Modern Birding: Using Technology to Identify Bird Songs
By Hannah Beckett

Every birder knows the wonderful feeling of hearing a new bird, followed by the desire to discover what bird you heard and then the thrill of correct identification. Whether you are a new birder with the daunting task of learning thousands of bird calls, or an experienced birder having difficulty teasing apart several birds calling at once, modern technology offers a solution for easy identification.

This technology first emerged as a recording tool for ornithologists collecting field data for research. The autonomous recording unit (ARU) is a small bird audio recorder that made fieldwork more effective and efficient by helping biologists identify species of birds present in targeted areas. These durable “song meters” are placed in hard to access areas and set to record at a certain time of day, duration of time, and frequency. By using song meters, researchers are able to capture most avian species in a given area.

Once the data is compiled, the recordings are processed through an analysis program. The program creates a spectrogram, a visual representation of the bird songs. These computer-generated graphs show the basic shape of an audio wave and how its frequencies change over time. When analyzed by an expert in the field, the data reveals an abundance of information. Through the spectrogram, scientists can see where songs overlap with each other or when certain birds are closer to the microphone than other birds. It also shows the different patterns within bird songs as the pitch and intensity of the sound changes over time. Just as bird songs are unique to each species, so too are their song visualizations.

The elements of a spectrogram are fairly simple and straightforward. The horizontal axis represents time and is read from left to right. The vertical axis represents frequency, with the high-pitched notes near the top and the low-pitched notes below. The resulting spectrogram is essentially a musical score for birdsong. However, unlike human compositions, the horizontal width of each note on a spectrogram determines how long it lasts. It can last anywhere from a few seconds to a fraction of one.

Meanwhile, the shape of a spectrogram indicates quality. A whistle, for instance, looks like a single, horizontal line. Whereas, a nasal sound produces a stack of horizontal lines. The color acts as a sort of "third axis" representing the amplitude (or how loud) a particular frequency is at a specific time stamp. Ultimately, a spectrogram acts as a species’ unique signature. Each one may have minor variations, but breaking down the overall pattern gives a good idea of what bird is calling.

In the past few years, the technology has advanced. Today, bird sound ID technology may reside in the palm of anyone’s hand. Phone apps, such as the Merlin Bird ID app, enable people to use their cellphone to see live predictions of the identification of birds singing in your locale. As a phone records sound, the audio is converted into a spectrogram. Inside the app’s software, the spectrogram is compared to different samples of bird calls already identified and tagged by a group of sound ID experts. The app will decide which sample best matches the phone’s recording and display its guess on the screen.

While the technology has room for improvement, these programs are a wonderful tool and fun to use. Individuals looking to learn about nature, hone their birding skills or contribute to

conservation, may benefit from these apps. Whether you're an experienced birder or someone looking for a fun afternoon activity, I encourage everyone to try out this bird identification technology.

Photo: Red-winged Blackbird.

Credit: Mike Williams

Photo: Red-winged Blackbird Song Spectrogram (Using Kaleidoscope Program)

Credit: Hannah Beckett