

Bird Monitoring for Riparian Health  
Mendocino County Resource Conservation District  
SSU's Galbreath Wildlands Preserve (GWP) and Anderson Valley Unified Schools  
Community Foundation Field of Interest Grant  
Final Report  
October 3, 2019

Background:

**Why This? Why Now?**

**Background:** The Mendocino County Resource Conservation District (MCRCD) installed a riparian revegetation demonstration project on the Galbreath Wildlands Preserve in partnership with Sonoma State University (SSU) along an unnamed tributary to upper Rancheria Creek in 2014-2017 under 319(h) and Prop 84 grant funds. Additionally, SSU led a series of trainings in "Birding by Ear" in 2017 to foster and engage community and student volunteer(s) to help monitor bird activity and conduct citizen science on the Preserve and in the AV Community. The organizations sought a way to connect these two activities, spawning Bird!Tech.

**Challenge:** MCRCD and SSU have been challenged with how to conduct on-going, long term monitoring to assess the health and improvement as the riparian demonstration project(s) continues to grow and evolve. At the same time, SSU and MCRCD are seeking ways to engage community and student volunteers in citizen science projects at the GWP and in the Anderson Valley community. Also, SSU learned in the process of the "Birding by Ear" trainings that it is more difficult than they originally thought to train volunteers to bird by ear.

**Proposed resolution:** This project was developed to engage community members in long-term bird monitoring studies at three restoration sites in the Navarro River watershed in Anderson Valley. Through deploying recording devices that would record bird song and uploading those recordings to a software platform known as "Arbimon", [Arbimon.com](http://Arbimon.com), bird song monitoring is now available for community participation in long-term studies. The project teaches new skills to community members and students, allowing them to observe how environmental changes affect these bird species. The project introduces the community to new technologies that transform the way we see the world. The goal of the project was to increase participants' personal connection to watershed processes, while at the same time gather crucial data on the soundscape of wildlife.

**Geographic area:** The project was to be implemented in three locations, upper Rancheria Creek (Galbreath Wildlands Preserve), Robinson Creek (Anderson Valley High School) and Con Creek (Anderson Valley Elementary School).

**Scope of Work:**

Deliverables included the following items:

- Purchase six Audio Moth portable acoustic recorders placed in three different sub-basin streams
- Recruit AV community and student volunteers
- Place sensors in the field to record one minute of sound every 10 minutes.

- Host two trainings to teach participants about bird monitoring recorders and software at two workshops
- Host two field workshops about restoration projects, their importance, and how changes in vegetation can affect the watershed and bird activity
- The recordings will be uploaded by volunteers to an on-line site and analyzed using the ARBIMON II bio-acoustics analysis software platform, with review and input from SSU Professor Chris Halle

Final Report includes the following items:

- Sign in lists from all workshops
- Record of all volunteer activity in placing the sensors and collecting them, uploading the recordings
- Photos of student and community volunteers participating in the workshop/trainings and volunteer activities
- A list of species identified through the recordings and any data analysis that ARBIMON software produces

All deliverables were met since the project began in April 2018.

The bird species identified formally through recording and analysis through Arbimon include:

- *Colaptes auratus*
- *Pipilo crissalis*
- *Melanerpes formicivorus*
- *Zonotrichia atricapilla*
- *Aphelocoma californica*

As reference for the Bird!Tech Team, this bird list was created from the Birding-by-Ear volunteers in 2017.

Common name	Latin name	Resident or migrant
Acorn woodpecker		resident
American crow		resident
Black phoebe		resident
Black-headed grosbeak		migrant
Brown creeper		resident
California scrub jay	<i>Aphelocoma Californica</i>	resident
California towhee	<i>Pipilo crissalis</i>	resident
Cassin's vireo		migrant
Common raven		resident
Coopers hawk		resident
Dark-eyed junco		resident

Downy woodpecker		resident
Golden-crowned sparrow	Zonotrichia atricapilla	seasonal
Hairy woodpecker		resident
Hermit thrush		migrant
Northern flicker	Colaptes auratus	resident
Northern pygmy owl		resident
Nuttall's woodpecker		resident
Oak titmouse		resident
Pileated woodpecker		resident
Red-shouldered hawk		resident
Spotted towhee		resident
Steller's jay		resident
Warbling vireo		migrant
Hutton's vireo		resident

### Project Overview and Lessons Learned:

There were many challenges along the way and the project did not get as far as originally was hoped. It was important for us to remember that this is a new technology that was new to everyone involved, and even though we had some hiccups and it was a bit like feeling our way around in the dark, significant progress was made to building the road map for further recording bird songs, collecting and analyzing data.

