

## INTRO TO ACOUSTICS

**Tara Hohoff**  
IBCP Coordinator

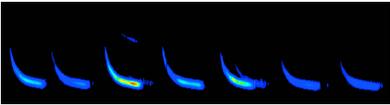


**Illinois Bat**  
CONSERVATION PROGRAM

## WHAT IS IT?

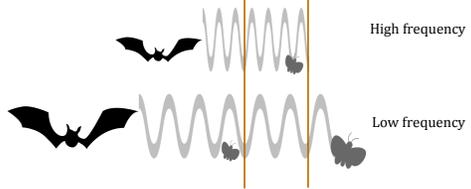
Using ultrasonic recorders to collect data on local bats





## BAT ECHOLOCATION BASICS

Echolocation: emitting and receiving sound waves as a method for perceiving the environment



High frequency

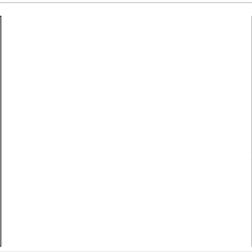
Low frequency

Frequency: number of cycles per second

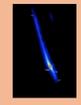
## BAT ECHOLOCATION BASICS

Search phase



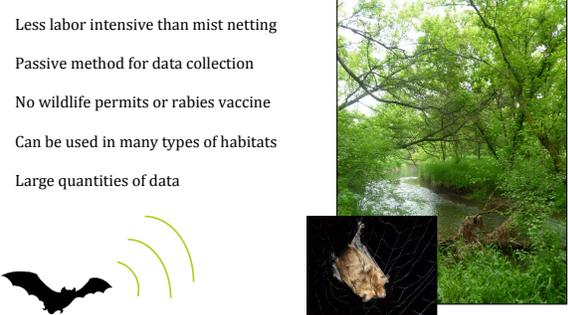



Frequency modulated




## WHY USE ACOUSTICS?

- Less labor intensive than mist netting
- Passive method for data collection
- No wildlife permits or rabies vaccine
- Can be used in many types of habitats
- Large quantities of data

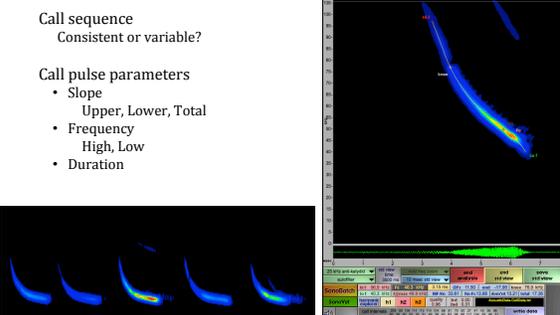
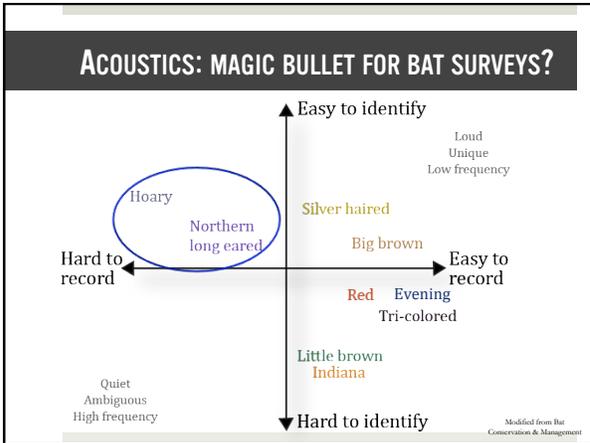
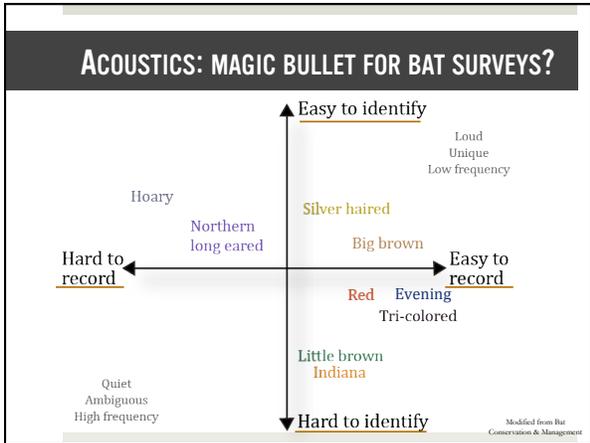


