your estimation.
- See the next pages for examples of clutter categories.

Clutter Category Examples

Clutter Category 0



Clutter Category 1



Clutter Category 2



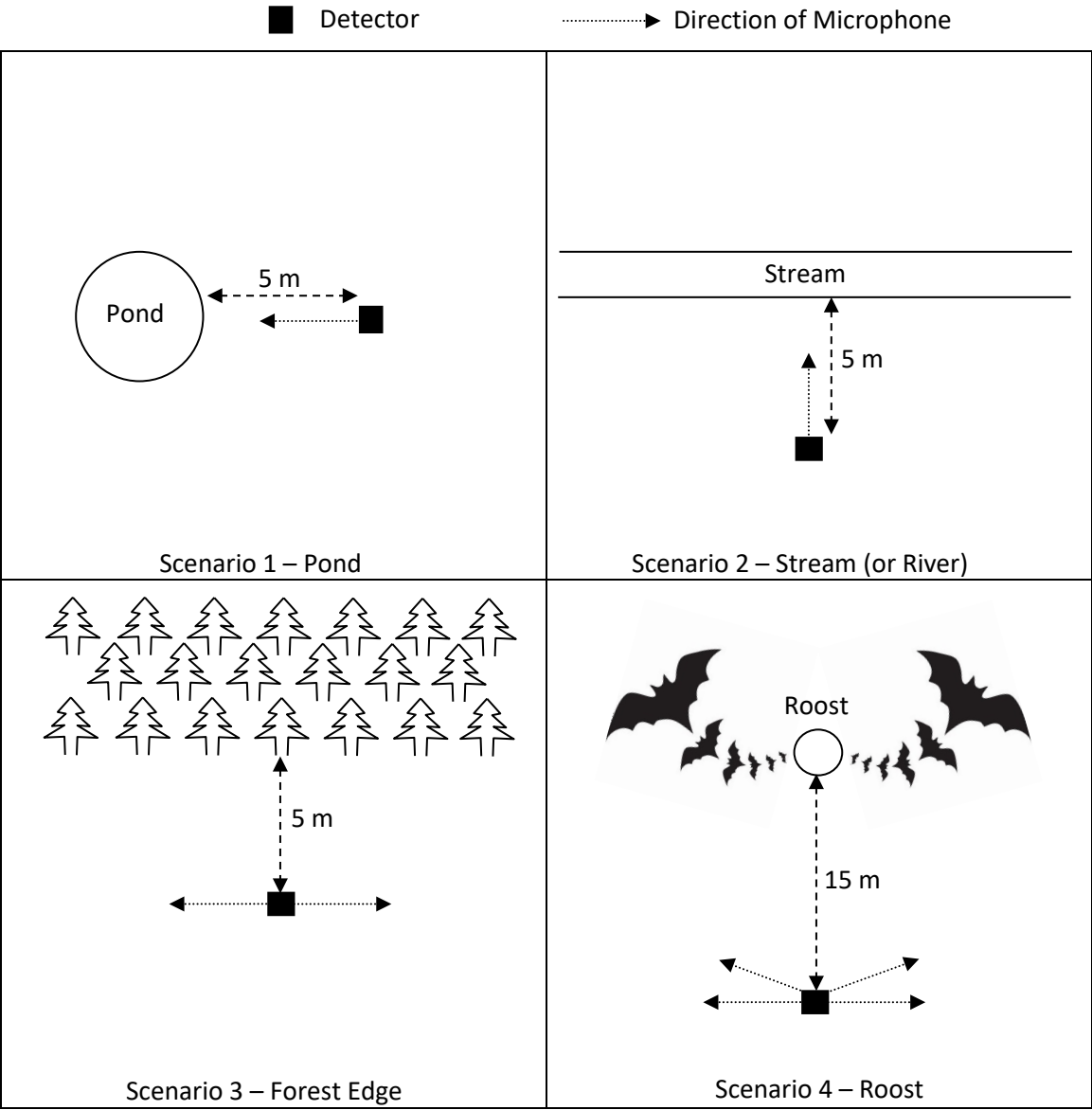
Clutter Category 3



Clutter Category 4



Detector Placement Examples



Detector Placement Examples (Photos)

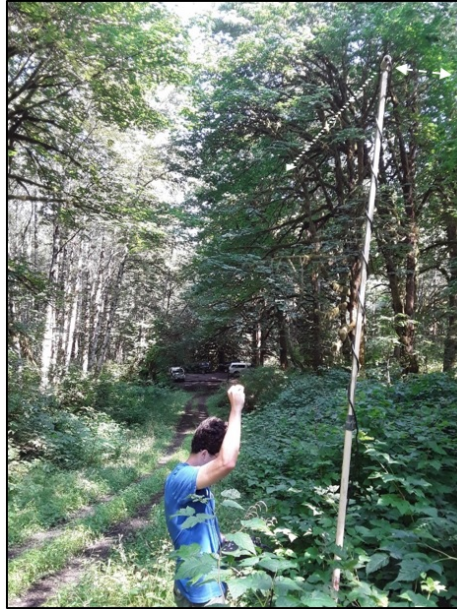
The following photos provide example scenarios in which to place the detectors. Distances from detection targets may not be exact, follow the guidance provided above. Direction of arrow indicates orientation of microphone. Dashed lines indicate distance of the microphone from detection targets or clutter, while dotted lines indicate direction of microphone.



- 1) Detector is placed ~3-5 m from the detection target, i.e., the pond, with the microphone directed towards the pond to detect bats as they primarily fly above the pond and not necessarily while they approach the surface of the water. (This site would be characterized as Clutter Category 0.)



- 2) Detector is placed ~3-5 m from the stream with the microphone directed towards the open area of stream between the rock and forest on the left and right of the detector to detect bats as they fly along the stream. (This site would be characterized as Clutter Category 0.)



- 3) Where vegetation confines narrow roads or trails, place the detector towards the most open space as possible (i.e., either pointed up or down the open corridor). In mesic habitat with dense foliage, place the detector along these linear features using the foliage as a back drop to camouflage the detector. (This site would be characterized as Clutter Category 4.)



- 4) In mesic or other dense, older forests, place the detector where it will detect bats commuting along water corridors and where bats may be foraging in the canopy or gaps in the canopy. (These sites would be characterized as Clutter Category 4.)



- 5) In the vicinity of rock features (cliffs, canyon walls, rocky outcroppings, etc.), place the detector a fair distance away (~10 m) and/or point the microphone away from the rock surfaces to detect bats as they commute along the rock feature and to avoid the effects of these features on the echolocation signal. (The site on the left would be characterized as Clutter Category 1 while the site on the right would be characterized as Clutter Category 2).

DETECTOR SETUP/DEPLOYMENT

****Ensure that you are finished deploying detectors at least 1 hour before local sunset time****

This section provides an example of how the detectors can be deployed. Any materials can be used as long as the microphones are elevated off of the ground and away from clutter (see previous section).