Solid bones for the project were created, and the pathway to achieving the original goals are poised to come to full fruition. The project brought together community volunteers and the Grant Project Team, made up of staff from the Mendocino County Resource Conservation District, Sonoma State Professor Chris Halle, as our teacher and guide, along with Claudia Luke, director of SSU's Center for Environmental Inquiry, and the GWP Preserve Coordinator Margot Rawlins. Everyone was new to the concept and the technology and we were all learning together this new approach to monitoring riparian health.

The Preserve is in a remote location. Most of our volunteers also live rurally and have limited broadband capability. Learning this brand-new technology was a challenge for the volunteers as well as the Project Team. Two three-hour trainings were held two Sundays in October 2018. The first sensors were deployed at the GWP in November of 2018. The AVHS Wildlife Biology class began experimenting with deployment in January 2019. With the above-average rainy season, many of the recordings for the first months sounded primarily of rain. The Project Team continued to meet 1-2 times monthly into March 2019. The group would struggle to identify bird songs on the files that had been uploaded, there would be a little chirp here and there, but not too much to hear and see in the visualizer. The group began to wane and disperse, without much to go on. It wasn't until going back later in the summer and listening to the March and April recordings where the fun began. There were also some logistical challenges with configuring the recording devices properly and coordinating the deployment and retrieval of the sensors. This activity was primarily conducted by two stalwart Yorkville volunteers and the GWP

coordinator. Once the sensors were brought back in from the field there was the task of downloading the recordings off of the sensors, and reconfiguring them, and then uploading the files to an external hard drive. The hard drive would then be delivered to AVHS or SSU where there was fast internet connection, and ideally student involvement, where the files could be uploaded to the Arbimon Project site without eating up volunteers' rural home bandwidth.

A project for Bird!Tech Galbreath Wildland Preserve was created on the Arbimon software platform and Audio Moth recording devices were configured and deployed out into the field at least monthly from November 2018 to the present. The volunteer team that was designated for deployment at Con Creek at AVES was not able to get the sensor deployed. There is now interest from the Anderson Creek Independent Study Program, as well as a computer class teacher, to deploy the sensor and start uploading the files to the project. This will happen during the 2019/2020 school year. The sensors were deployed at AVHS, but the sounds of the creek and the rain drowned out any clear bird calls. Timing may have been an issue. The sensors will continue to be deployed through the science program at AV Jr/Sr High School. The sensors will continue to be deployed at GWP as well. Monitoring may only take place in spring and fall, when there are migratory species traveling through and the birds are more active. Listening to the recordings and tagging bird calls will likely be more appealing to volunteers and students during the winter months. Birds will continue to be tagged using the Latin names per Arbimon specifications.

### Conclusion:

So much has been learned in this past year, the project made it to halfway marks in terms of what is possible within the Arbimon Project so there is more work to be done. A volunteer network is developed, and volunteers are trained on use of the software. Logistical challenges still need to be overcome and streamlined for ease and success of the program. One next step that the Project Team feels may help with interest and engagement with the program is if volunteers could receive an audio moth for their home site, to connect the audio portion with the field location where birds can also be seen regularly around volunteer's homes. The goal is to build bird-call-listening skills among volunteers and create an opportunity for ongoing citizen engagement at the Galbreath Wildlands Preserve, and AV Elementary and Jr/Sr High School creek trails, while also monitoring those bird calls to see if over time, as the riparian zone continues to grow, the number and diversity of bird species will also continue to grow.