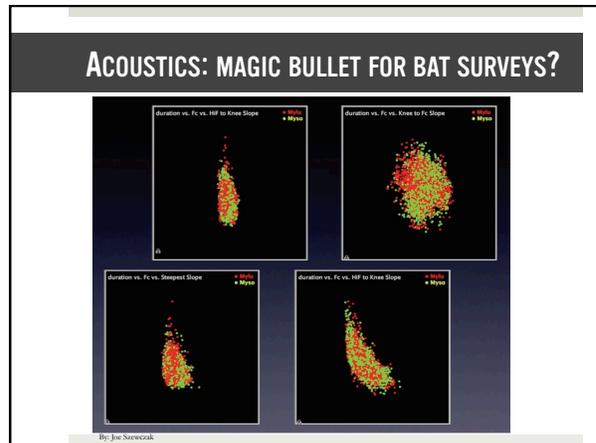
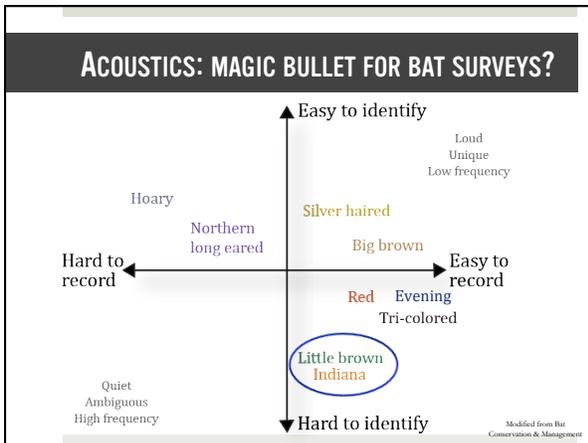
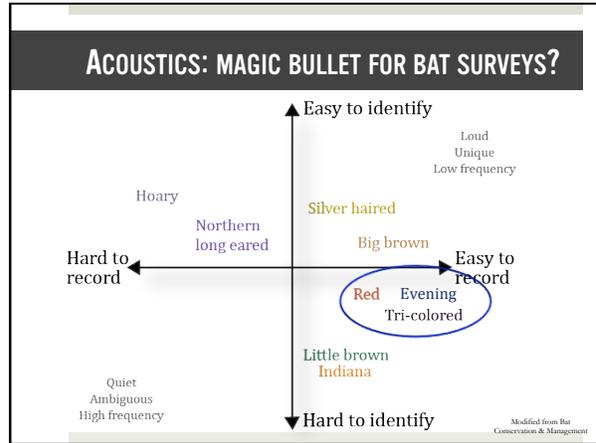
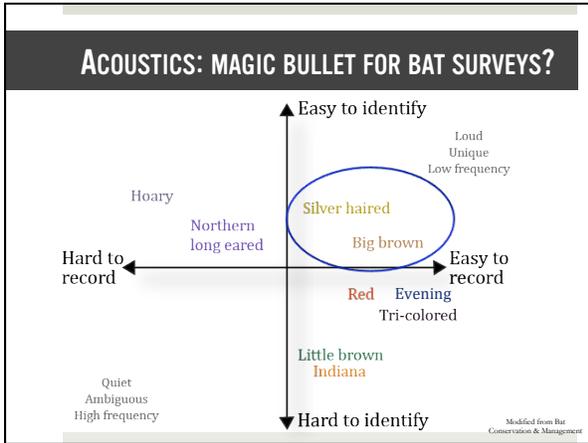
## HOW CAN WE INTERPRET THIS DATA?

Call sequence  
Consistent or variable?

