



Sound Station Pilot Project

2013 Annual Report



ON THE COVER

Technician setting up a Biological Sound Station
Photograph courtesy of Crater Lake National Park

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December 2013

U.S. Department of the Interior

National Park Service

Natural Resource Stewardship and Science

Fort Collins, Colorado

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Abstract

Six biological sound stations were deployed at four locations in 2013 with the goal of detecting Northern Spotted owls and Barred owls. Each site was in an owl activity center and included: Boundary Springs, Crater Creek, Grayback Ridge, and Lower Sun Creek. Each location was surveyed using 1 or 2 sound stations. In addition, 3-6 field surveys were conducted at each site by 2 wildlife technicians following the Northern Spotted Owl Monitoring Protocol. A Northern Spotted owl was recorded at the Grayback Ridge sound stations and a Barred owl was recorded on multiple occasions at the Lower Sun Creek station. Both of these owls were also heard during field crew surveys. However, at four of the locations, five stations recorded calls from other species of owls (Great Horned) that were not picked up during the field crew surveys. Stations also picked up many other avian and mammal species not related to the Spotted Owl Monitoring Program.

Introduction

In 2012, the wildlife team at Crater Lake National Park (CRLA) began experimenting with using biological acoustic stations to help sample known Northern Spotted owl (*Strix occidentalis caurina*) territories. In 2013, we continued this effort with the goal of trying to determine if we would be able to use acoustic stations to document Northern Spotted owls (NSO) and Barred owls (BO).

Biological sound stations have the potential of being a valuable tool in the Park's spotted owl monitoring program. Recordings from these stations can provide information on site occupancy, pair status for NSO and BO, and nearby predators. Stations are easily deployed and require far less field crew time to implement when compared to the time it takes to sample a site using traditional survey techniques. Stations record sound data at a site 24 hours a day, 7 days a week, for two weeks at a time. This provides us a better chance of documenting owls when compared to the 1-3 visits a crew member can make to a site during a sampling year. In addition, as BO distribution expands at the park, NSO may be less likely to vocalize, which may make NSO more difficult to detect when conducting typical surveys (Crozier 2006). Ultimately, using acoustic sound station and field crew surveys may give us a better chance to document NSO activities at known NSO sites.

It is important to make clear that we do not believe using acoustic stations will be a substitute to completing protocol surveys developed by the US Fish and Wildlife Service (USFWS 2011b). However, because of reduction in funding, shifting Park priorities, and a limited field season the wildlife team has not been able to adequately survey all known NSO sites or search for new NSO sites in recent years. The hope is that we can use these sound stations to supplement field crew efforts. The ultimate goal would be to deploy sound stations at sites where field crews are not able to survey and if a NSO is detected using the acoustic station, then field crews can complete protocol surveys at those sites to document nesting success.

Methods

Biological Sound Stations consist of a Roland R-05 MP3 recorder, a bi-directional microphone, a 60Ah 3.2V LiFePO4 battery and a modified Pelican case with a microphone jack installed (Figure 1). The microphone was lashed to a small diameter tree with parachute cord. The microphone cable was managed by wrapping it around the tree, and the pelican case was tucked away and covered with debris to help minimize the possibility of animals damaging the equipment. As part of the 2013 effort, a protocol was developed that provides details on how to consistently implement one of these stations at Crater Lake National Park (Murphy and Mohren 2013).

Sites were selected for one of two reasons. Some sites were selected based on the possibility of Spotted owls and/or Barred owls being in the area as documented from previous years and surveys conducted earlier this season. Other sites were selected because owls had not been observed at those sites in recent years and we wanted to see if the acoustic stations confirmed what we had been observing. Six stations were deployed at four activity centers. Two stations were deployed at Boundary Springs, two at Crater Creek, one at Grayback Ridge and one at Lower Sun Creek. Total

number of stations at each site was based on how many we thought would be need to cover areas at each known activity center where NSO have been documented in the past.