Equipment Checklist:

Item	Quantity Per Detector Location	Quantity Per SU (Total)
T-post Pounder/driver	1	1
T-post	1	4
PVC Pipe, 2-inch diameter, 10-foot section	1	4
PVC T-joint, 2-inch diameter	1	4
Detector (Pettersson D500X)	1	4
Microphone	1	4
Microphone capsule	1	4
Microphone cable, 25-foot	1	4
Weather Resistant Storage Box	1	4
CompactFlash Memory Cards, 16 or 32 GB (if you have extra, take them with you)	1	4
Batteries, size C	4	16
Reusable Zip Ties	Several	Several
Lashing Strap	1	4
Datasheets	1	4
GPS Unit		1
Camera		1

- 1) **Ensure the selected site is within the targeted Sample Unit.**
After selecting a site to deploy the detector, pound a t-post into the ground.
- 2) Attach the PVC T-joint to one end of the 10-foot PVC pipe.
- 3) Remove and reverse the microphone (mic) capsule on the mic so that the mic element protrudes from the capsule.
- 4) With the mic cable attached to the mic, place the mic/capsule into the PVC T-joint so that the mic protrudes from the T-joint.
- 5) Secure the mic cable to the PVC pipe near the T-joint/pipe connection with a reusable zip tie (not too tight to avoid damaging mic cable). Wrap the remainder of the mic cable around the PVC pipe.
- 6) Place the PVC pipe over the t-post. *Note: PVC with a 2-inch diameter will fit over a standard t-post.*
- 7) Connect the microphone cable to the detector. **Follow steps in DETECTOR OPERATION AND SETTINGS section for battery and**



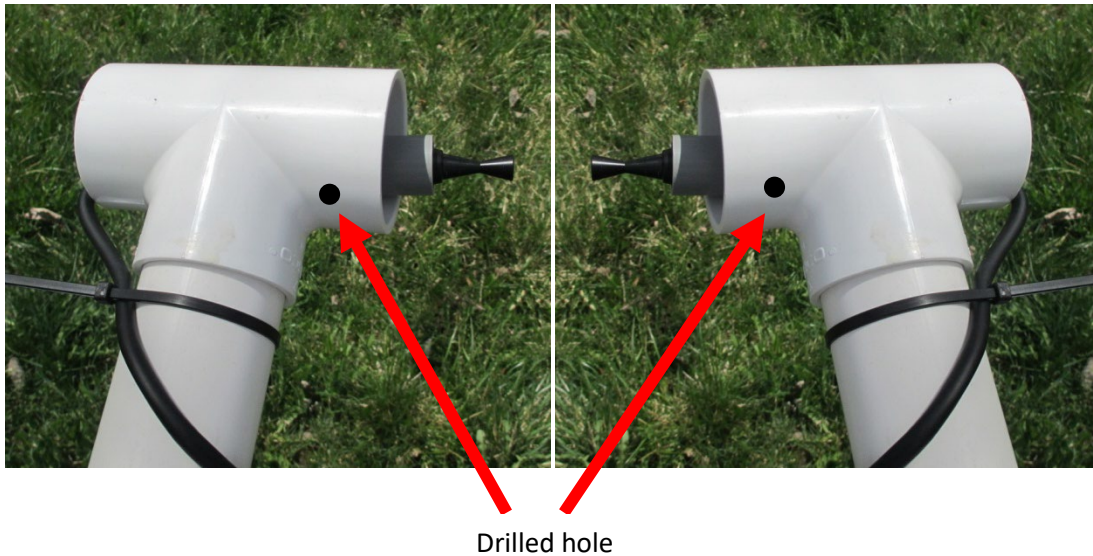
memory card installation and to ensure the detector has the appropriate settings and is ready to record.

- 8) When closing the storage box, place the detector with the screen against the box wall to prevent damaging the LCD. Ensure that the mic cable is in the notch at the back of the storage box. Allow the mic cable to droop below cable notch to prevent water intruding along the cable into the box. Put excess cable in storage box to avoid damage by rodents.
- 9) Secure the mic cable near the bottom of the PVC with a zip tie (again, not too tight to avoid damage to the cable). Secure the storage box to the PVC pipe/t-post with the lashing strap.
- 10) Leave setup up for 1 night, return the next day to retrieve the equipment if possible. *If it is assumed that it rained for more than 50% of the night, then consider leaving the detectors out for an additional night.*
- 11) **REMEMBER to take a photo of the detector setup that includes the detection target (e.g., pond).**
- 12) **Complete Field Maps form (or datasheet) (refer steps in Field Maps and datasheet instructions sections).**



Tips for Deploying the Detector

- 1) Consider using black PVC or if using white PVC, consider camouflaging it with paint or duct tape to hide pipe. Bats will inspect new intrusions in the environment and cause indistinguishable calls.
- 2) Consider using a level with a magnet to get the t-post straight up and down. If the t-post is at a slant then the PVC will tilt which will cause the microphone to be pointed up or down. The microphone pointing up can cause precipitation to get to the microphone element causing possible damage while the microphone pointing down can cause poorer quality calls to be obtained due to bounce from clutter below the microphone.
- 3) For ease of carrying into the field, you could cut PVC pipe in half and use connector to join the two halves.
- 4) Consider the following to secure the microphone in the PVC Tee joint. Drill two holes (1/4" or larger), one on each side of the bottom of the Tee joint (see photo below). This will allow for a zip tie to be inserted through these holes and looping inside the Tee joint around the microphone/mic capsule. The zip tie can be tightened to secure the microphone/mic capsule in place.



D500X DETECTOR OPERATION AND SETTINGS

Batteries and Memory Card Installation



- 1) Open battery compartment by unscrewing large screw on top of detector and install 4 “C” rechargeable batteries.

Remember to charge batteries before use. This can take up to 4 hours (when completely charged, each C battery should have a charge of >1.35 Volts). Consider marking (color-coding with tape) different sets of batteries to distinguish between charged and used batteries.

- 2) Remove protection cover on bottom of detector by unscrewing the 2 large screws. Confirm **POWER** switch is in the OFF (center) position. Insert one CF Card in top left slot (as in below). **Remember to record the CF Card ID No. on the Field Maps form or paper datasheet.**

**** Always switch off the power using the POWER switch before removing or inserting a CF card. To safely switch the power off, first put the D500X to sleep (press and hold ON/OFF button, release it, then press ENTER) and then set the POWER switch to OFF (center). Failure to follow these steps may cause loss of recorded files and/or corruption of the CF card.**



- 3) Switch **POWER** switch to INT (to the right) for internal power. The detector will power up, "D500X" will show briefly on the screen, followed by "Analyzing CF Cards." A screen will appear showing the ID, size, and free space of the CF card.
- 4) Press **ENTER** to continue to the Ready screen. (If batteries were previously installed, press ON/OFF button once, then press and hold ON/OFF again until the Ready screen appears). USER0 should show at the top of the screen, if it doesn't press ENTER and use the LEFT/RIGHT buttons to scroll to USER0, then press ENTER to select USER0.



dB bar indicating
the unit is
detecting sound

Always check the settings before deploying the detector to ensure the settings are correct.

Check if the D500X is Detecting Sound

- 1) Ensure the microphone is connected to the detector. **The connector on the cable requires a hard push into connector slot on the detector (i.e., it should not pull out easily when correctly connected). Yet when connecting, ensure the connector is lined up appropriately or damage to the pins in the connector could occur due to misalignment.**
- 2) With the detector powered on and the Ready screen in view, make noise (clap, jingle keys) and you will notice bars being filled on the dB indicator (see the above image).
- 3) If there is no indication of sound being detected, power down the unit and ensure the microphone is attached correctly to the mic cable and the mic cable is attached to the detector. *If still no sound, the microphone may be damaged, contact the Bat Hub Coordinator.*

Check User Profile Settings

- 1) Press **F1** button and the Settings menu will appear.
- 2) Press **ENTER** button to select 1-USER PROFILES. Check the profile, which should look like the following:



- 3) If everything is correct, press the **ESC** button to return to the Settings menu. *If settings are not correct, press ENTER button, use UP/DOWN buttons to navigate among parameters and LEFT/RIGHT buttons to change options. Press the ENTER button when done to save settings.*