# Arbimon:

The dashboard features a top navigation bar with tabs for Dashboard, Data, Visualizer, Analysis, Jobs, and Settings. The main content area is divided into several sections:

- Project Description:** A text box stating the project's purpose: "This purpose of this project is to monitor the bird community in the area of the Galbreath Wildlands Preserve, specifically along the revegetation restoration project on an unnamed tributary to Upper Rancheria Creek in Yorkville and along Robinson Creek adjacent to the Anderson Valley Jr/Sr High School and Con Creek adjacent to AV Elementary School in Boonville, CA."
- Progress:** A section with a green progress bar and several icons representing different data sources or actions.
- Sites:** A section indicating "11" sites.
- Storage:** A section showing "5,000 recordings of 35,000 (14%)".
- Species:** A list of species monitored:
  - Colaptes auratus
  - Pipilo crissalis
  - Melanerpes formicivorus
  - Zonotrichia atricapilla
  - Aphelocoma californica

On the right side, there is a map of the region with two red location pins. The map includes labels for various towns like Ukiah, Boonville, and Geyserville, and major roads like 101 and 128.

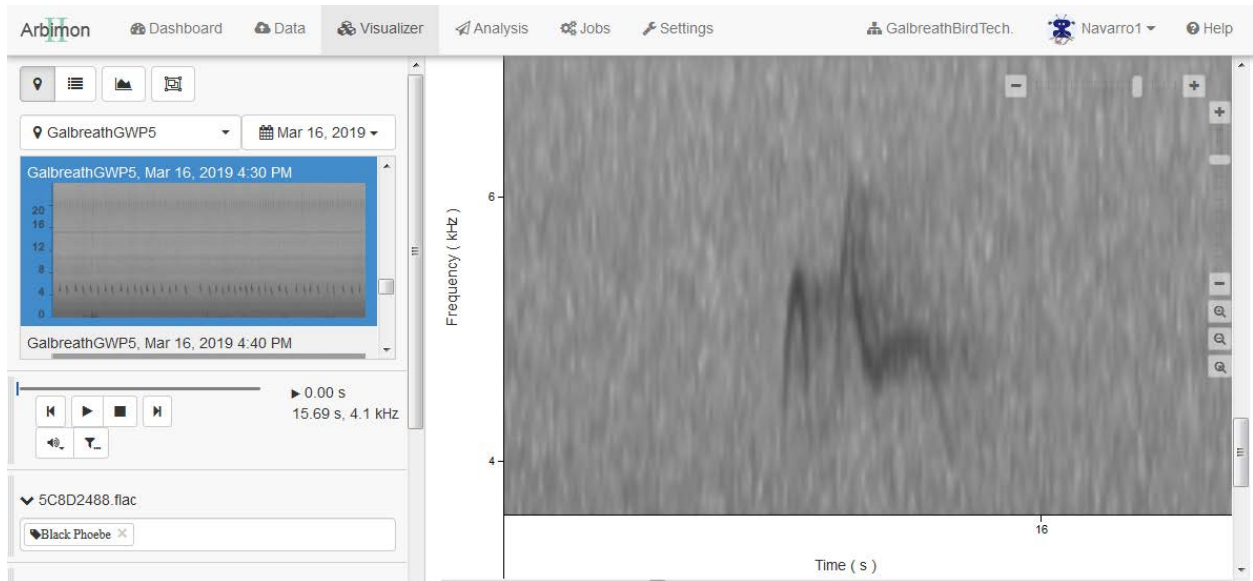
The Visualizer interface displays a spectrogram of a bird call. The y-axis is labeled "Frequency ( kHz )" and ranges from 0 to 22. The x-axis is labeled "Time ( s )" and ranges from 0 to 60. A vertical blue line is positioned at approximately 8.34 seconds, with a tooltip that says "Click to set current play time to 58.60s". A specific call is highlighted with a green tag labeled "Black Phoebe". The spectrogram shows a series of vertical lines representing the frequency components of the call over time.