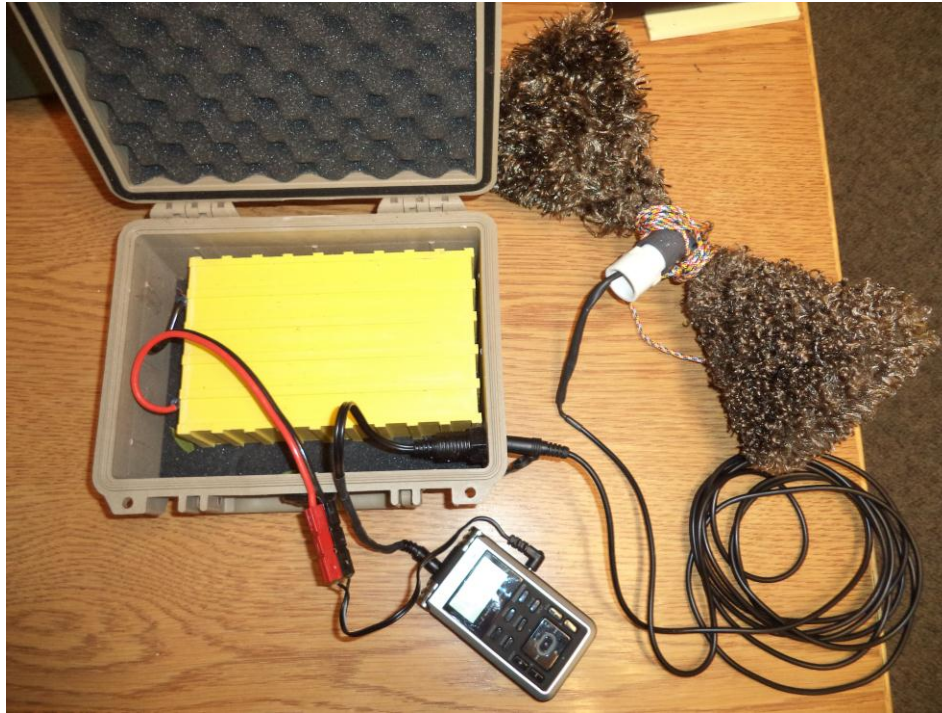


Figure 1. Components of a biological sound station

Once a activity center and general location within the center was selected to deploy the station(s), field crews would go to the site and based on micohabitat characteristics select the best location to deploy the acoustic stations. Micohabitat characteristics that we considered included: vegetation structure, topography, distance to potential noise sources (e.g., streams, roads, trails etc.), distance to areas of heavy animal activity (e.g., game trails, nesting birds), and areas protected from wind. Once a location was selected, stations were left at sites for approximately two weeks.

Once the acoustic stations were recovered, data was downloaded and analyzed using software from NPS Natural Sounds Program. MP3 files from the recording unit were renamed using the Acoustic Monitoring Toolbox (AMT) before converting the files to NVSPL files using AUDIO2NVSPL. Once files were in the NVSPL format, SPLAT, a program in AMT was used to review spectrographs and audio data for NSO and BO (Figure 2). The audio was listened to, and any owl species heard were recorded. Anecdotal observations were also noted for other sounds heard while listening for owls.

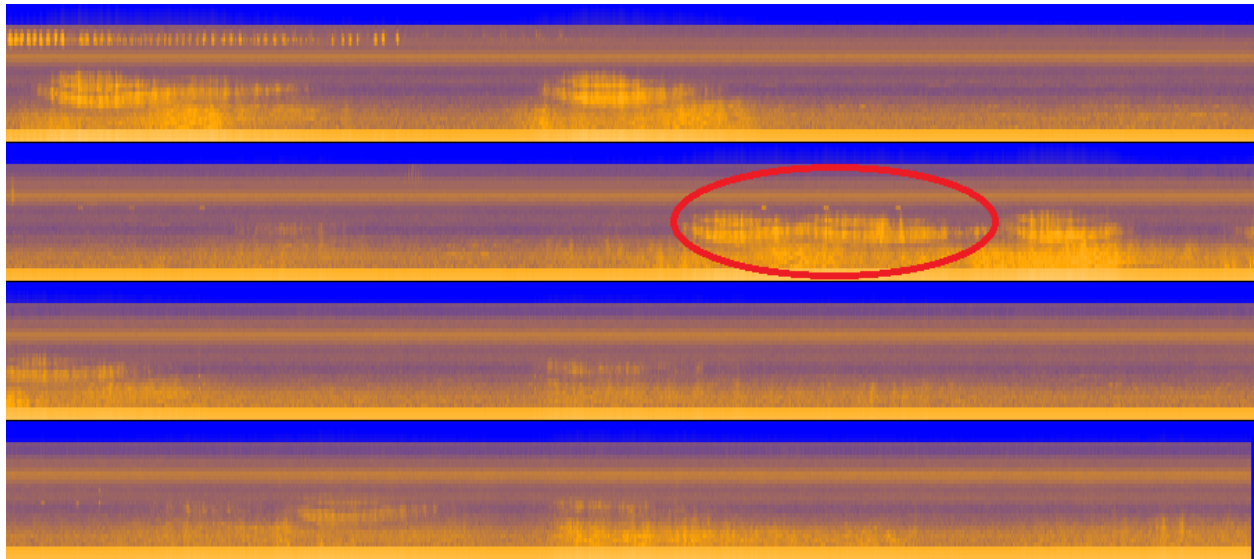


Figure 2. A spectrograph showing a series of spotted owl 4-note calls, as well as an airplane.