Check Recording Settings

- 1) From the Settings menu, press the **DOWN** button to move to 2-RECORDING SETTINGS and press the **ENTER** button to go to Recording Settings, which should look like below:



- 2) If everything is correct, press the **ESC** button to return to the Settings menu. *If settings are not correct, use UP/DOWN buttons to navigate among parameters and LEFT/RIGHT buttons to change options. Press the ENTER button when done to save settings.*

Check Timers Settings

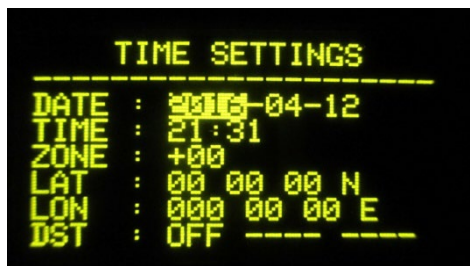
- 1) From the Settings menu, press the **DOWN** button to move to 3-TIMERS and press the **ENTER** button.
- 2) Press the **ENTER** button again to go to 1-ABSOLUTE TIMERS, which should look like below:



- 3) **Note:** the unit will start recording at 7:30 pm (19:30) and stop recording at 6:30 am. These start/stop times are set to encompass sunset/sunrise times for any location in the Pacific Northwest from 1 June to 31 August.
- 4) If everything is correct, press the **ESC** button to return to the Settings menu. *If settings are not correct, press ENTER button, use LEFT/RIGHT buttons to navigate among parameters and UP/DOWN buttons to change options. Press the ENTER button when done to save settings.*

Check Time Settings

- 1) From the Settings menu, press the **DOWN** button to move to 4-TIME SETTINGS and press the **ENTER** button to go to Time Settings, which should look like below (**Note:** the current date and time will show):



- 2) If everything is correct, press the **ESC** button twice to return to the Ready screen. *If settings are not correct, use UP/DOWN buttons to navigate among parameters and LEFT/RIGHT buttons to change options. Press the ENTER button when done to save settings.*

The steps in this section must be followed to set the detector to record. The detector will not record unless these steps are followed.

Formatting the CF Card

Prior to setting the detector to record, you must format the CF card in the detector (even if you did this from your computer). Formatting in the detector immediately before recording ensures that the data does not become corrupted or is lost while monitoring.

- 1) From the Ready screen, press **F1**.
- 2) Press **DOWN** button until you get to 6-UTILITIES. Press **ENTER**.
- 3) Press **DOWN** button until you get to 3-FORMAT CF-CARD. Press **ENTER**.
- 4) A screen will appear showing the number of files on the CF card (if any). ***If there is data on the card, ensure you have copied.**
- 5) Press **ENTER**, a warning message will appear that you are about to permanently remove all files. Press **ENTER** again.
- 6) Press and hold **ON/OFF** button to start the format.
- 7) Once the format is complete, '0' files will be shown for the CF Card.
- 8) Press **ESC** to exit. A message will appear stating that the system must be restarted. Press **ENTER**.

The system will restart. Press **ENTER** or **ESC** to get to the Ready screen.

The steps in this section must be followed to set the detector to record. The detector will not record unless these steps are followed.

Setting the Detector to Record

- 1) From the Ready screen, press the **REC** button and the Recording Settings window will appear.
- 2) Press the **ENTER** button. The System Power Down screen will appear with a message stating that the system is powering down and a 3-second countdown.

The ON/OFF button can be pressed to momentarily turn on the screen to verify the unit is ready to record. If recording is working properly, you will see one of the following messages:

If the unit is set to record before the start time (7:30 pm), the System Power Down screen will appear with the message, 'WAKE UP - WAITING' under the start/stop times.

If the unit is set to record after the start time (7:30 pm), the System Power Down screen will appear with the message, 'WAKE UP - ARMED' under the start/stop times and the REC and ON lights will flash once every 5 seconds.

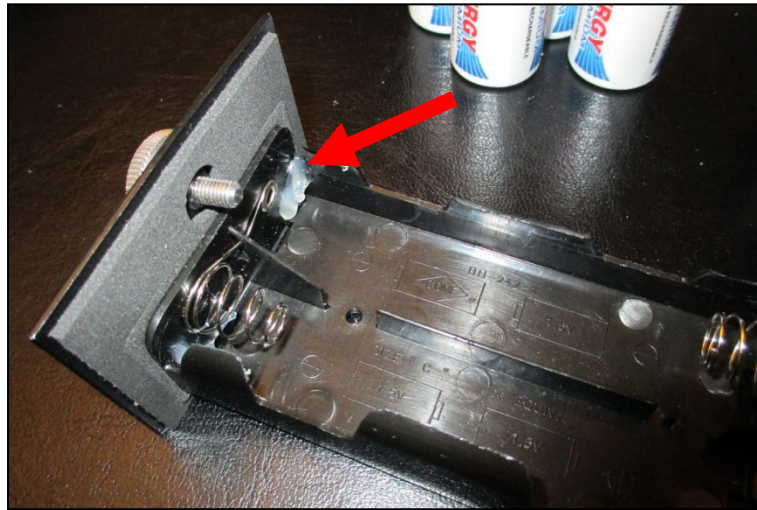


Troubleshooting: If the Unit does not Power On

When using rechargeable batteries, you may encounter a situation where the unit will not power on after putting in the batteries and setting the POWER switch to INT (ON). The positive pole on a rechargeable C battery is shorter than a standard alkaline battery and there is plastic on a screw/nut to the battery cover that prevents the battery from making contact with the power contacts in the tray. Follow these steps to remove that plastic. After following these steps, you can apply a small amount of glue to the screw/nut to secure the nut.

- 1) Set the **POWER** switch to the OFF position (center).
- 2) Remove batteries from the battery tray.
- 3) You can disconnect the battery tray from the unit if you want but if you leave it connected be careful not to damage the wire connection during this process.

- 4) The photo below shows the plastic that needs to be removed. Using a knife, cut and pull it off of the screw/nut.



- 5) Reconnect the battery tray to the unit and put batteries into the tray.
- 6) Set the **POWER** switch to the ON position (INT, right) and the unit should power on.

SM4BAT-FS DETECTOR OPERATION AND SETTINGS

Batteries and Memory Card Installation



- 1) Release the side latch, open the security cover. Press the small circular indentation between SD memory card slots A and B with your thumb to release the middle section. This opens the middle section to access the battery bay. **Note:** *If it is difficult to release the section, press down closer to the gasket seam.*
- 2) Install four (4) “D” batteries.
If using rechargeable batteries, remember to charge batteries before use. This can take several hours. Consider marking (color-coding with tape) different sets of batteries to distinguish between charged and used batteries.
- 3) To close the battery bay, gently and firmly push the middle section (display and keypad) down until it snaps into place.
- 4) Insert one SD memory card in slot A. **Remember to record the SD Card ID No. on the Field Maps form or paper datasheet.**
- 5) Slide the power switch down to **INT** for internal battery power. The detector powers on and the main menu appears on the display.

Note: *Do not turn the power off when a recording is in progress. To safely exit from recording, press **SCHEDULE STOP**, allow the recorder to return to the Main Menu, and then switch the power off. Avoid quickly switching power off and on again (avoid quick switches between **INT** and **EXT**). The recorder can interpret this sudden loss and restoration of power as an error and may start creating diagnostics.*

Check if the SM4BAT-FS is Detecting Sound

- 1) Ensure the microphone is connected to the detector.
- 2) At the Main Menu, select Utilities by pressing **DOWN** then **ENTER**.
- 3) Select Calibrate Mic by pressing **DOWN** twice then **ENTER**.