Call pulse parameters

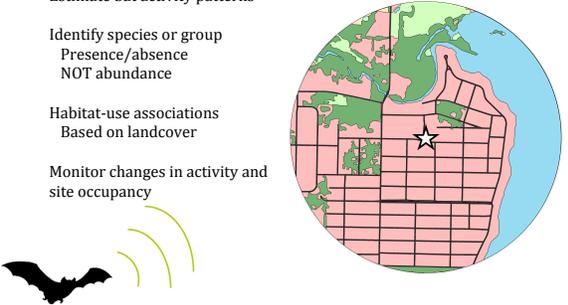
- Slope
  - Upper, Lower, Total
- Frequency
  - High, Low
- Duration



## WHAT CAN WE DO WITH THE DATA?

- Estimate bat activity patterns
- Identify species or group
  - Presence/absence
  - NOT abundance
- Habitat-use associations
  - Based on landcover
- Monitor changes in activity and site occupancy



## ACOUSTIC SURVEY DESIGN

### A Plan for the North American Bat Monitoring Program (NABat)

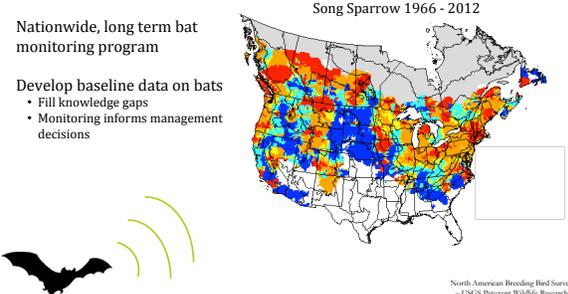
Susan C. Loeb, Thomas J. Rodhouse, Laura E. Ellison, Cori L. Lausen, Jonathan D. Reichard, Kathryn M. Irvine, Thomas E. Ingersoll, Jeremy T. H. Coleman, Wayne E. Thogmartin, John R. Sauer, Charles M. Francis, Myles L. Bayless, Thomas R. Stanley, and Douglas H. Johnson



## NORTH AMERICAN BAT MONITORING PROGRAM

- Nationwide, long term bat monitoring program
- Develop baseline data on bats
  - Fill knowledge gaps
  - Monitoring informs management decisions

Song Sparrow 1966 - 2012



North American Breeding Bird Survey  
- USGS Patuxent Wildlife Research Center

## NORTH AMERICAN BAT MONITORING PROGRAM



### NORTH AMERICAN BAT MONITORING PROGRAM

A map of Illinois is shown with a green grid overlay. In the bottom left corner, there is a black silhouette of a bat with three curved green lines representing sound waves emanating from it.

### NORTH AMERICAN BAT MONITORING PROGRAM

GRTS → Generalized Random Tesselation Stratified

A map of Illinois is shown with a green grid overlay. Several blue squares are scattered across the grid, representing sampling points. In the bottom left corner, there is a black silhouette of a bat with three curved green lines representing sound waves emanating from it.

### NORTH AMERICAN BAT MONITORING PROGRAM

A map of Illinois is shown with a blue background and a black outline of the state. Four yellow stars are placed on the map, indicating specific locations. Two photographs are included: one showing a person standing next to a tall pole in a field, and another showing a person sitting in the driver's seat of a red car at night, looking at a laptop.

### NORTH AMERICAN BAT MONITORING PROGRAM

Stationary sites

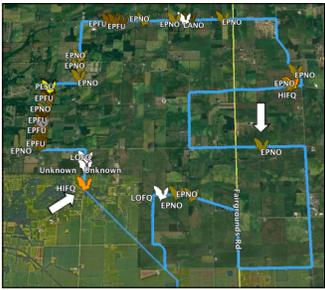
- Longer survey time
- Account for nightly variation
- Typically one landcover surveyed

In the bottom left corner, there is a black silhouette of a bat with three curved green lines representing sound waves emanating from it. On the right side, there is a photograph of a person standing next to a tall pole in a field, similar to the one in the previous slide.

