DEVELOPMENT OF AN AUTOMATED SYSTEM FOR ACOUSTIC IDENTIFICATION OF BATS

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Acoustic sampling

- Allows extensive sampling with little human input
- Minimizes the impacts of temporal variation on the results
- Can sample areas that cannot be sampled using other techniques
Bat Activity

<table>
<thead>
<tr>
<th>Date</th>
<th>Summit 1</th>
<th>Summit 2</th>
<th>Midslope</th>
<th>Camp Buckner</th>
<th>Forested woods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sep</td>
<td>1000</td>
<td>800</td>
<td>600</td>
<td>400</td>
<td>200</td>
</tr>
<tr>
<td>Oct</td>
<td>1200</td>
<td>1400</td>
<td>1000</td>
<td>800</td>
<td>600</td>
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<td>2000</td>
<td>2200</td>
<td>1600</td>
<td>1400</td>
<td>1200</td>
</tr>
</tbody>
</table>
Qualitative ID

- Accurate with extensive experience
- Variable accuracy rates
- Can analyze ~ 400 calls per hour
Filters

- Easy to set up and run
- Fast analysis
- Can be customized to select specific call types
- Either very specific (selects a small set of calls from a species) or general (allows multiple species)
Pre-automated quantitative ID

• Utilizes DFA
• Allows for ID with known accuracy rates
• Requires user to walk data through numerous steps in the process
• Analysis is limited
Automated program overview

• What the new program isn’t
• What the new program is
• Specifics
What it’s not

• More net filter
  – Aka: Britzke filter, MYSO filter
    • The most misused filter in Analook history

• Program of the summer of 2011
  – This program relied on Analook for cleaning and parameter extraction
What the program is

• Still requires CFCRead to download data
  – Can actually use full spectrum data after some manipulation

• Data must be in consistent format and structure

• Conducts analysis of data from reading in directories to producing excel output
Data organization needs

- No limit to the number of folders
- Need data in night folders
  - must be in yyyymmdd named folder
- Need to have to levels above this night directory
- Example
  - Bats2012
    - Project 1
      - Site 1
        » 20111119
Options

• GPS data
  – For transects GPS files in night folder
  – For stationary data have a excel file

• Sunset/sunrise
  – Calculates activity of individual files
Specifics

• Involves customized filtering
  – Automatically varies with noise levels of files
  – Removes noise
  – Identifies broken pulses
  – Allows for inclusion of COTO and CORA

• Extract parameters
  – ~ 20 parameters
  – Includes some sequence level parameters
Identification

- High/low frequency group for all pulses
- For high quality pulses does species identification
  - Use if/then statements for certain call types
  - DFA
- Allows identification as unknown
Excel output of results

- File level summary
  - Data from each individual file analyzed

- Night/site level summary
  - Summary of all data from files form the same night and site combination

- Species presence summary
  - Species presence determinations based on maximum likelihood estimates
Running the program

- Step 1: Browse to locate the main bat file
- Step 2: Choose the species set
- Step 3: Check the boxes for the supplemental data options as appropriate
- Step 4: Click Process data
Alternative data input

- Since call library is time consuming to collect, an option was included to analyze from other data sources
- SCAN’ R program allows extraction of parameters for inclusion in the automated program