- 4) You will see the display below showing that the detector is detecting sound. Make noise (clap or jingle keys) and you will notice the dBV numbers change as sound is detected. The values may not be exactly as below, just check that the numbers change when you create sound.

```
MICROPHONE CALIBRATE
@40 kHz:
Ch 0: -47 dBV
```

- 5) If there is no indication of sound being detected, power down the unit and ensure the microphone is attached correctly to the mic cable and the mic cable is attached to the detector.
- 6) Press **LEFT** button twice to return to Main Menu.

Check SM4BAT-FS Settings

- 1) From the Main Menu, select Settings by pressing **DOWN** then **ENTER**.
- 2) Press **ENTER** to select the **Audio** settings (if cursor not already on Audio, then press DOWN) and check the settings below.

Parameters	Values
Gain	12 dB
16K High Filter	off
Sample rate	384 kHz
Min Duration	1.5 ms
Max Duration	none
Min Trig Freq	7 kHz
Trigger Level	12 dB
Trigger Window	3 s
Max Length	00:05
Compression	none

- 3) Use **DOWN** button to scroll through settings. *If settings are not correct, use RIGHT button to navigate among parameters and UP/DOWN buttons to change options. Press the ENTER button when done to save settings.* If everything is correct, press the **LEFT** button to return to the Settings menu.
- 4) Press the **DOWN** then **ENTER** to go to **Date and Time** and check that these are correct (the format will be shown as below). Alternatively, the date and time can be checked by pressing the **CHECK STATUS** button from the Main Menu.

YYYY-MM-DD HH:MM:SS

```
2018-Jun-1 15:17:45
```

- 5) If everything is correct, press the **LEFT** button to return to the Settings menu. *If settings are not correct, use RIGHT button to navigate among parameters and UP/DOWN buttons to change options. Press the ENTER button when done to save settings.*
- 6) Prefix – there is no need to set a prefix, but if you want to set a prefix for each recorded file, then consider setting the prefix to the Location ID. Navigate to **Main Menu > Settings > Location > Prefix** to set the prefix.
- 7) Navigate to **Main Menu > Settings > LED Indicator** and check that the LED Indicator is set to 5 minutes only.
- 8) From the Main Menu, select Schedule by pressing **DOWN** twice then **ENTER**. Select Edit Schedule and check the schedule:

```
START:    time 19:30
DUTY:     always
END:      time 06:30
```

- 9) **Note:** the unit will start recording at 7:30 pm (19:30) and stop recording at 6:30 am. These start/end times are set to encompass sunset/sunrise times for any location in the Pacific Northwest from 1 June to 31 August. These Start and End time settings can be adjusted based on local times as long as the detector is set to record from 30 minutes prior to sunset and continue until 30 minutes after sunrise.
- 10) If the detector is set to some other schedule then a quick way to change the schedule is to navigate to Quick Start from the Main menu and select Record Always. Then change the Start to 19:30 and End to 06:30 from the Edit Schedule menu.

The steps in this section must be followed to set the detector to record.

Setting the Detector to Record

- 1) From the Main Menu, press **SCHEDULE START** to start the schedule.
- 2) Warning messages may appear warning you of required settings, missing SD cards, or a missing microphone. Press **DOWN** button to proceed to the next warning. Address these issues as needed.
- 3) The unit will attempt to run the schedule and the message, 'Preparing to record', will appear.
- 4) If the unit is set to record before the start time (7:30 pm), the message, 'Going to sleep until' will appear.
- 5) If the unit is set to record after the start time (7:30 pm), the message, 'Currently Recording' will appear.

```
2018-Jun-1  15:17:45
Preparing to record
A 19:30-06:30 #00001
```

```
2018-Jun-1  15:17:45
Going to sleep until
2018-Jun-1  19:30:00
```

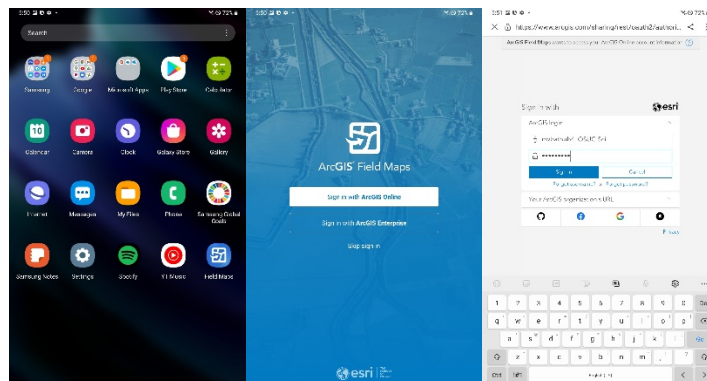
```
2018-Jun-1  20:17:45
Currently Recording:
A 19:30-06:30 #00001
ARMED        @ SR=384K
```

DATA COLLECTION INSTRUCTIONS

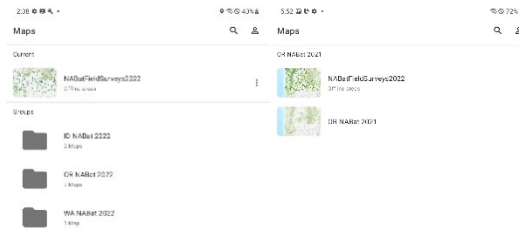
Data collection for PNW NABat surveys should be performed using the ArcGIS Field Maps app. This application is nearly identical to ArcGIS Field Maps (used in prior years), which has been deprecated and is no longer supported. If you must use ArcGIS Field Maps, please see previous versions of this document for instructions. If you cannot use Field Maps (because you do not have an ArcGIS Online account or a mobile device to collect the data), the paper datasheet will be available to use.

- 1) Contact your GIS administrator to get an ArcGIS Online (AGOL) account ID setup. Send this ID to the Bat Hub Data Manager (patrick.emblidge@oregonstate.edu) so that they can add your ID to the AGOL group and that you have access to download the Field Maps web map. You will receive an invitation to join the group after which you will need to login to www.arcgis.com to accept the invitation.
- 2) Download the Field Maps app from the Google Play Store (for Android devices) or from iTunes App Store (for Apple iOS devices) and install to your device.
- 3) The Field Maps app is started by tapping on the Field Maps icon. For first time use, you will need to sign-in to your AGOL account. To login to AGOL, follow the instructions provided to you by your GIS administrator or refer to the following link for general info on logging in; <https://doc.arcgis.com/en/arcgis-online/reference/sign-in.htm>.

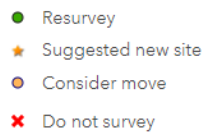
With a public account:



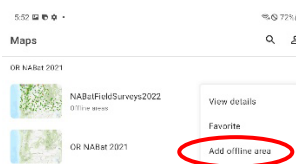
- 4) After logging in, and selecting the NABat group you have been added to, you should see available maps. For the 2022 season, we will all be using the same web map, **NABatFieldSurveys2022**. Tap on a map to open it. Depending on your device, it may take several seconds for the map to load fully.