## NORTH AMERICAN BAT MONITORING PROGRAM

**Mobile survey**

- Short time at each location
- Surveys numerous land cover types
- Two nights of survey can account for nightly variation
- Road bias

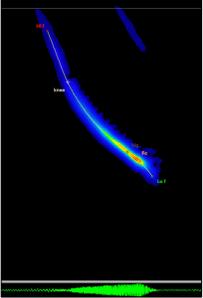


Created using Microsoft transect

## NORTH AMERICAN BAT MONITORING PROGRAM

6 GRTS grids completed

- 12 mobile transects **4,348 files**
- 16 stationary points **41,231 files**



## SM4BAT Setup



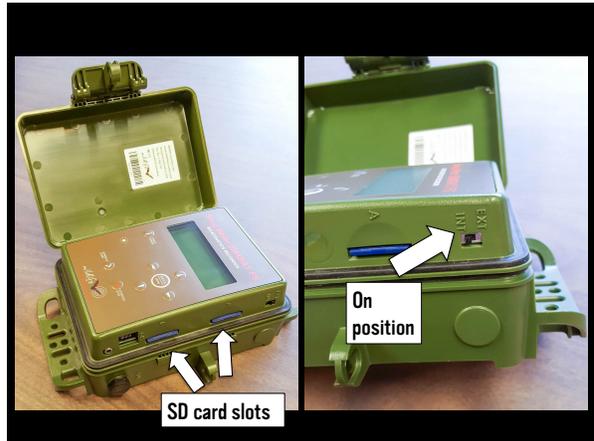
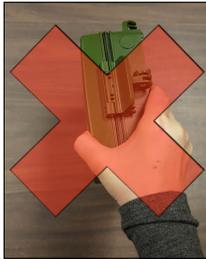

## General SM4BAT handling...

- Utilize recording units with associated microphones and cables
- Store recording units flat, not vertical



## General SM4BAT handling...

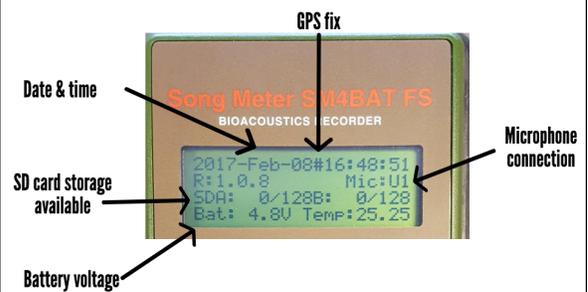
- Remove microphone cables from recorder but not from microphone

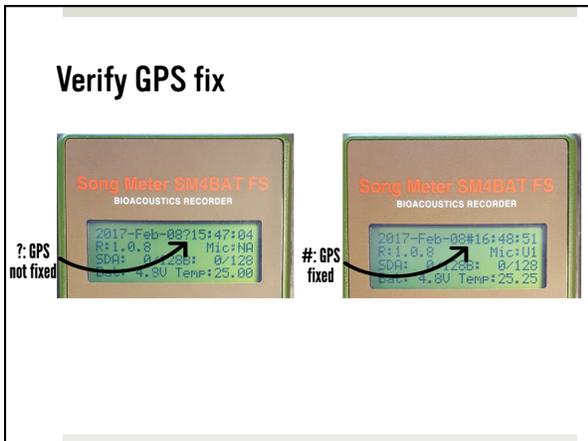
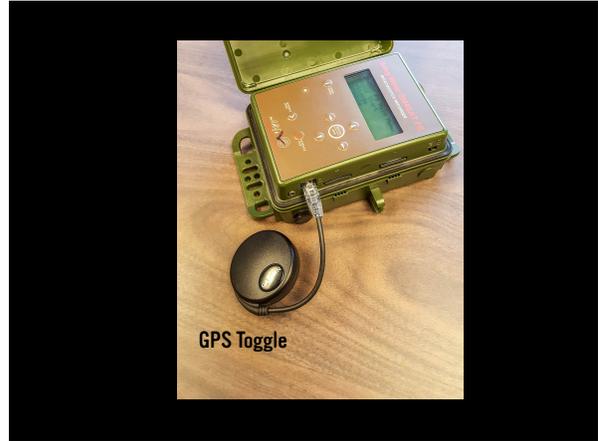
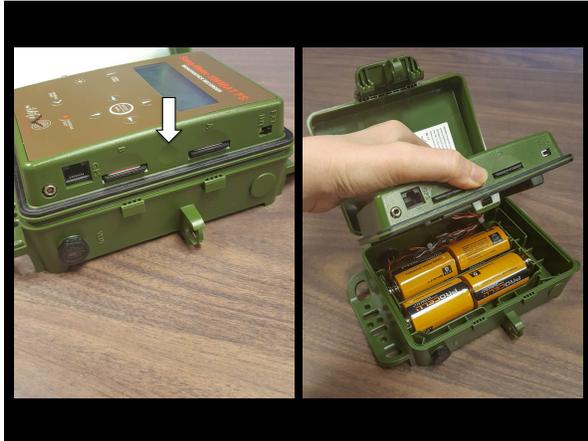


