Bioacoustics and Telemetry Team of 2014-2015 - November 1st, 2014

Introduction

Think of a drone flying over the Costa Rican Rainforest, recording what it hears and sending it back to some guy in Arizona. Imagine that guy in Arizona being able to take a population inventory of a species just by sitting and listening, no stress of capturing animals, no cost of travel, no extremely expensive equipment, just one guy, listening. This is what the Bioacoustics and Telemetry Team is working toward. The 2014-2015 Bioacoustics and Telemetry Team is Tyler Dunn, Peter Newmark, and Brooke Shemwell. The Forman Rainforest Project's Bioacoustics and Telemetry Team will be collecting the sounds of a variety of species for the database at the Macaulay Library at Cornell. So, here are the basics, bioacoustics is the sound that animals make. The telemetry component of the project allows the us to track larger animals like mammals back to their home so that we can record them. Cornell has designed a sound anaylisis software called Raven which will be used to compare and anlize the recordings in the field. This will allow us to take a closer look at each recording to make sure we have caught the sound in its entirety. The Bioacoustics and Telemetry Team is also learning how to retrieve sounds at optimum recording quality by using different techniques when it comes to the recorder's microphone settings and placement when recording. Taking recordings of animals might seem quaint and unimportant right now, but the Bioacoustics and Telemetry Team plan to save the rainforest by making it a lot easier to take population inventories instead of through the collection of displaced animals. The 2015 Bioacoustics and Telemetry Team is truly aiming to make the world a better place for all animals.

Goals for this year:

*add to the Macaulay Library

*Record animals in different times throughout the day to get a better understanding of the recordings and the animals behaviors.

Objectives Before the Rainforest

*Familiarize ourselves with Raven and learn how to make strong recordings

*Complete the Methods and Equipment Paper

Thank You, Cornell University - February 6th, 2015

Thank you so much Cornell University for lending us your Sony PBR/400 Parabola dish. We have been practicing our recording techniques. We have also been studying more about sound waves so that we can better understand how to drown out certain sounds naturally as to not take anything away from the animal's sound.

Methods and Procedures - February 27th, 2015

Methods and Procedures

Bioacoustics is all about the recording of the animals. Recording is basically the same procedure whether the species is terrestrial, cursorial, or arboreal. Fossorial and aquatic species will likely not be recorded in this expedition.

1. When recording, first, target a sound.
2. Next, rotate the microphone 90 degrees to the right or left and listen for a second, repeat in the same direction until finding the area where the target sound is the strongest.
3. Next, take a safety recording of about 2 to 3 minutes.
4. After the safety recording, begin the approach (while still recording).
5. Half the distance between the microphone and the species, check the gain to make sure the recorder is taking in nothing above 12 gain, if so, turn down the gain.
6. If the species is still a good distance away, meaning that the gain has not reached above 12, and half the distance again; repeat as many times as needed while simultaneously continuing to check the gain.
7. Feeling that the recording is of sufficient quality, make the closing statement. For the closing statement state the name of the species (if identified), the date, the time of day, the location, the GPS coordinates and elevation, the temperature, the behavioral context of sound, the natural sound or response to to playback (if playback, announce on tape), the number of individuals, the habitat description, the recording equipment (the type of audio recorder, microphone, if used, filter position), and the distance to the animal.

When recording around water, the procedure of recording basically is the same, but the water must be taken into account.

1. First, target a sound.
2. Next, rotate the microphone 90 degrees to the right or left and listen for a second, repeat in the same direction until finding the area where the target sound is the strongest and the sound of water is the lowest.

When recording around water, there are some dead spots where the water is less audible. These dead spots depend on the type of water that is being recorded near. If recording around a deep stream or river, meaning a stream or river where the water level is below ground level, the

dead zone lies in a parabola beside the ditch, as seen in the picture. Beneath the parabola is the dead zone, where the disrupting sound of the stream does not reach, almost like rain with an umbrella, the ditch acts as an inhibiting object, that distorts the sound waves so that they travel vertically and then more diagonally, rather than horizontally. If recording around a waterfall, stream, or river, and there is a large object such as a tree, or large rock, between the species being recorded, and the source of the disruptive noise, stand on the species side of the rock, tree, or inhibiting object with the recorder and as close to said object as possible, to be sure that as little disruptive noise as possible inhibits the recording.

The 2014-2015 Bioacoustics and Telemetry Team uses a software called Raven Pro Software, designed by Cornell University. This software helps to see if the recordings are good. The idea behind the team using Raven Software is to see the highs and lows of the recording and make sure that they are not above or below 12 or -12 gain. The Team's use of Raven has evolved since last year. This year, the Bioacoustics and Telemetry team is not using Raven to edit the recordings. Cornell wants the recording as it was recorded to be sure that the sound of the animal is in its purest form.

The Bioacoustics and Telemetry team was derived from a previous team on the Forman School Rainforest Project, Project O, or Orthopterans. Project BT is only in its second year. Last year's team focused a lot on Orthopterans. This year, Orthopterans will be taking a bit of a back seat. Although Orthopterans will be a satellite subject to the project, they are still a very important aspect of the project. Orthopterans are essential to the Rainforest and the study of Orthopterans and their health reflects the rainforest's health and it's biodiversity. The idea is to get recordings of the Orthopterans in captivity without them feeling as if their in captivity. If the Orthopterans feel as if their in captivity, they will make distress calls, rather than their natural communication. In order to allow the insects to feel at ease, there needs to be a container made that simulates their natural habitat.

Telemetry:

In this project, telemetry is the procedure of collaring and tracking an animal. Telemetry aids in recording by giving a person the ability to find a certain animal in its natural habitat in order to record and document the natural behavior of said animal without human contact.

1. First, attach a transmitter to a captured animal, be sure that it fits well enough not to fall off, but does not harm the animal.
2. Next, setup the antenna and and the receiver in order to track the animal.
3. Let the animal go.
4. Next, track the animal.
5. Begin tracking by closing eyes and moving the antenna horizontally, 360˚.
6. Stop the antenna where the signal sounds loudest.
7. Next, move the antenna in a vertical motion.
8. Stop the antenna where the signal sounds loudest.
9. Open eyes and walk in the direction of the loudest signal.

10. Stop every 10 steps and repeat steps 5, 6, 7, 8, and 9. (alter step 5 and only rotate horizontally 180˚)
11. As the species gets closer, turn down the RF gain in order to get a more accurate reading on the species location.
12. Once the animal has been found, record it and attempt to get the collar back.

There are two possible signals. The first signal is called an up signal, this signal will be variant and means the animal is active, or moving. The second type of signal is a down signal. A down signal is a constant beat, this means the animal has stopped, whether it be sleeping dead, or the collar fell off, or it means that there is a short signal.