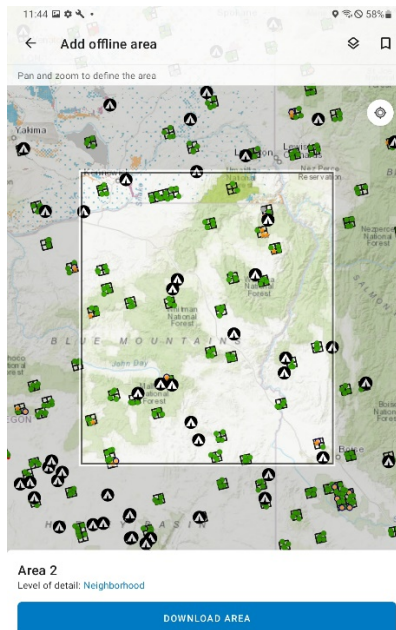
- 5) You can drag and zoom in/out to review an area of the map you intend to conduct surveys.
- 6) Review your target survey areas to familiarize yourself with the cells and specific locations (NABatSiteStatus2022 layer) you will survey. When applicable, locations are categorically marked:



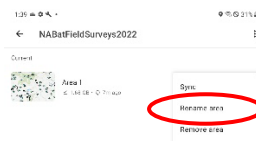
- **Resurvey:** a previous survey location that should be surveyed again in 2022.
 - **Consider move:** a previous survey location that should be moved in 2022 due to poor performance or access issues. The **StatusNote** field will have a suggestion for a new location to move to, which will appear as an orange star on the map.
 - **Suggested new site:** an office-vetted potential new survey location. See **StatusNote** field for suggested detection target. Final survey location is at the discretion of the field biologist based on conditions at the site.
 - **Do not Survey:** a previous survey location that should NOT be surveyed again in 2022. The **StatusNote** field may give an explanation and suggested replacement site, which will appear as an orange star on the map.
- 7) For downloading maps for offline use, tap on the back button to return to the home screen (i.e., the screen with the list of maps). Next, tap on the three dots to the right of the desired map, then tap **Add offline area**.



- 8) You will first need to select the **Level of detail** near the bottom of the screen. Setting this to **Neighborhood** will result in wide map coverage with a level of detail that will show roads and topographic lines from the basemap. Larger extents will not include much fine scale detail, and if your downloaded area does not include a location you are surveying, you will not be able to enter data for that location.
- 9) Pan around the map and use pinch-to-zoom so you can see the survey unit labels.
- 10) Be sure the spatial extent bounding box includes your target survey units, and try to cover as many as possible.

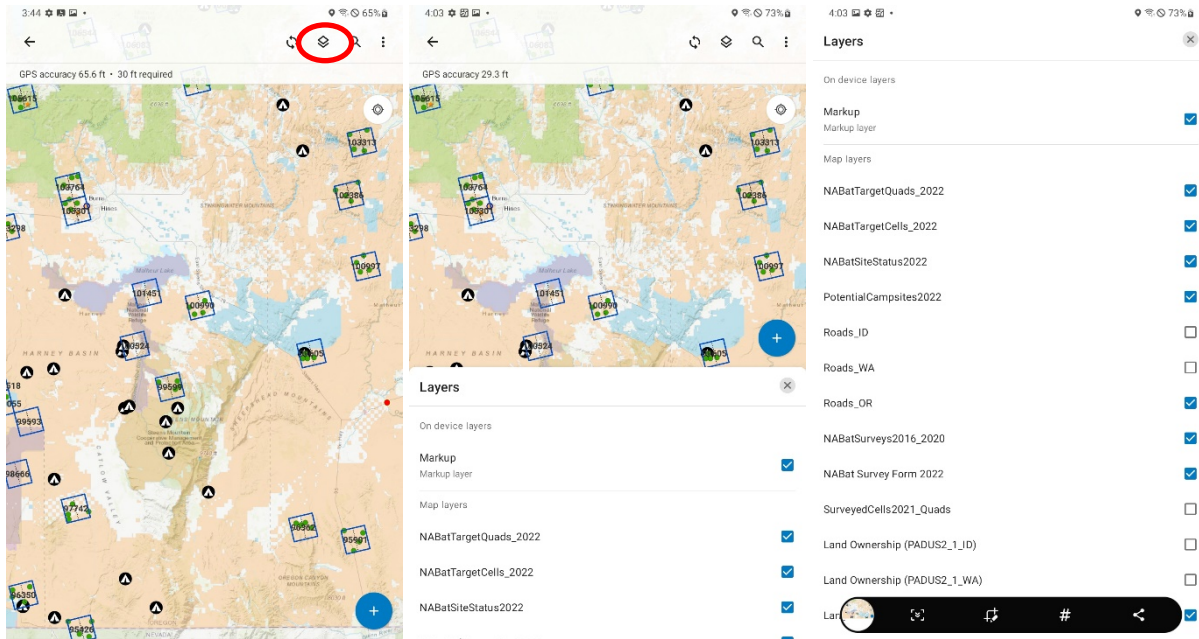


- 11) Keep in mind that the selected area and level of detail determine the amount of data downloaded (max is ~2 GB).
- 12) After selecting the work area and map detail, tap on **Download Area**. A progress wheel will display to the right of the selected map. Once downloaded, you can rename the offline map.

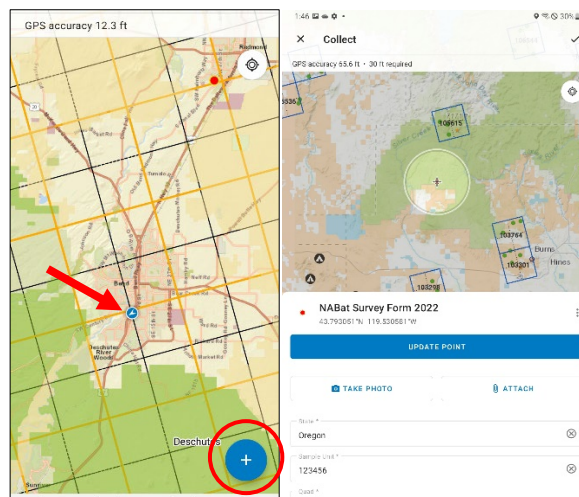


- 13) You may need to add multiple offline areas at a time in order to get full coverage of your work area. Include all the survey units that you will be visiting while you do not have mobile data or WiFi access. **The app will not allow you to enter data for sites that are not within the extent of the offline map.**

- 14) To survey a site select the offline map encompassing the area you will be surveying. Activate the Road and Land Ownership map Layers for the state you are working in, if desired. You may use the map to navigate to your desired detector location.

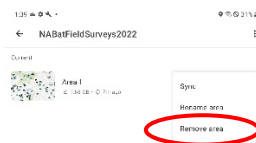


- 15) When ready to collect data, **ensure that the GPS location has stabilized with accuracy < 10 m.** You should see a blue point with an arrow representing your location on the map. To enter data on the form at your location, tap on the + icon on the bottom right, and select the **NABat Survey Form 2022** layer.



- 16) The survey form mirrors the paper datasheet. Yet, changes in formatting the form were made to improve functionality and to facilitate data management. Work through the form from top to bottom.

- 17) If there is an **Add Point** button with no coordinates visible above it, you may need to wait for satellite coverage, then tap the compass symbol in the top right of the map to re-center it, then tap the **Add Point** button in order to save your coordinates. Do not drag the crosshair around the map or the saved coordinates will not be at your physical location.
- 18) Tap on the **Take Photo** button to capture a photo of the **detector setup AND detection target**.
Please take a photo of every site regardless if you took one last year.
- 19) **All the fields with an asterisk must be completed in order to submit the form.** Fields with multiple choices were made to be single- or multiple-select dropdowns depending on the field. **Please complete the entire form. Ensure the Recovery Date is correct, it will default to the date you deploy the detector.**
- 20) After all necessary fields are completed, tap on the ✓ in the top right to save the form. A red point will appear on the map where you collected the data. If needed, you may edit information you entered for this site by tapping on it.
- 21) When you are online (i.e., have an active mobile or Wi-Fi connection), tap on 'Sync' to submit the data to the Bat Hub. If the downloaded map contains additional survey units that will be visited, then successive form completion/point creation and syncing can be repeated as often as possible.
- 22) **After all data is synced**, please check with Bat Hub to ensure that all data was received. The Bat Hub Data Manager will perform weekly scheduled downloads of Field Maps data from AGOL for QA backup purposes. Once data has been backed-up the downloaded map can be deleted, especially in preparation for the map download of the next targeted set of survey units. To delete a map, tap on the three vertically-aligned dots to the right of the map and tap **Remove area**.



