Soundscapes to Landscapes

Monitoring bird diversity across the landscape using citizen science and bioacoustics

Recent reports highlight that North America has lost nearly three billion birds since 1970. The reports indicate potentially disastrous impacts to ecosystem health, but also highlight that science-based conservation is effective. However, in order to guide conservation decisions, it's critical that we develop innovative ways to track biodiversity across broad spatial scales. Soundscapes to Landscapes (S2L), a collaborative effort between Point Blue, Sonoma State University and other partners, seeks to advance large-scale monitoring of birds – and eventually other wildlife – using citizen science, bioacoustics, and new Earth-observing sensors that give us information about habitat and benefits for wildlife.

> As obsessed birders with a particular interest in bird vocalizations, we jumped at the chance to contribute to S2L in any way we could. We love being part of such a passionate team of scientists, nature-loving community members, and the wonderful non-profit Point Blue. We couldn't ask for a more gratifying way to volunteer our time.
>
> **-MILES & TERESA TUFFLI**
> **S2L CITIZEN SCIENTISTS**

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Orange-Crowned Warbler. Photo by AlanSchmierer, publicdomain

S2L audio recording device. Photo by Rose Snyder

The Biodiversity Challenge

Understanding how biodiversity is affected by environmental change requires monitoring wildlife across large areas, which is expensive and often logistically impractical using standard survey techniques. The S2L project is a citizen science-based framework that can be applied to efficiently detect animal presence in a cost-effective manner at multiple spatial scales. You can help us make a difference!

Leveraging New Technology

To obtain bioacoustics data, S2L uses the AudioMoth, an inexpensive and easily programmable battery-powered audio recording device that captures and stores the data on a microSD card. To ascertain where certain species are present on the landscape, we use cutting-edge artificial intelligence techniques to automate species detection in the sound recordings.

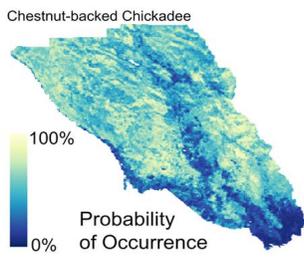**Conservation Science for a Healthy Planet**

Figure from Burns et al. 2020; Chestnut-backed Chickadee by Alan Schmierer, Flickr

Citizen scientists during a field training. Photo by Taylour Stephens/S2L

Modeling Species Distributions

We fill the missing locations in our field data by using advanced statistical modeling to map birds across the landscape. These models use data from our bioacoustics monitoring coupled with habitat characteristics data obtained from satellite sensors. The models generate species distribution maps, which show the probability of occurrence for each target species across the study area.

Engaging Our Communities

S2L engages the public by providing community members with the opportunity to take an active role in bioacoustics data collection. Property owners work with our team to place audio recorders on their land, undergraduate students and volunteers collect the majority of our field data, and birding enthusiasts of all levels identify bird calls to help train the artificial intelligence programs.

An S2L volunteer installing an audio recorder. Photo by Rose Snyder
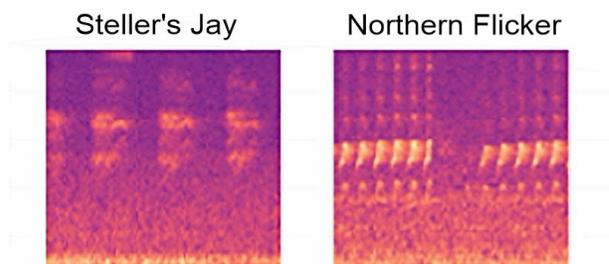
Visual representation of bird song and call data from Soundscapes to Landscapes data

Evaluating Management Impacts

S2L's low-cost, scalable approach can help evaluate the effectiveness of land management actions. For example, we can compare species detections across sites of varying restoration stages, or of varying intensity of burning, or under different management regimes. We can then visualize and correlate areas of higher biodiversity with land management actions, which can help inform future conservation and management decisions.

Open, Real Time Science

S2L follows the "open science" standard. We share all our data and analyses with the scientific community. Our framework is entirely cloud-based and soon fully automated, so that as sound data are collected and uploaded, we can detect species in near-real time, update our species detection databases, and inform the next iteration of the species distribution models.

Get Involved

Offer Your Property

Help us grow our bioacoustics dataset by offering your property as a field site. Invite a team to your site to deploy and retrieve AudioMoth recording devices, or receive the devices with instructions in the mail to install on your own.

Volunteer

Join a team of outdoor enthusiasts and conduct field work on public and private lands. Or, hone your birding-by-ear skills and help us identify bird calls in recording clips (no bird expertise necessary)!

Donate

Invest in conservation science for a healthy planet.

Visit pointblue.org/donate or contact Nancy Gamble at 707.781.2554 or Bennett Smith at 707.779.1200

Visit soundscapes2landscapes.org/volunteers to sign up, or contact Rose Snyder at 707-781-2555 ext. 420 or rsnyder@pointblue.org.

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