Results

Sound stations were deployed between June 7th and September 3rd. A total of 5 stations recorded 2079 hours of sound data. Spotted owl activity was recorded at one sound station at the Grayback Ridge NSO activity center (Table 1). Northern Spotted owls were also detected at the Grayback Ridge site while implementing 3 surveys following the standardized NSO monitoring protocol.

Barred owls were recorded at one station located at the Lower Sun Creek activity center (Table 1). This station picked up barred owls on multiple occasions, including a pair (male and female calling in proximity) of barred owls on at least two occasions. During protocol surveys, BO's were documented at the Lower Sun Creek site and at the Crater Creek site. However the Barred owl at Crater Creek was documented a month prior to us setting up the sound station.

Great horned owls were heard on three of the sound stations including Boundary Springs, Crater Creek, and Grayback Ridge. During protocol surveys, Great horned owls were not observed at any of the sites.

Other non-owl sounds were anecdotally observed on the recordings, including black bear, elk, woodpecker sp., raven, Douglas squirrel, northern flying squirrel, and a diversity of landbird species.

Table 1. Preliminary results focusing on owl activity from sound stations deployed at Crater Lake National Park in 2013.

Site Name	Days Deployed	Owls Observed
Boundary Springs (BOSP01_13)	16	Great Horned Owl
Boundary Springs (BOSP02_13)	16	Unknown Owl
Grayback Ridge (GRRIO1_13)	16	Spotted Owl, Great Horned Owl
Crater Creek (CRCR01_13)	18	Unknown <i>Strix</i> , Great Horned Owl
Crater Creek (CRCR02_13)	18	None
Lower Sun Creek (SUCR01_13)	14	Barred Owl, Unknown <i>Strix</i>

Discussion

Based on the 2012 and 2013 efforts it is clear that acoustic sound stations can be used to document NSO and BO and would be a good addition to the CRLA Spotted owl monitoring project. This season, effort was limited by the fact that multiple microphones were unavailable after breaking. Early in the season, only two microphones were available, later only one. Being able to only deploy up to two sound stations at a time limited the area at each location that could be sampled. Ultimately the wildlife team would like to have 12 acoustic monitoring stations that could be deployed throughout the spring and summer.

One of the stations at Crater Creek, CRCR01_13, recorded calls from an owl that was not positively identified. Some records were a series of single hoots; the listener felt these calls were possibly a barred owl or a spotted owl. A barred owl was observed during a site survey earlier in the season, so the calls may have been that of a barred owl. It is recommended that in cases such as this, follow up surveys using the NSO protocol should be implemented to confirm NSO or BO presence.

Increasing the number of stations deployed per location would increase the probability of recording a target species in that area. More work should be put into understanding the range of detection for the sound stations so stations can be setup to most effectively cover an area. During the winter of 2013/14 the wildlife staff plans on looking into a program called “SPreAD GIS”. This program is designed to map the distribution of sound over an area bases on a variety of factors (topography, temperature, landcover, etc.). It is our hope that this program can help better define how many station to use at each known owl activity center and where the best location are to place these stations.

A number of calls were identified as owls, but a positive identification of species was not able to be determined from listening to the audio files. These unknown owls were recorded at Boundary Springs, Crater Creek, and Lower Sun Creek. It is recommended that in instances where owls were recorded but could not be identified, we should follow up with traditional surveys.

The method of detecting owl calls consisted of visually scanning spectrographs for what looked like a signature of an owl. More effort was put into nighttime and early morning hours when owls would be more likely to call, and when there were fewer background noises. This method potentially misses calls that are more distant or buried beneath other sounds. It is recommended that the wildlife team look for a method that allows quicker and more accurate scanning of the sound data to better detect owls. Some work has been done with the software ISHMAEL to automatically scan for owl calls by the NPS Natural Sounds program. It is recommended that the CRLA wildlife team work with the Sounds Program to continue to examine this effort as a potential way to quickly scan for NSO and BO calls.

While analyzing data, the primary goal was to detect owl calls, more specifically, spotted and barred owls. Other sounds were occasionally made note of anecdotally; elk bugles, flying squirrels, woodpeckers, bears, etc. were observed. Time could be spent with the data for other purposes, such as song bird inventories although this would require a significant amount of time and effort.

The biological sound station program is still in its infancy at Crater Lake, but shows great promise for assisting in a wide variety of natural resource projects. The Northern Spotted Owl Program in particular can benefit from use of this technology, and efforts to incorporate it into surveying should be continued.

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