Field Maps data field descriptions
(Required fields in bold)

State	US state within with the survey location exists. Select one from the list.
Sample Unit	Sample Unit ID is the unique CONUS_10KM number for the 10 km x 10 km cell derived from Bat Grid. This will be visible by tapping your location on the map before entering the form.
Quad	The Quad ID is an intercardinal 5 x 5 km cell within the Sample Unit, given a NW, NE, SE, or SW label based on its location within the sample unit. It is also visible by tapping your location on the map.
Quad Number	A number to distinguish among multiple sites within the same quad. The first point to be surveyed within a quad should be given the number 1. For additional locations within the same quad, increment the quad number, even if the survey is taking place in a subsequent year.
New Site?	Select 'Yes' if this is a new site for the current year, or if you had to move or change a site from the previous years.
Directions to site	Enter concise, descriptive directions which could be followed by someone who has never been to the site.
Site Name	Enter a unique, short, descriptive name for the site.
Deployment Date	The date the detector is deployed. Tap the field to open a calendar and select the appropriate date.
Recovery Date	The date the detector is retrieved. Same as above. Ensure you set this to the correct date as Field Maps defaults to the day you deployed. If the detector is not recovered on the date you enter, please tap the point and edit it to change this recovery date.
Deployment Contact(s)	Name of primary person/people responsible for deploying the detectors. Please consistently enter your full name(s).
Deployment Agency	Deployment Agency is a single-select field and represents the affiliation of the Deployment Contact.
Enter other Agency	If your affiliation is not listed, enter it here. Please be consistent.
Land Ownership	Select the landowner for the site. If you select "Other", then explain in the field below.
Enter other Land Ownership	If the landowner is not listed, enter it here. Please be consistent.
Land Owner Phone	Enter contact information if available.
Land Owner Email	Enter contact information if available.
Land Owner Address	Enter contact information if available.
Detector Type	Select your detector type.
Detector Serial No.	The manufacturer's supplied serial number for the detector. For Wildlife Acoustics detectors, use only the numbers after the prefix, i.e., do not include "S4U" or "SMU".
CF/SD Card ID No.	Enter the designated number or unique ID for the data card you insert into the detector.
Standard Detector Settings?	If you followed the detector settings in this document, select "Yes". Otherwise, select "No" and write in the comments what settings differ.
Recording Start Time	The date and time you armed the detector for recording, especially if it differs for some reason from the deployment date.
Recording Stop Time	The date and time the detector stopped recording, especially if it differs for some reason from the recovery date.
Deployment Date	The date the detectors are deployed. When the user taps on the dropdown arrow for the Deployment Date field, a calendar pops up highlighting the current date.
Microphone Height (m)	Height off the ground in meters. The project standard height is 3 m (~10 ft).

Microphone Orientation	Cardinal or intercardinal direction the microphone is facing (N, E, S, W, NE, SE, SW, NW).
Distance to Clutter (m)	Clutter is physical objects in the flight environment (e.g., tree branches, leaves, water surfaces, cliff faces, etc.). Distance in Meters to nearest object.
Clutter Category	Use one of the 5 categories to describe the percent clutter within a 50-m hemispheric radius of the detector: 0 - no structural interference (open habitat) 1 - 1 to 25% clutter 2 - 26 to 50% clutter 3 - 51 to 75% clutter 4 - 76 to 100% interference (dense vegetation or narrow canyon topography)
Clutter Type	A multiple-select field, that is, select the most <u>prominent</u> observed clutter type within a 50 m hemispheric radius of the microphone. If other significant types or unlisted types, then enter below.
Enter Other Clutter Type	Enter secondary but prominent clutter type, or an unlisted clutter type if it is primary.
Photo Direction	Use cardinal or intercardinal direction (N, E, S, W, NE, SE, SW, NW) to record the direction the photo of the detector setup was taken.
Habitat	Choose the primary, general habitat type of the site.
Waterbody, Dry Water Feature, Rock Feature, Meadow, Forest Edge, Forest Opening, Other Detection Targets	A detection target is the landscape feature of interest at which acoustic bat activity is being monitored. Select a feature under the appropriate descriptor category, and enter as many as are primarily applicable.
Comments	Enter any relevant information that you could not enter above. Enter any detector settings that differ from those listed in this document. <u>If you retrieve the detector and there was some issue (knocked over, chewed cable, dead batteries, etc.), please enter that here.</u>

Standard: D500X Detector Settings	<p>The standard settings for this project are: Profile: SAMP. FREQ = <u>500</u>, PRETRIG = <u>OFF</u>, REC. LEN = <u>5</u>, HP-FILTER = <u>NO</u>, AUTOREC = <u>YES</u>, T. SENSE = <u>MED</u> Record Settings: INPUT GAIN = <u>45</u>, TRIG LEV = <u>160</u>, INTERVAL = <u>0</u> Absolute Timers Settings: TIMER ON = <u>19:30</u>, TIMER OFF = <u>06:30</u></p> <p>If you use different settings, provide values for them. Describe whether you used Absolute or Relative Timers.</p>
SM4BAT Detector Settings	<p>The standard settings for this project are: Profile: GAIN = <u>12 dB</u>, 16K HI FLTR = <u>off</u>, SAMP. RATE = <u>384 kHz</u>, MIN DUR = <u>1.5 ms</u>, MAX DUR = <u>none</u>, MIN TRIG FREQ = <u>7 kHz</u>, TRIG LEV = <u>12 dB</u>, TRIG WIND = <u>3 s</u>, MAX LGTH = <u>5 s</u>, COMPRESSION = <u>none</u> Schedule Settings: START TIME = <u>19:30</u>, END TIME = <u>06:30</u></p> <p>If you use different settings, provide values for them.</p>

DATASHEET INSTRUCTIONS

- 1) After setting up the detector, **complete the datasheet fully.** Important fields are noted below.