## Main menu



## Check status screen





### Verify microphone connection



### Positional accuracy



### Mark waypoint



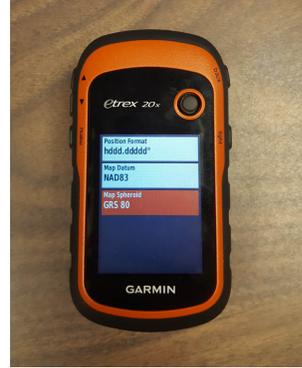
### Verify GPS settings



Verify GPS settings



Verify GPS settings



## STATIONARY SITE SELECTION

Try to survey all available landcover types



## STATIONARY SITE SELECTION

Landowner contact

- Time consuming
- Select & contact ahead of time
- Notify landowner:
  - 10ft PVC pole
  - 3-5 days (weather)
  - Your contact info in case needed
- Friendly landowners:
  - Contact info - send results
  - Subsequent year contact



## STATIONARY SITE SELECTION



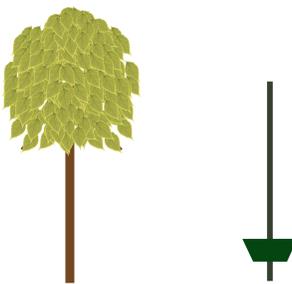
Camouflage with environment

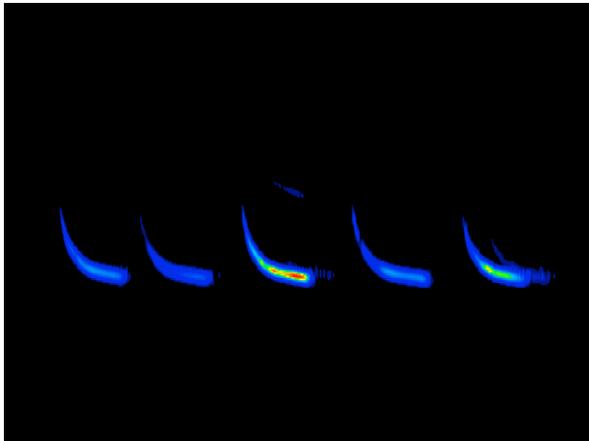
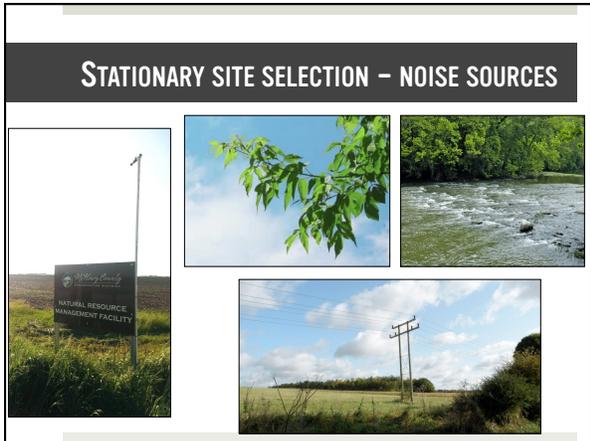
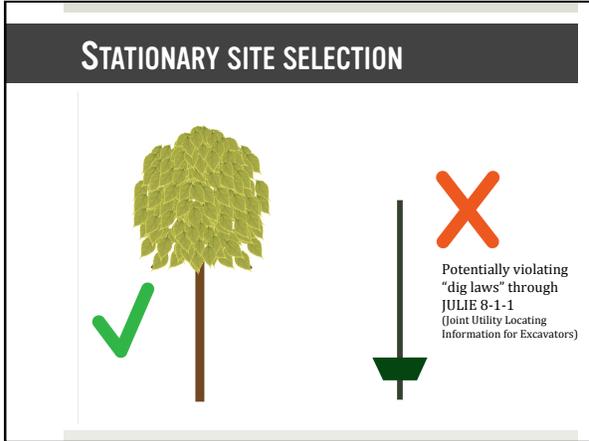
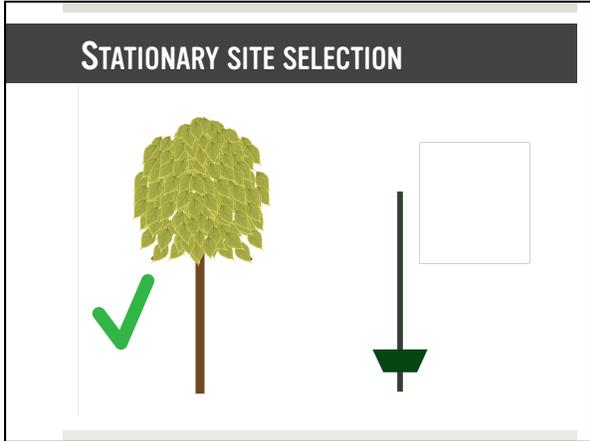
- Bats may be attracted to "new" structure
- Attracting bats will bias survey

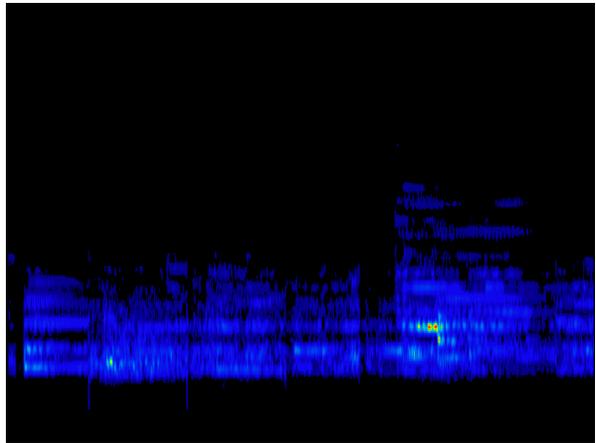
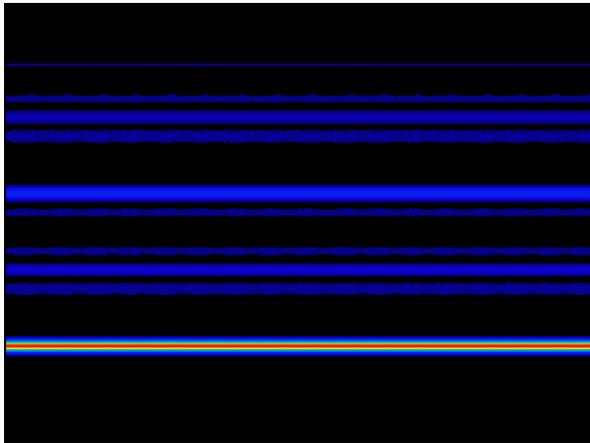
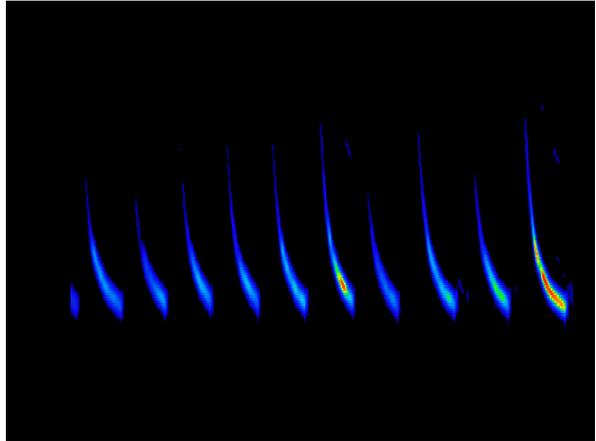
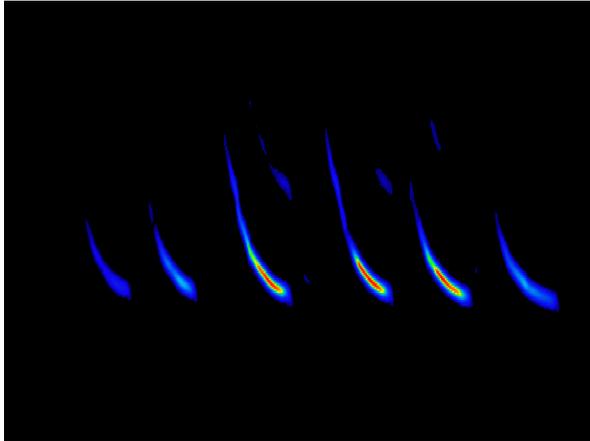
Secure pole, microphone, and detector to avoid theft or damage