On the left side, there is a control panel with the following elements:

- Location: GalbreathGWP5
- Date: Mar 16, 2019
- Thumbnail: GalbreathGWP5, Mar 16, 2019 4:30 PM
- Thumbnail: GalbreathGWP5, Mar 16, 2019 4:40 PM
- Playback controls: Play, Stop, Previous, Next buttons, and a progress bar showing 8.34 s / 58.60 s, 22.8 kHz.
- File name: 5C8D2488.flac
- Tag: Black Phoebe
- Species Presence Validation: 0 / 0
- Training Sets: (eye icon)

Arbimon Visualizer, spectrogram of a Black Phoebe call, with Tag

## Arbimon Continued:



Arbimon Visualizer, spectrograph of a Black Phoebe call, close up view

Project Location Maps:

Galbreath Wildlands Preserve:



Photo 1. Map of Riparian Restoration Demonstration Project showing treatment sites

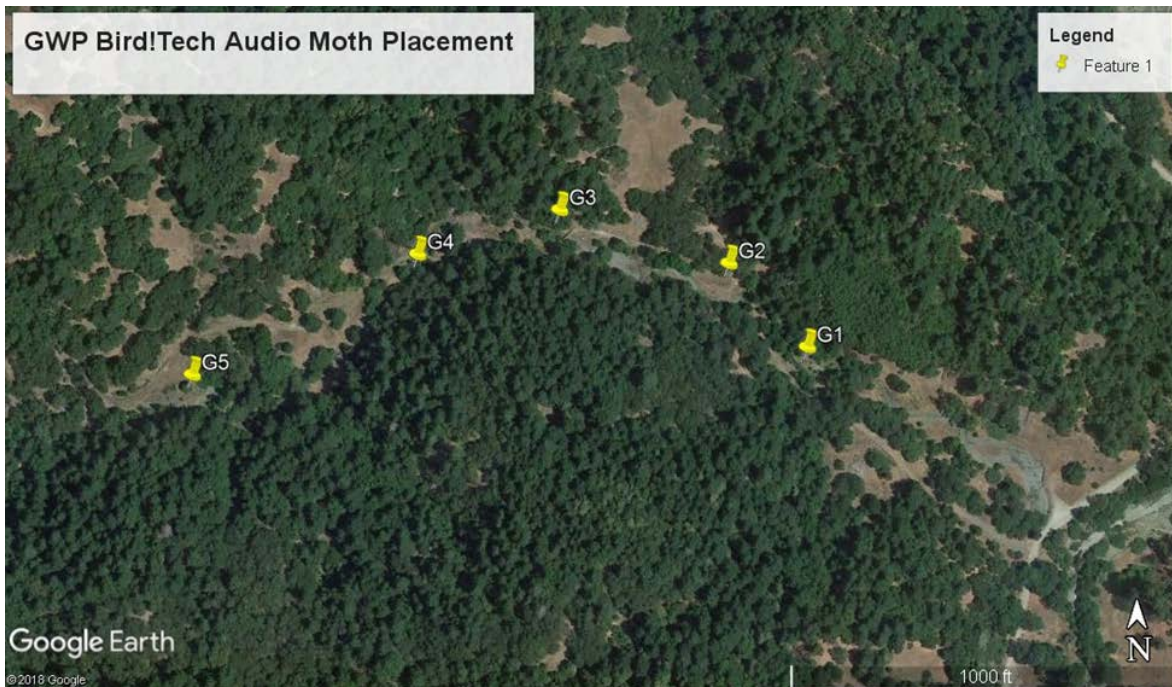


Photo 2. Map of (5) GWP Bird!Tech Audio Moth sensor locations

Restoration Project(s), before and after photos:

*Galbreath Wildlands Preserve/ GWP Site #6, Bird!Tech site GWP1:*



Photos 1. Before- 3/11/15



Photo 2. After- 7/11/19

*Anderson Valley Jr/Sr High School/Robinson Creek Restoration Project:*



Photo 3. Before- 11/2002



Photo 4. After- 9/2011

*Anderson Valley Elementary School/Con Creek Trail*



Photo 5. Before- 10/20/11, w/ Himalayan blackberries



Photo 6. After- 7/29/19



Workshops (2) and Restoration Project Tours (2)



Photo 7. Photo from Workshop #1, 9-12, October 21, 2018



Photo 8. Photo from Workshop #2, 9-12, November 4, 2018



Photo 9. Photo from Deployment and Restoration Project Tour, November 2018



Photo 10. Dusk Chorus Bird!Tech event at GWP, tour of the Restoration Project and Overview of the Bird!Tech Project, August 16, 2019