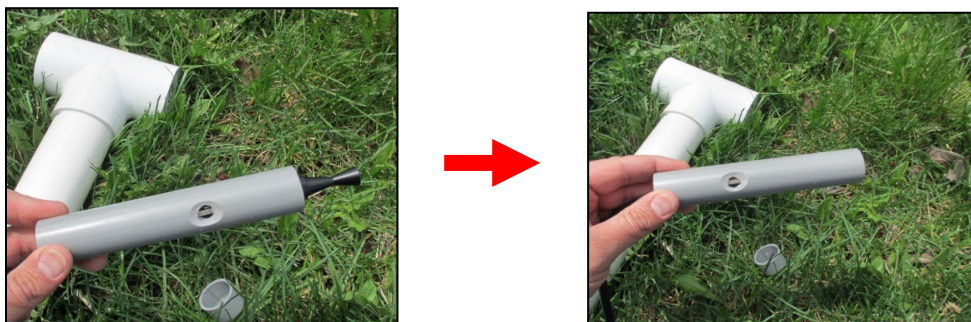
- 2) The second page of the file containing the datasheet has descriptions of each field. It would be beneficial to print this on the reverse side of the datasheet.
- 3) **Location ID** – use the Sample Unit ID (CONUS_10KM field in GIS shapefile) plus the intercardinal direction (NW, NE, SW, SE) representing the quadrant for the detector site location plus a sequential quadrant number, e.g., 123456_NW1. If more than one site occurs in the same quadrant then use the quadrant number to differentiate among detector locations, e.g., 123456_NW1 and 123456_NW2.
- 4) **Datum and Latitude/Longitude** – record coordinates in **NAD83** and **decimal degrees Latitude/Longitude (DDD.DDDDD°)**. If you record in any other format, please provide the datum and other pertinent info (e.g., the zone if using UTM's) on the datasheet. **Be sure to double check what datum your GPS is set in, even though you may change it to decimal degrees Latitude/Longitude it may be in another datum. Record coordinates every year, regardless if this is the same site previously surveyed.**
- 5) **Detector Serial No.** – this is important to match the data to the site location. Use the Serial Number provided by the manufacturer. For D500X, this can be seen by opening the CF Card compartment.
- 6) **CF (SD) Card ID No.** – this is important to match the data to the site location's datasheet. Use any ID so that the Bat Hub Coordinator can match that card to its associated datasheet.
- 7) **Clutter Category** – remember to consider all of the clutter within a **50-m hemispheric radius** of the detector (look up and around!).
- 8) **Clutter Type** – circle the most prominent type of clutter (most likely vegetation) but circle other significant types.
- 9) **Photos** – **remember to take a photo of the detector setup that includes the detection target (e.g., pond) and surrounding environment.** Turn on the GeoTag option, if possible. Use the Location ID to name the image file (e.g., 123456_NW1.jpg).
- 10) **D500X Detector Settings** – write-in values if using any settings different from the standard settings. For the SM4BAT, you may enter settings here or list them out in the Comments.
- 11) **Detection Target** – circle the most prominent landscape feature (e.g., waterbody) where you are attempting to record bat activity. If other significant features, then select those as well. Follow this by selecting the more specific descriptors for these features.

DETECTOR RETRIEVAL

****Ensure that you are retrieving detectors at least 1 hour after local sunrise time****

- 1) Once you have arrived at the site, fill out any necessary data on the datasheet or in the Field Maps form (e.g., weather observations, detector status notes).
- 2) **D500X** – Safely switch the power off by first putting the unit to sleep (Failure to follow these steps may cause loss of recorded files and/or corruption of the CF card):
 - 1) Press **ON/OFF** button, the screen will turn on.

- 2) Press and hold **ON/OFF** button, the Ready screen will appear, release **ON/OFF** button (this stops recording mode although the unit may not be actively recording when you perform this).
 - 3) Press and hold **ON/OFF** button until the System Power Down screen appears (“SYSTEM POWER DOWN” will appear at the top with timer info below that and “ENTER TO POWER DOWN”), release **ON/OFF** button, then press **ENTER** button (this powers down the unit, but proceed to next step to completely power down the unit).
 - 4) Open the bottom protective cover to access the **POWER** switch and put it in the OFF position (center).
 - 5) If you are removing the CF Card now (because you will immediately be deploying the detector at another site) then ensure you have recorded the CF Card ID No. on the datasheet and that you are using a new, empty CF Card. If not, then maybe best to wait until you get to the office to remove the CF Card and do the documentation then.
 - 6) Close protective cover.
- 3) **SM4BAT-FS** – Safely power off the unit (Failure to follow these steps may cause loss of recorded files and/or corruption of the SD card):
- 1) Open the cover. Press and hold the **SCHEDULE STOP** button for several seconds.
 - 2) Slide the power switch to **EXT** to turn power off.
 - 3) Close protective cover.
- 4) Disassemble all equipment. Take special care to wind up the mic cable and secure using tape, zip ties or other fasteners to prevent damaging it during storage and transport.
- 5) Ensure to reverse mic capsule on microphone and place cap over capsule, so as to protect the microphone from damage.



DATA TRANSFER PROTOCOL

When returning to the office, follow these steps to prepare and send the data to the Bat Hub:

- 1) If using the Field Maps form, ensure:
 - 1) Required fields are completed, especially the Detector Serial No. and CF Card ID No.
 - 2) Ensure form has been submitted (synced).
- 2) If using paper datasheets, ensure they are filled out completely.
 - 1) **Ensure coordinates are clearly written on datasheets.** If possible, download GPS coordinates to a GPX file.
 - 2) Ensure filenames of photos contain the Location ID of the site (e.g. 106544_NE1.jpg) and that they are recorded on the appropriate datasheet.
 - 3) Ensure CF (SD) Card ID No. is recorded on the appropriate Field Maps form or datasheet.
 - 4) Scan datasheets.
 - 5) Copy photos and scanned datasheets to the CF or SD Card containing the acoustic data for the specific site.
- 6) Back up acoustic data from CF or SD Card, photos and (scanned datasheets) to your computer. Label the copied folder on your computer in the following format; <Location ID>_<CF (SD) Card ID#>, e.g. 106544_NE1_55.
- 7) Mail data cards (and datasheets) to Bat Hub at:

Nadja Schmidt
HERS Lab, NW Bat Hub
Oregon State University-Cascades
1500 SW Chandler Avenue
Bend, Oregon 97702
- 8) If monitoring at another Sample Unit, prepare equipment for next deployment.

APPENDIX

Setting Up the D500X Detector for the First Time

Follow the steps in this section if the detector is brand new and you are using it for the first time.

- 1) If the unit is not powered down, then power it down by pressing and holding the **ON/OFF** button, release it, then press **ENTER**. Set the **INT/EXT** switch to OFF (center).
- 2) Follow these steps to update the detector firmware to version **2.3.0** if unit is not already up-to-date (current version can be seen on initial startup screen):
 - 1) Download the D500X Utility program to your computer from <http://www.batsound.com/?p=33> and the latest firmware **D500X 2.3.0 (V230_161211_151753.D500X)** from <http://www.batsound.com/?p=31>.
 - 2) Connect a CF Card to your computer via a CF card reader.
 - 3) Double click on the **D500X Utility.exe** file to run it. **(You must use this utility program to transfer the file, it cannot be done by simply transferring the file to the CF card via Windows explorer.)**
 - 4) From the "Select CF card" dropdown, select the drive for your CF Card.
 - 5) Click on **Transfer** button in the "Transfer D500X firmware to CF card" section.
 - 6) Browse to the location on your computer where you downloaded the D500X 2.3.0 firmware, actual filename is "V230_161211_151753.D500X". Click **Open**.
 - 7) The firmware file will be transferred to the CF Card. In the Status window, you will see confirmation of this. Click on **Exit** to close the utility program.
 - 8) With the detector powered off (**POWER** switch set to OFF [center]), insert the CF Card into slot A (top left slot).
 - 9) Set the **POWER** switch set to ON (INT, right). The unit will power on and recognize that the CF Card has a firmware update. Follow the on-screen instructions to update the firmware. When completed, the unit will tell you to power down the unit via the switch and to remove the CF Card. Remove the CF Card.
- 3) Insert another CF Card or reformat the CF Card with the firmware using your computer prior to using it. Power on the unit using the **POWER** switch.
- 4) From the Ready screen, press **ENTER** and use the **LEFT/RIGHT** buttons to scroll to USER0.
- 5) Press **ENTER** to select USER0.
- 6) From the Ready screen, press **F1** button and the Settings menu will appear.
- 7) Press **ENTER** button to select 1-USER PROFILES. To edit the settings, press **ENTER** button and use **UP/DOWN** buttons to navigate among parameters and **LEFT/RIGHT** buttons to change values. Settings should appear as follows:



```
PROFILE      = USER0
-----
SAMP. FREQ   = 500
PRETRIG      = OFF
REC. LEN     = 5
HP-FILTER    = NO
AUTOREC      = YES
T. SENSE     = MED
```