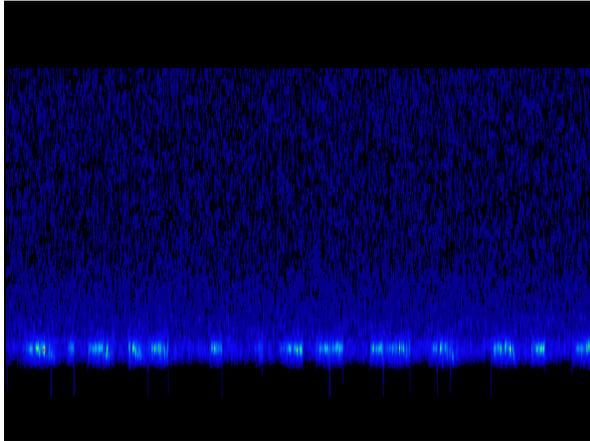
Avoid high-use areas in residential spaces - bonfire pit, playset, etc.

## STATIONARY SITE SELECTION







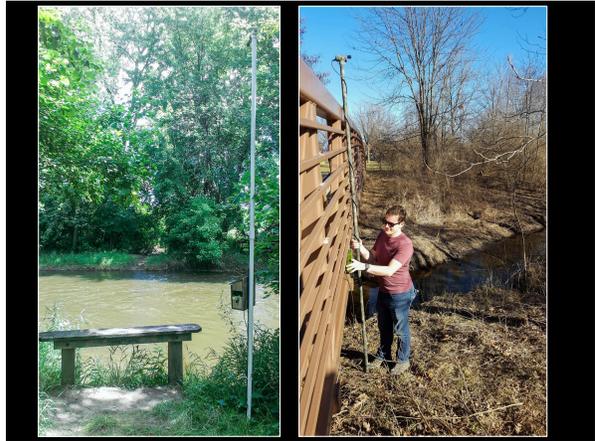


**STATIONARY SITE SELECTION – POTENTIAL ROOSTS**

**STATIONARY SITE SELECTION – CORRIDORS**

**Deployments:**  
The good, the bad, and the ugly





**STATIONARY DEPLOYMENT – STEP BY STEP**



Use PVC pole alone to verify microphone will not hit vegetation

## STATIONARY DEPLOYMENT – STEP BY STEP



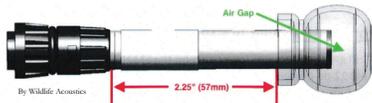
- Place bungee over PVC tee
- Insert microphone through tee
- Wrap bungee around PVC and microphone until secure
- Use rubberbands if additional stability needed



- Secure pole and recorder with cable lock
- Verify settings and secure recorder door with masterlock



## MICROPHONE CARE



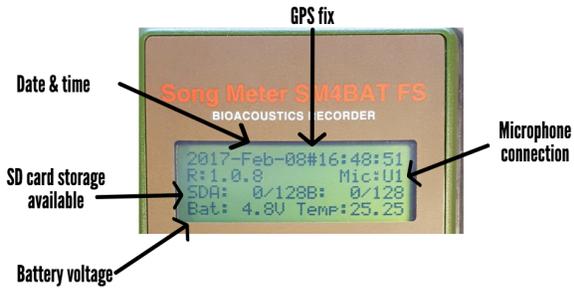
- Do not deploy in severe weather if possible
- Do not remove wind screen from stationary microphones
- Do not handle wind screen when damp, water may displace and effect microphone
- Do not angle microphone upward – keep angled at 90 degrees or slightly downward

## FIELD DATASHEET

### IDNR Stationary Acoustic Surveys

GRTS ID:	GRTS Name:
Surveyors:	County:
Recorder type: SM4BAT FS Microphone Height: 3m	GPS Waypoint #:
Detector ID:	Latitude:
Slot A Card ID: <small>Space available:</small>	Longitude:
Slot B Card ID: <small>Space available:</small>	Positional Accuracy:
Battery level at deployment:	Deployment Date:
Battery level at pickup:	Pickup Date:

### Check status screen



### FIELD DATASHEET

Microphone Orientation (0-360°):
Clutter:      Low    Med    High
Photos taken <input type="checkbox"/>

### STATIONARY DEPLOYMENT – STEP BY STEP



### FIELD DATASHEET

Microphone Orientation (0-360°):
Clutter:      Low    Med    High
Photos taken <input type="checkbox"/>

- Low - little to no vegetation within 10 feet of microphone
- Med - some vegetation within 10 feet of microphone
- High - multiple branches of vegetation within 10 feet of microphone

## FIELD DATASHEET

Microphone Orientation (0-360°):
Clutter:    Low    Med    High
Photos taken <input type="checkbox"/>

Photo #1: Filled out datasheet

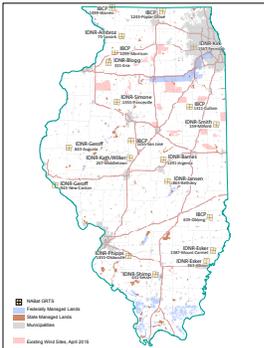
Photo #2: Acoustic setup

Photo #3: In front of microphone, taking image of survey region

## STATIONARY DEPLOYMENT – STEP BY STEP



## TRANSFER OF EQUIPMENT



GRIS #	GRIS Name	Surveyor	Order (South to North)
0431	Sesser	Shrimp	1
0363	Albion	Esler	2
1387	Mount Carmel	Esler	2
1455	Okawville	Phipps	3
0619	Oblong	IBCP	3
0943	New Canton	Geroff	4
0863	Bethany	Jansen	5
1291	Argenta	Barnes	6
0267	Middletown	Kath/Wilker	7
0843	Augusta	Geroff	8
1035	San Jose	IBCP	8
0159	Milford	Smith	9
1311	Cullom	IBCP	9
1355	Princeville	Simone	10
0331	Erie	Bligg	11
1099	Morrison	IBCP	11
0075	Lanark	Ambrutz	12
1567	Fernilab	Kirk/IBCP	13
1243	Poplar Grove	IBCP	13
1499	Warren	IBCP	13

## ACCESSING ONLINE RESOURCES

**Illinois Bat  
CONSERVATION PROGRAM**

<http://www.illinoisbats.org>

## TAKE HOME MESSAGE

- Use resources
- Contact us with any issues
- **Take notes**
  - Mistakes happen & we can deal with them as long as we know they happened!