- 8) After you have finished changing values, press the **ENTER** button to save settings. (The unit will return to the Ready screen, you can use the F1 and ENTER buttons to return to 1-USER PROFILES to check that the settings were saved).
- 9) From the Profile settings screen, press the **ESC** button to return to the Settings menu.
- 10) From the Settings menu, press the **DOWN** button to move to 2-RECORDING SETTINGS and press the **ENTER** button to go to Recording Settings. To edit the settings, use the **UP/DOWN** buttons to navigate among parameters and **LEFT/RIGHT** buttons to change values. Settings should appear as follows:



- 11) After you have finished changing values, press the **ENTER** button to save settings. (The unit will return to the Ready screen, you can use the F1 and ENTER buttons to return to 2-RECORDING SETTINGS to check that the settings were saved).
- 12) From the Recording settings screen, press the **ESC** button to return to the Settings menu.
- 13) From the Settings menu, press the **DOWN** button to move to 3-TIMERS and press the **ENTER** button.
- 14) Press the **ENTER** button again to go to 1-ABSOLUTE TIMERS. To edit the settings, press **ENTER** button and use the **LEFT/RIGHT** buttons to navigate among parameters and **UP/DOWN** buttons to change values. Settings should appear as follows:



- 15) After you have finished changing values, press the **ENTER** button to save settings. (The unit will return to the Timers screen, you can use the ENTER button to return to 1-ABSOLUTE TIMERS to check that the settings were saved). *Go to 2-RELATIVE TIMERS and ensure that there are no times set here, all RTIMERs should show "--:--" for both ON and OFF. If times do appear there, then press the ON/OFF button to clear these times.*
- 16) From the Timers screen, press the **ESC** button to return to the Settings menu.
- 17) From the Settings menu, press the **DOWN** button to move to 4-TIME SETTINGS and press the **ENTER** button to go to Time Settings. To edit the settings, use the **UP/DOWN** buttons to navigate among parameters and **LEFT/RIGHT** buttons to change values. *Only the DATE and TIME need to be set.* Settings should appear as follows with the current date and time:



- 18) After you have finished changing values, press the **ENTER** button to save settings. (The unit will return to the Ready screen, the new date and time can be viewed at the bottom of the Ready screen or you can use the F1 and ENTER buttons to return to 4-TIME SETTINGS to check that the settings were saved).
- 19) From the Time Settings screen, press the **ESC** button to return to the Settings menu.
- 20) From the Settings menu, press the **DOWN** button to move to 6-UTILITIES and press the **ENTER** button to go to Utilities.
- 21) Press the **DOWN** button to move to 4-BATTERY SETTINGS and press the **ENTER** button to go to Battery Settings.
- 22) Press the **DOWN** button to move to EVENT LOG and use the **LEFT/RIGHT** buttons to set to ON.
- 23) Press **ENTER** button to save settings.
- 24) Press **ESC** button several times until you return to the Ready screen. The detector should now have the appropriate settings.

Formatting the CF Card

You should format the memory card in the detector immediately before setting it to record. If the memory card has data possibly from the current season, do not format this card, contact the Bat Hub Coordinator to verify that this data has been downloaded. When it is necessary to format a card, then follow these steps.

- 1) From the Ready screen, press F1.
- 2) Press DOWN button until you get to 6-UTILITIES. Press ENTER.
- 3) Press DOWN button until you get to 3-FORMAT CF-CARD. Press ENTER.
- 4) A screen will appear showing the number of files on the CF card (if any).
- 5) Press ENTER, a warning message will appear that you are about to permanently remove all files. Press ENTER again.
- 6) Press and hold ON/OFF button to start the format.
- 7) Once the format is complete, 0 files will be shown for the CF Card.
- 8) Press ESC to exit. A message will appear stating that the system must be restarted. Press ENTER.
- 9) The system will restart. Press ENTER or ESC to get to the Ready screen.

Setting Up the SM4BAT-FS Detector for the First Time

Follow the steps in this section if the detector is brand new and you are using it for the first time.

- 1) If the unit is not powered down, then power it down by pressing and holding the **SCHEDULE STOP** button. Set the power switch to **EXT**.
- 2) Follow these steps to update the detector firmware to version **SYS2-1-1.SM4** if unit is not already up-to-date (current version can be seen by pressing the CHECK STATUS button):
 - 1) Download the latest firmware from <https://wildlifeacoustics.com/download/firmware-updates>. Ensure to download the firmware for the appropriate model (i.e., FS).
 - 2) Copy the firmware file to the top-level directory (**not in a folder**) of an SD memory card.
 - 3) Insert the SD Card into the detector in slot A.
 - 4) Power on the unit by sliding the power switch to **INT**.
 - 5) Navigate to **Main Menu > Utilities > Firmware Update** using the **DOWN** and **ENTER** buttons.
 - 6) At the Select upgrade file prompt, select the firmware update file and press **ENTER**. You should see the following messages: *'Upgrading... Upgrading Complete! Rebooting...'* The recorder applies the new firmware and restarts.
- 3) Power on the unit using the power switch if the unit is not already on.
- 4) From the Main Menu, select Settings by pressing **DOWN** then **ENTER**.
- 5) Press **ENTER** to select the **Audio** settings (if cursor not already on Audio, then press DOWN) and check the settings below.

Parameters	Values
Gain	12 dB
16K High Filter	off
Sample rate	384 kHz
Min Duration	1.5 ms
Max Duration	none
Min Trig Freq	7 kHz
Trigger Level	12 dB
Trigger Window	3 s
Max Length	00:05
Compression	none

- 6) Use **DOWN** button to scroll through settings. Use **RIGHT** button to navigate among parameters and **UP/DOWN** buttons to change options. Press the **ENTER** button when done to save settings. If everything is correct, press the **LEFT** button to return to the Settings menu.
- 7) Press the **DOWN** then **ENTER** to go to **Date and Time**. Use **RIGHT** button to navigate among parameters and **UP/DOWN** buttons to change values. Press the **ENTER** button when done to save settings.

YYYY-MM-DD HH:MM:SS

2018-Jun-1 15:17:45

- 8) If everything is correct, press the **LEFT** button to return to the Settings menu.
- 9) Prefix – there is no need to set a prefix, but if you want to set a prefix for each recorded file, then consider setting the prefix to the Location ID. Navigate to **Main Menu > Settings > Location > Prefix** to set the prefix.
- 10) Navigate to **Main Menu > Settings > LED Indicator** and check that the LED Indicator is set to 5 minutes only.
- 11) From the Main Menu, select Quick Start and select Record Always.
- 12) Return to the Main Menu and select Schedule by pressing **DOWN** twice then **ENTER**. Select Edit Schedule and change the Start to 19:30 and End to 06:30.

START: time 19:30
DUTY: always
END: time 06:30

- 13) **Note:** the unit will start recording at 7:30 pm (19:30) and stop recording at 6:30 am. These start/end times are set to encompass sunset/sunrise times for any location in the Pacific Northwest from 1 June to 31 August. These Start and End time settings can be adjusted based on local times as long as the detector is set to record from 15 minutes prior to sunset and continue until 15 minutes after sunrise.

Formatting the CF Card

If the memory card has data possibly from the current season, do not format this card, contact the Bat Hub Coordinator to verify that this data has been downloaded. When it is necessary to format a card, then follow these steps.

- 1) From the Main Menu screen, navigate to **Utilities > Format All Cards** using the **DOWN** and **ENTER** buttons.
- 2) At the **Confirm: Format All?** prompt, select **Yes** to format the SD memory card(s). Progress messages appear, and then the display returns to the Utilities menu.